

**Pre-Feasibility Study for carrying out Operation & Maintenance of Water Supply, Sewerage & Storm Water drains (WSS &SW) on Public Private Partnership (PPP) basis for 6 cities/towns in Karnataka**

**Final Report**



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**IL&FS** | Infrastructure

**To**



**Infrastructure Development Department  
Government of Karnataka  
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# 1 Introduction

## 1.1 Project Background

- a. **Infrastructure Development Department (IDD)**, Government of Karnataka is the Infrastructure arm of Government of Karnataka (GoK) with the primary objective of facilitating development of infrastructure projects across Karnataka.
- b. IDD, in consultation with Karnataka State Industrial Investment & Development Corporation Limited (KSIIDC), IL&FS Infrastructure Development Corporation Limited (IL&FS IDC), Infrastructure Development Corporation of Karnataka Limited (iDeck) and Karnataka State Financial Corporation (KSFC), has identified a list of infrastructure projects for development across the State. In order to minimize dependence on GoK's resources for development of these projects, IDD wishes to explore the possibilities for development of these projects on Public Private Partnership (PPP) basis.
- c. In this regard, IDD recognizes the fact that some of these projects would be financially self-sustainable & profitable for development on PPP basis without any financial assistance from GoI/GoK, while the balance projects would require financial assistance/Viability Gap Funding (VGF) to make them financially sustainable for development on PPP basis.
- d. In order to assess if these projects would be prima facie feasible for development on PPP basis and their financial self-sustainability or otherwise, IDD decided to engage KSIIDC-IL&FS Project Development Company Limited (KIPDC), iDeck and KSFC for conducting Pre-feasibility studies for each of these identified projects.
- e. IDD, vide its Annexure 1 of its letter no.: ID/89/ITS/2008[Part-I] dated 18.03.2009, has mandated KIPDC to undertake the Pre-feasibility study for the development of water supply, sewerage and solid waste management systems for 10<sup>1</sup> cities/towns across Karnataka, among other projects assigned to KIPDC for conducting the pre-feasibility studies.
- f. As KUIDFC is in the process of development/construction/augmentation of water supply & sanitation systems in cities and towns across Karnataka under its various schemes, IDD vide its letter no.: ID/89/ITS/2008 dated 08.06.2009 directed KIPDC to carry out the pre-feasibility study for establishing the viability for Operation & Maintenance (O&M) of water supply, sewerage and storm water drainage systems of Raichur, Hospet, Bidar, Davanagere, Gadag-Betageri and Ilkal on PPP basis (hereinafter referred to as the "Project").
- g. On completion of the pre-feasibility study, IDD has agreed in principle to assign the project development and bid process management of this Project to KIPDC, if found viable for development on PPP basis without any financial support/VGF from Government of India (GoI). On such assignment of the project development and bid process management of this Project to

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<sup>1</sup> The project was started to conduct Pre-feasibility study for 10 CMCs. However, due to non-availability of information from 4 CMCs Ramanagara, Chanapatana, Mandya & Tumkur) in spite of repeated follow-ups for obtaining the information, the study is conducted for 6 CMCs (Raichur, Hospet, Bidar, Davanagere, Gadag-Betageri and Ilkal).



KIPDC, IDD would permit KIPDC to recover the Professional fees for the same, as may be mutually agreed upon between IDD and KIPDC, from the selected developer/bidder of the Project

- h. However, if this Project is found to be viable for development only with financial assistance/VGF from GoI, then the project development and bid process management related work of this Project would be bid out by IDD as per GoI guidelines for PPP projects, in which KIPDC would also be eligible to participate.

## 1.2 Pre-feasibility: Idea & objective

Developing countries invest over \$200 billion<sup>2</sup> per year in new infrastructure, representing roughly 4 per cent of their national output and one fifth of their total investment. Over the past two decades, these investments have paid considerable dividends, such as substantial increase in the proportion of households with access to clean water, and the per capita doubling of power production and telephone lines. However, 1 billion people in the developing world still lack access to clean drinking water and nearly 2 billion lack accesses to electric power. A severe barrier to sustainable development in nearly all developing countries has been the consistent failure of infrastructure providers to support facilities through appropriate maintenance programmes. Inadequate maintenance severely compromises efficiency in all sectors of infrastructure in developing countries. Over time, poor maintenance can result directly in reduced quality of service and increased costs for users. For example: Water-supply systems deliver an average of only 70 per cent of their output to users, annually failing to achieve a best-performance average of 85 per cent; consequently, individual investments in water storage tanks and private wells are frequent and costly.

Unavailability of resources, unskilled staff, inadequate project planning and lack of coordination are the obvious factors for poor maintenance programmes; but there exists one consistently significant reason in all infrastructure sectors: a systematic bias in favour of new construction at the expense of maintenance and, even, efficient operations. This preference for new construction over sustained maintenance is the result of the specificity and technical rationality inherent in capital-intensive and standardized construction activities. It is observed that the focus on short-term technical rationality (construction) versus the long-term process of institutional development (maintenance) is endemic. The practice of providing short-term solutions can conflict with long-term institutional development needs. So it is clear that there is an urgent need to improve responsiveness in the area of Operation and Maintenance (O&M) of existing infrastructure.

The primary objective of this assignment is to prepare a Pre-feasibility study report for carrying out O&M of Water Supply, Sewerage and Storm Water Drains as a single package for 6 cities/towns across Karnataka on Public-Private Partnership (PPP) basis, which would include assessment of, *prima facie*, feasibility for development of such Project on PPP basis, recommendations, conditionalities & enablers for development of the Project on PPP basis, preliminary assessment of the project financials, cash flow and viability issues, exploring options of packaging with other allied commercial components to make the project viable for a PPP mode, identifying criteria for measuring and monitoring service quality to be provided by developers/ operators to be selected for the Project, recognition of infrastructure, financing & other requirements for establishing the Project and Plan of Action for initiating next steps of project development and bid process management of the Project.

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<sup>2</sup> <http://unpan1.un.org/intradoc/groups/public/documents/UN/UNPAN000778.pdf>



### 1.3 Approach & Methodology of Pre- Feasibility

KIPDC will be adopting the following Approach and Methodology for executing the assignment:

#### Situation Analysis

- **City Profiles:** Understanding & Analysis of demographics, land use and density distribution, existing infrastructure and future growth pattern of the identified 6 CMCs.
- **Existing Situation:** Study of existing water supply, sanitation and storm water drainage systems, coverage areas and population covered under the existing system, quantity supplied, quality, duration, frequency, per capita supply, source and storage of water, water treatment facilities, institutional arrangements, financial aspects, existing sanitation & drainage system, existing waste water collection network, treatment system in place, review of on-going and proposed urban water supply and sanitation management plans and schemes within each CMCs etc.

#### Review & Analysis

Review of Secondary Research Data & Analysis thereof will be undertaken to understand the following:

- Future growth and demand (demographic projections, demand for water, waste water generation etc.)
- Review of existing & proposed schemes under the ULBs for water supply and sanitation.
- Review of existing tariff and financial sustenance of O&M of water supply and sanitation network.
- Standards and Norms to be followed

#### Identification of Critical Issues

Critical issues would be identified as a part of the project pre-feasibility which would be required to be addressed by the stakeholders prior to commencement of Project Development. Some of the critical factors are:

- Audit & Inventory of existing Water Supply, Sewage & Storm water Drainage infrastructure
- Existing billing system, tariff in place, O&M cost
- Collection of User Charges & Connection Charges
- Possibilities & limitation on Private sector participation in O&M

#### Preliminary Financial Viability Assessment

As per the study requirements, KIPDC will carry out a Preliminary Financial Viability Assessment for the Project based on ball-park estimation of Capital costs, O&M costs, revenues and other key performance parameters.

#### Project Implementation Structure

An appropriate project implementation structure would be recommended for implementation of the project on PPP basis or any other feasible mode of implementation based on the Preliminary Financial Viability Assessment.

#### Identification of Critical Requirements

Initial list of critical requirements to establish the Project viz., list of Govt. approvals, clearances, VGF and other support as required for the development and implementation of the project would be listed in the Pre-feasibility study report.

#### Reports & Presentations

KIPDC will submit the following reports/presentation to IDD, while carrying out the assignment:

- Inception Report (submitted earlier)
- Draft Pre-feasibility Report & Presentation
- Final Pre-feasibility Report

### **Project Development Framework & Way Forward**

The Pre-feasibility study report of the Project would include the suggested Project Development Framework and Way Forward for development of the Project.

#### **1.4 Scope of Work of the Pre-Feasibility Study<sup>3</sup>**

- Justification on the identified 6 CMCs for the Pre-feasibility Study.
- Understanding the role and merits & demerits of PSP/PPP in O&M of Urban Water Supply, Sewerage & Storm water Drainage through case studies in India.
- Overview & Profiling of each CMC ( Demography, land use etc.), its existing infrastructure w.r.t. water supply, sewage( UGD & Sewage Treatment) and storm water drainage(Existing Situation Assessment)
- Understanding of the existing structure of O&M under each CMC, components of O&M and Revenue & expenditure components of O&M for the above-mentioned urban services (UWSS&SD).
- Understanding the future proposal, expansion plans, improvement projects proposed for the urban services (UWSS&SD) under each CMC by the ULBs, GoK funding or through other external funding.
- Identification of key issues & bottlenecks of O&M (existing tariff structure, collection system etc, willingness to pay etc.)
- Exploring the possibility of incorporating the investment component for provision of independent House Service Connections (HSC) as part of O&M package
- Preparation of preliminary financial Model in order to explore the viability of a PPP mode for carrying out O&M (cash flow analysis to determine the self sustainability of the project)
- Preliminary recommendations of possible Project Structures & Project Development Framework.( Structure of PPP, Identification of O&M components for PPP, Benefits/returns to CMCs if any, exploring other possible commercial components etc.)
- Way Forward

#### **1.5 O&M Components of Urban Water Supply, Sewerage and Storm water Drainage**

Operation and Maintenance (O&M) refers to all activities needed to run a water supply and sanitation system, except for construction of new facilities. Operation includes the planning and control of the extraction/collection, treatment, conveyance, delivery of water and/or the collection, treatment, and disposal of effluent. It also covers the management of client and public relations, legal, personnel, commercial and accounting functions.

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<sup>3</sup> Detail & the process of revisions, changes & finalization of the Scope of Work (SOW) and identification of 10 CMCs is elaborated in Annexure 4.

Maintenance may be preventive, predictive or breakdown. Preventive or routine maintenance, including leak detection, should be carried out continuously according to pre-established schedules, as per rational considerations such as the manufacturer's recommendations for servicing the equipment. Once agreed upon, these schedules need to be kept to and the results recorded. Special programs such as intensive leak detection, surveys to detect illegal connections, or distribution network analysis, may be scheduled on an annual or one-time basis. Breakdown maintenance is needed where past routine maintenance has been insufficient, as well as after accidents and where plant is aging. All interventions need to be analyzed and the causes of malfunction or breakage recorded, so as to guide future procurement decisions and help in deciding whether part or all of a network or plant should be upgraded or replaced.

A continuous safe water supply service calls for ample and reliable water sources and adequate capacity for treatment, transmission and distribution, as well as properly functioning pumps, reservoirs and networks. Similarly constant & consistent maintenance is required to have an uninterrupted functioning of the sewerage system and the drainage network in order to maintain the health & hygiene of the city. The way these facilities are operated and maintained can greatly affect the health of the population, the quality of the environment, the benefits to the poor and the resources available for investment in expansion. Good O&M can enhance the quality of service and extend the useful lives of facilities. This affects the financial performance of water utilities and, hence, the resources available for investment in new services. To minimize the costs of operating a water-supply system, competent management of capital and current expenditures, assets and liabilities are just as important as preventing losses of water from the system. Adequate cost recovery ensures that enough funds are available to pay for operation, maintenance and debt service. In majority of the urban areas, the O&M of urban services like water supply, sewage, solid waste management, Storm water drains etc. are carried out by the respective ULBs. Due to various factors like low tariff rates/user charges, poor collection efficiency of user charges, lack of sufficient funds, limitations on skilled man power, lack of technology, etc. the ULBs are not able to perform efficiently for carrying out the O&M of the provided urban services.

### **1.6 Private Sector participation in O&M of Urban Water Supply, Sewerage and storm water Drainage**

Private Sector Participation (PSP) or Public Private Partnership (PPP) in water supply & sanitation sector is an emerging phenomenon and there are number of successful PSP/PPP projects ranging from bulk water supply, Urban water supply, Industrial water supply, treatment of sewage, Solid waste management to O&M of water supply and sewerage. Currently provision and maintenance of urban water supply, sanitation and storm drains is the responsibility of Urban Local Bodies (ULBs) and the respective state water supply & sewerage boards. The ULBs are committed to supply quality water continuously or at regular frequency, with constant pressure, and are expected to maintain the sewage & storm water drainage networks and treat the sewage in order to maintain the hygiene of the city. The ULBs with limited skilled manpower and technology are not able to fulfill the above-mentioned requirements.

PSP/PPP in O&M would bring in updated technology, organized management system and skilled manpower, which are expected to enhance the existing O&M scenario of water supply, sewage & storm water. The following are some of the benefits/merits of PSP/PPP in water supply observed from projects implemented in various parts of India;

- Private participation has resulted in monetary savings in O&M due to increased efficiency in

operation & service delivery

- It is observed that there is a drastic reduction in Unaccounted for Water (UFW) due to vigilance on pilferage and control on leakages, thus resulting in availability of additional water, which has facilitated the ULBs to increase the supply network/ quantity of water supply/duration/frequency etc.
- Due to properly managed and maintained treatment plants, supply network & tanks, the quality of water supplied to consumers has improved.
- Maintenance by private operator is carried out on a preventive basis rather than on a 'breakdown'/reactive basis, which reduces the frequency and duration of interruptions in the service.
- Private contracting has reduced the average time taken to repair bursts and leaks in the pipeline, which has reduced the period of disrupted water supply, consumer complaints and dissatisfaction, as well as the O&M costs.
- ULBs have established better control on the O&M system as they have the option of penalizing or providing incentives to the private operator in order to improve the efficiency of the O&M
- Management of staff hired under private contracts is much easier since such staff is accountable for inefficiency, negligence and absence.
- It is also observed that O&M bids are becoming competitive & cheaper over the period of time, as more firms are taking part in these sectors and also because firms are becoming more efficient through their experience in this field, thus resulting in reduction of overall O&M expenditure of the ULBs

Privatization of O&M is possible in two ways i.e. privatization of the existing water supply systems and secondly, privatization of systems in newly developed townships, housing colonies, business and commercial complexes, etc. But owing to some inherent reasons like pricing, rate regulation, unaccounted supply etc. privatization of existing water supply systems is difficult. Prices charged to water consumers have historically not reflected the full cost of water services and thus have fostered deterioration of water-supply systems. For instance, many local bodies and water supply departments, which are responsible at the local level for the operation and maintenance of such systems, are unable to recover even the operation and maintenance cost from the beneficiaries. By and large, the tariff rates being charged from the consumers are very low and there is a general reluctance for enhancing the same. Under these circumstances, without aiming at full cost recovery, privatization cannot be a successful proposition especially under a PPP mode. But, there are projects which have overcome the factor of complete dependency on user charges, by packaging with various allied components like provision of Industrial Water, sale of treated water, solid waste management etc., as part of the contract or by adopting various modes of PSP /PPP or combination of both. *Tiruppur Water Supply and Sewerage Project (operational since 2005), Mysore Water Supply - Performance Based Water Management Contract, O&M of Nagpur Water Supply (2008) and O&M of Bisalpur- Ajmer Water Supply, Rajasthan are some of the successful PSP/PPP projects, Annexure-1* provides details of these projects.



### 1.7 Towns identified for Pre-feasibility Study w.r.t. O&M under PPP:

The Scope of Work and identification of the 6 towns/cities for the prefeasibility study was refined and finalized based on interaction and recommendations from various stake holders & authorities (IDD, KUIDFC, KUWSDB, DMA & KSIIDC). Need for O&M services for proposed /new urban services, level of private participation required in terms of funds/investments, technology etc. and other basic parameters like, population, number of households, network coverage, willingness to pay etc. were considered in identifying the towns for the pre-feasibility study. **Annexure-4** elaborates the process of identification & Finalization of the CMCs and the scope of work for the pre feasibility study.

The Pre- Feasibility study would be carried out for the following CMCs:

- a. **Raichur and Hospet**, wherein the water supply & sanitation networks are being expanded/improved under North Karnataka Urban Sector Investment Programme (NKUSIP)<sup>4</sup>. On expansion/improvement of the network, there is need for investment to provide House Service Connections (HSC) and an operator for O&M of the system.
- b. **Davanagere, Bidar, Gadag-Betagere and Ilkal** wherein the water supply & sanitation networks would be expanded/improved in the near future through NKUSIP and which would require investment for provision of House Service Connections (HSC) and operator for operation & maintenance of the system in future.

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<sup>4</sup> For details of North Karnataka Urban Sector Investment Programme (NKUSIP) Please refer **Annexure -2**



## 2 Hospet

### 2.1 Hospet City Profile:

Hospet, the second largest urban center in Bellary District, is located at a distance of 336 Km from the State Capital, Bangalore and 65 Km from Bellary. The town is the taluk head quarters of the Hospet taluk in Bellary District with a population of 163,284 (2001 census) and 1, 88,000 (2008). It is one of the educational, administrative and trade centres of the state. The Tunga Bhadra Dam is at 5 Kms from the town. Jindal Vijayanagar Steel Plant, one of the largest steel plants in India, is located at about 30 Kms from the town. Due to the presence of iron ore deposits around the town, intensive mining activities are carried out in the area. The agricultural development around the town is extensive due to the presence of the Tungabhadra Dam. In addition to this, many small scale steel industries exist in and around the town. The UNESCO World Heritage Site of Hampi is situated at about 13 Kms from the town. Recently Hampi University has been set up at Kamalapur near Hospet town.

#### Latitude, Longitude & Altitude:

Hospet is situated at 15° 29' North latitude and 76° 48' East longitude. The town's altitude is 467 m above the mean sea level. The town is located between the Tungabhadra river and a hillock. The town gently slopes towards the river on the Northern side.

#### Connectivity:

Hospet is well connected by both roadway and railway to Bangalore, Mumbai, Chennai and Hyderabad. The town is situated on the Guntakal-Hubli broad gauge railway line. And National Highway-63 connects Hubli to Bellary.

#### Climate:

The town lies in the dry tract of the district and experiences scanty rainfall throughout the year, the average rainfall being around 619 mm per annum. The rainfall is mostly received during May to November and about 60 percent of the annual rainfall is received during the months of June to September. The maximum rainfall is registered during the month of August.

#### CMC Jurisdiction:

The City Municipal Council's (CMC) jurisdiction extends up to an area of 50.92 sq. Km, with 35 wards.

### 2.1.1 Demography

#### Population:

Hospet's population has grown significantly from 114,329 in 1991 to 163,284 in 2001 indicating a decadal growth rate of 42.83 % and annual growth of around 3.63% during 1991-2001. As per the information gathered from CMC and SPAN consultants, Hospet's Population has grown to 1,88,000 by 2008. The increase in the population of Hospet can be attributed to the presence of large number of small scale industries, tourism and trade & commerce as well as the delimitation of CMC during 1991-2001. The average daily floating population of the town is 1,000, which can be attributed to the large number of tourists visiting from all over the world. The Government is considering a proposal for carving out a separate Hospet District out of Bellary District with Hospet town as the headquarters, which will further enhance the growth of the town in the future.

#### Household Size:



The total number of households in Hospet has increased from 20,465 in 1991 to 30,905 in 2001 and 31,563 in 2008. The household size for Hospet is 5.9, which is well below the national average household size of 6.3 (Census 2001).

Comprehensive Development Plan for Hospet town (2011) prepared by the Town and Country Planning Department (TCPD) projects a population of 2,38,720 and Water Supply Augmentation Scheme for Hospet (2001) prepared by the Karnataka Urban Water Supply and Drainage Board (KUWSDB) and II<sup>nd</sup> stage Under Ground Drainage Scheme for Hospet town prepared by Dalal Consultants and Engineers Limited (2030) projects population of 3, 47,769. NKUSIP's CLIP report prepared by WSAPL projects a population of 2, 06,090 (2011) and 3, 29,270 (2031) which is considered for this study.

### 2.1.2 Economy

Owing to its connectivity, Hospet has become the focal point for trade and commercial activities in the region. There are six large and medium scale industries in the town. The town has good mix of industrial and agricultural base with cotton and rice exported to other parts of the country.

#### Industries:

Large, medium and small scale industries operate in Hospet town. Karnataka Industrial Area Development Board (KIADB) has developed an industrial estate in 1997 spreading over 41.48 hectares in Sanklapur area housing 42 industrial plots. Further, the Karnataka Small Scale Industrial Development Corporation Limited (KSSIDC) has also developed an industrial estate spreading over 2.23 hectares housing 35 industrial plots. Overall, about 2,974 industrial units with a total investment of around Rs. 40 crores have been established providing employment to around 15,602 persons in Hospet taluka.

Apart from the above-mentioned, there are about six large and medium scale industries functioning in Hospet with a total investment of around Rs. 70 crores providing employment to around 2,556 persons in and around Hospet. The District Industrial Centre, Bellary has prepared an action plan for Hospet Taluk and is in the process of implementing the same.

#### Mineral Resources:

Minerals deposits like Iron ore, manganese, lead ore, Gold, Copper, Mica, quartz and ornamental stones are available in abundance in Hospet taluka driving the economic development of the city. The estimated iron ore in Sandur and Hospet belt is about 1,500 million tons with 65 to 70 percent of iron content.

#### Tourism:

Hampi is a UNESCO World Heritage Site, situated on the banks of the River Tungabhadra and 13 kms away from Hospet town. Owing to the world heritage importance, tourists from different parts of world visit Hampi. Hospet town is the nearest town with good hotel accommodation. As a result, most of the tourists stay in Hospet and visit Hampi. On an average around 3, 40,000 tourists visited Hampi annually during 2001 to 2003.

### 2.1.3 Land-use Plan/CDP, Regulations:

According to the 1992 land use statistics, residential area occupies around 46% of the total developed area, with density of 560 persons per hectare, and Industrial around 11%. Agriculture lands are spread over 1,194 hectares, accounting for around 58.70% of the local planning area. The following table provides detailed break-up of various land uses of Hospet CMC.

**Table 2-1: Existing Land use**

Land Use	Area in Ha	Composition %
Residential	291.56	46.28
Commercial	29.00	4.60
Industrial	67.50	10.71
Public & Semi Public	51.94	8.24
Recreational/ Open space	19.26	3.06
Circulation	170.74	27.10
<b>Total</b>	<b>630.00</b>	<b>100.00</b>
Water Sheet	121.05	
Agricultural	1,194.45	
Vacant Lands	89.50	
<b>Grand Total</b>	<b>2,035.00</b>	

**Residential Use:** As mentioned earlier, the area under residential use is 46.28 percent of the total developed area in the town. The intensity of development varies from place to place. The net density under residential area works out to around 560 persons per ha (as per 2001 census).

**Commercial Use:** The area under commercial use is 29 hectares, which works out to around 4.60 percent of the developed area in the town. Hospet is the second important commercial centre next to Bellary in Bellary District.

**Industrial Use:** Industrial developments are spread around 67.50 ha within Hospet CMC limits. However, recent industrial developments are concentrated in Chitawadigi area, Hampi Road, Harihar Road and Bellary road outside the Hospet CMC limits. There is significant scope for development of iron & steel industries in and around Hospet, given the enormous quantity of iron ore resources available in Hospet taluka.

## 2.2 Existing UWSS&SD – Supply/collection System & Coverage

### 2.2.1 Existing water supply

The first organized water supply system for Hospet town was created in year 1966, with Tungabhadra Power Canal as the source. The power canal is shut down for a month every year, when water is drawn from the adjacent Raya Canal. With the increase in population and industries, the Second Stage Water Supply Scheme was commissioned in May 1999 with Raya - Basavanna canal as the source. In addition, 55 bore wells, fitted with power pumps, supply water to some pockets, which are not covered by the piped water supply or function as a supplementary source to areas, which face water shortage. About 240 bore wells, fitted with hand pumps, are also in use.

**Table 2-2: Water Supply Overview**

Description	Unit	Quantum
Total area of Hospet	Sq. Km	50.92
Total no. of Households (2008)	Nos.	31,563
Households covered by House Service Connections (HSC)	Nos.	9,644
% households served by HSC	%	30
Gross water supply (Ground and Surface)	MLD	18.39
Frequency of Supply	-	Daily (3 Hrs)

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<b>Description</b>	<b>Unit</b>	<b>Quantum</b>
Present Supply (2004)	Lpcd	98

The current water supply from the three sources, as shown below, is estimated to be 18.39 MLD. However, wide fluctuations are experienced in the supply. In summers, the water level in Tungabhadra dam generally goes down, due to which both Power Canal and Raya Canal needs to be closed and first stage water supply system may not be in use for 2 to 3 months.

**Table 2-3: Capacity and Supply from Existing Water Supply Sources**

<b>Source</b>	<b>Installed Capacity (MLD)</b>	<b>Actual Supply (MLD)</b>
First Stage Water Supply Scheme (FSWSS)	4.54 expanded to 6.48 by installing high discharge pumps.	Supply discontinued
Second Stage Water Supply Scheme (SSWSS)	18.16	18.16
Ground water sources	0.23	0.23
<b>Total</b>	<b>24.87</b>	<b>18.39</b>

**Coverage:**

Piped water supply is made available to the citizens through 9,644 House Service Connections (HSC) and 996 public stand posts. The house connections account for only 30% of the total 31,563 residential properties. There are 350 commercial connections, which account for 4.3% of total 8,093 commercial properties. Total length of distribution mains is 88.30 Km, which covers almost 88 percent of the total road length of 100.36 Km.

The population covered by piped water supply is stated to be 1, 09,668 (56,900 by house connections and 52,788 by stand posts), which works out to around 58% of the population. However, as per City Level Investment Planning (CLIP) report estimates prepared for the NKUSIP programme, water supply covers around 80% (assuming more than 6 persons i.e. around 10 person use one connection) of the population. All the water connections are currently un-metered.

**Table 2-4: Consumer Connections Details**

<b>Type of connection</b>	<b>Total(nos)</b>
Domestic connections	9,644
Non domestic / commercial connections	350
Industrial connections	28
<b>Total</b>	<b>10,022</b>

**Per Capita Supply:**

Earlier, the old First Stage system was operated for 14 hours, while Second Stage System was operated for 20 hours every day. The total supply was thus 22.93 MLD (4.54 MLD from old First Stage system, 18.16 MLD from new Second Stage System and 0.23 MLD from ground water sources). However, in the recent past, the old First Stage system was discontinued and the supply to the town is only from the Second Stage System & Ground Water Sources, totaling to 18.39 MLD. The earlier average gross supply to the population of around 1,88,000 worked out to 122 lpcd when the First Stage & Second Stage systems and Ground Water Sources were available. The current supply is 98 lpcd, with only the Second Stage system being operational, in addition to Ground Water Sources. However, the actual supply to the consumers would be much lower after taking into consideration the system losses.



**Duration of Supply:**

Water is supplied daily for 3 hours (6AM – 9AM).

**Pressures:**

Pressures are generally good. But, some areas suffer from low pressure due to old pipe network and distance from the service reservoir.

**First Stage Water Supply Scheme (FSWSS)**

The system can supply 6.48 MLD by pumping water from Tungabhadra Power Canal and Raya canal over 20 hours of operation. The following section briefly covers the water supply components of FSWSS:

**Raw Water Supply Works:**

The water is supplied from the two canals of Tungabhadra river and the Intake Work comprises of intake pipes from both the canals, intake well and a Pump house housing raw water pump of 55HP. Raw Water Pumping Main carries water from the pumping house at canal intake to the water treatment plant located at around 4.77 km away from the intake canal.

**Water Treatment Facilities:**

This is a conventional water treatment plant with design capacity of 4.54 MLD located behind the Government Junior College. The plant has following units:

- (a) Inlet channel with V notch for flow measurement
- (b) Flash mixer
- (c) Rectangular flocculator
- (d) Two rectangular settling tanks
- (e) Two rapid sand filter beds
- (f) Wash water tank, located above the filter house
- (g) One chlorinator, which has been recently installed but not brought in use
- (h) Bleaching powder dosing in filter water channel

**Clear Water Pumping Station:** Clear water is pumped from the treatment plant to the Clear Water Pumping Mains through this station with a 90 HP motor.

**Clear Water Pumping Main:**

This main carries water to the two service reservoirs, which are at a distance of 3.6 kms, through the following pipelines: (a) 350 mm diameter cast iron pipeline 840 m long, (b) 300 mm diameter cast iron pipe line, 1020 m long, and (c) 200 mm diameter cast iron pipeline, 1750 m long.

**Second Stage Water Supply Scheme (SSWSS):**

This system draws water from Raya - Basavanna canal at a location near the Fisheries Department. The canal is close to the dam and is reported to be flowing throughout the year.

This canal has a combined discharge of 355 cusecs. The source works are new and in good working condition.

The source works consist of

- (a) Canal intake in the form of a head wall with rose piece,
- (b) 600 mm diameter cast iron pipeline laid for a length of 12 m and designed to carry 9 MGD flow,

- (c) Intake well, which is a stone masonry circular sump of 9 m diameter and 3.5 m depth, and
- (d) Rectangular pump house, 12m X 6m in size.

**Raw Water Pumps:**

Two centrifugal pumps with 170 HP pump and auto transformer starters

**Raw Water Pumping Main:**

This is a 600 mm diameter pre-stressed concrete pipe line (6 kg/cm<sup>2</sup>) laid for a length of 1,440 m up to the water treatment plant.

**Water Treatment Plant:**

This plant is designed to treat 4 MGD (18.16 MLD). It is located by the side of Chitradurga - Solapur National Highway and has following units:

- (a) Cascade aerator
- (b) Raw water channel, with a standing wave flume
- (c) Flash mixer, with 2 hp stirrer
- (d) Clariflocculator
- (e) Four rapid sand filter beds, two on each side
- (f) Wash water tank, 0.5 ml capacity OHT
- (g) Chemical house
- (h) Chlorination arrangement

**Clear Water Pumping Station:**

Treated water is pumped to a master balancing reservoir, through the following works, located in the water treatment plant premises:

- (a) Sump of 0.85 million litres capacity
- (b) Rectangular pump house, located by the side of the sump
- (c) Two horizontal centrifugal pumps with 215 HP motor

**Clear Water Transmission:** This main carries water to the Mother Tank, located in water treatment plant premises, and from there to four over head service reservoirs in the city. The Mother Tank is an elevated tank with 0.5ML capacity. It performs the function of a surge tank and insulates the subsequent sections of the transmission mains from the effect of the water hammer. The transmission mains and feeder mains consist of pre-stressed concrete pipelines.

**Distribution System:**

**Service Reservoirs:** There are 6 Elevated Storage Reservoirs (ELSR) which forms part of the network system. Two reservoirs, at Chitwadgi and Amaravati, were constructed in the First Stage Scheme, while four more were added in the Second Stage Scheme. One more elevated tank of 0.34 ML capacity at Amaravati acts as a standby to the Chitwadgi School ELSR. The total storage available is thus 7.60 ML. The Chitwadgi ELSR and Amaravati ELSR were earlier filled from First Stage Scheme, while the other five reservoirs are filled from Second Stage Scheme. The distribution zones of these five reservoirs are interconnected to each other.

**Distribution Network:** The old distribution system, laid in First Stage Scheme, consists of Cast iron pipelines of diameters ranging from 300 mm to 75 mm and GI pipes of 50 and 25 mm. No distribution mains were laid in Second Stage Scheme. Total length of the distribution network in Hospet City is 103 km.



### 2.2.2 Existing Sewerage System:

The first sewerage system of Hospet town was constructed in year 1977. This system covers about 50 percent of the town area. The system was maintained by KUWSDB till 1997 and then was handed over to the Hospet CMC for O&M. Balance 50% of the town area does not have sewer network, while individual latrines and some public latrines take care of the human waste. The domestic wastewater flows through the roadside drains into the nallas and pollutes the water courses.

**Coverage:** The sewer network of 53.62 km long sewer lines covers about 50 percent of the town, divided into five drainage districts, along 53.43 percent of the 100.36km long road network. Sewers appear to be largely operational.

**House Service Connections:** 7,580 properties have been connected to the sewerage system.

### Sewage Pumping Station:

This pumping station is located in Ranipet. It consists of two concentric wells. The inside well is a dry well, in which pumps are installed. Outside circumferential well is a wet well, which was supposed to receive the sewage from the main sewer. The pumping machinery comprises five centrifugal pumps, three pumps coupled with 220 HP motors and two pumps coupled with 70 HP motors. This pumping station was never operated. Several bursts in the pumping main were reported at the time of commissioning. The sewage was bypassed, through the overflow line, to the nearby built up drain, which now carries the raw sewage to a natural drain, on to Tungabhadra River. The pumps are slowly deteriorating.

**Pumping Main:** A 500 mm diameter RCC pumping main, 2 km long, was laid from the pumping station up to the sewage treatment plant. However, this main was tapped by the farmers at many points. There were frequent operational and maintenance problems in commissioning the main, due to which this main was never functional.

**Sewage Treatment Plant:** This plant is located on Jambunath road, at a higher elevation in relation to the town. The plant consists of six waste stabilization ponds, constructed on 44 acres plot. The ponds are damaged and the banks of the ponds are eroded or are being excavated for quarrying the soil. The revetment is damaged and stones are being taken away by the local residents. The plant is in a neglected state. The location of the plant, which is on the upstream of the town, appears defective. It requires pumping and the potential of using the effluent for land irrigation will be progressively reduced due to expansion of the town on this side. Also, there is no possibility of its use in the future.

### 2.2.3 Drains

The drainage system in Hospet town consists of three major nallas (Happi nalla, nalla from Jambunathnagar road to Hampi road and nalla from Chitwadgi to Tungabhadra river) and a network of secondary and tertiary drains built around these main channels. Total length of the primary drains is 14.50 Km while that of secondary and tertiary drains is 32.50 Km.

Table 2-5: Existing Drainage system

Drain Type	Length (Km)	Distribution%
<b>Storm water Drains</b>		
• Open drains (Pucca)	2.50	7.69
• Closed drains (Pucca)	20.00	61.54



Drain Type	Length (Km)	Distribution%
• Open drains (Kutcha)	10.00	30.77
<b>Total Storm Water Drains</b>	<b>32.50</b>	<b>100.00</b>
<b>Primary drain channels</b>		
• Happi Nalla	7.00	48.28
• Nalla from Jambunathnagar road to Hampi road	6.00	41.38
• Nalla from Chitwadgi to Tungabhadra river	1.50	10.34
<b>Total Primary Drains</b>	<b>14.50</b>	<b>100.00</b>

**Primary Drains:** There are three principal natural drains, which flow through the town.

- (a) Happi Nalla: This nalla flows from Jambunath halli in the south to Hampi road in the north and eventually joins Tungabhadra River. It is a natural stream, irregular in shape, full of vegetation and trees, and with average width varying from 10 to 12 m. It carries the rain water, which is used by the farmers for agricultural purpose.
- (b) Nalla from Jambunath Nagar Road to Hampi Road: This nalla flows in south to north direction and through the town on the west side of railway line. It is also a natural stream, irregular in shape and width varying from 6 to 12 m. The course is full of vegetation and trees. The nalla carries mainly the storm water from Jambunath nagar road up to Ranipet, where a major built up drain carrying about 60 percent of the wastewater in the town joins it. The downstream stretch of this nalla mainly acts as a wastewater drain and carries a lot of debris, plastic bags, etc. It eventually joins Tungabhadra river.
- (c) Nalla from Chitwadgi to Tungabhadra River: This nalla flows in south – north direction and is located on the west side of the town. Besides storm water, it carries wastewater from Chitwadgi area. The nalla is irregular in shape, full of vegetation and about 5 to 6 m in width. The nalla course on the downstream of Chitwadgi area is full of debris and plastic bags. The nalla eventually joins Tungabhadra River.

**Secondary and Tertiary Drains:** The roadside drains are provided on both sides of the roads. All the built up drains are rectangular in shape and are constructed in stone masonry with concrete at the bottom. The kutcha drains are in the form of excavated shallow trenches, with no protection to the sides and are prone to damage by the traffic.

**Coverage:** Drains are provided on both sides of the roads. Total length of the roads is 100.36 Km and the drains are required for a total length of 200.72 Km. Thus, the built up drains of 22.50 Km length cover only 11.20 percent of the roads. Kutcha drains cover another 4.98 percent roads.

### 2.3 Existing O&M Structure of the CMC for Water Supply, Sewage and Drains

City Municipal Council takes care of the Operation and Maintenance (O&M) of Water Supply, Sewerage System, Drainage, Solid Waste Management, Roads etc. The Engineering Section along with Public Health Sections of the CMC is responsible for the O&M of assets of the city's urban services.

**Engineering Section:** An Assistant Executive Engineer (AEE) heads the Engineering Section and is assisted by one assistant engineer, two junior engineers, one junior town planner and other staff. The AEE has overall responsibility and supervises all the work taken up by the department. The junior

engineers have ward-specific responsibilities. The major duties and responsibilities of the Engineering Section include construction and maintenance of roads, maintenance of the water supply infrastructure and maintenance of public buildings and structures.

**Public Health Section:** The Public Health Section is responsible for municipal services such as water supply, public lighting, garbage clearance, etc., apart from other public health duties. This section is also responsible for sanitation facilities of the CMC. The Health Officer (HO) has the overall responsibility for the section. One senior sanitary inspector and two junior health inspectors, assist the HO. Junior officers are in-charge of works execution at the field level, which includes monitoring and supervising the work of sanitary labourers in the wards under their charge and attending to specific local complaints.

#### **O&M of Existing Water Supply System:**

The following table illustrates the staff details of the CMC's O&M team for water supply system

**Table 2-6: Staff Details of Water Supply O&M in CMC:**

Description	No of posts filled (nos)
Staff and helpers employed by CMC	18
Pump operators	2
Valvemen	1
Hired staff	26
<b>Total</b>	<b>47</b>

**Preventive Maintenance:** The operating staff carries out the preventive maintenance of the electrical and mechanical equipment of the pumping stations such as pumps, valves, piping, motors, breakers, panel boards, meters, capacitors, cables etc. Maintenance of flash mixers, flocculators, clarifiers, piping valves, dosing equipment etc. of the water treatment plants is also taken up by the staff. The maintenance of civil works, such as painting and minor repairs, is attended to, as and when required.

#### **Maintenance Facility:**

(a) **Routine Maintenance and Small Repairs:** Repairs such as routine checking of electrical and mechanical plant and equipment, cleaning connections, changing contacts, changing of oil in transformers etc are done by the CMC staff. The spares required are drawn from the stores or are purchased locally.

(b) **Special Repairs:** Special repairs required for electrical, mechanical equipment or for civil structures are done through private workshops and through contracts.

#### **Water Quality Monitoring:**

- **Raw Water Quality:** Currently there is no regular schedule followed to test the physical, chemical and bacteriological tests of the raw water at the source. Samples are occasionally collected and tested for bacteriological quality in the laboratory at Bellary. The turbidity of raw water is also not measured daily, at the water treatment plants.
- **Quality of Water Supplied to Consumers:** There is no formal system of testing the samples of tap water for either the bacteriological quality or the residual chlorine.

#### **Records:**

(a) **O & M Manual:** A formal O & M manual is not prepared for the installations of the water supply

system.

(b) **Record at Pumping Stations and Water Treatment Plant:** Logbooks are maintained at each pumping station and water treatment plant.

### 2.3.1 Operation and Maintenance of the Existing Sewage system:

**Operation and Maintenance of Sewers:** CMC has employed 177 sweepers and scavengers, in addition to 75 workers employed on contract, for the maintenance of the sewers. The main job is cleaning of the sewers, which is done manually by using bamboos.

### 2.3.2 Storm Water Drains

Maintaining the storm water drains are also responsibility of CMC, but maintenance of drains is not a regular phenomenon and not given importance. Maintenance of drains are carried out only during flooding and other emergency occasions only.

**Problem Areas:** No serious flooding incidents are reported. Some of the existing drains overflow on the road, as they are often blocked due to indiscriminate throwing of the garbage and plastic bags.

- **Inadequate Coverage:** Only 11.20 percent roads have built up drains. Insanitary conditions prevail in areas, which do not have surface drains.
- **Disposal of Domestic Sewage:** In the absence of a sewerage system covering the entire town and inadequate sanitation facilities, a large amount of the domestic sewage is let into storm water drains. This is resulting in pollution of the public water bodies such as river and canals, as the waste runoff leads to these watercourses.
- **Silting and Solid Waste Accumulation:** Silting and uncontrolled solid waste dumping cause blockage and stagnate storm water/wastewater runoff. Consequently, storm water drains choke and may overflow into neighboring areas.

### 2.3.3 Constraints of Existing O&M system:

The CMC is operating and maintaining the system, with the staff employed on the permanent roll, on daily wages or through contract. While a complete overhaul of the present O & M set up may be ideal, it is not practical, on account of the following constraints:

- (a) A large number of people are already employed on this job and their termination or redeployment elsewhere will not be possible. Most of the staff, engaged in actual operation and maintenance needs to be imparted training.
- (b) The O & M of water supply or sewerage system gets lower priority, due to which there is difficulty in getting required staff, material and funds in time. This results in deterioration in both operation and maintenance.

The above-mentioned factors & constraints has resulted in continues leakages/pilferages in the supply mains, distribution networks & at HSCs, due to which the UFW at Hospet CMC is estimated to be around 52% and the STP is not in an operational mode.

## 2.4 CMC's Revenues and Expenses & Cost of O&M of municipal Services

### 2.4.1 Summary of Municipal Finances

Table 2-7: Summary of Municipal Finances

Item	1998-99	1999-00	2000-01	2001-02	2002-03
	Amount in Rs. million				
<b>Revenue Account</b>					
Revenue income	28.94	33.72	58.59	36.22	33.59
Revenue expenditure	22.47	25.83	27.22	27.21	32.54
Surplus/Deficit	6.47	7.89	31.37	9.02	1.05
<b>Capital Account</b>					
Capital income	0.45	2.03	4.50	0.61	0.60
Capital expenditure	8.19	5.42	1.67	6.51	1.55
Surplus/Deficit	(7.74)	(3.40)	2.83	(5.90)	(0.95)
Fiscal Status	(1.26)	4.49	34.21	3.11	0.09
<b>Debt &amp; Suspense Account</b>					
Extraordinary income	0.61	0.45	0.33	0.71	2.40
Extraordinary expenditure	1.33	1.77	0.66	2.26	1.26
Surplus/Deficit	(0.71)	(1.32)	(0.33)	(1.56)	1.14
Overall Fiscal Status	(1.98)	3.17	33.87	1.56	1.24

The Revenue Account comprises of recurring items of income and expenditure. These are essentially all financial transactions related to the day-to-day operations of the municipality. Table below summarizes the status of the Revenue Account.

Table 2-8: Revenue Account Status

Item	1998-99	1999-00	2000-01	2001-02	2002-03
	Amount in Rs. million				
<b>Revenue Income</b>					
Own Source/Tax	17.18	23.11	25.57	7.25	6.96
Own Source/Non Tax	6.69	8.94	8.51	9.43	7.44
Assigned Revenue	0.69	0.95	1.09	2.16	1.62
Revenue Grants	4.39	0.72	23.43	17.40	17.56
<b>Total- Revenue Income</b>	<b>28.94</b>	<b>33.72</b>	<b>58.59</b>	<b>36.22</b>	<b>33.59</b>
<b>Revenue Expenditure</b>					
Establishment	17.88	21.11	19.08	17.59	23.09
Operation and Maintenance	4.59	4.72	8.14	9.62	9.45
Debt Servicing	-	-	-	-	-
<b>Total- Revenue Expenditure</b>	<b>22.47</b>	<b>25.83</b>	<b>27.22</b>	<b>27.21</b>	<b>32.54</b>
Revenue Account Status	6.47	7.89	31.37	9.02	1.05

**Own Sources/Tax:** This item head comprises of income sourced primarily from octroi, consolidated property tax (general purpose tax, water tax, lighting tax and scavenging tax) and professional tax. On an average, through the assessment period, own source/tax income constitutes 42 percent of the CMC's revenue income, constituted largely by octroi income from 1998-99 to 2000-01 and solely by property tax thereafter.

**Own Sources/Non Tax:** This item head comprises of income from municipal properties, fees on municipal services (building permission, etc.), user charges (water and sewerage tariffs) and miscellaneous services. On an average, through the assessment period, own source/non tax income constitutes 22.46 percent of the total revenue income. Rental income from municipal properties, water charges and income from fees and fines constitute the major revenue sources under this item head. Income through non-tax own sources of the CMC has grown over the assessment period at a CAGR of about 3 percent.

**Assigned Revenues:** This item head comprises of income from Government of Karnataka (GoK)/State transfers of municipal income collected by the state line department. The income items generally include surcharge on stamp duty, entertainment tax, motor vehicle tax, and other transfers. Assigned revenue constitutes about 3.56 percent of the CMC's total revenue income and has grown at a CAGR of about 24 percent.

**Revenue Grants and Contribution:** This item mainly comprises octroi compensation grants, SFC grants, special establishment grants and other special grants that the State Government may transfer from time-to-time to the CMC. In case of Hospet, revenue grants and contributions constitute about 31.5 percent of the total revenue income.

**Revenue expenditure** comprises broadly of three categories of expenditure—establishment, operation and maintenance and debt servicing. Unlike in many other ULBs, Hospet CMC has provided a consolidated figure pertaining to the total establishment.

**General Administration and Tax Collection:** This head comprises expenditure on pay and allowances of elected representatives, salary and other operational expenses related to all municipal functions, excluding water supply and temporary establishment for solid waste management, pension and gratuity payouts and provident fund contributions. Expenditure under this head accounts for about 65.73 percent of the total revenue expenditure during the assessment period. Over 93 percent of the expenditure under this head is accounted for by establishment expenses.

**O&M Cost of Public Works:** Expenditures under this item head comprise repair and maintenance works on buildings, roads and drains. This head constitutes the single largest cost center for the CMC. Hospet CMC spends about 8.72 percent of its total expenditure on public works. Expenditure under this head has grown at a CAGR of 22 percent.

**O&M Cost of Water Supply:** In terms of operation and maintenance expenditure, water supply is the second largest cost center of the CMC (after public works), accounting for over 7.16 percent of the total revenue expenditure. Expenditure under this head has grown at a CAGR of about 27 percent during the assessment period.

**O&M Cost of Solid Waste Management:** Expenditure under this head accounts for about 5.66 percent of the revenue expenditure over the assessment period. This head covers expenditure incurred in conservancy operations of the CMC, including salaries of temporary staff and rent and operation and maintenance of a fleet of vehicles for solid waste collection and transportation. Expenditure under this head has increased at a CAGR of about 52 percent over the assessment period, largely attributable to the surge in salary of temporary conservancy workers.

**O&M Cost of Street Lighting:** Street Lighting accounts for about 5.56 percent of the revenue expenditure and comprises primarily of expenditure on electricity charges and replacement of lighting fixtures. Expenditure under this head has also registered a CAGR of 19 percent.

**Other Services and Miscellaneous Expenditure Heads:** Expenditure on other services accounts for about 4 percent of the revenue expenditure, comprising essentially of expenditure on public safety and fire services, public gardens, markets, education, etc.

**Debt Servicing:** This item head comprises interest payments on external borrowings. According to the financial data provided by the CMC, there has been no debt servicing during the assessment period. In the absence of data regarding borrowings, it is not possible to ascertain whether the municipality is defaulting on debt servicing or whether there is not commitment.

**Key Financial Indicators:** Analysing CMC's financials provides some key inputs which would form the key parameters of exploring the feasibility of PPP for O&M. Through the analysis it is understood that income from the Non-Tax Sources is only 22.46% of the CMCs Revenue income and the O&M cost of municipal services forms 26.60% of the Revenue Expenditure. About 73 percent of the total expenditure is on establishment-related heads, leaving relatively lower amounts for expenditure on operation and maintenance of services. The per Capita Growth Rate of O&M expenses is 16.59%. It is also observed that the CMC is able to collect 77.76% of the user charges for water supply and 89% of the property tax and spends Rs.10/- per Rs.1000/- collection of taxes.

**Table 2-9: Key Financial Indicators**

Indicators		Value	Unit
<b>A</b>	<b>RESOURCE MOBILISATION</b>		
1	Per Capita Income	246.26	Rs. p.a
2	Sources of Funds		
	a Share of Own Sources - Taxes in Total Revenue Income	42.45	%
	b Share of Own Sources - Non-Tax items in Total Revenue Income	22.46	%
	c Share of Assigned Revenue in Total Revenue Income	3.56	%
	d Share of Revenue Grants in Total Revenue Income	31.52	%
3	Growth in Revenue Income	3.79	% p.a
4	Growth in Own Sources of Revenue Income	(11.86)	%
<b>B</b>	<b>FUND APPLICATION</b>		
1	Per Capita Expenditure	173.92	Rs. p.a
2	Application of Funds		
	a Share of Establishment Expenditure in Total Revenue Expenditure	73.40	%
	<b>b Share of O&amp;M Expenditure in Total Revenue Expenditure</b>	<b>26.60</b>	<b>%</b>
	c Functional Allocation of Municipal Expenditure		
	General Administration & Tax Collection	68.73	%
	Municipal Services	31.27	%
	Debt Servicing - Interest Payment	-	%

**Pre-feasibility study for carrying out O&M of Water Supply, Sewerage & Storm Water drains (WSS &SW) on Public Private Partnership (PPP) basis for 6 CMCs in Karnataka: Final Report**

	d	Share of Establishment Expenditure to Total Revenue Income	54.85	%
3		Growth in Establishment Expenditure	0.21	%
4		Growth in O&M Expenditure	19.75	%
5		Growth in Total Revenue Expenditure	6.76	% p.a
<b>C</b>		<b>PERFORMANCE INDICATORS</b>		
1		Operating Ratio	0.75	Ratio
2		Growth in Per Capita Own Income	(14.19)	% p.a
3		Growth in Per Capita Revenue Grant	37.67	% p.a
4		Growth in Per Capita Revenue Income	1.04	% p.a
5		Growth in Per Capita Establishment Expenditure	3.79	% p.a
<b>6</b>		<b>Growth in Per Capita O&amp;M Expenditure</b>	<b>16.59</b>	<b>% p.a</b>
7		Growth in Per Capita Revenue Expenditure	6.80	% p.a
9		Capital Utilization Ratio	5.44	Ratio
<b>D</b>		<b>EFFICIENCY INDICATORS</b>		
1		Tax Collection Performance		
	a	Property Tax	89.01	%
	b	Water Tax	77.76	%
	c	Drainage Tax	--	%
2		Cost of Collecting Rs. 1000 of Taxes	10.73	Rs.
3		Property Tax Demand per Assessment	295.46	Rs. p.a
4		Population per P.T Assessment	5.18	Persons

Source: NKUSIP CLIP Report.

## 2.5 Development Initiatives for Hospet and its region by GoK

### 2.5.1 Proposed land use (2011):

According to the CDP, the Bellary Urban Development Authority (BUDA) proposes to develop an area of 1,805 ha of land in Hospet. Existing vacant land is earmarked for residential sites. Consequently, the share of residential land use has increased to 49.32 percent of the total proposed area. Land allocation for traffic and transportation accounts for 19.24 percent of the proposed development. However the proposed circulation area demarcation is 7.86 percent less than the existing developed area in the town. The BUDA proposes to develop more parks and playgrounds in the town, meeting the proposed increase of 7.21 percent over current allocation.

**Table 2-10: Proposed Land use**

Land Use	Area	Composition
	Hectare	%
Residential	890.22	49.32
Commercial	60.90	3.37
Industrial	164.84	9.13
Recreational	185.39	10.27
Public & Semi- public	156.37	8.66
Circulation	347.35	19.24



Land Use	Area	Composition
	Hectare	%
<b>Total</b>	<b>1,805.07</b>	<b>100.00</b>
Water Sheet	121.05	
Agricultural	108.88	
<b>Grand Total</b>	<b>2,035.00</b>	

### 2.5.2 Industrial Development Plan:

The availability of resources both human, material resources and the demand for various goods and services are high in Bellary District. Based on the technical feasibility and economic viability, the District Industrial Centre has identified 110 industries suitable to establish in Bellary district. According to the Industrial Development Plan prepared for five years (2001-2005) to attract the investment to the tune of Rs. 1312.4 million in 1,164 tiny/small scale industries provide employment to the tune of 13,469 persons. The development plan gives more thrust to agro-based industries the expected investment of Rs. 431 million with an employment potential of 4,213 persons secondly, mineral based industries expected investment of Rs.298 million with an employment potential of 3,215 persons.

### 2.5.3 Suvarna Karnataka Development Corridor (SKDC) Programme:

The State government in its 2008-09 Budget has identified Bellary District for development of steel zone and to promote mega steel industries and allied infrastructure components in the district (as part of the SKDC programme), which would promote economic development of the region.

## 2.6 NKUSIP PROPOSAL and Investment for Water Supply, Sewerage and Storm Water Drains

GoK, through its North Karnataka Urban Investment Plan (NKUSIP), proposes to improve the Environmental sanitation infrastructure, water supply, urban roads and slum development of Hospet city. The following are the summary of Urban Water Supply, Sewerage and Drain improvements proposed through NKUSIP.

### 2.6.1 Summary of NKUSIP Project Interventions

**(i) Water Supply:** Interventions in this sector comprises of provision of additional distribution network for uncovered areas and rehabilitation of raw water pumping main and water treatment plant of first stage water supply scheme. Rehabilitation of raw water and clear water transmission main in second stage water supply scheme.

**(ii) Sewerage and Sanitation:** Based on water demand, population growth, and town topography, a Activated Sludge Process system is proposed for sewage treatment. Rehabilitation of existing sewer line of 53 km long is proposed.

**(iii) Flood and Drainage Control:** Given the scanty rainfall in the area and the prevalent condition of roads, the projects proposed under this category include creation of road side drains in addition to improvements of primary and secondary drains.

### Estimated Cost of Intervention:

The total cost of water supply, Sewerage & Sanitation and Storm water Drainage and environmental sanitation infrastructure cost is Rs.551.32 million; project costs by sector are elucidated in the following table.



**Table 2-11: Estimated Cost of High Priority Interventions (Cost in Million Rupees)**

Water Supply	153.12
Sewerage and Sanitation	398.20
Storm Water Drainage	0.00

Source: NKUSIP DPR Reports

### 2.6.2 Water Supply

Under this component, provision of pumping main up to water treatment plant, which stretches to 4.77 km, improvement to chemical dosing system and replacement of filter control, flow measuring device for water treatment plant and flow meters in transmission mains and six reservoirs, is proposed. Water auditing and leak detection for pumping stations, water treatment plant and transmission mains and leak detection measures for distribution system and additional distribution network to uncovered areas for a length of 100 km to cater 100,000 persons for 2011 with 12,500 house service connections, is proposed under NKUSIP.

**Table 2-12: Benefits expected from Water Supply Component**

	Item	Existing Situation	Post NKUSIP
1.	Duration of water supply	Once every day for three hours	Four hours each in morning and evening every day (total 8 Hours)
2.	Population covered	109668 by house service connection (52,700 by public stand post )	Additional 65,000 population covered by HSC
3.	Pressures	Low	High
4.	Water metering	Un metered	Metered

**Table 2-13: Proposed Water Supply Components**

Proposed Water Supply Components		
1	Rehabilitation to electro mechanical equipments for power canal water supply system	At Raw water and Pure water pumping stations
2	Water supply distribution network	139 Kms.
3	Pure water pumping main for Raya – Basava canal water supply system	150 mtr.
4	Proposed Pumping Machinery for Raya – Basava canal water supply system	2 Nos. of - 288 HP Raw Water Pumps with 35m head and 2 Nos. of -388 HP Pure water Pumps with 50m head
5	Providing Filter Beds at Raya - Basava WTP	9.08 MLD capacity
6	Proposed Feeder Mains	11.853Kms.
7	Proposed ELSR's	1 No. of 10 Lakh litres & 2 No of 5 Lakh litres.
8	Proposed GLSR's	1 No of 5 Lakhs litres

Source: KUIDFC DPR for Hospet

As per the CLIP Report, an additional of 12,500 connections was proposed as part of the proposed water supply scheme and an additional cost of Rs.18.75million is estimated for the same. The finalized proposed Water Supply Scheme for Hospet proposes an additional 17,500 HSCs for the year 2011, but this component has to be implemented by the CMC. The proposed water supply component is expected to benefit about 27,144 households in Hospet by 2011 (the design year for distribution network).

### 2.6.3 Proposed Sewage Component

Under this component, it is proposed to improve the existing sewerage network for a length of 53.62 km and to provide new network in the uncovered areas to cater to future requirement till 2011. The total length of the new network is 227 km, with 17,500 house service connections. 27 MLD capacity Activated Sludge Process has been proposed.

**Table 2-14: Implementable Sub-projects under NKUSIP – Sewerage and Sanitation**

Proposed Sewerage System		
1	Proposed capacity of STP	27.0 MLD STP
2	Proposed wet wells	Two numbers
3	Proposed Sewer Network	227 Km
	Total Cost (Rs.Million)	398.2

Source: KUIDFC DPR for Hospet

As per the CLIP Report, an additional of 12,500 connections was proposed as part of the proposed Sewerage System and an additional cost of Rs.12.50 million is estimated for the same. The finalized proposed Sewerage component for Hospet proposes an additional 17,500 HSCs for the year 2011, but this component has to be implemented by the CMC. The proposed Sewerage component is expected to benefit about 25,080 households in Hospet by 2011.

The following table illustrates the details of the benefits expected from proposed Sewerage System.

**Table 2-15: Benefits expected from proposed Sewerage System**

Item	Existing Situation	Post NKUSIP
1. House service connection	7,580 Nos	Additional 17,500 HSC
2. Population covered	40,000 by house service connection	Additional 65,000 population covered by HSC
3. Existing STP	Not Functional	Functional

**Estimate of Sewage Flow:** Water demand of the town has been projected at the rate of 90 lpcd. However, the sewer network needs to be designed to carry a minimum sewage flow of 100 lpcd, as per CPHEEO Manual on Sewerage and Sewage Treatment. The treatment plant is however proposed to be developed in phases. It is proposed that Initial phase would serve 80 percent of 90 lpcd, i.e. 72 lpcd and is proposed to be augmented subsequently to treat 100 lpcd. Hence the demand for sewerage system is proposed at following rates of sewage flow.

- (a) 100 lpcd for sewer network, and
- (b) 72 lpcd for sewage pumping and treatment plant up to year 2011 and 100 lpcd beyond 2011.

**Demand of Sewerage System:** The capacity of sewerage system, required for Hospet town, is worked out below.

**Table 2-16: Demand of Sewerage System**

Component	Year 2004		Year 2011		Year 2021	
	Population	Demand	Population	Demand	Population	Demand
		MLD		MLD		MLD
Sewer Network	170,000	17.00	206,090	20.61	262,470	26.25
Pumping Station	-	12.24	-	14.84	-	26.25
Sewage Treatment plant	-	12.24	-	14.84	-	26.25

Following table compares the capacity of various components of the existing and proposed sewerage system with the projected demand.

**Table 2-17: Comparison of Additional Demand and Anticipated Supply of Sewerage Facilities**

Component	Unit	Supply		Year 2004		Year 2011		Year 2021	
		Year 2004	Year 2021	Demand	Surplus (Shortfall)	Demand	Surplus (Shortfall)	Demand	Surplus (Shortfall)
Sewer Network	Km	53.62	170.00	100.00	0	130.00	0	170.00	(40.00)
Sewage Treatment	MLD	-	26.00	12.24	(12.24)	14.84	11.16	26.25	(0.25)

**Septic Tank for Kondanayakana Halli Area:** The area is at lower elevation and cannot drain into the proposed STP by gravity. Hence, a septic tank is proposed for this area.

**Adequacy:** Once the proposed augmentation project is implemented, the sewer network and the treatment plant will be quite adequate to meet the demand of the town, right upto year 2021. Perhaps some additional sewer lines will be required after year 2011. Proposed sub-project include (i) repairs to sewers and manholes; (ii) construction of sewage treatment plant; and (iii) provision of additional sewer network to meet the assessed demand. The following table indicates the existing and projected number of households to be connected to the sewerage system in Hospet.

**Table 2-18: Household Connections in Sewerage System Component**

Details	Existing (2004)	Projected (2011)
No of household connections	7,580	25,080
Percentage to total town's households	24%	80%

## 2.6.4 Storm Water Drainage Network Urban Drainage

The CLIP Report for Hospet has identified improvement and development of storm water drains as one of the Components of NKUSIP project. Under this component, it is proposed to improve the condition of the existing nalas, namely, Hampi Nala, Nala from Jambhunath Nagar Road to Hampi Road and Nala from Chitawadigi to Tungabhadra River. The total estimated investment required for the improvement of 2.0 km nallahs is Rs. 20.00 million. It is also proposed to improve the Tertiary and Secondary drains along the major roads. The following table provides the estimated budget for storm water drain works and also the estimated O&M cost.

**Table 2-19: Roadside Drain Improvement Costs**

<b>Road Type</b>	<b>Amount (Rs. Million)</b>
PWD owned road side drains	65.30
ULB owned road side drains	49.15
<b>Total</b>	<b>114.45</b>
<b>Annual O&amp;M</b>	<b>1.15</b>

Source: NKUSIP CLIP Report

The nallas, passing through the town, need to be cleared of all the blockages and provided with properly designed built up sections at certain strategic locations. The construction may be in cement concrete for the base and stone masonry with cement plaster for the side walls. The estimate provides for the built up section for a total length of about 2 km. The primary drains also need to be desilted. Investment The total investment may be of the order of Rs. 20 million, as shown in table below:

**Table 2-20: Tentative Cost of Primary Drain Improvement**

<b>Item</b>	<b>Unit</b>	<b>Quantity</b>	<b>Rate Rs.</b>	<b>Amount Rs.million</b>
Improvement in primary drains	km	2	10,000,000	20.00
<b>Total</b>				<b>20.00</b>

Source: NKUSIP CLIP Report

As per the finalized NKUSIP project , the Storm Water components is not considered as part of the NKUSIP funding and has to be carried out by the CMC.

## **2.7 O&M and its cost as recommended by NKUSIP**

### **2.7.1 Proposed Improvements in O & M (water supply)**

Considering the constraints of the CMC, it is proposed by NKUSIP to improve the O & M operations in stages, so as not to change the current set up and practices drastically, but at the same time bring in discipline and control in O & M operations. It is recommended to post following key persons for the operation and Maintenance of pumping installations and treatment plants.

**Table 2-21: Proposed O&M team – Water Supply**

<b>Category of Staff</b>	<b>Qualification</b>	<b>Description</b>	<b>Total</b>
Assistant Executive Engineer	B.E (Civil)		1
Assistant Engineer	B.E (Civil)/ Dip		2
Plant Operator	B.Sc (Chemistry)	1 for each treatment plant	2
Pump Operator	ITI (Mech)	1 for each PS	4
Electrician	ITI (Electrical)	1 for each PS	4

Providing laboratory set up at the water treatment plants for carrying out daily analysis of raw water turbidity, determination of dose of the coagulant and testing residual chlorine of treated water. Developing training program for the existing unqualified staff to improve the skills in operation and maintenance of the respective components. Preparing O & M plan at the beginning of each year with details about staff, energy consumption, requirement of materials such as chemicals and spares, maintenance and repairs, raw water bills and other miscellaneous items. After the existing system is rehabilitated and planned augmentation works are constructed, it will be necessary to plan for an efficient O & M of the system. To calculate the O&M cost of water supply at Hospet, the existing O&M cost of existing water supply component is projected till 2011-12 @ of 16.59% per annum and the O&M

cost due to additional new components is projected at @ 3% of the proposed investment estimated as per NKUSIP. Thus the O&M cost is estimated to be Rs. 12.55 million/annum.

## 2.7.2 Proposed Improvements in O & M (Sewerage System)

**Table 2-22: Proposed O&M team – Sewerage System**

Category of Staff	Qualification	Description	Total
Assistant Executive Engineer	B.E (Civil/Mechanical)		1
Assistant Engineer	B.E (Civil)/ Dip		1
Plant Operator	B.Sc (Biology)	1 for each treatment plant	1
Pump Operator	ITI (Mech)	1 for each PS	1
Electrician	ITI (Electrical)	1 for each PS	1

The above table illustrates the proposed O&M team for the sewerage system.

- Providing laboratory set up at the sewage treatment plants for analyzing the parameters like pH, suspended solids and Biochemical Oxygen Demand (BOD) of the influent and effluent.
- Developing training program for the existing unqualified staff to improve the skills in operation and maintenance of the respective components.
- Preparing O & M plan at the beginning of each year with details about staff, energy consumption, requirement of material such as chemicals and spares, maintenance and repairs, raw water bills and other miscellaneous items.

**O & M Expenditure:** After the existing system is rehabilitated and planned augmentation works are constructed, it will be necessary to plan for an efficient O & M of the system. Expenditure on various items of O & M is detailed in the following table and is estimated at Rs.4.69 million per year.

**Table 2-23: Estimated O&M expenditure of Sewerage System**

Category of Staff	Parameter	Number / Quantity	Rate / Month Rs.	Amount / Year Rs. Million
Assistant Engineer		1	15,000	0.18
Qualified STP operator	One for each STP	1	8,000	0.10
Qualified Plumbers	One for every 20 Km sewer line	11	8,000	1.06
Helpers	a) Pumping stations & STP at 3 each	3	5,000	0.18
	b) Two assistants for every plumber.	20	5,000	1.20
Watchman	3 at each STP	3	5,000	0.18
Maintenance to works	26 MLD capacity	Rs. 0.05 million per MLD		1.30
Miscellaneous	LS			0.50
<b>Total O &amp; M</b>				<b>4.69</b>

But the O&M cost for sewage is estimated considering 2% of the total cost of investment for sewage

component as per NKUSIP which would be Rs. 7.96 million/ annum.

## 2.8 Need for Private Partnership in O&M of Municipal services in Hospet

### Water Supply

Lack of efficiency in the existing O&M of water supply system has resulted in 52% of Unaccounted For Water (UFW) and is estimated to reach 62% by the year 2021 (*as per CLIP Report*). This has also resulted in a low average tariff level of Rs.3.61/kl. Private sector participation in O&M is expected to bring in skilled, trained and attentive work force and latest technology through which it is expected to reduce the water losses due to leakages and pilferage during transmission and distribution. Thus the UFW water can be reduced to 25 to 30%, which would increase the quantity of supply by 20 to 25%. It can also improve the efficiency level of O&M of treatment plants, thus reducing the water loss and also optimizing the uses of chemical and consumption of power. Case studies illustrate that through private sector participation, O&M costs can be reduced by 10 to 20% and together with the reduction of UFW as above, there could be revenue gains of above 50% of the current levels.

### Sewerage & Drainage System

Maintenance of Sewerage system is not a primary component of Hospet CMC's O&M services, due to which the STP is not functional and majority of the sewerage network has to be repaired. If the same system of O&M is continued, the environmental sanitation conditions in the town will continue to deteriorate as population density increases. Similarly, O&M of storm water drains is not given requisite attention leading to occasional flooding of roads and residential areas. Private sector participation of O&M of sewerage system and storm water drains with dedicated work force and organised operation schedule would improve the environmental sanitation conditions of the city.

## 2.9 Preliminary Financial Analysis

Based on the information collected, collated and analyzed regarding existing scenario of urban water supply, sewerage and storm water drains of the CMC, its O&M system and CMC's revenue income and expenditure, a preliminary financial analysis is carried out in order to explore the viability of PPP in O&M of water supply, sewerage and Storm water drainages starting from the year 2011-2012. The following are the key assumptions considered for preliminary financial analysis:

### 2.9.1 Commencement of O&M operations:

Hospet is one of the three cities identified and tendered out for establishment of additional assets & improvement of urban water supply and sewerage systems under the first tranche of ADB funding and the project would be awarded for implementation by the end of the year 2009. Considering a time span of two years for completion of the project components, it is assumed that the O&M of the urban services would commence by 2011-12.

### 2.9.2 Demography:

Hospet's population is expected to reach 206,090 by 2011. As per CMC's records, Hospet has 31,563 household properties and 8093 Non-domestic/commercial properties.

### 2.9.3 Number of Service Connections:

**Water Supply:** The number of House Service Connection (HSC) is expected to cover a total of 27,144 by 2011 including the additional 17,500 connections proposed through NKUSIP project. Since, there is no information available on the proposed additional number of non-domestic/commercial connections, it is assumed that by 2011 the direct service connections would cover 100% of the existing number of non-

domestic/commercial properties of 8093 (2008).

**Sewage:** The total number of HSC is expected to be 25,080 by 2011 and the same is considered for the analysis. As there is no information available on service connections to Non-domestic /Commercial and industrial properties, these are not considered for the preliminary analysis.

#### **2.9.4 Tariff & Collection efficiency:**

Existing water tariff of Rs.55/-, Rs.110/- and Rs.220/- per month for domestic, Non-domestic/Commercial and Industrial connections, respectively, as recommended by GoK, is assumed without any revisions for the year 2011-12 and is expected to remain same for the next 5 years (till 2015-16). An increase of 30% on the existing tariff is assumed from year 2016-17. Further, it is assumed that there would not be any tariff for water consumed through Public Stand Post. For sewage connections, it is assumed that 10% of the water tariff charges would be collected as sewage tariff (as per inputs provided by KUIDFC) and there would not be any charges collected for O&M of drains.

Collection efficiency of Hospet CMC for water tariff is 77.8% and property tax is 89%. Existing collection efficiency of 77.8% is assumed for the analysis.

**Table 2-24: Key Assumption & Parameters for Preliminary Financial Analysis**

<b>Key Parameters</b>	<b>Existing (2008)</b>	<b>Proposed Additional (by 2011)</b>	<b>Total (2011)</b>
<b>Total Population</b>	<b>188,000</b>	<b>18,090</b>	<b>206,090</b>
<b>Total House Hold Properties</b>	<b>31,563</b>		
<b>Total Commercial Properties</b>	<b>8093</b>		
<b>Water Supply</b>			
Total House Service Connections (No. of Connections)	9644	17500	27,144
Population to be covered by HSC (No.)	<b>40,773</b>	65000	105773
Non domestic (No. of Connections)	<b>350</b>		
Commercial/Industrial Connections(No. of Connections)	<b>28</b>		
Tariff for Domestic/Household (Rs/connection)	55.00		
Tariff for Non-Domestic/ Commercial(Rs/Connection)	110.00		
Tariff for Industrial (Rs/connection)	220.00		
Collection Performance-% of HSC (water charges)	77.8%		
Collection Performance - % of (Property Tax)	89.0%		
<b>Sewage</b>			
Total House Service Connections (HSC)	7580.00	17,500	25,080
Population to be covered by HSC	40,000.00	65,000	1,05,000
Tariff for Domestic ( assumption- 10% of water tariff)	5.50		
Tariff for Non-Domestic( assumption- 10% of water tariff)	11.00		

### 2.9.5 O&M expenditure:

The O&M cost of water supply amounts to Rs.2.33 million per annum (2003) considering that it accounts for 7.16% of the total revenue expenditures of the CMC. This cost is projected at the rate of 16.59% (which is the rate of growth of the CMC's O&M cost of all urban services between 1998-2003) till 2011-12. Thus, the O&M cost of existing water supply components is estimated to be **Rs.7.95 million** for the year 2011-12.

Based on case studies, the O&M cost for water supply due to additional connections & improvements is assumed to be 3% of the total capital cost estimated for water supply component under NKUSIP project (excluding the estimated cost for water audit), i.e. an additional cost of **Rs.4.59 million** per annum. Based on the above computations the total O&M cost for water supply for the year 2011-12 is estimated to be **Rs. 12.55 million**.

**Table 2-25: Assumptions for O&M Expenditure**

Sector	O&M as % of capital cost
Water Supply	3.00
Sewerage & Sanitation	2.00
Storm water Drain	1.00

As per the secondary data collected, Hospet CMC does not have any major expenditure towards O&M of existing sewerage & drainage system. Majority of the existing sewerage system, including the STP, would be improved and rehabilitated as a part of the proposed investment through NKUSIP. The CLIP report estimates that the O&M cost of Hospet's sewerage system would be around **Rs. 4.69 million** per annum. The O&M cost was also estimated by assuming 2% of the estimated capital cost of investment planned for the sewerage components of Hospet through NKUSIP, which is around **Rs. 7.96 million** per annum, and the same is assumed for the preliminary analysis.

### 2.9.6 Expenses of O&M operator:

As provision of HSC connections would be the CMC's responsibility and is not factored under NKUSIP project, provision of HSC connections (Water Supply & Sewage) is factored as part of the O&M. Therefore, the operator has to invest in the provision of 17,500 new HSC for both water supply and sewage. Unit cost of providing HSC for water supply ranges from Rs. 1050/- for unmetered connection to Rs. 2200/- for metered connection and for sewage HSC it ranges between Rs.1000/- to Rs. 2500/- as per the specification of the connections. As per CLIP report, a unit cost of Rs 1500/- and Rs.1000/- was assumed for water supply & sewage respectively. Considering that the CLIP report was prepared in 2004, Rs. 2200/- and Rs. 2500/- for water supply and sewage respectively is considered for estimating the total investment for providing HSC and is estimated to cost of Rs. 82.25 million.

**Table 2-26: Cost of Provision of New House Service Connections**

	New Infrastructure	Proposed No. of Connections	Unit Cost as per NKUSIP in Rs.	Unit Cost as per consultant's inputs in Rs.	Total Investment in Rs. million
1.	Water Supply - House Service Connection Cost	17,500	1,500	2,200	38.5
2.	Sewage - House Service Connection Cost	17,500	1,000	2,500	43.75



**Pre-feasibility study for carrying out O&M of Water Supply, Sewerage & Storm Water drains (WSS &SW) on Public Private Partnership (PPP) basis for 6 CMCs in Karnataka: Final Report**

	<b>New Infrastructure</b>	<b>Proposed No. of Connections</b>	<b>Unit Cost as per NKUSIP in Rs.</b>	<b>Unit Cost as per consultant's inputs in Rs.</b>	<b>Total Investment in Rs. million</b>
<b>Total</b>					<b>82.25</b>

Source: NKUSIP CLIP Report & Inputs from DPR consultants

Apart from the above-mentioned O&M expenses, a private O&M operator would have its initial investment like procurement of equipments for maintenance, communication instruments and vehicles for transportation to carry out the O&M operations and is estimated to be around Rs.1.00 million and monthly office administrative expenses like rentals of office space, salary of administrative office staff and other office over heads is estimated to Rs. 0.69 million per annum.

**Table 2-27: Administrative Expenses of the O&M Operator**

<b>Office expenditure of the O&amp;M Operator</b>	<b>Rs. Per Month</b>	<b>Rs. Million per annum</b>
Rentals/month	10000.00	<b>0.12</b>
Increment in office rentals		5%
<b>Office Staff Salary and Overheads</b>		
Salary of Manager	15000.00	0.18
Salary of Office technical Assistant	7500.00	0.09
Accounts officer	10000.00	0.12
Office Attender	5000.00	0.06
Overheads	20000.00	0.24
<b>Total</b>		<b>0.69</b>
Increment in salaries		10%

### 2.9.7 Other Assumptions:

It is assumed that the cost due to depreciation of assets would be at the rate of 0.02% (CPEEHO) of the total estimated O&M expenditure per annum. Cost of collection of water charges is assumed to be Rs.10.73 for every Rs.1000/- collected as per cost for cost of collecting property tax and water cess (CLIP Report).

### 2.9.8 O&M Revenue Income:

As discussed earlier, the revenue income from water supply & sewerage are assumed only from the properties with HSC and based on the existing tariff rates of GoK. As provision of new HSC connections would be part of the O&M services. The existing new water supply connection charges of Rs.1850 (Per Domestic Connection) & Rs.3000 (per Commercial Connection) and new sewage connection charge of Rs.1000 per connection would also be considered as part of the Revenue income of the operator.

### 2.10 Financial Viability for PPP mode of O&M for Hospet CMC:

The preliminary financial analysis carried out based on the above-mentioned key assumption illustrates that the O&M expenditure for the year 2011-12 would be around Rs. 21.11 million and the Operator has to invest around Rs.82.25 million to provide 17,500 new HSC each for water supply & Sewage. Thus, the total expense of the first year (2011-12) of operation is estimated around Rs.105.17 million. The revenue income through tariff collection (assuming 80% collection efficiency) for the same year would be only



Rs.13.70 million as the income from the additional new connections would start only from the second year. Thus, there is a deficit of Rs.91.47 million for the year 2011-12, which is around 667.52% of the revenue income for the first year.

During the second year of operations, the operator would get Rs.49.88 million as income from the new connection charges and additional income from water & sewage tariffs from the 17,500 new connections, thus increasing the revenue income to Rs.62.37 million (assuming 80% collection efficiency), with a surplus of Rs. 36.23 million. The revenues for 3<sup>rd</sup>, 4<sup>th</sup> & 5<sup>th</sup> year would remain constant with Rs. 30.33 million with a deficit of Rs.6.15, Rs.10.96 & Rs.16.56 million respectively.

When compared with other towns in the region, Hospet is a economically stronger with industrial, agricultural and tourist activities, has tremendous growth potential and the CMC has better track record of revenue income and collection efficiency. However, the preliminary financial analysis indicates that a PPP mode for O&M of water supply, sewerage and Strom water drains along with establishment of new HSCs at existing tariff levels is not financially viable for Hospet CMC. However, with tariff rationalization and support from GoK in terms of annuity payments, O&M of water supply, sewerage and storm water drainage systems on PPP basis can be made viable.

#### **2.10.1 Assumptions for Viability:**

The preliminary financial analysis also indicates that a 30% increase in the revenue income by increase in tariff rates by 2011-12 and achieving 100% collection efficiency would provide positive cash flows during second and third years. Further, private participation is expected to bring down the overall O&M cost through efficient handling of the system and its is assumed that a PPP mode would reduce the O&M cost at least by 10% of the existing or estimated cost. This would further improve the cash flows.

As discussed earlier, one of the key objective of a PPP in O&M would be to bring down the UFW losses from the current 52% to at least 25 -30%. This reduction in UFW would facilitate CMC to increase its supply, number of HSC connections and also the per capita supply. This reduction in UFW would have a direct or indirect increase in the revenue income, thus providing positive cash flows.

#### **2.10.2 Revenue from reuse of STP water:**

The prime objective of the pre-feasibility is to explore a PPP mode for O&M of water supply, sewage and drainage as one package. Therefore, to make the project viable under PPP mode, revenue income from sale of treated water from STP is also explored. It is estimated that the proposed STP would release 21.6 MLD (assuming 80% of the proposed STP Capacity of 27MLD) of treated water every day. As part of the O&M, the private operator has to maintain and operate the STP; therefore CMC, as a part of the PPP agreement can provide the rights over the treated water from the STP to the private operator. This would facilitate the operator to generate income by sale of the treated water to industrial areas, construction industries, landscape maintenance and for other non-domestic consumptions. The Bellary example indicates that treated water is sold at Rs.20/ Kilo liter; however, a nominal rate of Rs.5/- per Kilo liter of treated water is assumed for projections at Hospet. Thus, the income which can be generated by sale of treated water would be around Rs.39.42 million per annum. Hospet being an industrial city, there is potential demand for treated water and the same needs to be examined as a part of a detailed feasibility study.

Assuming 75% realization, the operator can generate Rs 29.5 million/ annum. This additional income would make the project totally viable under PPP mode, even by retaining the current tariff rates.

## **2.11 Recommendations to make a PPP of O&M viable in Hospet CMC:**

The following are some of the recommendations which might make a PPP mode viable:

1. Increase in water tariff rates by 2011-12 or Introducing metered tariff collection for all consumer categories
2. Improving collection efficiency to 100%
3. Increasing the existing sewerage charges

The CMC has to carry out the above-mentioned recommendations in order to make the O&M cost of urban services self sustainable. Especially in water supply, the current tariff of Rs. 55 per month for a average monthly consumption of 17.48 kl (assuming 98 lpcd and average house hold size of 6) accounts to a very low tariff rate of Rs. 3.15/kl. With improvement and expansion plans, the per capita consumption is proposed to be increased to 135 lpcd, which would account to a tariff collection of only Rs.2.44/kl. It is also observed through secondary data collection that each HSC serves to more than one household and therefore the average consumption level per HSC is around 40.50 kl per month against 17.64 kl considered for estimation, therefore the actual tariff collection is only Rs.1.36/kl. Considering these facts, it is recommended to carry out the above-mentioned measures in order to make the CMC's O&M component financially self sustainable, which would also enhance viability of a PPP mode.

## **2.12 Project Structure & Way Forward**

### **2.12.1 Option - 1**

With existing tariff structures, O&M of water supply, sewerage and storm water drains on PPP basis in Hospet CMC can be made viable only by packaging the sale of treated water from STP. But, the actual demand for treated water and viable rates for the same need to be studied for exploring the viability. The following can be considered as the prime components of Project structure.

- The water supply, sewage & drainage assets would be operated & maintained by a private operator for a period of 5 to 8 years
- Provision of 17,500 new water supply HSCs and 17,500 new sewage HSCs within one year from the date of lease agreement and O&M of the assets (water supply, sewage & storm water drainage) for a period of 5 to 8 years as per the Key Performance Indicators (KPI) (as indicated in section 2.12.2) would be the Minimum Development Obligation (MDO) of the project.
- The CMC would provide the Private Operator the right to sell the treated water from the STP, starting from the second year of the agreement. The Operator shall quote an annual amount payable to the CMC for the same which shall be the bid-parameter.
- CMC shall collect the monthly tariff charges/user charges for the services from the consumers/households and fully remitted to the Operator.
- The private operator shall compulsorily recruit at least 25% (% shall be fixed based a detailed assessment) of the existing O&M staff under water supply & sewerage divisions of the CMC. If possible, the remaining staff under Water Supply & Sewage divisions shall be transferred to other departments within the CMC or shall be assigned to monitor the KPI of the O&M carried out by the Private Operator. If transfer is not viable then the remaining staff also shall be temporarily deputed to the O&M operator and the operator would remit the CMC staff salary to

the CMC. This arrangement would mutually benefit both CMC & the O&M operator as CMCs staffs would get benefited in terms of their technical & technological capacity building and O&M operator would get benefited as the CMCs staff would have the best knowledge of the system, network & the town.

**Benefits:**

This option would enable the city to get good O&M services, without the CMC having to invest for the new HSCs. This would bring down the O&M cost and the CMC would generate income through the annual payments made by the operator for the right to sell STP water. Also, the operator would aim to achieve the KPI as its returns are directly linked to the monthly tariff collection and quantity & quality of the STP water.

**Risks:**

Risks include Force Majeure events like droughts; earthquakes etc. due to which the water- supply might get affected. These risks shall be resolved through a detailed compensation mechanism as a part of the agreement.

- The operator risks also include poor tariff collection or lack of demand for treated water. The operator has to factor the same in its bid.

**Initiatives Required from CMC/GoK:**

- CMC should carry out an audit of the existing assets of the water supply, sewage and storm water drainage components/infrastructure which would be handed over to the O&M operator for O&M, in order to provide details & inventory of the existing components and the status of the assets.
- CMC should enforce stringent regulations to curb illegal and unauthorized supply of water within the CMC limits and also implement norms which would restrict and regulate the number of bore holes/bore wells permitted within certain surface area limits or within a ward.
- CMC also should implement norms restricting the use of potable water for construction activities and landscape uses.
- CMC should appoint an Independent Engineer for frequent monitoring of the KPI of the agreement

**2.12.2 Alternative Options/Performance Based Management Contract (PBMC)**

However, if there is no sufficient demand for sale of the treated water from the STP in Hospet:

- O&M can be carried out through other PPP & PSP modes, through a combination of the following measures:
  - Financial support from CMCs/Govt. of Karnataka by means of Annuity payments
  - Phased increase in water and sewerage tariff across all consumer categories
  - Introduction of meter based tariff rates

- PSP for O&M of systems can also be explored through Management Contract model
- The O&M contract shall be structured factoring in performance based incentives and penalties and lowest Annuity payment basis from CMC/GoK (i.e. PBMC)
- Term of a PBMC contract, including installation of HSC, can be for a maximum period of 5 years, including the HSC installation period.
- Installation of HSC shall be completed within 1 year.
- The contract can be structured based on annuity payment and the annuity amount shall be arrived based on the actual O&M expenses. The O&M expenses quoted can be the first bid parameter, with a weightage of 70%.
- Price quoted for installation of the HSC shall be the second bid parameter, with a weightage of 30%.
- The bidder shall be selected based on the lowest overall evaluated bid after taking into account the first and second Bid Parameters, as per their respective weightages mentioned above.
- The following **Key Performance Indicators (KPI)** may be considered to monitor the performance of the O&M contractor, with appropriate modifications/changes/fine-tuning while structuring the project in detail:
  - a. **Quality of water distributed to the consumers.**

Achieving the best drinking water quality, as recommended by WHO/CPEEHO standards, can earn the O&M operator a bonus of up to 5% of the Fixed annuity amount. On the other hand, a penalty of 5% for water quality supplied below the recommended quality standards can be levied.
  - b. **Reduction in the overall UFW from existing 52% to a maximum range not exceeding 25 to 30%.**

A reduction up to 25% within the second year of operation can earn the operator a bonus of 10% and reduction of up to 20% can earn a bonus of 15%. If the UFW is not reduced below 40% then the operator would face a penalty up to 10%.
  - c. **Quantity and quality of the treated water from STP:**

Treated STP water with a quantity of at least 80% of the installed STP capacity and with a water quality of BOD level less than 12 can earn the operator a bonus of another 5%. A BOD level above 15 can face a 5% penalty.
  - d. **Minimizing system-downtime:**

Minimizing system-downtime and time for repairs & maintenance with minimal impact on water supply timings, duration, quantity and quality of supply & treatment, assessed as per consumer feedback, would provide the operator an additional bonus of 5%.
  - e. **An overall reduction in the O&M cost:**

An overall reduction in the O&M cost of the existing infrastructure components/network of water supply, sewage and storm water drains upto 10% (especially reduction in consumption of electricity) can earn the operator a bonus of 5% of the quoted annuity amount. An increase in O&M cost exceeding 10% and above can have a penalty of 5%.

- Thus, the operator can achieve maximum additional bonus of 35% of Annuity payments per annum based on his performance. Consistency in O&M performance by achieving 30% & above bonus for 2 consecutive years shall provide an additional bonus of 10% at the end of the contract term. Further, the bonus payment shall be paid only at the end of the 3<sup>rd</sup> year and the 5<sup>th</sup> year. But the penalty if any shall be deducted every year.
- The annuity payment would start from the second year.
- CMC shall appoint an independent engineer to monitor the Performance indicators of the contract.

*The above-mentioned Key Performance Indicators (KPI), incentives & penalty clauses are indicative and the exact quantification of the indicators can be determined only through a detailed audit and assessment of the services and its components and also through a detailed financial analysis as part of a detailed project report preparation.*

## 3 Raichur

### 3.1 Raichur City Profile:

Raichur, the headquarters for Raichur district is located at a distance of 409 kms from the state capital, Bangalore. Raichur City Municipal Council has population of 205,634 persons as per census 2001 and 252,115 (2008). Raichur is located between two rivers viz., Tungabhadra and Krishna, flowing at a distance of 20 and 30 kms respectively from the city. A Thermal Power Station with six units of 210 MW each is also situated in the city. In addition to extensive agricultural development around the city owing to the presence of Tungabhadra canal, there also exist many small-scale steel industries in and around the city.

#### Latitude, Longitude & Altitude:

Raichur is situated at 15° 12' North latitude and 77° 21' East longitude and at an altitude of 400 meters above mean sea level

#### Connectivity:

The city is well connected by road to Bangalore, Mumbai, Chennai, Hyderabad and Delhi and by rail through Bangalore - Hyderabad and Bombay – Chennai broad gauge lines.

#### Climate:

The town falls under the arid region and the climate is characterized by dry weather with temperature varying from maximum 43° C to minimum 20° C. The town experiences scanty rainfall as it lies in the dry tract of the district; the annual rainfall being 638 mm which is mostly confined from June to November.

#### CMC Jurisdiction:

The City Municipal Council's (CMC) jurisdiction extends up to an area of 50.70 sq. Km, with 35 wards.

### 3.1.1 Demography

#### Population:

Raichur population has grown remarkably from 169,488 in 1991 to 205,634 in 2001 indicating a decadal growth rate of 36.03 % and compounded annual growth rate is 1.95% for 1991-2001. As per the information gathered from CMC and the SPAN consultants, the Raichur's Population has grown to 2,52,115 by 2008. The increase in population of Raichur can be attributed to the presence of large number of small-scale industries. The growth is also attributed to trade and commerce since the town has become a focal point due to its locational advantage and its linkages with other towns and districts.

#### Household Size:

The total number of households has increased from 30,739 in 1991 to 37,500 in 2001 and 37918 in 2008. As per census 2001 the household size for Raichur is 5.4, which is well below the national average household size of 6.3. As per Detailed Project Report for Water Supply, Raichur Town prepared by SPAN consultants, projects a population of 271,390 (2011) which is considered for this study.

### 3.1.2 Economy

Owing to its connectivity, Raichur has become the focal point for trade and commercial activities in the region. There are eight large and a medium scale industry in the taluka. The town has good mix of

industrial and agricultural base with cotton and rice exported to other parts of the country. Raichur town has the most prestigious and profit making power generation unit, Raichur Thermal Power Station (RTPS) with 6 units each of 210 MW capacity which is running almost 100 % capacity.

**Industries:**

Raichur is one of the three districts in Karnataka identified by Government of India for the establishment of growth center. Large, medium and small-scale industries operates in Raichur town. Karnataka Industrial Area Development Board (KIADB) has also developed an industrial area in Raichur. Karnataka Small Scale Industrial Development Corporation (KSSIDC) developed an industrial estate with 53 sheds , out of which 17 units are working.

In Raichur Taluka, there are about 2,200 small-scale industrial units with a total investment of Rs. 38 crores providing employment to around 9,890 persons. Raichur District is considered as a biggest market in cotton and oil seeds, about 70 % of the area were under cotton during 1970 to 1990. This leads to setting up of large number of cotton spinning, ginning and pressing industries. .

**3.1.3 Land Use Plan/CDP, Regulations:**

According to the 1995-land use statistics, residential area occupies around 51 % of the total developed area with density of 340 persons per hectare and industrial area around 10 %. The following table provides a comparison of detailed break-up of various land uses of Raichur CMC as per land use 1995 and existing scenario (2008).

**Table 3-1: Land Use Distribution**

Land Use	1995		2008	
	Area in Ha	Composition %	Area in Ha	Composition %
Residential	502.17	50.89	1933	41.26
Commercial	58.31	5.91	271	5.78
Industrial	99.11	10.05	625	13.34
Public & Semi Public	120.69	12.23	472	10.07
Recreational/ Open space	45.72	4.63	471	10.05
Circulation	160.78	16.29	913	19.49
Total	<b>986.78</b>	<b>100.00</b>	<b>4685</b>	<b>100.00</b>
Hillocks/Water Sheet /others	77.07		1149	
Vacant Lands	352.15		300	
<b>Grand Total</b>	<b>1,416.00</b>		<b>6,134.00</b>	

**Residential Use:** The percentage of the total developed area in the town area under residential use has decreased from 51% to 41% from the year 1995 to 2008. The intensity of development varies from place to place.

**Commercial Use:** The area under the commercial use is static between 1995 to 2008 which is around 6% of the developed area in the town. Raichur is one of the important centers for production of cotton in South India and a major trading centre for groundnut, paddy, rice and other agricultural products.

**Industrial Use:** The percentage of the total developed area in the town under industrial use has increased from 10 % to 13 % from the year 1995 to 2008. When compared to the available resources for





industrial development in and around the town, land under industrial use is less.

### 3.2 Existing UWSS&SD – Supply/collection System & Coverage

#### 3.2.1 Existing water supply

Raichur city has three piped water supply systems, one drawing water from Tungabhadra Left Bank Canal and two drawing water from Krishna River.

**Table 3-2: Water Supply Overview**

Description	Unit	Quantum
Total area of Raichur	Sq. km	50.70
Total no. of Households (2008)	Nos.	37,918
Households covered by House Service Connections (HSC)	Nos	17,671
% served by HSC	%	46.60
Property Tax Assessments with Service Connections	%	53.55
Gross water supply (Ground and Surface)	MLD	42.27
Frequency of Supply	Daily	one hour
Present Supply (2008)	Lpcd	167

Source: KUIDFC

In addition, 360 bore-wells are also in use. Some of them have been fitted with power pumps and connected to the local distribution network. They yield about 2.27 MLD. Thus, the total supply to the town is **44.54 MLD**

**Table 3-3: Capacity and Supply from Existing Water Supply Sources**

Source	Installed Capacity (MLD)	Actual Supply (MLD)
Old Krishna River (Deosugur Head Works) Water Supply System.	4.54	2.27
Tungabhadra Left Bank Canal Water Supply System	18.16	10.00*
New Krishna River Water Supply System.	40.00	30.00**
<b>Total</b>	<b>62.70</b>	<b>42.27</b>

Source: Raichur CMC/KUWSDB

\* Capacity limited for inadequate pumping arrangements at present.

\*\* 10 MLD provided to industrial growth centre.

Note: - WTPs are designed for a total of 62.70MLD (Old Krishna 4.54 MLD, New Krishna 40.00 MLD and Tungabhadra Left Bank canal 18.16 MLD)

#### Coverage:

Piped water supply is made available through 17,671 domestic, 240 non-domestic and 95 industrial connections and 3468 public stand posts. House connections account for 46.60 % of the 37,918 residential households while non-domestic connections are mere 2.05 % of the commercial properties. Population covered by the house connections is likely to be of the order of about 117493, while another 105634 population is reported to be using stand posts. Thus 223,127 persons, which are about 89 % of total population, have access to the piped water supply system.

**Table 3-4: Consumer Connections Details**

Type of connection	Total(nos)
Domestic connections	17,671
Non domestic / commercial connections	240
Industrial connections	95
<b>Total</b>	<b>18,006</b>

**Per Capita Supply:**

Presently the total quantity of water supplied in the city is about 42.27 MLD excluding ground water sources which works out to be 167 lpcd including system losses for the present population of 2, 52,115. This is the gross supply at water treatment plant. However in general the supply level in the city is quite satisfactory.

**Duration of Supply:**

Water is supplied daily for about an hour.

**Pressures:**

Pressures are reported to be low, due to old and inadequate size pipeline and limiting supply duration to one hour.

**Krishna River (Deosugur Head Works) Water Supply System**

This is the oldest system, which was commissioned in year 1936. It was designed to supply 2.27 MLD to 30,000 populations. A booster station at Yeramarus and two reservoirs were added in the remodeling scheme implemented in year 1967. Deosugur system currently supplies water to all the industries, Ekklapur village and one GLSR at Ganga Nivas.

**Raw Water Supply Works:**

The source works are located on Krishna River and are known as Deosugur head works. They consist of one circular intake well, Connecting main, Jackwell, with an overhead rectangular pump house with galvanized iron sheet roof and Low level pumping arrangement. Water from the head works is pumped to the water treatment plant through a 400 mm diameter CI pipeline laid for a length of 1.20 km. Water from low level pumping station is pumped to the Jackwell through a 250 mm diameter CI pipeline.

**Water Treatment Facilities:**

The plant, with 4.54 MLD capacity, has following units;

- (a) Two rectangular pre settling tanks in two streams, each with two compartments.
- (b) Mixing channel with baffles and alum dosing.
- (c) Two sedimentation tanks, with mixing channel and chemical dosing from two alum tanks.
- (d) Three filter beds.
- (e) Clear water sump of 1.8 ML capacity.

- Valve, gates, flash mixer motors are badly damaged. Chlorination system and filter control system are not working properly. Electrical equipment like, panel boards, switch gears, wiring needs rehabilitation. No installation flow of measuring devices
- No proper treated water quality checks and laboratory facilities are available.

**Clear Water Pumping Station:**

The pumping station is located in the water treatment plant premises. Known as high level pumping



station, it pumps water to the Intermediate Pumping Station at Yeramarus by 100 Hp motor.

**Clear Water Transmission to IPS:**

This main is a 400 mm diameter, 15 km long cast iron pumping main. It transmits the pumped water from water treatment plant to the Intermediate Pumping Station (IPS).

**Intermediate Pumping Station:**

The intermediate pumping station is located at Yeramarus. It pumps water mainly to the industries and also to one GLSR at Ganga Niwas in the city.

**Clear Water Pumping Main from IPS:**

The pumping main from IPS to Ganga Nivas low level GLSR is a 400 mm diameter cast iron pipeline. Major supply from this main goes to the small-scale industries and only about 10 % flows to the Ganga Nivas GLSR. It also supplies water to Eklaspur village OHT of 50,000 gallons.

**2<sup>nd</sup> Tungabhadra Left Bank Canal Water Supply System ( Rampur)**

The scheme was developed in year 1976 for the supply of 18.16 MLD water from Tungabhadra Left Bank Canal (TBLB). During summer only 10 MLD water is being drawn from this source due to limited storage in the balancing reservoir due to inadequate pumping capacity to utilize the 15 days opening of the canal to fill up the impounding reservoir. The supply is mainly to the town for the domestic use. The components of the source works are;

- (a) A rectangular RCC Framed One permanent and two temporary pump houses, one of galvanized iron sheets and other of bamboo mats.
- (b) 600 mm CI pipeline from canal intake to the sump,
- (c) 6.5 x 4 m size sump and
- (d) Four pumps installed in the pump house for pumping water from the sump to the balancing reservoir
- (e) Three pumps installed on the bank of canal for pumping to the sump.
- (f) One pump installed outside the pump house
- (g) One 250 KVA transformer.

**Raw Water Pumps:**

Two 20 HP pumps and one 25 HP pump are used for pumping the canal water to the balancing reservoirs.

**Raw Water Pumping Main:**

Raw water pumped from the canal flows to the impounding reservoirs through following pumping mains,

- (a) 600 mm diameter 30 m long cast iron pipeline from pump house.
- (b) 150 mm diameter PVC main laid for a length of 30 m from the pump house.
- (c) Three 150 mm diameter PVC mains 75 m long, to carry water from the canal/directly to the impounding reservoir.

**Water Treatment Plant:**

The plant is designed to treat 18.16 MLD water. It is a conventional coagulation, sedimentation, filtration, chlorination process, with following units;

- (a) Inlet chamber and raw water channel.
- (b) Flash mixer with 2 HP motor operated stirrer.

- (c) Clariflocculator with two 1 HP motor operated flocculators and 2 HP motor operated scraper bridge.
- (d) Four rapid sand filter beds.
- (e) One 50,000 gallons capacity wash water over head tank.
- (f) Two chlorinators.
- (g) Chemical house with alum tanks.

**Clear Water Pumping Station:**

Treated water is pumped to the service reservoirs in Zone 3 of the town distribution system, through following units.

- (a) Clear water sump of 1.36 ML capacity.
- (b) Pump house constructed by the side of the sump.
- (c) Two centrifugal Kirloskar make pumps of 400 cum/hour discharge against 70 m head and coupled to 150 HP motors.
- (d) One centrifugal pump of 850 cum/hour discharge against 70 m head and coupled to 350 HP motor.
- (e) Three 200 KVA transformers.

**Clear Water Transmission:**

Clear water is pumped to the reservoirs in Zone 3 through following CI mains

**3<sup>rd</sup> Stage Water Supply with Krishna River as Source**

**Raw Water Supply Works:**

Krishna River is the source of the augmentation. The source works are located, upstream of the raw water intake of Raichur Thermal Power Station (RTPS). Water is released from the Narayanpur dam on Krishna River (in Andhra Pradesh) for the power plant. Karnataka Power Development Corporation is planning to construct a barrage on Krishna River on the downstream of RTPS intake works for steady supply of water to the thermal power plant. The river stretch near the intake works of Raichur town is thus a very reliable source of water supply.

**Raw Water Pumps:**

Two vertical turbine pumps are installed in the jack well.

**Raw Water Pumping Main:**

Diameter is 800 mm and total length is 10,800 m out of which 6,340 m pipeline is of mild steel pipes and 4460 m pipeline is of PSC pipes (12 kg/cm<sup>2</sup> pressure). An air vessel is installed near the head works for surge control.

**Water Treatment Plant:**

The plant is located in the Industrial Growth Centre. It is designed to treat 40 MLD water for supply to the city. 10 MLD water will be supplied to the Industrial Growth Centre. The water treatment plant has following units;

- i. Aeration fountain, 2.5 m diameter and with three cascades.
- ii. Raw water channel, 7.55 x 1.10 x 0.50 m standing water depth (SWD) with provision for flow measurement but without the meter.
- iii. 2.50 m diameter, 3.50 m SWD flash mixer.
- iv. Bypass channel of 12.75 x 1.10 x 0.50 m size.
- v. One 44.75 m diameter and 4.17 SWD clariflocculator, with four flocculators run by 2 HP motors and scraper bridge operated by 1.5 HP motor.

- vi. 492 sqm filter house, accommodating eight 5.57 x 6.37 m size filter beds, four on each side with central filter gallery and filter annexe building of 45 sqm size.
- vii. Two storeyed chemical house, with two alum tanks.
- viii. Overhead wash water tank of 1 ML capacity.
- ix. Chlorination plant.

**Clear Water Pumping Station:**

Treated water is pumped from WTP to the Intermediate Pumping Station (IPS) through 600 HP 3.3 KV motors

**Clear Water Pumping Main to IPS:**

This main is 10,920 m long 600 mm diameter pipeline

**Intermediate Pumping Station near Civil Hospital:**

These pumping station pumps water to the various service reservoirs in the town

**Clear Water Transmission:**

Two zones receive supply from the new Krishna River system through the transmission mains from IPS.

**Distribution System**

**Service Reservoirs:**

The present supply to Raichur is made through 26 service reservoirs (18 Nos ELSR, 8 Nos GLSR) having a total capacity of 17.45 ML, while some portions of the city are directly fed from the transmission mains.

**Distribution Network:**

The distribution network consists of about 175.75 km of pipe lines of heterogeneous material such as PVC, GI and RCC with diameters ranging from 50 mm to 300 mm. The present distribution network consists of some very old pipelines that have to be replaced so as to improve the supply by lowering losses due to leaks

**3.2.2 Existing Sewerage System**

Sewerage system provided in Raichur town was designed to cover 150,000 population and for a sewage flow at 135 lpcd. The sewer network covers only about 40 % of the CMC area.

**Sewer Network:**

Sewers of sizes varying from 150 mm to 900 mm have been laid for a total length of 85 km. About 3,500 manholes are provided on these sewers. Stoneware pipes are used for 150 and 225 mm diameter sewers, while RCC NP2 and NP3 class pipes are used for 300 to 900 mm diameter sewers. 55 km sewers were laid in year 1971, while another 30 km sewer were laid in year 1991. The system is divided in four drainage districts, as under.

(a) Drainage District A. This district covers Station area, Goods shed, part of Railway colony, I. B. colony etc. The sewage generated in this zone is conveyed to the sewage treatment plant near Hosur village, through 300 mm diameter and 625 m long RCC pipe sewer.

(b) Drainage District B. It covers inner Fort area of the Androon Quilla and Nijalingappa colony. The main sewer of 450 mm diameter conveys the sewage flow in the district to 900 mm diameter outfall sewer.

(c) Drainage District C. Major part of the city, such as Beroon Quilla, Bruhasthwar pet, Somwar pet,

Mangalwar pet, Thimmapur pet, Zahirabad, Maddi pet, Maktha pet, Commerce College and Jawahar Nagar area, are covered in this district. The sewage is collected in a 750 mm diameter main sewer and conveyed to the outfall sewer.

(d) Drainage District D. The zone covers Gunj area, part of Maktha pet, Civil Hospital area and Police quarters etc. Main sewer of 600 mm diameter joins the 900 mm diameter outfall sewer.

(e) Sewage collected from districts B, C and D flows to another treatment plant located near Ekalspur village at 1.90 km from the town through 900 mm diameter RCC sewer laid for a length of 2 km.

**House Service Connections:**

As per 2004 NKUSIP Clip report there was 7,500 sewer connections in use. 6,000 of them are domestic, 1,300 are non-domestic and 200 are the industrial connections. 45 public conveniences were also connected to the sewer network. Presently there are 7,580 connections in use.

**Sewage Treatment Plant:**

Two sewage treatment plants with total capacity of 20.50 MLD are provided near Hosur village and Ekalspur village. The plant at Hosur was designed to receive sewage from district A, while the other plant was designed to treat sewage from districts B, C and D. Both plants are waste stabilization ponds.

(a) Hosur pond - 1 X 100 X 60 X 1.20 m size (18.5 MLD)

(b) Ekalspur ponds - 472 X 270 X 1.20 m size (2 MLD)

**3.2.3 Drains**

The drainage system in Raichur town consists of five primary drains, which run through the town in east-west or south-north direction, and tertiary drains which are built around these primary drains.

**Table 3-5: Existing Drainage system**

<b>Drain Type</b>	<b>Length Kms</b>	<b>Distribution %</b>
Open drains (Pucca)	44.00	80.44
Closed drains (Pucca)	7.50	13.71
Open drains (Kutchra)	3.20	5.85
Subtotal (Drains)	54.70	100.00
Primary drain channels	10.50	

**Primary Drains:**

There are five principal natural drains, which flow through the town.

(a) Nallah No. 1. This is a lined drain, which starts at Katkalova ELSR, passes along Sheshmal theatre and terminates in Aam Talav. The direction is from east to west. The length of drain is about 1.50 km and width is from 4 to 5 m. The lining has been damaged. Sidewalls need to be raised. Nallah is silted to a large extent.

(b) Nallah No. 2. This nallah, flowing in south-north direction starts from hillock on the south side of the Aam Talab. It is a natural drain, carries wastewater from SBH colony and contains lot of trees, vegetation and debris. The length is about 1 km and width is 10 to 12 m.

(c) Nallah No. 3. This is a built up drain, starting from Bombay Company and Farooque Oil mill and flowing through Harijanwada, Maddipet, Basavannabavi, Goushala road, Siya talab and terminating into Manchalapur tank. The width is 4 to 5 m and length is about 3 km. The direction of flow is from east to west. The lining is damaged and nallah bed is silted. It is full of trees and vegetation and carries wastewater of the town.



(d) Nallah No. 4. Overflow of Aam Talav goes to Khandak, flows along Basaveswara circle, crosses the railway line, joins Nallah No. 3 and terminates into Manchalapur tank. The general direction of flow is from south to north upto Basaveswara circle and to northwest afterwards. The width of drain is 10 to 12 m's', length is 1.50 km. It mainly carries natural rainwater and is full of trees, vegetation and debris.

(e) Nallah No. 5. This nallah starts from Amit Ali Rice Mill, flows through Brihasthwar pet on Gunj road to Sukhani colony and joins Nallah No. 3 before the railway line. The direction is from southeast to northwest. The nallah is lined upto Gunj road and is in its natural form beyond. It is 1.5 km long and about 3 m wide. The nallah bed is full of wastewater; debris plastic bags etc and is silted. The lining has also been damaged.

### **Secondary and Tertiary Drains:**

The drains are provided on both sides of the roads. All the drains are rectangular in shape. Secondary drains are constructed in stone masonry and concrete. Tertiary drains are smaller in size. The kutcha drains are irregular in shape and prone to damage by the traffic.

### **Coverage:**

Drains serve the dual purpose of carrying storm water in rainy season and wastewater in other seasons. It is, therefore, necessary to provide drains on both sides of the road. The total length of the roads in the town is 171.50 km. The drains are required for a total length of 342 km. Actual length of built up drains is 51.50 km. They, thus, cover only 15 % of the roads. The length of both pucca and kutcha drains is 54.70 km, which shows coverage of only 19.61%.

## **3.3 Existing O&M Structure of the CMC for Water Supply, Sewage and Drains**

City Municipal Council takes care of the Operation and Maintenance (O&M) of Water Supply, Sewerage System, Drainage, Solid Waste Management, Roads etc.

### **O&M of Existing Water Supply System**

The following table illustrates the staff details of the CMC's O&M team for water supply system. In all about 142 persons are employed for operation and maintenance of the systems.

**Table 3-6: Staff Details of Water Supply O&M in CMC**

Details of Staff Deployed for Water Supply System Management					
Category	Old Krishna River System	New Krishna River System	Tungabhadra Canal System	Distribution	Bore Well
Pump operators and helpers					
Permanent	15	15	3	20	-
On contract	1	15	17	34	8
Equal pay equal work	-	3	3	7	-
Panchayat	1	-	-	-	-
<b>Total</b>	<b>17</b>	<b>33</b>	<b>23</b>	<b>61</b>	<b>8</b>

### **Preventive Maintenance:**

A formal maintenance manual is not prepared. However, the operating staff carries out the preventive maintenance of the electrical and mechanical equipment of the pumping stations such as pumps, valves, piping, motors, breakers, panel boards, meters, capacitors, cables etc. Maintenance of flash mixers,

flocculators, clarifiers, piping valves, dosing equipment etc of the water treatment plants is also taken up by the staff. The maintenance of civil works, such as painting and minor repairs, is attended to, as and when required.

#### **Maintenance Facility:**

(a) **Routine Maintenance and Small Repairs-** Repairs such as routine checking of electrical and mechanical plant and equipment, cleaning connections, changing contacts, changing of oil in transformers etc are done by the CMC staff. The spares required are drawn from the stores or are purchased locally.

(b) **Special Repairs-** Special repairs required for electrical, mechanical equipment or for civil structures are done through private workshops and through contracts.

#### **Water Quality Monitoring:**

(a) **Raw Water Quality-** Bacteriological quality of raw water is analyzed once in three month in District Health Laboratory. Even turbidity is not measured on daily basis, and no equipment like turbidity rod or turbidity meter is in use.

(b) **Quality of Water Supplied to Consumers-** There is no practice of testing the residual chlorine or bacteriological quality of the water supplied to the consumers on regular basis. Only when a complaint is received about the contaminated supply, residual chlorine and bacteriological quality of water are analyzed.

#### **Records:**

(a) **O & M Manual-** A formal O & M manual is not prepared for the installations of the water supply system.

(b) **Record at Pumping Stations and Water Treatment Plant-** Logbooks are maintained at each pumping station and water treatment plant.

### **3.3.1 Operation and Maintenance of the Existing Sewage system:**

CMC operates and maintains the system.

(a) **Staff-** One junior engineer, four work inspectors and 35 scavengers are employed for maintenance.

(b) **Maintenance-** The routine maintenance includes cleaning the sewers and blocked manholes. The work is done manually, using bamboos and one rodding machine. Repairs or replacement of sewers is done through contractors.

(c) **Complaints and Redressal-**Complaints, related to overflowing manholes, blockage of sewer lines etc, are received at the call centre in the CMC office and then conveyed to the UGD section. The repairs are done in a day under the instructions of the junior engineer and the work inspectors. Compliance is reported back to the call centre. Register of complaints and their compliance is maintained.

### **3.3.2 Storm Water Drains**

Maintaining the storm water drains are also responsibility of CMC, but maintenance of drains is not a regular phenomenon and not given importance.

#### **Problem Areas:**

- i. Many areas get flooded in rainy season due to inadequate drains or overflowing main drains.
- ii. **Secondary Drain Links-** Many low lying areas in the town cannot be effectively drained as there are no proper outlets or secondary drains connecting them to the primary channels.



- iii. **Unhygienic Condition-** While there are some sewer lines in the town, most of the areas are still dependent on the roadside drains for carriage of wastewater. In the absence of well constructed drains in many areas, waste water flows along the streets and accumulates in low lying areas. Use of the open channels for dumping the garbage and plastic bags affects the draining capacity of these channels. The open cess pools formed in the low lying areas pose a serious threat to the health of the citizen, besides polluting the ground water and presenting very ugly sights.
- iv. **Disposal of Domestic Sewage-** In the absence of a sewerage system covering the entire town and inadequate sanitation facilities, a large amount of the domestic sewage is let into storm water drains. This is resulting in pollution of the public water bodies such as river and canals, as the waste runoff leads to these water courses.
- v. **Silting and Solid Waste Accumulation-** Silting and uncontrolled solid waste dumping cause blockage and stagnate storm water/wastewater runoff. Consequently, storm water drains choke and overflow into neighboring areas.

### 3.3.3 Constraints of Existing O&M system:

The CMC is operating and maintaining the system, with the staff employed on the permanent roll, on daily wages or through contract. While a complete overhaul of the present O & M set up may be ideal, it is not practical, on account of the following constraints.

(a) A large number of people are already employed on this job and their termination or redeployment elsewhere will not be possible. Most of the staff, engaged in actual operation and maintenance needs to be imparted training. (b) The O & M of water supply or sewerage system gets lower priority, due to which there is difficulty in getting required staff, material and funds in time. This results in deterioration in both operation and maintenance.

## 3.4 CMC's Revenues and Expenses & Cost of O&M of municipal Services

### 3.4.1 Summary of Municipal Finances

Table 3-7: Summary of Municipal Finances

Item	1998-99	1999-00	2000-01	2001-02	2002-03
	Amount in Rs. million				
<b>Revenue Account</b>					
Revenue income	46.24	58.80	62.25	57.71	67.37
Revenue expenditure	42.31	49.43	54.88	55.59	57.82
Surplus/Deficit	3.93	9.37	7.37	2.11	9.55
<b>Capital Account</b>					
Capital income	2.97	5.90	4.48	2.03	276.69
Capital expenditure	8.10	14.15	9.85	4.19	9.72
Surplus/Deficit	(5.13)	(8.25)	(5.37)	(2.16)	266.97
Fiscal Status	(1.20)	1.12	2.00	(0.05)	276.52
<b>Debt &amp; Suspense Account</b>					
Extraordinary income	5.87	6.23	4.71	3.51	2.03
Extraordinary expenditure	5.87	6.13	5.32	3.30	-
Surplus/Deficit	-	0.10	(0.61)	0.21	2.03
Overall Fiscal Status	(1.20)	1.22	1.39	0.16	278.54

The Revenue Account comprises of recurring items of income and expenditure. These are essentially all financial transactions related to the day-to-day operations of the municipality. Table 3-8 summarizes the status of the Revenue Account.

**Table 3-8: Revenue Account Status**

Description (Rs. Million)	1998-99	1999-00	2000-01	2001-02	2002-03
<b>Revenue Income</b>					
Own Source/Tax	6.41	8.53	7.76	7.03	8.49
Own Source/Non Tax	15.19	15.88	17.35	16.90	25.87
Assigned Revenue	0.93	2.00	2.46	3.09	3.12
Revenue Grants	23.71	32.40	34.68	30.69	29.90
<b>Total- Revenue Income</b>	<b>46.24</b>	<b>58.80</b>	<b>62.25</b>	<b>57.71</b>	<b>67.37</b>
<b>Revenue Expenditure</b>					
Establishment	21.74	29.32	32.49	33.66	32.56
Operation and Maintenance	20.57	20.11	22.39	21.93	25.27
Debt Servicing	-	-	-	-	-
<b>Total- Revenue Expenditure</b>	<b>42.31</b>	<b>49.43</b>	<b>54.88</b>	<b>55.59</b>	<b>57.82</b>
Revenue Account Status	3.93	9.37	7.37	2.11	9.55

**Own Sources/Tax** - This item head comprises of income sourced primarily from consolidated property tax (general purpose tax, water tax, lighting tax and scavenging tax) and professional tax. On an average, through the assessment period, own source/tax income constitutes 13.12 % of the CMC's revenue income, solely by property tax. Raichur CMC levies a consolidated property tax of 22 % of the Annual Rateable Value (ARV).

**Own Sources/Non Tax** - This item head comprises of income from municipal properties, fees on municipal services (building permission, etc.), user charges (water and sewerage tariffs) and miscellaneous services. On an average, through the assessment period, own source/non tax income constitutes 38.40 % of the total revenue income. Rental income from municipal properties, water charges and income from fees and fines and constitute the major revenue sources under this item head. Income through non-tax own sources of the CMC has grown over the assessment period at a CAGR of about 14.23 %.

**Assigned Revenues** - This item head comprises of income from Government of Karnataka (GoK)/State transfers of municipal income collected by the state line department. The income items generally include surcharge on stamp duty, entertainment tax, motor vehicle tax, and other transfers. Assigned revenue constitutes about 3.87 % of the CMC's total revenue income and has grown at a CAGR of about 35.21 %.

**Revenue Grants and Contribution** - This item mainly comprises octroi compensation grants, SFC grants, special establishment grants and other special grants that the State Government may transfer from time-to-time to the CMC. In case of Raichur, revenue grants and contributions constitute about 51.93 % of the total revenue income. The grants are largely in the form of SFC devolution.

**Revenue expenditure** comprises broadly of three categories of expenditure—establishment, operation and maintenance and debt servicing. Unlike in many other ULBs, Raichur CMC has provided a

consolidated figure pertaining to the total establishment

**General Administration and Tax Collection** - This head comprises expenditure on pay and allowances of elected representatives, salary and other operational expenses related to all municipal functions, excluding water supply and temporary establishment for solid waste management, pension and gratuity payouts and provident fund contributions. Expenditure under this head accounts for about 10.01 % of the total revenue expenditure during the assessment period.

**O&M Cost of Public Works** - Expenditures under this item head comprise repair and maintenance works on buildings, roads and drains. Raichur CMC spends about 16.41 % of its total expenditure on public works. Expenditure under this head has declined to fluctuation in expenditure on O & M and registered a CAGR of -9 %.

**O&M Cost of Water Supply** - In terms of operation and maintenance expenditure, water supply is the second largest cost center of the CMC (after solid waste management), accounting for over 25.91 % of the total revenue expenditure. Expenditure under this head has grown at a CAGR of about 4.90 % during the assessment period.

**O&M Cost of Solid Waste Management** - Expenditure under this head accounts for about 29.93 % of the revenue expenditure over the assessment period. This head covers expenditure incurred in conservancy operations of the CMC, including salaries of temporary staff and rent and operation and maintenance of a fleet of vehicles for solid waste collection and transportation. Expenditure under this head has in fact declined over the period due to inconsistency in payoffs and the CAGR was about -12 %.

**O&M Cost of Street Lighting** - Street Lighting accounts for about 5.81 % of the revenue expenditure and comprises primarily of expenditure on electricity charges and replacement of lighting fixtures. Expenditure under this head has also registered a CAGR of 3.87 %.

**Other Services and Miscellaneous Expenditure Heads** - Expenditure on other services accounts for about 5.47 % of the revenue expenditure, comprising essentially of expenditure on public safety and fire services, public gardens, markets, education, etc.

**Debt Servicing** - This item head comprises interest payments on external borrowings. According to the financial data provided by the CMC, there has been no debt servicing during the assessment period. Though the CMC have the outstanding loans to HUDCO and other agencies the interest payments are not being reflected in the annual accounts, this could be attributed to direct deduction from SFC, the case of default is rare due to the fact that the local body has been showing expenditure towards principal payments.

**Key Financial Indicators:** Analysing CMC's financials, provides some key inputs which would form the key parameters of exploring the feasibility of PPP for O&M. Through the analysis it is understood that income from the Non-Tax Sources is only 31.08% of the CMCs Revenue income and the O&M cost of municipal services forms 42.65 % of the Revenue Expenditure. About 57.35 % of the total expenditure is on establishment-related heads. The per Capita Growth Rate of O&M expenses is 3.14%. It is also observed that the CMC is able to collect 87.24 % of the user charges for water supply and 70.45 % of the property tax and spends Rs.235.67/- per Rs.1000/- collection of taxes.

Table 3-9: Key Financial Indicators

Indicators		Value	Unit
<b>A</b>	<b>RESOURCE MOBILISATION</b>		
1	Per Capita Income	288.23	Rs. p.a
2	Sources of Funds		
a	Share of Own Sources - Taxes in Total Revenue Income	13.12	%
b	Share of Own Sources - Non-Tax items in Total Revenue Income	31.08	%
c	Share of Assigned Revenue in Total Revenue Income	3.87	%
d	Share of Revenue Grants in Total Revenue Income	51.93	%
3	Growth in Revenue Income	8.58	% p.a
4	Growth in Own Sources of Revenue Income	3.73	%
<b>B</b>	<b>FUND APPLICATION</b>		
1	Per Capita Expenditure	256.37	Rs. p.a
2	Application of Funds		
a	Share of Establishment Expenditure in Total Revenue Expenditure	57.35	%
b	Share of O&M Expenditure in Total Revenue Expenditure	42.65	%
c	Functional Allocation of Municipal Expenditure		
	General Administration & Tax Collection	10.01	%
	Municipal Services	89.99	%
	Debt Servicing - Interest Payment	-	%
d	Share of Establishment Expenditure to Total Revenue Income	51.15	%
3	Growth in Establishment Expenditure	10.63	%
4	Growth in O&M Expenditure	2.34	%
5	Growth in Total Revenue Expenditure	8.12	% p.a
<b>C</b>	<b>PERFORMANCE INDICATORS</b>		
1	Operating Ratio	0.89	Ratio
2	Growth in Per Capita Own Income	10.02	% p.a
3	Growth in Per Capita Revenue Grant	3.83	% p.a
4	Growth in Per Capita Revenue Income	7.64	% p.a
5	Growth in Per Capita Establishment Expenditure	8.38	% p.a
6	Growth in Per Capita O&M Expenditure	3.14	% p.a
7	Growth in Per Capita Revenue Expenditure	5.93	% p.a
9	Capital Utilization Ratio	1.86	Ratio
<b>D</b>	<b>EFFICIENCY INDICATORS</b>		
1	Tax Collection Performance		
a	Property Tax	70.45	%
b	Water Tax	87.24	%
c	Drainage Tax	--	%
2	Cost of Collecting Rs. 1000 of Taxes	235.67	Rs.
3	Property Tax Demand per Assessment	474.12	Rs. p.a
4	Population per P.T Assessment	7.35	Persons

Source: NKUSIP CLIP Report.

### 3.5 Development Initiatives for Raichur and its region by GoK

#### 3.5.1 Proposed land use (2011):

According to the City Development Plan (CDP), the Raichur Urban Development Authority (RUDA) proposes to develop an area of 1,324 Ha of land. Existing vacant land is earmarked for residential sites. Land allocation for traffic and transportation accounts for 17.52 % of the proposed development. However the proposed circulation area demarcation is 1.23 % more than the existing developed area in the town. The RUDA proposes to develop more parks and playgrounds in the town, meeting the proposed increase of 6.71 % over current allocation. Raichur town is divided into six districts for the purposes of planning the Comprehensive Development plan for 2011.

Table 3-10: Proposed Land use 2011

Land Use	Area in Ha	% Composition
Residential	1,936.66	37.13
Commercial	271.34	5.20
Industrial	1,030.84	19.76
Recreational	591.35	11.34
Public & Semi- public	472.38	9.05
Circulation	913.65	17.52
<b>Total</b>	<b>5,216.22</b>	<b>100.00</b>
Hillocks, Water Sheets and Agriculture land	484.78	
<b>Grand Total</b>	<b>5,700.94</b>	

Source: NKUSIP CLIP Report.

#### 3.5.2 Suvarna Karnataka Development Corridor (SKDC) Programme:

The State government in its 2008-09 Budget has identified Raichur District for development of steel zone and to promote mega steel industries and allied infrastructure components in the district (as part of the SKDC programme), which would promote economic development of the region.

### 3.6 NKUSIP PROPOSAL and Investment for Water Supply, Sewerage and Storm Water Drains

GoK through its North Karnataka Urban Investment Plan (NKUSIP) proposes to improve the Environmental sanitation infrastructure, water supply, urban roads and slum development of Raichur city. The following are the summary of Urban Water Supply, Sewerage and Drain improvements proposed through NKUSIP.

#### 3.6.1 Summary of NKUSIP Project Interventions

**(i) Water Supply.** Interventions in this sector comprise of repairs to civil works of intake and filters, repairs to filter controls, providing mechanical flash mixer, flocculator and chlorinator at WTP of old Krishna River Works, provision of chemical dosing system at WTP of Tungabhadra River Works and provision of laboratory equipment for new water works, is proposed. Provision of additional distribution network for uncovered areas is also proposed.

**(ii) Sewerage and Sanitation.** Based on water demand, population growth, and town topography, a Multi-Cell Waste Stabilization Pond (MWSP) system is proposed for sewage treatment. Sewer lines of approximately 129 km long will discharge sewage into the proposed sewage treatment plant (STP).

**(iii) Flood and Drainage Control.** As per NKUSIP clip report, the projects proposed under this category

had included creation of road side drains in addition to improvements of primary and secondary drains.

### Estimated Cost of Intervention

The total cost of water supply, Sewerage & Sanitation and Storm water Drainage and environmental sanitation infrastructure cost is **Rs.344.69 million (i.e. 7.40 million USD)**; project costs by sector are elucidated in the following table.

**Table 3-11: Estimated Cost of High Priority Interventions (Cost in Million Rupees)**

Water Supply	130.43
Sewerage and Sanitation	214.26
Storm Water Drainage	0.00

Source: as per ADB- KUIDFC meeting dated 08/07/09.

Note: 1USD = 46.58 INR

### 3.6.2 Proposed Water Supply Improvements

Under this component, it is proposed to rehabilitate the Tungabhadra canal water supply system, construction of two new service reservoirs, interlinking of Rampur zone with New Krishna system, redesigning of water distribution network extended to a total length of 100 Kms. The rehabilitation and improvements to the water supply component for Raichur to meet the drinking water requirements up to 2026, is proposed for an amount of Rs 130.43 million.

**Table 3-12: Benefits expected from Water Supply Component**

	Item	Existing Situation	Post NKUSIP
1.	Duration of water supply	Once every day for one to two hours	Three hours every day
2.	Population covered	117493 by house service connection (105634 by public stand post )	Additional 55,000 population covered by HSC
3.	Pressures	Low	High
4.	Water metering	Un metered	Metered

### Augmentation of Water supply for Tungabhadra canal water supply system

The rehabilitation includes the electro-mechanical components such as panel boards, starters, switch gears, cubical meters, cables etc at both raw water and clear water pump houses. This has been necessitated due old age as well as to improve the hydraulic and electrical efficiencies. Replacing of filter control valves, flash mixer motors and flow measuring devices at WTP are also proposed.

#### Service Reservoirs:

The present available storage is 17.45 ML against the requirement of 12.80 ML for 2026 storage water demand. In order to maintain the residual head at all points and to provide proper coverage to newly developed areas two new service storage reservoirs and a new one replacing an existing old reservoir are being proposed with different capacities for eight hours storage.

#### Rising main Details:

It is proposed to interlink the Rampur Zone with the New Krishna system by providing a separate pumping main of 500 mm DI of 3720 mts length from IPS to the West Police Station junction and

connect the line to the existing 400 mm CI pumping main from Rampur WTP. This interlinking will be put in service during scarcity in Rampur Zone and can be made permanent in future, if required. It is proposed to have a new pump house (12X10 m) and new pumps of 3X 150 HP (2+1) at the IPS premises utilizing the existing sump. It is also proposed to replace the 1750 mts of 355 mm HDPE pumping main by 350 mm DI pipe of the same length. This is in order to overcome the repeated breakages in the HDPE main which though laid in 2003 is leading to disruption of supply. The present pumping will not feed the proposed two reservoirs at Sathyanath Colony 0.5 ML GLSR and 0.30 ML OHT at Krishnadevaraya Colony and hence two sumps with sub pumping is proposed with suitable pumping machinery. The rising mains proposed are 200 mm DI K7 pipes for a length of 1590 mts from existing riser main at SBH Junction to sump and 320 mts from sump to GLSR for Sathyanath Colony and 150 mm DI K7 pipe for 1620 mts from sump at Panchamukhi OHT location to Krishnadevaraya Colony OHT.

**Distribution Network:**

The water supply distribution network for the entire city has been designed dividing the entire area into 22 zones & 6 sub-zones considering the levels and for maintaining 7 mts residual head for a total length of 100km. Total length of distribution system proposed as per this project is 100Kms including replacements and new pipes.

**Reduction of Non Revenue water**

It is proposed for the replacement of some part of the existing distribution line by which the major points of leakages will be plugged. Further, after installation of flow meters the quantity wasted and the approximate location can be identified and necessary preventive action taken. It is proposed to install 29 nos flow meters in the existing system and 4 nos in the proposed system. It is also proposed to arrange weekly readings of the flow meters installed in the existing system so as to assess the production, distribution quantities and the system losses.

**Table 3-13: Proposed Water Supply Components**

Proposed Water Supply Components		
1	Rehabilitation of Rampur water supply system	Mechanical and electrical rehabilitation
2	Water supply distribution network	100Kms.
3	Pure water rising and feeder main	8.85 km
4	Proposed Pumping Machinery for water supply system	2 Nos. of - 20 HP and 2 Nos. of -10HP pumps for pump house and also 2 Nos. of 300 Hp pump
5	Rehabilitation of water treatment plant at Rampur	18MLD capacity
6	Proposed OHT's(Over head tank)	1No. of 5 Lakh litres & 1No. of 3 Lakh litres.
7	Proposed GLSR's	1 No of 5 Lakhs litres
8	Bulk flow meters	33 Nos.

Source: KUIDFC DPR for Raichur

As per the CLIP Report, an additional of 4,874 connections was proposed as part of the proposed water supply scheme and an additional cost of Rs.7.50 million is estimated for the same. The finalized proposed Water Supply Scheme for Raichur proposes an additional 9,172 HSCs for the year 2011, but this component has to be implemented by the CMC. The water supply component is expected to benefit



about 26,843 households in Raichur by 2011, estimated by taking an assumption of covering 60 % of the expected total number of Households by the year 2011.

### 3.6.3 Proposed Sewage Component

As per NKUSIP Clip report, under this component, it is proposed to reconstruct and upgrade the existing STP at Eklasapur and Hosur Villages. This STP is based on waste stabilization ponds; the existing plant has four ponds and as described earlier the ponds are completely damaged and filled with bushes. It is proposed to increase the capacity by additional 7 MLD to cater for the future needs. Hence, the total capacity of the remodeled STP will be 27.5 MLD with multi waste stabilization ponds (MWSP). Around 85 km of the existing sewers will be rehabilitated and an additional 75 km of the network will be provided to expand the system into uncovered areas and to cater for the future growth.

The estimated cost for the projects identified, with HSC, was Rs. 237.00 million. But as per present discussions the total investment to be made for this component under this project is Rs. 214.26 million (which would be excluding house service connections)

**Table 3-14: Implementable Sub-projects under NKUSIP – Sewerage and Sanitation**

Proposed Sewerage System		
1	Remolding of existing STP and Proposing additional capacity of STP	20.5 and additional 7.0 MLD of capacity
2	Proposed Sewer Network	75 Km
<b>Total Cost (Rs.Million)</b>		<b>214.26</b>

Source: KUIDFC

As per the CLIP Report, an additional of 10,000 connections was proposed as part of the proposed Sewerage System and an additional cost of Rs.10.00 million is estimated for the same. The finalized proposed Sewerage Scheme for Raichur proposes an additional 19,263 HSCs for the year 2011, but this component has to be implemented by the CMC. The proposed Sewerage component is expected to benefit about 26,843 households in Raichur by 2011.

The following table illustrates the details of the benefits expected from proposed Sewerage System.

**Table 3-15: Benefits expected from proposed Sewerage System**

Item	Existing Situation	Post NKUSIP
1. House service connection	7,580 Nos	Additional 19263 HSC
2. Population covered	40,500 by house service connection	Additional 104,020 population covered by HSC
3. Existing STP	Functional	Functional - up gradation

#### Estimate of Sewage Flow:

Water demand of the town has been projected at the rate of 90 lpcd. However, the sewer network needs to be designed to carry a minimum sewage flow of 100 lpcd, as per CPHEEO Manual on Sewerage and Sewage Treatment. The treatment plant can, however, be developed in phases. Initially, the capacity may be provided at 80 % of 90 lpcd i.e. 72 lpcd and may be augmented subsequently to treat 100 lpcd. Hence, the demand for sewerage system is worked out at following rates of sewage flow.



- (a) 100 lpcd for sewer network, and  
 (b) 72 lpcd for sewage pumping and treatment plant, up to year 2011 and 100 lpcd beyond year 2011.

#### Demand of Sewerage System:

The capacity of sewerage system required for the town is worked out below.

**Table 3-16: Demand of Sewerage System**

Component	Year 2004		Year 2011		Year 2021	
	Population	Demand	Population	Demand	Population	Demand
	Nos	MLD	Nos	MLD	Nos	MLD
Sewer network	223,000	22.30	271,390	27.14	343,360	34.34
Pumping station	-	16.06	-	19.54	-	34.34
Sewage treatment plant	-	16.06	-	19.54	-	34.34

Source: NKUSIP CLIP Report.

Following table compares the capacity of various components of the existing and proposed sewerage system with the projected demand.

**Table 3-17: Comparison of Additional Demand and Anticipated Supply of Sewerage Facilities**

Component	Unit	Demand							
		Supply	Year 2004			Year 2011		Year 2021	
		Year2004	Demand	Surplus (Shortfall)	Demand	Surplus (Shortfall)	Demand	Surplus (Shortfall)	
Sewer network	km	85.00	140.00	(55.00)	170.00	(85.00)	214.00	(129.00)	
Sewage treatment	MLD	20.50	16.06	4.44	19.54	0.96	34.34	(13.84)	

Source: NKUSIP CLIP Report.

#### Adequacy:

The existing sewer network falls short of even the present demand. However, the sewage treatment plants can serve the town up to year 2011, after they are rehabilitated.

**Table 3-18: Household Connections in Sewerage System Component**

Details	Existing (2008)	Projected (2011)
No of household connections	7,580	26,843
Percentage to total town's households	19.9%	60%

Source: KUIDFC component details.

### 3.6.4 Storm Water Drainage Network

#### Urban Drainage

As per NKUSIP Clip report, under this component it was proposed to improve the condition of the existing nallah and providing a proper outlet for the storm water drain in the low-lying areas. The total estimated investment required for the improvement was **Rs. 34.50 Million**. But as per the finalized NKUSIP project, the Storm Water component is not considered as part of the NKUSIP funding and has to be carried out by the CMC.

### 3.7 O&M and its cost as recommended by NKUSIP

#### 3.7.1 Proposed Improvements in O & M (water supply)

Considering the constraints of the CMC, it is proposed by NKUSIP to improve the O & M operations in stages, so as not to change the current set up and practices drastically, but at the same time bring in discipline and control in O & M operations. It is recommended to post following key persons for the operation and Maintenance of pumping installations and treatment plants.

**Table 3-19: Proposed O&M team – Water Supply**

Category	Requirement
ITI trained pump operator	1 at each pumping station.
ITI trained electrician	1 at each pumping station.
Water treatment plant operator, with minimum B.Sc. (Chemistry) qualification	1 at each water treatment plant.
Team of engineers (civil or mechanical) to be appointed for overall control of water supply and sewerage operations	A team consisting of one Assistant Executive Engineer assisted by two Assistant Engineers for bigger cities and one Assistant Engineer for smaller cities

Source: NKUSIP CLIP Report

It is also proposed to provide laboratory set up at the water treatment plants for carrying out daily analysis of raw water turbidity, determination of dose of the coagulant and testing residual chlorine of treated water and also to Develop training program for the existing unqualified staff to improve the skills in operation and maintenance of the respective components. It is also proposed to prepare O & M plan at the beginning of each year with details about staff, energy consumption, requirement of materials such as chemicals and spares, maintenance and repairs, raw water bills and other miscellaneous items. After the existing system is rehabilitated and planned augmentation works are constructed, it will be necessary to plan for an efficient O & M of the system. To calculate the O&M cost of Water Supply component at Raichur, the existing O&M cost of existing water supply component is projected till 2011-12 @ of 10% per annum and the O&M cost due to additional new components is projected at @ 3% of the proposed cost of the investment estimated as per NKUSIP. Thus the O&M cost is estimated to be Rs. 39.24 million /annum.

#### 3.7.2 Proposed Improvements in O & M (Sewerage System)

The table below illustrates the proposed O&M team for the sewerage system as per NKUSIP Clip report. It is also proposed to provide laboratory set up at the sewage treatment plants for analyzing the parameters like pH, suspended solids and Biochemical Oxygen Demand (BOD) of the influent and effluent and to develop training program for the existing unqualified staff to improve the skills in operation and maintenance of the respective components. Also it is proposed to prepare O & M plan at the beginning of each year with details about staff, energy consumption, requirement of material such as chemicals and spares, maintenance and repairs, raw water bills and other miscellaneous items.

**Table 3-20: Proposed O&M team – Sewerage System**

Category of Staff	Qualification	Description	Total
Assistant Executive Engineer	B.E (Civil/Mechanical)		1
Assistant Engineer	B.E (Civil)/ Dip		1
Plant Operator	B.Sc (Biology)	1 for each treatment plant	1

**Pre-feasibility study for carrying out O&M of Water Supply, Sewerage & Storm Water drains (WSS &SW) on Public Private Partnership (PPP) basis for 6 CMCs in Karnataka: Final Report**

Pump Operator	ITI (Mech)	1 for each PS	1
Electrician		1 for each PS	1

Source: NKUSIP CLIP Report

**O & M Expenditure:** After the existing system is rehabilitated and planned augmentation works are constructed, it will be necessary to plan for an efficient O & M of the system. To calculate the O&M cost of sewage component at Raichur, the existing O&M cost of existing sewage component is projected till 2011-12 @ of 10% per annum and the O&M cost due to additional new components is projected at @ 2% of the proposed cost of investment estimated as per NKUSIP. Thus the O&M cost is estimated to be Rs. 5.65 million/annum.

### **3.8 Need for Private Partnership in O&M of Municipal services in Raichur**

#### **Water Supply**

As per observations derived out of primary survey conducted for NKUSIP, as provided in initial Clip report of Raichur the average household consumption of water is 13.83 kl/month and designed supply is 21.87kl/month @ 135 lpcd, consumption. The gap in consumption and supply quantity is owing to the high value of Unaccounted for Water (UFW) which is 69% in Raichur. Also around 64.2 % of total supply of water is lost owing to technical inefficiency. Private sector participation in O&M is expected to bring in skilled, trained and attentive work force and latest technology through which it is expected to reduce the water losses due to leakages and pilferage during transmission and distribution. Thus the UFW water can be reduced to 30%, which would increase the quantity of supply by around 25%. It can also improve the efficiency level of O&M of treatment plants, thus reducing the water loss and also optimizing the uses of chemical and consumption of power. Case studies illustrate that through private sector participation the O&M costs can be reduced by 10 to 20%.

#### **Sewerage & Drainage System**

The existing sewerage system in Raichur requires substantial rehabilitation. Rehabilitation of existing sewage treatment plant, construction of a sewage treatment plant and extension of sewer network to serve areas not yet connected to the system along with the proposed rehabilitation will help collect, treat and dispose sewage effectively. Without rehabilitation and extension works, it is assumed that the present levels of service provided by the sewerage systems will continue. Effectively, this means that environmental sanitation conditions in the town will continue to deteriorate as population density increases. Similarly, O&M of storm water drains is not given requisite attention leading to occasional flooding of roads and residential areas. Private sector participation for O&M of sewerage system and storm water with dedicated work force and an organized operation schedule would improve the environmental sanitation conditions of the city.

### **3.9 Preliminary Financial Analysis:**

Based on the information collected, collated and analyzed regarding, existing scenario of urban water supply, sewerage and storm water drains of the CMC, its O&M system and CMC's revenue income and expenditure, a preliminary financial analysis is carried out in order to explore the viability of PPP in O&M of water supply, sewerage and Storm water drainages starting from the year 2011-2012. The following are the key assumptions considered for preliminary financial analysis:

#### **3.9.1 Commencement of O&M operations:**

Raichur is one of the three cities identified and tendered out for establishment of additional assets &



improvement of urban water supply and sewerage systems under the first tranche of ADB funding and the project would be awarded for implementation by the end of the year 2009. Considering a time span of two years for completion of the project components, it is assumed that the O&M of the urban services would commence by 2011-12.

### **3.9.2 Demography:**

Raichur's population is expected to reach 271,390 by 2011. As per the CMC's record Raichur has 37,918 house hold properties and 4869 Non-domestic/commercial properties.

### **3.9.3 Number of Service Connections:**

**Water Supply:** The number of House Service Connection (HSC) is expected to cover a total 60 % out of the total number of estimated households by 2011 i.e. 26,843 connections including the additional 9,172 connections proposed through NKUSIP project. Since , there is no information available on the proposed additional number of non-domestic/commercial connections, it is assumed that by 2011 the direct service connections would cover 100% of the existing number of non-domestic/commercial properties of 4869(2008).

**Sewage:** The total number of HSC is expected to be 26,843 by 2011 and the same is considered for the analysis. As there is no information available on service connections to Non-domestic /Commercial and industrial properties ,these are not considered for the preliminary analysis.

### **3.9.4 Tariff & Collection efficiency:**

Existing water tariff of Rs.55/- , Rs.90/- and Rs.220/- per month for domestic, Non-domestic/ Commercial and Industrial connections respectively as recommended by GoK is assumed without any revisions for the year 2011-12 and is expected to remain same for the next 5 years (till 2015-16). An increase of 30% on the existing tariff is assumed from year 2016-17. Further, it is assumed that there would not be any tariff for water consumed through Public Stand Post. For sewage connections, it is assumed that 10% of the water tariff charges would be collected as sewage tariff (as per inputs provided by KUIDFC) and there would not be any charges collected for O&M of drains.

Collection efficiency of Raichur CMC for water tariff is 87.2% and property tax is 70 %. Though 100% collection efficiency can be achieved through private participation, the existing collection efficiency of 87.2 % is assumed for the analysis.

**Table 3-21: Key Assumption & Parameters for Preliminary Financial Analysis**

Key Parameters	Existing (2008)	Proposed Additional (2011)	Total
Total Population	252,115	19275	271,390
Total House Hold Properties	37,918		
Total Commercial Properties	4,869		
<b>Water Supply</b>			
Total House Service Connections (No. of Connections)	17,671	9172	26,843
Population to be covered by HSC (No.)	117,493	55,000	172,493
Non domestic (No. of Connections)	240		
Commercial/Industrial Connections(No. of	95		
Tariff for Domestic/Household (Rs/connection)	55.00		

**Pre-feasibility study for carrying out O&M of Water Supply, Sewerage & Storm Water drains (WSS &SW) on Public Private Partnership (PPP) basis for 6 CMCs in Karnataka: Final Report**

Key Parameters	Existing (2008)	Proposed Additional (2011)	Total
Tariff for Non-Domestic/ Commercial(Rs/Connection)	110.00		
Tariff for Industrial (Rs/Connection)	220.00		
Water Supply New Connection Charge- Domestic	2000.00		
Water Supply New Connection Charge- Non Domestic	5000.00		
Collection Performance-% of HSC(water charges)	87.2%		
Collection Performance - % of (Property Tax)	70.0%		
<b>Sewage</b>			
Total House Service Connections (HSC)	7580.00	19,263	26843
Population to be covered by HSC	40500.00	104,020	
Tariff for Domestic ( assumption- 10% of water tariff)	5.50		
Tariff for Non-Domestic( assumption- 10% of water	11.00		
Sewage New Connection Charge (one time)	1000.00		

### 3.9.5 O&M expenditure:

The O&M cost of water supply amounts to Rs.14.98 million per annum considering that the cost of O&M for water supply accounts to be 26 % of the total revenue expenditures of the CMC. This cost is projected at the rate of 10% till 2011-12 (3.14% is the rate of growth of the CMC's O&M cost of all urban services between 1998-2002 but considering that a rate of 3.14% is relatively low and there would be regular increase in salaries and other operational expenses, an optimal growth rate of 10% per annum is considered for projecting the O&M cost.) Thus the O&M cost of existing water supply components is estimated to be Rs.35.32 million for the year 2011-12.

Based on case studies, the O&M cost for water supply due to additional connections & improvements is assumed at the rate of 3% of the total capital cost estimated for water supply component under NKUSIP project (excluding the estimated cost for water audit) i.e. an additional cost of Rs.3.91 million per annum. Based on the above computations the total O&M cost for water supply for the year 2011-12 is estimated to be Rs. 39.24 million.

**Table 3-22: Assumptions for O&M Expenditure**

Sector	O&M as % of Capital Cost
Water Supply	3.00
Sewerage & Sanitation	2.00
Storm water Drain	1.00

As per the existing scenario the O&M cost of sewage at Raichur is Rs. 0.58 million/ annum and is projected to Rs. 1.36 million till 2011-12 @ of 10% per annum. The O&M cost of the additional sewage components to be provided as per the NKUSIP was also estimated by assuming 2% of the estimated capital cost of investment for the sewerage components of Raichur through NKUSIP, which is around Rs. 4.29 million per annum. Therefore, the total O&M cost of sewage component at Raichur is estimated to be Rs. 5.65 million/ annum, and the same is assumed for the preliminary analysis.

### 3.9.6 Expenses of O&M operator:

As provision of HSC connections would be the CMCs responsibility and is not factored under NKUSIP



project, provision of HSC connections (Water Supply & Sewage) is factored as part of the O&M. Therefore, the operator has to invest in the provision of 9172 and 19263 new House Service Connections both for water supply and sewage each. Which is estimated to cost of Rs. 68.34 million (@ of Rs.2, 200/- for water supply connection and Rs.2, 500/- for sewerage per connection)

**Table 3-23: Cost of Provision of New House Service Connections**

	<b>New Infrastructure</b>	<b>Proposed No. of Connections</b>		<b>Unit Cost as per consultant's inputs in Rs.</b>	<b>Total Investment in Rs. million</b>
1.	Water Supply - House Service Connection Cost	9,172	Nos	2,200	20.18
2.	Sewage - House Service Connection Cost	19,263	Nos	2,500	48.16
<b>Total</b>					<b>68.34</b>

Source: Analysis

Apart from the above-mentioned O&M expenses, a private O&M operator would have its initial investment like procurement of equipments for maintenance, communication instruments and vehicles for transportation to carry out the O&M operations and is estimated to be around Rs.1.00 million and monthly office administrative expenses like rentals of office space, salary of administrative office staff and other office over heads is estimated to Rs. 0.69 million per annum.

**Table 3-24: Administrative Expenses of the O&M Operator**

<b>Office expenditure of the O&amp;M Operator</b>	<b>Rs. Per Month</b>	<b>Rs. Million per annum</b>
Rentals/month	10000.00	<b>0.12</b>
Increment in office rentals		5%
<b>Office Staff Salary and Overheads</b>		
Salary of Manager	15000.00	0.18
Salary of Office technical Assistant	7500.00	0.09
Accounts officer	10000.00	0.12
Office Attender	5000.00	0.06
Overheads	20000.00	0.24
<b>Total</b>		<b>0.69</b>
Increment in salaries 10%		10%

### 3.9.7 Other Assumptions:

It is assumed that the cost due to depreciation of assets would be at the rate of 0.02% (CPEEHO) of the total estimated O&M expenditure per annum. Cost of collection of water charges is assumed to be Rs.235.67/- for every Rs.1000/- collected as per the cost of collecting property tax and water cess (CLIP Report).

### 3.9.8 O&M Revenue Income:

As discussed earlier, the revenue income from water supply & sewerage are assumed only from the properties with HSC and based on the existing tariff rates of GoK. As provision of new HSC connections would be part of the O&M services. The existing new water supply connection charges of Rs.2000 (Per Domestic Connection) & Rs.5000 (per Commercial Connection) and new sewage connection charge of

Rs.1000 per connection would also be considered as part of the Revenue income of the operator.

### **3.10 Financial Viability for PPP mode of O&M for Raichur CMC:**

The preliminary financial analysis carried out based on the above-mentioned key assumption illustrates that the O&M expenditure for the year 2011-12 would be around Rs. 48.83 million and the Operator has to invest around Rs.68.33 million to provide 9712 for water supply & 19,263 Sewage new HSC connections . Thus, the total expenses of the first year (2011-12) of operation are estimated around Rs.118.98 million. The revenue income through tariff collection (assuming 87.2% collection efficiency) for the same years would be only Rs.16.44 million as the income from the additional new connections would start only from the second year. Thus, there is a deficit of Rs.102.54 million for the year 2011-12, which is around 624 % of the revenue income for the first year.

During the second year of operations, the operator would get Rs.37.61 million as income from the new connection charges and additional income from water & sewage tariffs from the 9172 & 19263 new connections respectively , thus increasing the revenue income to Rs.55.63 million (assuming 87.2% collection efficiency), with a deficit of Rs. 9.11 million. The revenues for 3<sup>rd</sup>, 4<sup>th</sup> & 5<sup>th</sup> year would remain constant with Rs. 22.83 million with a deficit of Rs.38.02, Rs.43.48 & Rs.49.49 million respectively.

Inspite of Raichur being the largest urban centre in the District with tremendous growth potentials and also the CMC has high revenue collection efficiency; still the outcome of the preliminary financial analysis indicates that a PPP mode for O&M of water supply, sewerage and Strom water drains at existing tariff levels is not financially viable for Raichur CMC. However, with tariff rationalization and support from GoK in terms of annuity payments, O&M of water supply and sewerage systems on PPP basis can be considered.

#### **3.10.1 Assumptions for Viability:**

The preliminary financial analysis also indicates that a 30% increase in the revenue income by increase in tariff rates by 2011-12 and achieving 100% collection efficiency would provide positive cash flow during second year but still resulting in deficits for the rest of the years. Further, private participation is expected to bring down the overall O&M cost through efficient handling of the system and its is assumed that a PPP mode would reduce the O&M cost at least by 10% of the existing or estimated cost. This would further improve the cash flows.

As discussed earlier, one of the key objective of a PPP in O&M would be to bring down the UFW losses from the current 69% to at least 25 -30%. This reduction in UFW would facilitate CMC to increase its HSC connections or to increase the per capita supply. This reduction in UFW would have a direct or indirect increase in the revenue income, thus improving the cash flows.

#### **3.10.2 Revenue from reuse of STP water:**

The prime objective of the pre-feasibility is to explore a PPP mode for O&M of water supply, sewage and drainage as one package. Therefore, to make the project viable under PPP mode, revenue income from sale of treated water from STP is also explored. It is estimated that the proposed STP would release 22 MLD (assuming 80% of the proposed STP Capacity of 27.5MLD) of treated water every day. As part of the O&M, the private operator has to maintain and operate the STP; therefore CMC, as a part of the PPP agreement can provide the rights over the treated water from the STP to the private operator. This would facilitate the operator to generate income by sale of the treated water to industrial areas, construction industries, landscape maintenance and for other non-domestic consumptions. The Bellary example indicate that treated water is sold at Rs.20/ Kilo liter; however a nominal rate of Rs.5/- per Kilo liter of treated water is assumed for projections at Raichur. Thus , the income which can be generated

by sale of Treated water would be around Rs.40.15 million per annum. Raichur being an industrial city, there is potential demand for treated water and the same needs to be examined as a part of a detailed feasibility study.

Assuming 75% realization, the operator can generate Rs 30.11 million/ annum. Even with this additional income the project may not be viable under PPP mode.

### 3.11 Recommendations to make a PPP of O&M viable in Raichur CMC:

The following are some of the recommendations which might make PPP mode viable:

1. Increase in water tariff rates by 2011-12 or Introducing metered tariff collection for all consumer categories
2. Improving collection efficiency to 100%
3. Increasing the existing sewerage charges
4. Measures to reduce the cost of tariff/tax collection

The CMC has to carry out the above-mentioned recommendations in order to make the O&M cost of urban services self sustainable. Especially in water supply the current tariff of Rs. 55 per month for an average monthly consumption of 33.44 kl (assuming 167 lpcd and average house hold size of 6.6) accounts to a very low tariff rate of Rs. 1.64/kl. But it is also observed through secondary data collection that each HSC serves to more than one household and therefore the average consumption level per HSC is around 45.51 kl per month against 33.44 kl considered for estimation, therefore the actual tariff collection is only Rs.1.21/kl. Considering these facts, it is recommended to carry out the above mentioned measures in order to make the CMC's O&M component financially self sustainable, which would also improve the viability for a PPP mode.

### 3.12 Project Structure & Way Forward

#### 3.12.1 Performance Based Management Contract (PBMC)

With existing tariff structures, O&M of water supply and sewage on PPP basis in Raichur CMC is not viable, therefore an alternative option **for carrying out O&M of water supply and Sewage through Performance Based Management Contract (PBMC) is recommended.** The following can be considered as the prime components of Project structure for PBMC.

O&M can be carried out through other PPP & PSP modes, through a combination of the following measures:

- Financial support from CMCs/Govt. of Karnataka by means of Annuity payments
- Phased increase in water and sewerage tariff across all consumer categories
- Introduction of meter based tariff rates
- PSP for O&M of systems can also be explored through Management Contract model.
- The O&M contract shall be structured factoring in performance based incentives and penalties and lowest Annuity payment basis from CMC/GoK (i.e. PBMC).
- Term of a PBMC contract, including installation of HSC, can be for a maximum period of 5 years including the HSC installation period.
- Installation of HSC shall be completed within 1 year.



- The contract can be structured based on annuity payment and the annuity amount shall be arrived based on the actual O&M expenses .The O&M expenses quoted can be the first bid parameter, with a weightage of 70%.
- Price quote for installation of the HSC shall be the second bid parameter, with a weightage of 30%.
- The bidder shall be selected based on the lowest overall evaluated bid after taking into account the first and second Bid Parameters, as per their respective weightages mentioned above.
- The following key Performance Indicators (KPI) may be considered to monitor the performance of the O&M contractor:

a. **Quality of water distributed to the consumers**

Achieving the best drinking water quality as recommended by WHO/CPEEHO standards can earn the O&M operator a bonus of up to 5% of the fixed annuity amount. On the other hand, a penalty of 5% for water quality supplied below the recommended quality standards can be levied.

b. **Reduction in the overall UFW from existing 69% to a maximum range not exceeding 25 to 30%.**

A reduction up to 25% within the second year of operation can earn the operator a bonus of 10% and reduction of up to 20% would provide a bonus of 15%. If the UFW is not reduced to 30% then the operator would face a penalty up to 10%.

c. **Quantity and quality of the treated water from STP**

Treated STP water with a quantity of at least 80% of the installed STP capacity and with a water quality of BOD level less than 12 can earn the operator a bonus of another 5%. A BOD level above 15 can face a 5% penalty.

d. **Minimizing system-downtime**

Minimizing system-downtime and time for repairs & maintenance with minimal impact on water supply timings, duration, quantity and quality of supply & treatment assessed as per consumer feedback would provide the operator an additional bonus of 5%

e. **An overall reduction in the O&M cost**

An overall reduction in the O&M cost of the existing infrastructure components/network of water supply, sewage and storm water drains up to 10% (especially reduction in consumption of electricity) can earn the operator a bonus of 5% of the quoted annuity amount. An increase in O&M cost exceeding 10% and above can have a penalty of 5%.

- Thus the operator can achieve an additional bonus of 35% per annum based on his performance. Consistency in O&M performance by achieving 30% & above bonus for 2 consecutive years shall provide an additional bonus of 10% at the end of the contract term. Further the bonus payment shall be paid only at the end of the 3<sup>rd</sup> year and the 5<sup>th</sup> year. But the penalty if any shall be deducted every year.

- The annuity payment would start from the second year.
- CMC shall appoint an independent engineer to monitor the Performance indicators of the contract.

*The above-mentioned key performance indicators (KPI), incentives & penalty clauses are indicative and the exact quantification of the indicators can be determined only through a detailed audit and assessment of the services and its components and also through a detailed financial analysis as part of a detailed project report preparation.*

**Initiatives Required from CMC/GoK:**

- CMC should carry out an audit of the existing assets of the water supply, sewage and storm water components/infrastructure which would be leased to the O&M operator, in order to provide details of the existing components and the status of the assets.
- CMC should enforce stringent regulations to curb illegal and unauthorized supply of water within the CMC limits and also implement norms which would restrict and regulate the number of bore holes/bore wells permitted within certain surface area limits or within a ward.
- CMC also should implement norms restricting the use of potable water for construction activities and landscape uses.
- CMC should appoint an Independent Engineer for frequent Monitoring of the KPI of the agreement.



## 4 Davangere

### 4.1 Davangere City Profile

Davangere city is a district headquarters, located on NH-4 at a distance of about 260 km from Bangalore. Davangere was a sub-divisional headquarters in Chitradurga District. In 1997, Davangere was bifurcated from Chitradurga District and received the status of a District. The city is spread over an area of 61.08 sq.km; with a population of 363,780 (2001 census). Located on the main trade route that connects northern part of the country to the southern peninsula this city is primarily an educational and business centre.

#### Latitude, Longitude & Altitude:

Davangere is situated in the central part of Karnataka. Geographically, it is situated at 14°28'N latitude and 75°55'E longitude. The town altitude is 600 m above the mean sea level (MSL).

#### Connectivity:

The city is well connected by a network of national and state highways. Pune-Bangalore highway NH-4 passes through the city. SH-15 connects City with the two important neighboring district head quarters-Bellary and Shimoga. Besides these roads, a network of major and minor roads leads to neighbouring towns and villages of the region. The city is connected by Pune-Bangalore railway line. The nearest international airport is located at Bangalore, 260 km from the city.

#### Climate:

The region has a meteorological observatory station located at Chitradurga. The city is characterized with hot summer months with low rainfalls during monsoon, the average annual rainfall being around 680 mm. The temperature varies between 35°C to 38°C during summer and 16°C to 20°C during winter.

#### CMC Jurisdiction:

The City Corporation jurisdiction extends up to an area of 61.08 sq. km, with 35 wards.

### 4.1.1 Demography

#### Population:

Davangere has witnessed significant growth in the urban population every decade especially after 1941. The population had increased from 287,233 in 1991 to 363,780 in 2001 indicating a decadal growth rate of 26.65 % and annual compounded growth of 2.39%.

Davangere being a district headquarters and important trade and educational centre, is causing significant increase in the population every year. The city has a large Agriculture Producers Marketing Committee (APMC) yard that caters to the surrounding towns and villages. The city also houses important government offices like Deputy Commissioner, Davangere Urban Development Authority, KSRTC, Animal Husbandry Department, etc. which attracts people from nearby places for jobs and hence, the floating population in the city is also high. Good connectivity by roads and railways with other parts adds more value to the city.

**Household Size:**

The total number of households has increased from 50,279 in 1991 to 77,877 in 2001. The household size for Davangere is 4.67, lower than the average national household size of 6.3 (Census 2001). As per NKUSIP Clip report the population projected for the year 2011 is 4, 88,410 persons, which will be considered for further analysis for this study.

**4.1.2 Economy**

Earlier, Davangere was considered trade and commerce centre but, now, it is recognized more as an educational centre. Davangere has a large Agriculture Produce Marketing Committee (APMC) yard that caters to the surrounding towns and villages which mainly deals with cotton, paddy and oil seeds. Owing to its good connectivity via road and rail with other parts of the region, it has become a focal point for trade and commerce.

**Industries:**

Davangere has only small and medium scale industries and it lacks in large-scale industries. Karnataka Small Scale Industries Development Corporation (KSSIDC) and Karnataka Industrial Area Development Board (KIADB) have developed two industrial estates on Lokikere road and Davangere road respectively in the city. KSSIDC extends to an area of 7.83 Ha and the provision along with the maintenance of infrastructural facilities in this estate lies with the ULBs. KIADB estate houses 35 developed plots spread over an area of 37.96 Ha of land. KIADB is responsible for the provision and maintenance of the basic infrastructural facilities in the estate.

The city is predominantly a food based industrial city as it has more than 600 food based industries followed by 250 units of beedi manufacturing units.

**4.1.3 Landuse Plan/CDP, Regulations**

**Existing Land Use (2008)** the existing land-use pattern of Davangere City indicates that out of 4712 Ha of developed area, residential use occupied 993 Ha (21.07 % of the total developed area), commercial 402 Ha (8.53%) while industrial and traffic and transportation occupied 828 Ha (17.57 %) and 1725 Ha (36.61 %) respectively. Parks and playgrounds occupy about 2.31 % of the total local planning area. The table below shows the broad land utilization of Davangere as per the existing scenario:

**Table 4-1 : Land Use Distribution**

Classification	Existing Land Use	
	Area in Ha	% Composition
Residential	993	21.07
Commercial	402	8.53
Industrial	828	17.57
Public Utilities	116	2.46
Recreational /open spaces	109	2.31
Public & Semi- public	539	11.44
Circulation	1725	36.61
<b>Developed Area</b>	<b>4,712</b>	<b>100.00</b>
Agricultural	953	
Water Bodies	-	
Other vacant land	1198	
<b>Grand Total</b>	<b>6,863</b>	

Source: Davangere Corporation Website



## 4.2 Existing UWSS&SD – Supply/collection System & Coverage

### 4.2.1 Existing water supply

The first organized piped water supply scheme was implemented in 1917, with Tungabhadra River near Harihar as the source. With increase in the population, a new scheme was implemented in the year 1969-70, to draw water from Bhadra Harihar Branch Canal. Recently, in January 2004, Tungabhadra River Water Supply Scheme Stage II has been commissioned. During same time, the Kundawada lake scheme based on Bhadra Harihar canal has also been commissioned. These four sources, supplemented by local bore wells provide about 34.50 MLD water. Hence, Davangere City gets its water supply from the following five systems

**Table 4-2: Water Supply Overview**

Description	Value	Indicators
Total area of Davangere	Sq. Km	61
Total no. of Households (2001 census)	Nos.	77877
Households covered by House Service Connections (HSC)	Nos	16,800
Total households served by House Service Connections	%	29.56
Gross water supply (Ground and Surface)	MLD	34.5
Frequency of Supply	-	Daily (2 Hrs)
Per capita Supply (2008)	Lpcd	94.8

Source: NKUSIP Report

As per the NKUSIP clip report the total numbers of Households covered by House Service Connections (HSC) are 16,800 and 129 non-domestic connections are present.

The current water supply from these three sources, as shown below is estimated to be **34.5 MLD**. However, wide fluctuations are experienced in the supply. In summers, the water supply from ground water sources goes down to 0.2 MLD.

**Table 4-3: Capacity and Supply from Existing Water Supply Sources**

Source	Installed Capacity (MLD)	Actual Supply (MLD)
Old Tungabhadra River Water Supply System	4.50	-
New Tungabhadra River Water Supply System	40.00	30.00
Bhadra Harihar Branch Canal Water Supply System	22.50	-
Kundawada Water Supply System	13.00	-
Ground Water Supply	4.50	4.50
<b>Total</b>	<b>84.50</b>	<b>34.50</b>

Source: NKUSIP Report

### Coverage:

Piped water supply is made available through 16,800 domestic and 129 non-domestic connections. House connections account for only 29.56 percent of the 56,821 registered residential households while non-domestic connections are mere 1.26 percent of the 10,201 commercial properties.

Population covered by piped water supply is stated to be 293,979 (109668 by house connections and 184,311 by stand posts), which works out to around 81.08 % of total population. Total length of the pipelines is 130 km, which covers almost 25.9% of the total road length of 501.68 km.

**Table 4-4: Consumer Connections Details**

Type of connection	Total(nos)
Domestic connections	16,800
Non domestic / commercial connections	129
Industrial connections	0
<b>Total</b>	<b>16,929</b>

**Per Capita Supply:**

Total quantity of water, supplied in 15 hours operation, is about 30 MLD. Bore wells account for another 4.5 MLD. Thus, gross total supply at the source is 34.50 MLD, which works out to be 94.8 lpcd for the present population. However, the actual supply to the consumers would be much lower after taking into consideration the system losses.

**Duration of Supply:**

Water is supplied alternate day for 1-2 hours.

**Pressures:**

Pressures are generally low and supply is irregular in many areas, due to old distribution line.

**Old Tungabhadra River Water Supply Scheme**

This scheme was implemented in the year 1917 initially for a population of 15,000. The present capacity of the system is 4.5 MLD. This system is not in use.

**Raw Water Supply Works:**

Tungabhadra River, which is about 20 km away to the north of the city, is the source of water supply. The intake works are located along the downstream of the Tungabhadra River on old NH-4. Two horizontal split casing pumps were installed in the old pump house. One of these pumps, with its piping and valves, was dismantled in 1964. This old pumping station was abandoned and a new pumping station was constructed in year 1969. Raw Water Pumping Main carries water from the pumping station at intake to the water treatment plant.

**Water Treatment Facilities:**

The water treatment plant is designed to handle 4.50 MLD. The raw water is pumped directly to a settling tank, with 2.25 ML storage capacity. Water from settling tank flows to two rapid sand filters, one 4.60 m dia circular bed designed to treat 1.125 MLD and other 5.18 m diameter circular bed designed to treat 3.375 MLD. The treated water is stored in a sump.

**Clear Water Pumping Station:**

Clear water is pumped from the treatment plant to the Clear Water Pumping Mains through this station with a 275 HP motor.

**Clear Water Pumping Main:**

The pumping main is a 400 mm diameter cast iron pipeline laid from the water treatment plant upto the city.



### **Bhadra Canal Water Supply System**

This scheme, which was commissioned in year 1972, is designed to supply 22.50 MLD. The system is in use. The yield is reported to have gone down to 18 MLD. The water treatment plant needs some repairs in

- (i) Flow measuring device,
- (ii) Flash mixer,
- (iii) Chemical dosing system, and
- (iv) Filter controls.

#### **Raw Water Supply Works:**

Bhadra Harihar Branch Canal, located at a distance of about 0.5 km from the city, is the source of water supply. This canal runs continuously from June to December, but runs for only 10 days each in five months of January to May. The intake works consist of two pipe outlets operated by gates. Water flows to the raw water pumping station comprising screens at the entry, an open sump and a rectangular pump house.

#### **Water Treatment Facilities:**

A conventional 22.50 MLD capacity treatment plant is constructed by the side of the balancing storage reservoir. It has following units:

- (i) Aeration fountain, consisting of 6 m diameter cascade aerator;
- (ii) Raw water channel;
- (iii) Flash mixer;
- (iv) Clariflocculator of 33 m outside diameter, and 3.7 m water depth;
- (v) Four rapid sand filter beds each with 4.5 m x 6.6 m size.

#### **Clear Water Pumping Station:**

Treated water is pumped through following works:

- (i) Clear water sump located at water treatment plant having 2.25 ML storage capacity and (30.48 x 24.38 x 3.5) m size.
- (ii) Pump house (6 x 20 x 5.5) m size.
- (iii) Three clear water pumps, two of them duty pumps and one standby, coupled to 75 HP motors.

#### **Clear Water Pumping Main:**

Water drawn from the canal is pumped directly to the water treatment plant and to the balancing reservoir, through two pumping mains as below.

- (i) Pumping main of 600 mm diameter 400 m long cast iron pipeline upto the treatment plant.
- (ii) Pumping main of 600 mm diameter 400 m long cast iron pipeline laid upto the balancing reservoir.

Clear water is from treatment plant is pumped to the service reservoirs through a 525 mm diameter cast iron pipeline, laid for a length of 3,200 m.

### **Kundawada Lake Water Supply System**

This system has been developed by the Corporation through Karnataka Land Army Corporation. It is basically similar to the earlier Bhadra Canal System and has been designed to supply 20 MLD water to the city. This system has been completed in January 2004. The system is kept as stand by and is operated, along with old Bhadra Canal System, whenever the Stage II Tungabhadra River System is shut

down for any repairs.

**Raw Water Supply Works:**

The Bhadra canal is the source. Water is drawn through the canal and flows by gravity to the Kundawada Lake balancing reservoir through 1.5 km long pipeline of 900 mm diameter

**Balancing Reservoir:**

Kundawada Lake constructed on a natural watercourse, located to the west of the city along National Highway bypass has a live capacity of 3605 ML

**Water Treatment Facilities:**

The plant is designed to treat 20 MLD water and has following components.

- (i) Aeration fountain.
- (ii) Raw water channel.
- (iii) Flash mixer.
- (iv) Clariflocculator 32 m diameter.
- (v) Four filter beds, which are open to sky with a central gallery, provided with a roof.
- (vi) Wash water tank of 5 lakh litres capacity.

**Clear Water Pumping Station:**

Treated water is pumped to feed the 1,000 mm diameter feeder main coming from Tungabhadra River Stage II system through two centrifugal pump of 300 lps discharge and coupled to 335 HP motors.

**Clear Water Pumping Main:**

Clear water is transmitted through 1.5 km long pre-stressed concrete pumping main of 600 mm diameter.

**New Tungabhadra River Water Supply Scheme Stage II**

The new Comprehensive Water Scheme Stage II has been taken up to

- (i) Extend the water supply facility to the newly developed extensions and area recently merged in the CDP limits of Davangere city,
- (ii) Augment the per capita supply, and
- (iii) Provide additional service storage reservoirs and strengthen the distribution network.

The new scheme is designed to cater to the demand of the city upto year 2021. The headwork and transmission system are designed for year 2021 demand of 60 MLD, while the water treatment plant, pumping machinery and storage reservoirs are designed to meet the year 2011 demand of 40 ML.

**Raw Water Supply Works:**

Tungabhadra River is selected as the source. The source works are located near Rajana Halli village, upstream of new NH-4.

**Water Treatment Facilities:**

The water treatment plant is designed to treat 40 MLD of raw water. It is a conventional coagulation, flocculation, sedimentation, filtration process and has following units.

- (i) Aeration fountain.
- (ii) Raw water channel with a notch and flow meter. Alum dose is added here.
- (iii) Flash mixer.
- (iv) 40 m diameter clariflocculator.



- (v) 8 filter beds four on each side.
- (vi) Laboratory.
- (vii) Wash water tank.
- (viii) Two gravity feed chlorinators.

**Clear Water Pumping Station:**

This pumping station is located in the water treatment plant premises; treated water is pumped through 550 Hp motors.

**Clear Water Pumping Main:**

Treated water is pumped to a balancing reservoir through a 900 mm diameter mild steel pipe line laid for a length of 750 m.

**Balancing Reservoir:**

One RCC ground tank of 1.5 ML storage capacity is constructed on the slope of Bathi hillock to provide balancing storage and sufficient elevation for ensuring gravity flow to the city from this point.

**Clear Water Gravity Main:**

Clear water flows from the balancing reservoir to the various service reservoirs in the city through a 1,000 mm mild steel pipeline in the initial stretch of 4,400 m and prestressed concrete pipeline of 6,850 m length upto the first branch feeder.

**Branch Feeder Mains:**

Water from the new scheme (and old Bhadra Canal System) is distributed to various service reservoirs in the city through individual feeder mains, branching off from the 1,000 mm gravity main

**Distribution System:**

**Service Reservoirs:**

There are 6 large overhead tanks (OHTs) and 1 ground tank (GLSR), besides 11 small OHTs, which together were distributing water from the two old systems. Since the capacities of some of these tanks were inadequate to meet the demand in supply hours so many of them are by passed and the distribution network is connected directly to the clear water pumping main from the 22.73 MLD water treatment plant of Bhadra Harihar Canal System. For New Tungabhadra River System 13 more elevated service reservoirs (OHTs) are constructed in the new Comprehensive Water Supply Scheme Stage II.

**Distribution Network:**

The old distribution system was laid in 1960, old and inadequate to meet the present demands. The approximate area covered by distribution network is 23 sq.km. This accounts for 46 % of present of the city. In some areas, distribution network is directly connected to the rising main. Under New Tungabhadra River scheme, the city is divided in 22 zones connected by about 100 km of PVC pipeline of diameter varying from 90 mm to 200 mm in the CWSS stage II.

**4.2.2 Existing Sewerage System**

Sewerage system was provided in the old part of Davangere City. However, as per NKUSIP Report no report or drawing showing the capacity of the system and the sewer network are available.

### Drainage Pattern:

One ridge, running from Yallamma Nagar to Nituvalli village divides the city in two parts. The highest level is 618 m at the TV station, while lowest level is 564 m near the STP under construction. The city is divided into four drainage districts, viz. A, B, C and D. Three drainage districts A, B and D drain into Bettur nallah, which flows from south to north along the eastern boundary of the city, while drainage district C drains into Kundawada tank, located on the west side of the city.

### Coverage:

Sewers have been laid for a length of 230.40 km, out of total 501.68 km long roads. Thus the coverage is 45.93 % of the total area. Other areas do not have access to UGD system.

### Drainage Districts:

The whole city was divided in four drainage districts, as under.

Table 4-5: Drainage district of UGD scheme

Drainage District	Areas
A, B, D	Drain into Bettur nallah, which flows from south to north along the eastern boundary of the city
C	Drains into Kundawada tank, located on the west side of the city

Source: Davangere Corporation/KUWSDB.

### Sewers:

A project report on "Nirmal Nagar Yojana" prepared by Corporation provides statistical details of 35 wards in the city. They mention length of sewers laid in each ward. According to this report, total length of sewers is 230.34 km.

### Sewage Treatment Plant:

No sewage treatment plant was provided in the old scheme. Sewage collected in the sewer network flows to the drains and then to Bettur nallah and Kundawada lake. Bettur nallah, which carries the major quantity of wastewater, eventually joins Tungabhadra River.

### Ongoing National River Action Plan Project

KUWSDB is implementing an ambitious "National River Action Plan "project, which aimed at abating the pollution of Tungabhadra river caused by the waste water of Davangere city and is being implemented with the finance and guidelines of National River Conservation Directorate (NRCD) of the Ministry of Environment and Forest, Government of India.

### Components:

This project has three principal components.

- (i) Interception and Diversion Works
- (ii) Sewage Treatment Plant
- (iii) Land Acquisition

### Sewage Treatment Plant:

Sewage from the outfall sewers will flow by gravity to the sewage treatment plant. STP is designed to handle 19.45 MLD and includes;

- (i) One anaerobic pond

- (ii) Eight facultative ponds
- (iii) Eight maturation ponds

### 4.2.3 Drains

The drainage system in Davangere city consists of five primary drains with secondary and tertiary drains built around these primary drains. **Table below** provides further details regarding storm water drains in the town

**Table 4-6: Existing Storm water Drainage system**

Drain Type	Length	Distribution
	Km	%
Open Drains- Pucca	270.85	85.58
Open Drains- Kutcha	42.13	13.31
Closed Drains	3.50	1.11
<b>Total</b>	<b>316.48</b>	<b>100.00</b>
Primary Drain Channels	18.50	

**Primary Drains.** There are five primary drainage channels in the city.

- a. Bettur Nallah. This is a major nallah, which flows from south to north, along the eastern boundary of the city. Its length is about 5-6 km. Width varies from 30-40 m. It is a natural stream, full of trees, vegetation and debris. It is a principal wastewater carrying channel, with 75 percent of city drainage flowing into this nallah.
- b. Nallah from Pamenahalli Road to Bettur Nallah. This a natural stream, with 3-4 km length and 25-30 m width. It flows from south to north, in the southeastern part of the city, and eventually meets southeastern part of the city Bettur nallah. It mainly carries storm water in the rainy season. Very little wastewater flows into this nallah.
- c. Built - up Drain from Church to Bettur Nallah. It flows from southwest to northeast in the north-eastern part of the city and joins Bettur nallah. It is a built up drain, constructed in stone masonry, 3 km long and 2 to 2.4 m wide. It mainly carries the wastewater from its catchment.
- d. Built-up Drain from Bapuji Hospital to KSRTC Bus Stand. This drain flows through the centre of the city in west-east direction. It is a built up drain with stone masonry walls and concrete bottom, is 2 km long and has width varying from 0.9 m to 1.2 m. It carries wastewater throughout the year.
- e. Built-up Drain from Nituvalli Village to KSRTC Bus Stand to Bettur Nallah. Initial portion of this drain upto KSRTC bus stand flows from southwest to northeast through the heart of the city, then turns to the east and meets Bettur nallah. It is a lined channel, with stone masonry walls and concrete bottom. The total length is 4.5 km and width varies from 1 m to 2 m. It mainly carries the wastewater in the city.

#### Secondary and Tertiary Drains:

The drains are provided in both sides of the roads. All the drains are rectangular in shape. Secondary drains are constructed in stone masonry and concrete. Closed drains are RCC box channels or RCC channels covered by slab. Tertiary drains are smaller in size. The kutcha drains are irregular in shape and prone to damage by the traffic.

**Coverage:**

Drains serve the dual purpose of carrying storm water in rainy season and wastewater in other seasons. It is, therefore, necessary to provide drains on both sides of the roads. The total length of the roads in the city is 493.75 km. The drains are required for a total length of 987.50 km. Actual length of built up drains (open and closed) is 312.98 km. They, thus cover 31.69 % of the roads. The length of both pucca and kutcha drains is 316.48 km, which shows 32.05 % coverage.

**4.3 Existing O&M Structure of the Corporation for Water Supply, Sewage and Drains**

City Corporation has been operating and maintaining the old Bhadra canal system. New Tungabhadra River system is still being operated by KUWSDB, while Karnataka Land Army Corporation is operating the New Kundawada Lake system.

**O&M of Existing Water Supply System**

The following table illustrates the staff details of the City Corporation’s O&M team for water supply system

**Table 4-7: Staff Details of Water Supply O&M in City Corporation:**

Description	No. of Post Filled
Assistant Executive Engineer	1
Junior Engineers	3
Pump Operators	3
Assistant Operators	6
Helpers	3
Cleaners	12
Sweepers / Gardeners/ Watch men	6
Valvemmen for feeder mains / Valvemmen for distribution	63
Assistant fitters for distribution	12
Helpers for distribution	24
<b>Total</b>	<b>133</b>

**Preventive Maintenance:**

The operating staff carries out the preventive maintenance of the electrical and mechanical equipment of the pumping stations such as pumps, valves, piping, motors, breakers, panel boards, meters, capacitors, cables etc. Maintenance of flash mixers, flocculators, clarifiers, piping valves, the staff also takes up dosing equipment etc of the water treatment plants. The maintenance of civil works, such as painting and minor repairs, is attended to, as and when required.

**Maintenance Facility:**

- **Routine Maintenance and Small Repairs-**The CITY CORPORATION staff does repairs such as routine checking of electrical and mechanical plant and equipment, cleaning connections, changing contacts, changing of oil in transformers etc. The spares required are drawn from the stores or are purchased locally.
- **Special Repairs-** Special repairs required for electrical, mechanical equipment or for civil structures are done through private workshops and through contracts.

**Water Quality Monitoring:**

**Raw Water Quality-** Bacteriological quality of raw water is being regularly analyzed for the new



Tungabhadra river system. At other places, raw water quality is not analyzed. Turbidity is measured at the water treatment plant by turbidity rod.

**Quality of Water Supplied to Consumers**-Residual chlorine of the water supplied from the water treatment plant is determined by OT test. Normally, residual chlorine of 1 mg/l is maintained. No bacteriological tests or residual chlorine tests are done on tap water.

**Records:**

- **O & M Manual**-A formal O & M manual is not prepared for the installations of the water supply system.
- **Record at Pumping Stations and Water Treatment Plant**- Logbooks are maintained at each pumping station and water treatment plant.

**4.3.1 Constraints of Existing O&M system**

The City Corporation is operating and maintaining the system, with the staff already employed on the permanent roll, on daily wages or through contract. While a complete overhaul of the present O & M set up may be ideal, it is not practicable, on account of following constraints.

- A large number of people are already employed on this job and their termination or redeployment elsewhere will not be possible. Most of the staff, engaged in actual operation and maintenance, are unqualified for the job and are untrained.
- The O & M of water supply or sewerage system gets lower priority, due to which there is difficulty in getting required staff, material and funds in time. This results in deterioration in both operation and maintenance.

**4.4 City Corporation’s Revenues and Expenses & Cost of O&M of municipal Services**

**4.4.1 Summary of Municipal Finances**

Table 4-8: Summary of Municipal Finances

Description (Rs.Million)	1998-99	1999-00	2000-01	2001-02	2002-03
<b>Revenue Account</b>					
Revenue income	80.12	83.45	99.02	100.17	113.05
Revenue expenditure	67.63	42.94	73.91	71.55	95.81
Surplus/Deficit	12.48	40.50	25.10	28.62	17.24
<b>Capital Account</b>					
Capital income	.40	.94	.70	.97	.92
Capital expenditure	22.35	20.26	24.55	19.79	.10
Surplus/Deficit	(21.94)	(19.32)	23.85)	(18.82)	.81
Fiscal Status	(9.45)	21.18	1.25	9.80	18.06
<b>Debt &amp; Suspense Account</b>					
Extraordinary income	7.72	4.51	8.38	6.75	-
Extraordinary expenditure	3.16	6.21	6.89	8.20	4.99
Surplus/Deficit	4.56	(1.70)	1.49	(1.45)	(4.99)

**Pre-feasibility study for carrying out O&M of Water Supply, Sewerage & Storm Water drains (WSS &SW) on Public Private Partnership (PPP) basis for 6 CMCs in Karnataka: Final Report**

Overall Fiscal Status	(4.89)	19.48	2.74	8.35	13.06
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The Revenue Account comprises of recurring items of income and expenditure. These are essentially all financial transactions related to the day-to-day operations of the municipality. Table below summarizes the status of the Revenue Account.

**Table 4-9: Revenue Account Status**

Item	1998-99	1999-00	2000-01	2001-02	2002-03
	Amount in Rs. Million				
<b>Revenue Income</b>					
Own Source/Tax	18.235	18.208	25.237	26.929	28.995
Own Source/Non Tax	14.818	14.158	14.034	17.416	24.56
Assigned Revenue	4.02	4.804	8.597	11.22	9.515
Revenue Grants	43.054	46.28	51.153	44.615	49.989
<b>Total- Revenue Income</b>	<b>80.125</b>	<b>83.451</b>	<b>99.021</b>	<b>1,00.179</b>	<b>1,13.059</b>
<b>Revenue Expenditure</b>	-	-	-	-	-
Establishment	46.312	32.284	58.716	56.583	60.082
Operation and Maintenance	21.326	10.658	15.2	14.973	35.73
Debt Servicing	-	-	-	-	-
<b>Total- Revenue Expenditure</b>	<b>67.638</b>	<b>42.942</b>	<b>73.916</b>	<b>71.556</b>	<b>95.811</b>
Revenue Account Status	12.487	40.509	25.105	28.623	17.248

Source: NKUSIP Clip report

#### **Own Sources/Tax**

This item head comprises of income sourced primarily from octroi, consolidated property tax (general purpose tax, water tax, lighting tax and scavenging tax) and professional tax. On an average, through the assessment period, own source/tax income constitutes 24.5 percent of the City Corporation's revenue income, constituted mainly by property tax 1999-99 to 2003-04. Davangere City Corporation levies a property tax of 24 percent (including 10 and 7 per cent for general purpose and water respectively) of the Annual Rateable Value (ARV).

#### **Own Sources/Non Tax**

This item head comprises of income from municipal properties, fees on municipal services (building permission, etc.), user charges (water and sewerage tariffs) and miscellaneous services. On an average, through the assessment period, own source/non tax income constitutes 17.75 percent of the total revenue income. Rental income from municipal properties, water charges and income from fees and fines and constitute the major revenue sources under this item head.

#### **Assigned Revenues**

This item head comprises of income from Government of Karnataka (GoK)/State transfers of municipal income collected by the state line department. The income items generally include surcharge on stamp duty, entertainment tax, motor vehicle tax, and other transfers. Collection of entertainment tax has been discontinued for the last three years. In case of Davangere City Corporation, surcharge on stamp duty has been the only item of assigned revenue during the assessment period. Assigned revenue constitutes about 7.81 per cent of the City Corporation's total revenue income .

#### **Revenue Grants and Contribution**

This item mainly comprises octroi compensation grants, SFC grants, special establishment grants and other special grants that the State Government may transfer from time-to-time to the City Corporation. In case of Davangere, revenue grants and contributions constitute about 50 per cent of the total revenue income.

**Revenue expenditure** comprises broadly of three categories of expenditure—establishment, operation and maintenance and debt servicing.

**General Administration and Tax Collection**

This head comprises expenditure on pay and allowances of elected representatives, salary and other operational expenses related to only general administration, pension and gratuity payouts and provident fund contributions. Expenditure under this head accounts for about 11.73 per cent of the total revenue expenditure during the assessment period.

**O&M Cost of Public Works**

Expenditures under this item head comprise repair and maintenance works on buildings, roads and drains. This head constitutes the second largest cost center for the City Corporation. Davangere City Corporation spends about 16.75 per cent of its total expenditure on public works.

**O&M Cost of Water Supply**

Expenditure under this item comprises of regular maintenance of water works. This head accounts for over 13.28 per cent of the total revenue expenditure

**Other Services and Miscellaneous Expenditure Heads**

Expenditure on other services accounts for about 15 per cent of the revenue expenditure, comprising essentially of expenditure on public safety and fire services, public gardens, markets, education, etc.

**Debt Servicing**

This item head comprises interest payments on external borrowings. According to the financial data provided by the City Corporation, there has been no debt servicing during the assessment period. In the absence of data regarding borrowings, it is not possible to ascertain whether the municipality is defaulting on debt servicing or whether there is not commitment.

**Key Financial Indicators:** Analysing City Corporation’s financials provides some key inputs which would form the key parameters of exploring the feasibility of PPP for O&M. Through the analysis it is understood that income from the Non-Tax Sources is only 17.75 % of the City Corporation s Revenue income and the O&M cost of municipal services forms 64 % of the Revenue Expenditure. About 72.97 percent of the total expenditure is on establishment-related heads, leaving relatively lower amounts for expenditure on operation and maintenance of services. The per Capita Growth Rate of O&M expenses is 11.27%. It is also observed that the City Corporation is able to collect 82.27% of the user charges for water supply and 61.94% of the property tax and spends Rs.126.51/- per Rs.1000/- collection of taxes.

**Table 4-10: Key Financial Indicators**

Indicators		Value	Unit
<b>A</b>	<b>RESOURCE MOBILISATION</b>		
1	Per Capita Income	266.31	Rs. p.a



**Pre-feasibility study for carrying out O&M of Water Supply, Sewerage & Storm Water drains (WSS &SW) on Public Private Partnership (PPP) basis for 6 CMCs in Karnataka: Final Report**

Indicators		Value	Unit
2	Sources of Funds		
a	Share of Own Sources - Taxes in Total Revenue Income	24.52	%
b	Share of Own Sources - Non-Tax items in Total Revenue Income	17.75	%
c	Share of Assigned Revenue in Total Revenue Income	7.81	%
d	Share of Revenue Grants in Total Revenue Income	49.92	%
3	Growth in Revenue Income	7.99	% p.a
4	Growth in Own Sources of Revenue Income	10.73	%
<b>B</b>	<b>FUND APPLICATION</b>		
1	Per Capita Expenditure	196.63	Rs. p.a
2	Application of Funds		
a	Share of Establishment Expenditure in Total Revenue Expenditure	72.97	%
b	Share of O&M Expenditure in Total Revenue Expenditure	27.03	%
c	Functional Allocation of Municipal Expenditure		
	General Administration & Tax Collection	11.73	%
	Municipal Services	88.27	%
	Debt Servicing - Interest Payment	-	%
d	Share of Establishment Expenditure to Total Revenue Income	53.08	%
3	Growth in Establishment Expenditure	6.72	%
4	Growth in O&M Expenditure	(2.97)	%
5	Growth in Total Revenue Expenditure	9.10	% p.a
<b>C</b>	<b>PERFORMANCE INDICATORS</b>		
1	Operating Ratio	0.73	Ratio
2	Growth in Per Capita Own Income	10.35	% p.a
3	Growth in Per Capita Revenue Grant	1.52	% p.a
4	Growth in Per Capita Revenue Income	6.60	% p.a
5	Growth in Per Capita Establishment Expenditure	4.38	% p.a
6	Growth in Per Capita O&M Expenditure	11.27	% p.a
7	Growth in Per Capita Revenue Expenditure	6.70	% p.a
9	Capital Utilization Ratio	26.08	Ratio
<b>D</b>	<b>EFFICIENCY INDICATORS</b>		
1	Tax Collection Performance		
a	Property Tax	61.94	%
b	Water Tax	82.27	%
c	Drainage Tax	--	%
2	Cost of Collecting Rs. 1000 of Taxes	126.51	Rs.
3	Property Tax Demand per Assessment	559.37	Rs. p.a
4	Population per P.T Assessment	5.56	Persons

Source: NKUSIP CLIP Report.





## 4.5 Development Initiatives for Davangere and its region by GoK

### 4.5.1 Suvarna Karnataka Development Corridor (SKDC) Programme

The State government in its 2008-09 Budget has identified Davangere District for development of food zone and to promote agro based and allied infrastructure components in the district (as part of the SKDC programme), which would promote economic development of the region.

## 4.6 NKUSIP PROPOSAL and Investment for Water Supply, Sewerage and Storm Water Drains

GoK, through its North Karnataka Urban Investment Plan (NKUSIP), proposes to improve the Environmental sanitation infrastructure, water supply, urban roads and slum development of Davangere city. The following are the summary of Urban Water Supply, Sewerage and Drain improvements proposed through NKUSIP.

### 4.6.1 Summary of NKUSIP Project Interventions

**(i) Water Supply:** Interventions in this sector comprise of provision of additional distribution network for uncovered areas and construction of storage barrage at new river works. Rehabilitation of water treatment plant of Old Bhadra Canal and provision of flow meters at pumping mains and reservoirs of New Tungabhadra River Works.

**(ii) Sewerage and Sanitation:** Rehabilitation of existing sewer line of 230.40 km and provision of additional sewer network of length 565.0 km is proposed.

**(iii) Flood and Drainage Control:** Earlier the projects proposed under this category included creation of road side drains in addition to improvements of primary and secondary drains, but based on present discussions no investments have been proposed for this component under this project

### Estimated Cost of Intervention

The total cost of water supply, Sewerage & Sanitation and Storm water Drainage and environmental sanitation infrastructure cost is Rs.519.3 million; project costs by sector are elucidated in the following table.

**Table 4-11: Estimated Cost of High Priority Interventions (Cost in Million Rupees)**

Water Supply	494.42
Sewerage and Sanitation	24.91
Storm Water Drainage	0.00

Source: NKUSIP DPR Report.

### 4.6.2 Water Supply

Under this component, provision of flow meters at pumping mains, water treatment plant and 21 reservoirs, improvement to chemical dosing system, replacement of filter control and chlorinator system at Old Bhadra Canal Works, is proposed. Water auditing and leak detection for old pumping stations and WTPs and leak detection measures for distribution system, construction of storage barrage at New Tungabhadra River Works, construction of three storage reservoirs and additional distribution network to uncovered areas for a length of 200 Km to cater 0.48 million persons for 2011, is proposed under NKUSIP.

**Table 4-12: Benefits expected from Water Supply Component**

	Item	Existing Situation	Post NKUSIP
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	Item	Existing Situation	Post NKUSIP
1.	Duration of water supply	Once every alternate day for one to two hours	Four hours each in morning and evening every day
2.	Population covered	109668 by house service connection 184,311 by public stand post	Additional 50,000 population covered by HSC
3.	Pressures	Low	High
4.	Water metering	Un metered	Metered

**Table 4-13: Proposed Water Supply Components**

Proposed Water Supply Components		
1	Rehabilitation/Repair/Replacement	<b>Old Bhadra Canal</b> <ul style="list-style-type: none"> <li>Water treatment plant</li> </ul> <b>New Tungabhadra River</b> <ul style="list-style-type: none"> <li>Raw water pumping mains</li> <li>Clear water pumping</li> <li>Service reservoirs</li> </ul>
2	Water supply distribution network	668 Kms.
3	Storage barrage at new river works	One in number
4	Road Overlay	103 Kms.

Source: NKUSIP Report

As per the CLIP Report, an additional of 10,000 connections was proposed as part of the proposed water supply scheme and an additional cost of Rs.22.0 million is estimated for the same. The finalized proposed Water Supply Scheme for Davangere is still under discussion. The proposed water supply component is expected to benefit about 26,800 households in Davangere by 2011 .

#### 4.6.3 Proposed Sewage Component

Under this component, it is proposed to improve the existing sewerage network for a length of 230.4 km at an estimated cost of **Rs. 24.91 Mn.**

#### Estimate of Sewage Flow

Water demand of the city has been projected at the rate of 90 lpcd. However, the sewer network needs to be designed to carry a minimum sewage flow of 100 lpcd, as per CPHEEO Manual on Sewerage and Sewage Treatment. The treatment plant can, however, be developed in phases. Initially, the capacity may be provided at 80 percent of 90 lpcd i.e., 72 lpcd and may be augmented subsequently to treat 100 lpcd. Hence the demand for sewerage system is worked out at following rates of sewage flow.

- (i) 100 lpcd for sewer network, and
- (ii) 72 lpcd for sewage pumping and treatment plant upto year 2011 and 100 lpcd beyond 2011.

#### Demand of Sewerage System

The capacity of sewerage system, required to be provided, is worked out below.

**Table 4-14: Demand of Sewerage System**

Component	Year 2004		Year 2011		Year 2021	
	Population	Demand	Population	Demand	Population	Demand
		MLD		MLD		MLD
Sewer Network	400,000	40.00	488,000	48.80	636,000	63.68
Pumping Station		28.80		36.14		63.60
Sewage Treatment Plant		28.80		36.14		63.60

Following table compares the capacity of various components of the existing and proposed sewerage system with the projected demand.

**Table 4-15: Comparison of Additional Demand and Anticipated Supply of Sewerage Facilities**

Component	Unit	Supply		Year 2004		Year 2011		Year 2021	
		Year 2004	Year 2009	Demand	Surplus (Short- fall)	Demand	Surplus (Short fall)	Demand	Surplus (Shortfall)
Sewer Network	km	230.4	-	501.68	(271.18)	610.0	(379.60)	795.0	(564.60)
Sewage Treatment	MLD	-	40.00	28.80	(28.80)	36.14	3.86	63.60	(23.60)

#### Adequacy

The sewer network in existing facility and planned augmentation does not cover the entire city. The treatment capacity will be adequate to take care of population up to year 2011 and does not call for immediate augmentation.

#### Augmentation of Sewerage System

The augmentation calls for increasing the sewer network by about 380 km to cover entire population up to year 2011.

#### 4.6.4 Storm Water Drainage Network

**Urban Drainage:** KUWS&DB has already undertaken the NRAP project of Interception, Diversion and Sewage Treatment and the City Corporation has also prepared another National River Action Plan Project (Restoration of Kundawada Lake Project), with the help of Karnataka Land Army Project. So as per the finalized NKUSIP project, the Storm Water components and provision of STP is not considered as part of the NKUSIP funding and has to be carried out by the City Corporation.

### 4.7 O&M and its cost as recommended by NKUSIP

#### 4.7.1 Proposed Improvements in O & M. (water supply)

Considering the constraints of the City Corporation, it is proposed by NKUSIP to improve the O & M operations in stages, so as not to change the current set up and practices drastically, but at the same time bring in discipline and control in O & M operations. It is recommended to post following

key persons for the operation and Maintenance of pumping installations and treatment plants.

**Table 4-16: Proposed O&M team – Water Supply**

Category of Staff	Qualification
ITI trained pump operator	1 at each pumping station
ITI trained electrician	1 at each pumping station
Water treatment plant operator, with minimum B.Sc. (Chemistry) qualification	1 at each water treatment plant
Team of engineers (civil or mechanical) to be appointed for overall control of water supply and sewerage operations	A team consisting of one assistant Executive Engineer assisted by two Assistant Engineers for bigger cities and one Assistant Engineer for smaller cities/towns

Providing laboratory set up at the water treatment plants for carrying out daily analysis of raw water turbidity, determination of dose of the coagulant and testing residual chlorine of treated water. Developing training program for the existing unqualified staff to improve the skills in operation and maintenance of the respective components. Preparing O & M plan at the beginning of each year with details about staff, energy consumption, requirement of materials such as chemicals and spares, maintenance and repairs, raw water bills and other miscellaneous items.

After the existing system is rehabilitated and planned augmentation works are constructed, it will be necessary to plan for an efficient O & M of the system. Expenditure on various items of O & M is estimated at Rs. 48.10 million per year.

#### 4.7.2 Proposed Improvements in O & M. (Sewerage System)

**Table 4-17: Proposed O&M team – Sewerage System**

Staff	Details
ITI trained pump operator	1 at each pumping station
ITI trained electrician	1 at each pumping station
Sewage treatment plant operator, with minimum B.Sc. (Biology) qualification	1 at each sewage treatment plant
Team of engineers (civil or mechanical) to be appointed for overall control of sewerage operations	A team consisting of one assistant Executive Engineer assisted by two Assistant Engineers for bigger cities and one Assistant Engineer for smaller cities / towns

The above table illustrates the proposed O&M team for the sewerage system. Providing laboratory set up at the sewage treatment plants for analyzing the parameters like pH, suspended solids and Biochemical Oxygen Demand (BOD) of the influent and effluent. Developing training program for the existing unqualified staff to improve the skills in operation and maintenance of the respective

components. And also preparing O & M plan at the beginning of each year with details about staff, energy consumption, requirement of material such as chemicals and spares, maintenance and repairs, raw water bills and other miscellaneous items.

**O & M Expenditure** - After the existing system is rehabilitated and planned augmentation works are constructed, it will be necessary to plan for an efficient O & M of the system. Presently there is no focus /expenditure by Davangere City Corporation on sewerage system so to calculate the O&M cost of sewage component at Davangere the O&M cost due to additional new components is projected at @ 2% of the proposed cost of investment as per revised NKUSIP components in addition to cost of new works estimated as per NKUSIP initial Clip report. Thus the total O&M cost is estimated to be Rs. 3.32 million/annum.

#### 4.8 Need for Private Partnership in O&M of Municipal services in Davangere

##### Water Supply

There is no measurement of water being drawn from the source, pumped to the city and distributed to the consumers. Also due to low efficiency in the existing O&M of water supply system, a high percentage of water is lost during transit and distribution, which accounts for 20-30 %of total supplied water .This, has also resulted in less supply at consumers end. Private sector participation in O&M is expected to bring in skilled, trained and attentive work force and latest technology through which it is expected to reduce the water loses due to leakages and pilferage during transmission and distribution. It can also improve the efficiency level of O&M of treatment plants, thus reducing the water lose and also optimizing the uses of chemical and consumption of power. Case studies illustrate that through private participations the O&M cost can be reduced by 10 to 20%.

##### Sewerage & Drainage System

The present sewerage network covers only 45% of the total area and also there is urgent requirement to operate and maintain the existing system for the optimum efficiency and also to construct the additional network. If the same system of O&M is continued, the environmental sanitation conditions in the town will deteriorate as population density increases. Privatized O&M of sewerage system is expected to have a dedicated work force and an organized operation schedule would improve the environmental sanitation conditions of the city.

#### 4.9 Preliminary Financial Analysis

Based on the information collected, collated and analyzed regarding, existing scenario of urban water supply, sewerage and storm water drains of the City Corporation, its O&M system and City Corporation's revenue income and expenditure, a preliminary financial analysis is carried out in order to explore the viability of PPP in O&M of water supply, sewerage and Storm water drainages starting from the year 2011-2012. The following are the key assumptions considered for preliminary financial analysis:

##### 4.9.1 Commencement of O&M operations:

As Davangere is among the cities identified under second tranche of funding and the preparation of DPR documents and other tender related procedures for establishment of additional assets & improvement of urban water supply and sewerage systems is currently under process. As part of the key assumptions, it is assumed that the assets would be established within a time span of two years and it is assumed that the O&M of the urban services would commence by 2011-12.

#### 4.9.2 Demography:

Davangere's population is expected to reach 488,400 by 2011. As per NKUSIP clip report, Davangere has 56,821 registered house hold properties (77,877 in total as per census 2001) and 10,201 Non-domestic/commercial properties.

#### 4.9.3 Number of Service Connections:

**Water Supply:** The number of House Service Connection (HSC) is expected to cover a total of 26,800 by 2011 including the additional 10,000 connections proposed through NKUSIP project. Since, there is no information available on the proposed additional number of non-domestic/commercial connections, it is assumed that by 2011 the direct service connections would cover 100% of the existing number of non-domestic/commercial properties of 10,201(2004).

**Sewage:** Sewers have been laid for a length of 230.40 km, out of total 501.68 km long roads. The coverage in terms of total area is thus 45.93 percent. For the preliminary analysis the same percentage is assumed for calculating the number of service connections to existing Domestic properties i.e 26097. Also as there is no information available on the proposed additional number of domestic connections, it is assumed that by 2011, 60% of the total households will be provided with sewerage connection. Further no information is available on service connections to Non-domestic /Commercial and industrial properties, these are not considered for the preliminary analysis.

#### 4.9.4 Tariff & Collection efficiency:

Existing water tariff of Rs55/- , Rs.110/- and Rs.300/- per month for domestic, Non-domestic/ Commercial and Industrial connections respectively as recommended by GoK is assumed without any revisions for the year 2011-12 and is expected to remain same for the next 5years (till 2015-16). An increase of 30% on the existing tariff is assumed from year 2016-17. Further, it is assumed that there would not be any tariff for water consumed through Public Stand Post. For sewage connections, it is assumed that 10% of the water tariff charges would be collected as sewage tariff (as per inputs provided by KUIDFC).

Collection efficiency of Davangere City Corporation for water tariff is 82.3% and property tax is 61.9%. Existing collection efficiency of 82.3% is assumed for the analysis.

**Table 4-18: Key Assumption & Parameters for Preliminary Financial Analysis**

Key Parameters	Existing	Proposed Additional (2011)	Total
Total Population (2001)	363,780	124,620	488,410
Total House Hold Properties (2001)	77,877		
Total Commercial Properties	10,201		
<b>Water Supply</b>			
Total House Service Connections (No. of Connections)	16800	10000	26800
Population to be covered by HSC (No.)	109668	50000	159668
Non domestic (No. of Connections)	129		
Industrial Connections(No. of Connections)	-		
Tariff for Domestic/Household (Rs/Household)	55.00		
Tariff for Non-Domestic/ Commercial(Rs/Connection)	110.00		
Tariff for Industrial (Rs/Connection)	300.00		
Water Supply New Connection Charge- Domestic (one	1500.00		

**Pre-feasibility study for carrying out O&M of Water Supply, Sewerage & Storm Water drains (WSS &SW) on Public Private Partnership (PPP) basis for 6 CMCs in Karnataka: Final Report**

Key Parameters	Existing	Proposed Additional (2011)	Total
Water Supply New Connection Charge- Non Domestic	3000.00		
Collection Performance-% of HSC(water charges)	82.3%		
Collection Performance - % of (Property Tax)	61.9%		
<b>Sewage</b>			
Total House Service Connections (HSC)	26,097	20,629	46,726
Population to be covered by HSC	40,000.00	65,000	1,05,000
Tariff for Domestic ( assumption- 10% of water tariff)	5.50		
Tariff for Non-Domestic( assumption- 10% of water tariff)	11.00		
Sewage New Connection Charge (one time)	1500.00		

#### 4.9.5 O&M expenditure:

The O&M cost of water supply amounts to Rs.12.7 million per annum considering that the cost of O&M for water supply accounts to be 13 % of the total revenue expenditures of the City Corporation. This cost is projected at the rate of 11.27% (which is the rate of growth of the City Corporation's O&M cost of all urban services between 1998-2003) till 2011-12. Thus the O&M cost of existing water supply components is estimated to Rs.33.2 million for the year 2011-12.

Based on case studies, the O&M cost for water supply due to additional connections & improvements is assumed to be 3% of the total capital cost estimated for water supply component under NKUSIP project (excluding the estimated cost for water audit) , i.e. an additional cost of Rs.14.83 million per annum. Based on the above computations the total O&M cost for water supply for the year 2011-12 is estimated to be Rs. 48.10 million.

**Table 4-19: Assumptions for O&M Expenditure**

Sector	O&M as % of capital cost
Water Supply	3.00
Sewerage & Sanitation	2.00
Storm water Drain	1.00

As per the secondary data collected, Davangere City Corporation does not have any major expenditure towards O&M of existing sewerage & drainage system. The O&M cost was estimated by assuming 2% of the estimated capital cost of investment planned for the sewerage components of Davangere ( through revised NKUSIP investments) and also additional network cost (as provided in initial NKUSIP report), which is around Rs. 3.32 million per annum and the same is assumed for the preliminary analysis.

#### 4.9.6 Expenses of O&M operator:

As provision of HSC connections would be the City Corporation's responsibility and is not factored under NKUSIP project, provision of HSC connections (Water Supply & Sewerage) is factored as part of the O&M. Therefore, the operator has to invest in the provision of 10,000 and 20,629 new House Service Connections both for water supply and sewerage, which is estimated to cost Rs. 73.57 million (@ of Rs.2, 200/- for per water supply connection and Rs.2, 500/- for per sewerage connection)



**Table 4-20: Cost of Provision of New House Service Connections**

	<b>New Infrastructure</b>	<b>Proposed No. of Connections</b>		<b>Unit Cost as per consultant's inputs in Rs.</b>	<b>Total Investment in Rs. million</b>
1.	Water Supply - House Service Connection Cost	10,000	Nos	2,200	22.0
2.	Sewage - House Service Connection Cost	20,629	Nos	2,500	51.57
<b>Total</b>					<b>73.57</b>

Source: NKUSIP CLIP Report

Apart from the above-mentioned O&M expenses, a private O&M operator would have its initial investment like procurement of equipments for maintenance, communication instruments and vehicles for transportation to carry out the O&M operations and is estimated to be around Rs.1.00 million and monthly office administrative expenses like rentals of office space, salary of administrative office staff and other office over heads is estimated to Rs. 0.69 million per annum.

**Table 4-21: Administrative Expenses of the O&M Operator**

<b>Office expenditure of the O&amp;M Operator</b>	<b>Rs. Per Month</b>	<b>Rs. Million per annum</b>
Rentals/month	10000.00	<b>0.12</b>
Increment in office rentals		5%
<b>Office Staff Salary and Overheads</b>		
Salary of Manager	15000.00	0.18
Salary of Office technical Assistant	7500.00	0.09
Accounts officer	10000.00	0.12
Office Attender	5000.00	0.06
Overheads	20000.00	0.24
<b>Total</b>		<b>0.69</b>
Increment in salaries 10%		10%

#### 4.9.7 Other Assumptions:

It is assumed that the cost due to depreciation of assets would be at the rate of 0.02% (CPEEHO) of the total estimated O&M expenditure per annum. Cost of collection of water charges is assumed to be Rs.126.51 for every Rs.1000/- collected as per cost for cost of collecting property tax and water cess (CLIP Report).

#### 4.9.8 O&M Revenue Income:

As discussed earlier, the revenue income from water supply & sewerage are assumed only from the properties with HSC and based on the existing tariff rates of GoK. As provision of new HSC connections would be part of the O&M services. The existing new water supply connection charges of Rs.1500 (Per Domestic Connection) & Rs.3000 (per non domestic Connection) and new sewage connection charge of Rs.1500 per connection would also be considered as part of the Revenue income of the operator.



#### **4.10 Financial Viability for PPP mode of O&M for Davangere City Corporation:**

The preliminary financial analysis carried out based on the above-mentioned key assumption illustrates that the O&M expenditure for the year 2011-12 would be around Rs. 55.78 million and the Operator has to invest around Rs.73.57 million to provide 10,000 & 20,629 new HSC each for water supply and sewerage. Thus, the total expense of the first year (2011-12) of operation is estimated around Rs.131.16 million. The revenue income through tariff collection (assuming 82.3% collection efficiency) for the same years would be only Rs.21.62 million as the income from the additional new connections would start only from the second year. Thus, there is a deficit of Rs.109.54 million for the year 2011-12, which is around 507 % of the revenue income for the first year.

During the second year of operations, the operator would get Rs.45.94 million as income from the new connection charges and additional income from water & sewage tariffs from the 10,000 & 20,629 new connections respectively, thus increasing the revenue income to Rs.65.96 million (assuming 82.3% collection efficiency), with a deficit of Rs. 3.43 million. The revenues for 3<sup>rd</sup>, 4<sup>th</sup> & 5<sup>th</sup> year would remain constant with Rs. 28.17 million with a deficit of Rs.42.07, Rs.49.48 & Rs.57.72 million respectively.

The outcome of the preliminary financial analysis indicates that a PPP mode for O&M of water supply, sewerage and Storm water drains at existing tariff levels is not financially viable for Davangere City Corporation. However, with tariff rationalization and support from GoK in terms of annuity payments, O&M of water supply and sewerage systems on PPP basis can be considered.

##### **4.10.1 Assumptions for Viability:**

The preliminary financial analysis also indicates that a 30% increase in the revenue income by increase in tariff rates by 2011-12 and achieving 100% collection efficiency would provide positive cash flow during second year but still resulting in deficits for the rest of the years. Further, private participation is expected to bring down the overall O&M cost through efficient handling of the system and it is assumed that a PPP mode would reduce the O&M cost at least by 10% of the existing or estimated cost. This would further improve the cash flows.

##### **4.10.2 Revenue from reuse of STP water:**

The prime objective of the pre-feasibility is to explore a PPP mode for O&M of water supply, sewage and drainage as one package. Therefore, to make the project viable under PPP mode, revenue income from sale of treated water from STP is also explored. It is estimated that the proposed STP would release 15.56 MLD (assuming 80% of the proposed STP Capacity of 19.45 MLD) of treated water every day. As part of the O&M, the private operator has to maintain and operate the STP; therefore City Corporation, as a part of the PPP agreement can provide the rights over the treated water from the STP to the private operator. This would facilitate the operator to generate income by sale of the treated water to industrial areas, construction industries, landscape maintenance and for other non-domestic consumptions. The Bellary example indicates that treated water is sold at Rs.20/ Kilo liter; however, a nominal rate of Rs.5/- per Kilo liter of treated water is assumed for projections at Davangere. Thus, the income which can be generated by sale of Treated water would be around Rs.28.40 million per annum. A detailed study shall be carried out as a part of a detailed feasibility study to understand the demand and viable rates for treated water.

Assuming 75% realization, the operator can generate Rs 21.3 million/ annum. This additional income would further help in reducing the deficits.

#### **4.11 Recommendations to make a PPP of O&M viable in Davangere City Corporation:**

The following are some of the recommendations which might make a PPP mode viable:

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1. Increase in water tariff rates by 2011-12 or Introducing metered tariff collection for all consumer categories
2. Improving collection efficiency to 100%
3. Increasing the existing sewerage charges.

The City Corporation has to carry out the above-mentioned recommendations in order to make the O&M cost of urban services self sustainable. Especially in water supply the current tariff of Rs. 55 per month for an average monthly consumption of 13.29 kl (assuming 95 lpcd and average house hold size of 4.7) accounts to a very low tariff rate of Rs. 4.14/kl per connection. But it is also observed through secondary data collection that each HSC serves to more than one household, so taking an assumption of 10 persons per connection, the average consumption level per HSC is around 40.50 kl per month against 13.29 kl considered for estimation, therefore the actual tariff collection is only Rs.1.36/kl. Considering these facts, it is recommended to carry out the above mentioned measures in order to make the City Corporation's O&M component financially self sustainable, which would also improve the viability for a PPP mode.

#### 4.12 Project Structure & Way Forward:

##### 4.12.1 Alternative Options/Performance Based Management Contract (PBMC)

With existing tariff structures, O&M of water supply on PPP basis in Davangere City Corporation is not be viable, therefore an alternative option **for carrying out O&M of water supply is through Performance Based Management Contract (PBMC)**. The following can be considered as the prime components of Project structure for PBMC.

O&M can be carried out through other PPP & PSP modes, through a combination of the following measures:

- Financial support from City Corporation/Govt. of Karnataka by means of Annuity payments
- Phased increase in water and sewerage tariff across all consumer categories
- Introduction of meter based tariff rates
- Metering of industrial and commercial connections and over next few years, metering of domestic connections
- PSP for O&M of systems can also be explored through Management Contract model
- The O&M contract shall be structured factoring in performance based incentives and penalties and lowest Annuity payment basis from City Corporation /GoK (i.e. PBMC)
- Term of a PBMC contract including installation of HSC can be for a maximum period of 5 years including the HSC installation period.
- Installation of HSC shall be completed within 1 year.
- The contract can be structured based on annuity payment and the annuity amount shall be arrived based on the actual O&M expenses The O&M expenses quoted can be the first bid parameter, with a weightage of 70%.

- Price quote for installation of the HSC shall be the second bid parameter, with a weightage of 30%.
- The bidder shall be selected based on the lowest overall evaluated bid after taking into account the first and second Bid Parameters, as per their respective weightages mentioned above.
- The following Key Performance Indicators (KPI) may be considered to monitor the performance of the O&M contractor:
  - a. **Quality of water distributed to the consumers**  
Achieving the best drinking water quality as recommended by WHO/CPEEHO standards can earn the O&M operator a bonus of up to 5% of the fixed annuity amount. On the other hand, a penalty of 5% for water quality supplied below the recommended quality standards can be levied.
  - b. **Reduction in the overall UFW from existing condition to a maximum range not exceeding 25 to 30%.**  
A reduction up to 25% within the second year of operation can earn the operator a bonus of 10% and reduction up to 20% would provide a bonus of 15%. If the UFW is not reduced to 30% then the operator would face a penalty up to 10%.
  - c. **Quantity and quality of treated water from STP**  
Treated STP water with a quantity of at least 80% of the installed STP capacity and with a water quality of BOD level less than 12 can earn the operator a bonus of another 5%. A BOD level above 15 can face a 5% penalty.
  - d. **Minimizing system-downtime**  
Minimizing system-downtime and time for repairs & maintenance with minimal impact on water supply timings, duration, quantity and quality of supply & treatment assessed as per consumer feedback would provide the operator an additional bonus of 5%
  - e. **An overall reduction in the O&M cost**  
An overall reduction in the O&M cost of the existing infrastructure components/network of water supply, sewage and storm water drains up to 10% (especially reduction in consumption of electricity) can earn the operator a bonus of 5% of the quoted annuity amount. An increase in O&M cost exceeding 10% and above can have a penalty of 5%.
- Thus the operator can achieve an additional bonus of 35% per annum based on his performance. Consistent performance by achieving 30% bonus and above for 2 consecutive year shall provide an additional bonus of 10% at the end of the term. Further the bonus payment shall be paid only at the end of the 3<sup>rd</sup> year and the 5<sup>th</sup> year. But the penalty if any shall be deducted every year.
- The annuity payment would start from the second year.
- City Corporation shall appoint an independent engineer to monitor the Performance indicators of the contract.

*The above-mentioned Key Performance Indicators (KPI), incentives & penalty clauses are indicative and*

*the exact quantification of the indicators can be determined only through a detailed audit and assessment of the services and its components and also through a detailed financial analysis as part of a detailed project report preparation.*

**Initiatives Required from City Corporation /GoK:**

- City Corporation should carry out an audit of the existing assets of the water supply, sewage and storm water components which would be leased to the O&M operator, in order to provide details & inventory of the existing components and the status of the assets.
- City Corporation should enforce stringent regulations to curb illegal and unauthorized supply of water within the City Corporation area and also implement norms which would restrict and regulate the number of bore holes/bore wells permitted within certain surface area limits.
- City Corporation also should bring norms restricting use of potable water construction and landscape uses.
- City Corporation should appoint an Independent Engineer for frequent Monitoring of the KPI of the agreement.

## 5 Bidar

### 5.1 Bidar City Profile

Bidar City, headquarters of Bidar district, is located in the northern plateau region of the Karnataka State. The city is located in northern most tip of the state at 669 kms from Bangalore, 141 kms from Gulbarga and 135 kms from Hyderabad (state capital of Andhra Pradesh). Bidar is one among the 21 Class I cities in the State with a population of 1, 70,204(2001 census) and 2, 09,058(2008).

Bidar has historical significance dating back to the Bahamani Kings in the 15th century. The ancient monuments and tombs seen around the city signify the importance of the town in the region. Also the Government of India has established the Air Force Training Center, located south of the city near Chidri village, in lieu of the flat terrain and high altitude.

**Latitude, Longitude & Altitude:** Bidar is located at 17°35' North latitude and 77°32' East longitude, at an altitude of 664 meters above mean sea level (MSL).

**Connectivity:** The city has grown along Hyderabad –Bhalki State Highway and is connected to National Highway No 9 (Hyderabad – Mumbai) via Srirangapatnam – Aurad State Highway (SH – 19). It is also well connected to Hyderabad by rail link. The nearest airport is Hyderabad at a distance of 135 kms.

**Climate:** The climate of Bidar is healthy and cooler relative to the neighboring districts of Karnataka i.e. Gulbarga and Bijapur. The maximum temperature varies from 39°C to 43°C and the minimum temperature falls to 18° C. The monsoon is generally spread over four months (June to September), the average annual rainfall being around 916.58 mm.

**CMC Jurisdiction:** The City Municipal Council's (CMC) jurisdiction extends up to an area of 43.0 sq. Km, with 35 wards.

#### 5.1.1 Demography

##### Population:

The total population of CMC is 170,204 as per census 2001. The city has experienced low population growth during the last decade (28.55 % from 1991 to 2001), compared to the consistently increasing growth rate since the 1930's i.e 61 % average decadal growth rate in the 60's, 70's and 80's. The population increase in previous decades (1961 to 1991) is attributed to the importance given to the town as a regional trade center thus witnessing in-migration to the area up to 25 % to 30 % of the population. In the 1990's the population growth rate began declining primarily due to lack of economic activities, growth of other urban centers in the region with shifting trends of migration. The compounded annual growth rate (CAGR) of population from 1961 to 1991 is 4.80 %, which has dipped to a low of 2.54 % in 1991-2001.

##### Household Size:

The total number of households in Bidar has increased from 20,803 in 1991 to 26,387 in 2001 and 32,835 in 2008. The average household size is 6.4, which is higher compared to the national average of 6.3 (census 2001). The higher household size can be attributed to predominant presence of Muslim population in the city.

Population projections carried out by the town-planning department as part of its Bidar Master Plan estimated the population of Bidar to be 2, 25000 and 3, 75000 by 2001 and 2011 respectively, as against the actual population of 170,204 for 2001. The population projected under NKUSIP Clip report is 2, 43,730 (2011) and 4, 34,690(2031) which is considered for this study.

### 5.1.2 Economy

The key drivers of Bidar city's economy are the trade and commerce and other services, particularly the regulated market activities and the general commercial and transport activity. Approximately 60 % of the city's population is involved in tertiary sector. There are 19 commercial and co-operatives banks in the city, which reflects the extent of the tertiary sector activities.

#### Industries:

The regional significance as a trade center, and the two industrial areas developed by KIADB, provided an industrial base to the city. Besides, there are a number of small-scale machine tool units, food processing, textile and printing and other service industries, which provide employment. As on December 2003, there were 34 large/medium scale industries, and 5,692 registered small-scale industries in the district. Owing to the absence of large-scale industries clubbed with economic recession in the past years in the district, has affected food processing and engineering industries of the area.

There are two major industrial estates (Nawabad Industrial Estate and Kolar Industrial Estate) developed by KIADB are located at an approximate distance of 5 km (Nawabad Estate) and 8 km (Kolar Estate) towards the west of Bidar city on opposite sides of the railway line. These industrial estates consist of completely developed industrial plots spread over 94 acres and 896 acres respectively. The estate houses industries such as agro, food and allied products, drugs and pharmaceuticals, and leather industries.

As per Department of Industries and Commerce statistics, 2003, there were 3 Food, agro products and allied products industries in Bidar (mainly sugar factories), employing 1,950 persons. The small-scale food processing units employed 7322 employees (mainly sugar mills within CMC limits and beyond), while 7400 persons were engaged in other industries like textile and printing, and wood works. In addition to the above two estates, the small-scale industrial units provide substantial employment opportunities in the region. While the estates are located along State Highway beyond the defense installations, the small-scale units are spread across the city.

#### Trade and Commerce:

The City has been a trade center, with almost 60 % of the population engaged in tertiary sector (20 % of the in trade and commerce activities, 9.95 % in transport, storage, etc. and 39.5 % engaged in other services).The APMC yard, at Gandhi Gunj area along SH, houses the wholesale markets for grain and sugarcane, is spread over an area of 10,000 Sqm with approximately 300 Sqm of shop area and storage area. Recent estimates have revealed that the APMC yard registers an average footfall of 3,000 customers per day.

#### Mineral Resources:

Laterite quarries are located in the city, which provides the employment opportunities and also fulfills the building material requirements of the city.



### Tourism:

Bidar is not a prominent tourist place. The historical monuments, religious places and tombs such as the King's fort, Madrasa Mohammad Gawan, Tombs of Barid Shah, Hazrat Khaja Abdul Faiz, Ali Barid and Hazrat Ziauddin Sahib, etc. generally attract only the local populace. Apart from the monuments, other important places of religious and pilgrimage significance are Papanasham Shiva temple, Gurunanak Gurudwara and Narasimha Swamy Temple.

### 5.1.3 Landuse Plan/CDP, Regulations:

The Town Planning Department, Bidar, carried out a land use survey in 1996. The land use details for 1996 are indicated in table below

**Table 5-1: Land Use Distribution**

Land Use	Existing in 1996	
	Area(in hectares)	% to Developed area
Residential	486.41	38.98
Commercial	45.53	3.65
Industrial	102.83	8.24
Governmental	2.56	0.21
Recreational	104.27	8.36
Public & Semi- public	163.36	13.09
Tourist Facilities	56.00	4.49
Circulation	286.77	22.98
<b>Developed Area</b>	<b>1,247.73</b>	<b>100</b>

Source: NKUSIP CLIP Report.

According to the 1996 – Land use statistics indicates that the total area under CMC's jurisdiction is 4,300 hectares, out of which only around 30 % is developed. Review of land utilization reveals that, 38 % of the developed area is under residential use and 35 percent is under public, semi-public and transport use. Significant area of land in Bidar, in the periphery of CMC and around the CMC is rich in black cotton soil and is utilized for agricultural use (mainly for cultivation of sugarcanes and vegetables).

## 5.2 Existing UWSS&SD – Supply/collection System & Coverage

### 5.2.1 Existing water supply

The first organized water supply to Bidar city was from Chidri, Chitta and Papanosh open wells. The yield of these sources started going down and was insufficient to meet the requirements of the city. Hence a comprehensive water supply scheme with source as Manjra River (a tributary of Godavari River) was implemented and commissioned in year 1974. This scheme was designed to supply 4.55 MLD water to 50,000 population of the city. The subsequent augmentation of this scheme has been undertaken and completed in year 2002. This scheme allows an additional supply of 27.23 MLD in two stages.

**Table 5-2: Water Supply Overview**

Description	Units	Indicators
Total area of Bidar	Sq. km	43.00

**Pre-feasibility study for carrying out O&M of Water Supply, Sewerage & Storm Water drains (WSS &SW) on Public Private Partnership (PPP) basis for 6 CMCs in Karnataka: Final Report**

Description	Units	Indicators
Total no. of Households (2008)	Nos.	32,835
Households covered by House Service Connections	Nos	7,799
%households served by HSC	%	29.56
Property tax assessments with service connections	%	23.66
Present Gross Water Supply (Surface and Ground)	MLD	33.63
Total water supplied from Treatment Plant	MLD	27.28
Frequency of Supply	-	Daily (1½ Hrs)
Net Supply (Including system losses)	lpcd	66

Source; Bidar DPR

**Table 5-3: Capacity and Supply from Existing Water Supply Sources**

Source	Installed Capacity (MLD)	Actual Supply (MLD)
Manjra augmentation Scheme (New)	27.23	20.0 ( in summer it is 11.4 )
Manjra Scheme (Old)	4.50	0
Bore-wells and Open wells	1.90	0.50
<b>Total</b>	<b>33.63</b>	<b>20.50</b>

**Coverage:**

Piped water supply is made available through 7,799 connections and 118 stand posts. The house service connection accounts for only 23.6% of the households. There is a likelihood of more than one household using one connection in many places.

Assuming that about 10 persons use one house connection and about 150 persons avail the facility at public stand posts, the total population likely to be using the piped water system will be about 94,500 i.e. approximately 47% of the total population. All the water connections are currently un-metered.

**Table 5-4: Consumer Connections Details**

Type of connection	Total(nos)
Domestic connections	7682
Non domestic / commercial connections	117
Industrial connections	-
<b>Total</b>	<b>7799</b>

Source: Bidar NKUSIP Clip report

**Per Capita Supply:**

Presently, bulk water supply system (pumping stations and treatment plant) is operated for about 12 hours per day. Since the old Manjra river system is not in use, total quantity of water pumped is about 20.5 MLD. Bore-wells and open wells add another 0.5 MLD, and the per capita supply is estimated to be 98 lpcd. In summer season, total water supplied from New Manjra water supply scheme is only 11.40 MLD further decreasing the per capita supply. However, the actual supply to the consumers would be much lower after taking into consideration the system losses.

**Duration of Supply**

In normal seasons, Water is supplied daily for a period of 1½ hours.

**Pressures:**





Pressures are reported to be good. Supply is made through 12 service reservoirs, one reservoir serving average 640 house connections and 15 public stand posts. Thus, the pressures are reasonably good due to less flow, good elevation and adequate storage in the service reservoirs.

**Old Manjra River Water Supply Scheme**

The source is Manjra River, with intake works located near village Janwada. The river stretch at this point is not perennial. Also, one more scheme of 9.09 MLD capacity has been constructed near the old scheme for water supply to industries in the KIADB area.

**Raw Water Supply Works:**

The intake well was disturbed and tilted in floods, and out-of-use since then. The connecting main has also become unserviceable, as it has been fully clogged with mud. Both these works need to be reconstructed. The jack well and pump house is useful and with some repairs can be brought in use.

**Raw Water Pumps:**

Two vertical turbine pumps each of 150 HP Kirloskar make motors are installed in the pump house. When the jackwell and pump house had collapsed, one submersible pump was installed. In 1997, one of the two vertical turbine pumps was replaced by a new set. Pumps need to be inspected and overhauled. The other electrical equipment, which is out of use and neglected, also needs to be repaired.

**Raw Water Pumping Main:**

Raw water, pumped from the river works, is conveyed to the water treatment plant, located at Markhal village, through a cast iron pipe line of 375 mm diameter and 8.9 km in length. Pipeline is also in a neglected state. Heavy leakages and bursts were reported in portions, where the pipeline is laid in black cotton soil. It is necessary to carry out leak detection survey, repair the portions, which are serviceable and replace the stretches with new pipelines, which cause frequent bursts and leakages. The flow measurement is also not possible.

**Water Treatment Facilities:**

The water treatment plant, with 4.55 MLD capacity, is located near Markhal village. The plant has following units; Aeration Tray, Raw water channel, Circular clarifier, Rectangular Flocculator, Rapid Sand filter beds (2 nos.), Chlorinator.

The plant is presently out of use. It can be rehabilitated to perform to its design capacity if, a) Flow measuring device is introduced, b) Equipment of flash mixer, flocculator, clarifier, filters and chlorination is replaced, and c) Efficient chemical dosing is reinstalled.

**Clear Water Pumping Station:**

This is located in the water treatment plant premises and has following component, as indicated in **Table** below

<b>Components</b>	<b>Description</b>
Ground Sump	Design capacity – 0.45 MLD
Pump house	~ One nos.; located by the side of sump
Centrifugal pumps	~ Two nos.; each run by 180 HP Kirloskar make motor
Clear Water pumping main	~ 375 mm dia. CI main, laid from clear water pumping station to Janwada road intermediate pumping station

The system is in a total state of neglect. The machinery needs repairs to make it functional again. Electrical connection needs to be restored again. The cast iron pipeline is out of use, but can be made



functional after some repairs. The old scheme has been out of use, since the commissioning of the new Manjra River scheme.

**New Manjra Water Supply Scheme**

This scheme has been recently commissioned by KUWSDB. The capacity of the system is 27.28 MLD, to be developed in two stages.

(i) Stage I of 20.46 MLD, to supply water to 186,000 population as projected for the year 2006. (ii) Stage II to be expanded to 27.28 MLD, to cover a population of 235,000 projected for the year 2021, for which civil works are designed, but the mechanical and electrical equipment will need to be upgraded to this capacity later.

**Barrage in Manjra River:**

Since the flow in Manjra River is not perennial, a barrage is constructed near Hippalgaon.

**Intake works:**

The water from the barrage is drawn through following works;

<b>Components</b>	<b>Description</b>
RCC intake well	~ 3 m internal diameter and 5.5 m depth
RCC connecting main	~ 1100 mm dia. laid for 60m length; capable of carrying 13.08 mgd flow.
RCC Jackwell	~ 8 m dia. and 22.4 m depth, constructed on right bank.
Pump house	~ 12.94 m diameter and 6.6 m height, constructed over the jack well
Approach bund	From the river bank upto Jackwell, for providing all weather access at level above HFL of the river.

**Raw Water Pumps:**

Two deep well vertical turbine pump sets with 600 hp motors are installed in the pump house. While one is a duty pump, the other is a standby.

**Raw Water Pumping Main:**

Raw water is pumped to the water treatment plant through a pumping main, designed to carry 27.28 MLD water to meet the year 2021 demand. The 8.9 km main line consists of MS and Prestressed concrete

**Water Treatment Plant:**

The water treatment plant is located by the side of the existing 4.55 MLD plant near Markhal village and is designed to treat 27.28 MLD water. However filters are provided for 20 MLD capacity. The components of water treatment plant are indicated in **Table** below;

<b>Components</b>	<b>Description</b>
Aeration fountain	
Raw water channel	With standing wave flume, where dose of poly- aluminium chloride (PAC) is administered.
Circular flash mixer	
Circular clariflocculator	With four flocculators
Rapid Sans filter beds	Six nos., three on each side
Wash water tank	One nos., Design capacity- one lakh gallon.



Components	Description
Chlorinators	2 nos.

The plant is a well-designed conventional water treatment plant. No flow measuring device has been provided at the inlet. The dosing of chemicals is arbitrarily done. Poly aluminum chloride (PAC) is being used as a coagulant, instead of alum. Most of the controls in the filter house are not functional.

**Clear Water Pumping Station:**

Clear water is stored in a sump of 0.68 ML capacity and is pumped to an intermediate pumping station near Janwada road OHT through motors of 550 Hp.

**Clear Water Transmission:**

Clear water is pumped to the intermediate pumping station through a 600 mm diameter pumping main, designed to carry 27.28 MLD treated water. The pre-stressed concrete pipeline runs upto a length of 3.69 Km.

**Intermediate Pumping:**

This pumping station is located near Janwada road OHT

**Distribution System:**

**Service Reservoirs:**

There are thirteen service reservoirs in use. All the reservoirs are elevated tanks (OHTs) with total storage of 6.89 ML. Depending on the location of the serving Overhead Tanks, Bidar city has been divided into ten water supply distribution zones. Each water zone is further divided into sub zones catering to independent areas

**Distribution Network:**

Distribution network in the city consists of PVC pipes, diameters ranging from 250 mm to 90 mm. connecting and interconnecting the ground level reservoirs and overhead tanks including gravity and pumping mains from ground level reservoirs to service area and gravity lines from the overhead tanks.

**5.2.2 Existing Sewerage System**

In Bidar City, sewer network was laid in some parts of the old city. Most of the sewers are presently defunct. There is no sewage treatment plant in the city. In old part of the city, domestic sewage is discharged into road side drains. Solid waste is also dumped in to road side drains. Mostly, stagnant waste water is visible on the roadside drains.

**Sewerage Network:**

The sewer network covers mainly the fort area (old city) and parts of extension area along the south and east. Most of the areas beyond the State Highway and railway line, a number of pockets in the extension areas, Vidyanagar area, Irani colony, areas east of PWD office, area in the vicinity of the Hazarath Abdul Faiz Darga and Mangalpet area, are not covered by the sewer network.

**Drainage Pattern:**

Eastern part of the city drains into a valley in the east, which leads to Narasing Zarima and the remaining part along with the southern extension of fort area drains into a valley to the south of Bidar town. The area lying in the western part of the old town drains into another valley flowing to the south under the



railway bridge. The two valleys join near Haladkeri village, situated on the south of Bidar town.

**Drainage Districts:**

Three main drainage districts are formed, each district drained through one main sewer.

(i) **Drainage District I-** It comprises the localities of Dargapura, Rohelle Galli, Harijan Wada, Mohella Soudagran, Talwadi, Shahbur Ground, Taleem Maniyar, Golekhana, Patel Nagar, part of Noorkhan Taleem and Mission area. The main sewer commences from N-W corner of outer fort and runs east wards along a flat valley (in between 666 & 672 m contour), emerges from western outer wall of fort near Mission Colony and leads towards the valley. As this valley flows in a different direction and terminates into a holy spring called "Narsing Zarima", the sewer is diverted to join sewer B of district II after crossing the railway line.

(ii) **Drainage District II-** This district covers outside area in NW of the town, such as part of Mysore Housing Board Colony, Shah Gunj, the southern part of area inside fort and south-eastern area outside fort. The main commences from Naya Kaman, flows along the southern fort wall and then follows the valley by the side of PWD office and runs up to Haladkeri village, where it joins the main sewer C and outfall sewer.

(iii) **Drainage District III-**This comprises most of the new extension areas, which either exists or is being developed. The already developed extension areas are on the western side of old town along Zahirabad Nanded road and upto Gandhi Gunj. The main sewer commences from Udgir road in front of jail and almost follows the western boundary of municipal area, upto industrial estate. From there, it follows a valley flowing eastward and ultimately joins the outfall sewer beyond Haladkeri village.

**Coverage:**

As stated above, the existing sewer network covers only 30 percent of the area and 40 percent of the roads. Sewers were designed to cover 80,000 population, mainly residing in the old fort area and a few extensions.

**Sewage Treatment Plant:**

The sewage flows to the nallas, without receiving any treatment. The public water bodies are being polluted by the untreated sewage discharged into the natural streams.

**5.2.3 Drains**

The drainage system in Bidar city consists of one primary drain, running north – south through the centre of the city and a network of secondary and tertiary drains built around this main drain. Total length of drains in the city is 192.44 kms.

**Table 5-5: Existing Drainage system**

Drain Type	Length	Distribution
	Kms	%
Open drains (Pucca)	175.64	95.27
Open drains (Kutchha)	16.80	8.73
<b>Total (Drains)</b>	<b>192.44</b>	<b>100</b>
Primary drain channel	4.50	



### Primary Drains:

The main primary drain is a nallah running north - south through the heart of the city. The length of this nallah is about 4.5 km within the city boundary. A length of about 1 km of this nallah from Multani Colony to Punjab Sindh Bank was excavated before year 1950 into a well defined channel of 3 m average width and 6 m depth. With the passage of time, this channel got silted up right up to natural ground level.

### Secondary and Tertiary Drains:

The drains are provided on both sides of the roads. All these drains are open drains. The pucca drains are V shaped or rectangular drains with V shape in the bottom. The old drains are constructed in stone masonry, while the new drains are constructed in cement concrete. The kutcha drains do not have a regular shape and are more prone to damage by the traffic.

### Coverage:

Drains serve the dual purpose of carrying storm water in rainy season and waste water in other seasons. Hence it is necessary to provide drains on both sides of the roads. The total length of drains required in the city is 603 km. Thus the existing drains cover only 31.91% of the roads. Pucca drains cover about 29.12% roads and 2.79% roads have kutcha drains.

## 5.3 Existing O&M Structure of the CMC for Water Supply, Sewage and Drains

KUWSDB takes care of the Operation and Maintenance (O&M) of water supply system in Bidar city. Staff used for operation of the supply works, is working under the control of the Assistant Executive Engineer.

### O&M of Existing Water Supply System

The following table illustrates the staff details of the KUWSDB's O&M team for water supply system

Table 5-6: Staff Details of Water Supply O&M in KUWSDB:

Description	Number
Laboratory assistant	1
Assistant operator	1
Operator	1
Works inspector	1
Wire man	1
Helper	15
Works mazdoor	2
Watchman	10
Guardener	1
<b>Total</b>	<b>33</b>

Source: NKUSIP Clip report

### Preventive Maintenance:

A formal maintenance manual is not prepared. However, the operating staff carries out the preventive maintenance of the electrical and mechanical equipment of the pumping stations such as pumps, valves, piping, motors, breakers, panel boards, meters, capacitor, cables etc. Maintenance of flash mixers, flocculators, clarifiers, piping valves, the staff also takes up dosing equipment etc of the water treatment plants. The maintenance of civil works, such as painting and minor repairs, is attended to, as and when



required.

**Maintenance Facility:**

- **Routine Maintenance and Small Repairs.** Repairs such as routine checking of electrical and mechanical plant and equipment, cleaning connections, changing contacts, changing of oil in transformers etc are done by the KUWSDB staff. The spares required are drawn from the stores or are purchased locally.
- **Special Repairs.** Special repairs required for electrical, mechanical equipment or for civil structures are done through private workshops and through contracts.

**Water Quality Monitoring:**

- **Raw Water Quality:** Only bacteriological quality of the river water is tested every fortnight in the Veterinary Hospital Laboratory. Physical and chemical quality of raw water is not ascertained regularly.
- **Quality of Water Supplied to Consumers:** Chlorination is done at each service reservoir by administering the dose of bleaching powder. Test is regularly conducted to ascertain the free residual chlorine, which generally is kept at 1.2 mg/l at the reservoir and 0.1 mg/l at the consumer tap. The bacteriological quality of the water reaching the consumers is not tested on a regular basis.

**Records:**

- **O & M Manual:** A formal O & M manual is not prepared for the installations of the water supply system.
- **Record at Pumping Stations and Water Treatment Plant:** Logbooks are maintained at each pumping station and water treatment plant.

**5.3.1 Operation and Maintenance of the Existing Sewage system:**

**Operation and Maintenance of Sewers:**

CMC operates and maintains the Sewerage system in Bidar city.

**5.3.2 Storm Water Drains**

Maintaining the storm water drains are also responsibility of CMC. Major problems associated with inadequacy of drains are silting, choking, garbage dumping, overflow of drains and the larger health concerns.

**Problem Areas:**

Only 29.12% roads are provided with well constructed drains. Insanitary conditions prevail in areas, which do not have surface drains.

- Silting of Primary Drain-** The portion of primary nalla passing through the heart of the city upto railway track has been silted with debris almost upto ground level. The flood water overflows the surrounding area causing severe problems in areas like Labour colony and Multani colony. The downstream stretch of nalla, joining the tank in Garnali village, is comparatively wide and well defined.
- Secondary Drain Links-**Low lying areas are affected because there are no drains in the area.
- Unhygienic Condition.** While there are some sewer lines in the city, most of the areas are still dependent on the roadside drains for carriage of wastewater. In the absence of well constructed

drains in many areas, waste water flows along the streets and accumulates in low lying areas. Use of the open channels for dumping the garbage and plastic bags affects the draining capacity of these channels. The open cess pools formed in the low lying areas pose a serious threat to the health of the citizen, besides polluting the ground water and presenting very ugly sights.

- iv. **Disposal of Domestic Sewage-** In the absence of the entire city being covered by sewage is let into storm water drains. This is resulting in pollution of the public water bodies such as river and canals, as the waste runoff leads to these water courses.
- v. **Silting and Solid Waste Accumulation-** Silting and uncontrolled solid waste dumping cause blockage and stagnate storm water/wastewater runoff. Consequently, storm water drains choke and overflow into neighboring areas.

### 5.3.3 Constraints of Existing O&M system

The CMC is operating and maintaining the system, with the staff employed on the permanent roll, on daily wages or through contract. While a complete overhaul of the present O & M set up may be ideal, it is not practical. Some reasons being, a large number of people are already employed on this job and their termination or redeployment elsewhere will not be possible since most of the staff engaged in actual operation and maintenance needs to be imparted training; and the O & M of water supply or sewerage system gets lower priority, due to which there is difficulty in getting required staff, material and funds in time, which results in deterioration in both operation and maintenance.

## 5.4 CMC's Revenues and Expenses & Cost of O&M of municipal Services

### 5.4.1 Summary of Municipal Finances

Table 5-7: Summary of Municipal Finances

Item	1998-99	1999-00	2000-01	2001-02	2002-03
	Amount in Rs. Million				
<b>Revenue Account</b>					
Revenue income	-	33.114	40.402	32.167	36.642
Revenue expenditure	-	27.318	33.602	29.488	28.180
Surplus/Deficit	-	5.795	6.800	2.679	8.463
<b>Capital Account</b>					
Capital income	-	.262	.794	0.011	1.145
Capital expenditure	-	5.573	5.028	5.154	6.611
Surplus/Deficit	-	(5.311)	(4.234)	(5.143)	(5.466)
Fiscal Status	-	.484	2.566	(2.464)	2.996
<b>Debt &amp; Suspense Account</b>					
Extraordinary income	-	-	-	-	-
Extraordinary expenditure	-	1.891	3.211	.310	1.273
Surplus/Deficit	-	(1.891)	(3.211)	(.310)	(1.273)
Overall Fiscal Status	-	(1.407)	(0.645)	(2.774)	1.723

The Revenue Account comprises of recurring items of income and expenditure. These are essentially all financial transactions related to the day-to-day operations of the municipality. Table below summarizes the status of the Revenue Account.

Table 5-8: Revenue Account Status

Item	1998-99	1999-00	2000-01	2001-02	2002-03
	Amount in Rs. Million				
<b>Revenue Income</b>					
Own Source/Tax	-	3.849	4.057	5.770	7.827
Own Source/Non Tax	-	6.152	11.741	5.053	10.642
Assigned Revenue	-	1.101	0.767	1.951	2.276
Revenue Grants	-	22.012	23.837	19.393	15.897
<b>Total- Revenue Income</b>	-	<b>33.114</b>	<b>40.402</b>	<b>32.167</b>	<b>36.642</b>
<b>Revenue Expenditure</b>					
Establishment	-	18.106	21.894	21.097	19.152
Operation and Maintenance	-	9.212	11.708	8.391	9.028
Debt Servicing	-	-	-	-	-
<b>Total- Revenue Expenditure</b>	-	<b>27.318</b>	<b>33.602</b>	<b>29.488</b>	<b>28.180</b>
Revenue Account Status	-	5.795	6.800	2.679	8.463

#### Own Sources/Tax:

This item head comprises of income sourced primarily from octroi, consolidated property tax (general purpose tax, water tax, lighting tax and scavenging tax) and professional tax. On an average, through the assessment period, own source/tax income constitutes 15.24 percent of the CMC's revenue income, constituted only by property tax 1998-99 to 2001-02. Bidar CMC levies a property tax of 22 per cent of the Annual Rateable Value (ARV). Income from the own tax sources have registered growth at CAGR of 26.70 per cent.

#### Own Sources/Non Tax:

This item head comprises of income from municipal properties, fees on municipal services (building permission, etc.), user charges (water and sewerage tariffs) and miscellaneous services. On an average, through the assessment period, own source/non tax income constitutes 23.10 percent of the total revenue income. Rental income from municipal properties, water charges and income from fees and fines and constitute the major revenue sources under this item head. Income through non-tax own sources of the CMC has grown over the assessment period at a CAGR of over 20.05 per cent.

#### Assigned Revenues:

This item head comprises of income from Government of Karnataka (GoK)/State transfers of municipal income collected by the state line department. The income items generally include surcharge on stamp duty, entertainment tax, motor vehicle tax, and other transfers. Collection of entertainment tax has been discontinued for the last three years. In case of Bidar CMC, surcharge on stamp duty has been the only item of assigned revenue during the assessment period. Assigned revenue constitutes about 4.37 per cent of the CMC's total revenue income and has grown at a CAGR of about 27.39 per cent.

#### Revenue Grants and Contribution:

This item mainly comprises octroi compensation grants, SFC grants, special establishment grants and other special grants that the State Government may transfer from time-to-time to the CMC. In case of Bidar, revenue grants and contributions constitute about 57.29 per cent of the total revenue income. The grants are largely are only by way of SFC devolution thereafter.

**Revenue expenditure** comprises broadly of three categories of expenditure—establishment, operation



and maintenance and debt servicing. Unlike in many other ULBs, Bidar CMC has provided a consolidated figure pertaining to the total establishment

**General Administration and Tax Collection:**

This head comprises expenditure on pay and allowances of elected representatives, salary and other operational expenses related to only general administration, pension and gratuity payouts and provident fund contributions. Expenditure under this head accounts for about 14.25 per cent of the total revenue expenditure during the assessment period.

**O&M Cost of Public Works:**

Expenditures under this item head comprise repair and maintenance works on buildings, roads and drains. This head constitutes the second largest cost center for the CMC. Bidar CMC spends about 15.70 per cent of its total expenditure on public works. Expenditure under this head has registered a negative CAGR of out 17.74 per cent.

**O&M Cost of Water Supply:**

Expenditure under this item comprises of regular maintenance of water works. This head accounts for over 5.50 per cent of the total revenue expenditure.

**O&M Cost of Solid Waste Management:**

Expenditure under this head accounts for about 50.84 per cent of the revenue expenditure over the assessment period. This head constitutes the largest cost center for the CMC. This head covers expenditure incurred in conservancy operations of the CMC, including salaries of temporary staff and rent and operation and maintenance of a fleet of vehicles for solid waste collection and transportation. The expenditure under this head during the assessment period was inconsistent and had registered a CAGR of out 2.05 per cent.

**O&M Cost of Street Lighting:**

Street Lighting accounts for about 2.35 per cent of the revenue expenditure and comprises primarily of expenditure on electricity charges and replacement of lighting fixtures. The expenditure this head has registered a high CAGR of 21.55, due sudden increase in expenditure during 2002-03.

**Other Services and Miscellaneous Expenditure Heads:**

Expenditure on other services accounts for about 5.91 per cent of the revenue expenditure, comprising essentially of expenditure on public safety and fire services, public gardens, markets, education, etc.

**Debt Servicing:**

This item head comprises interest payments on external borrowings. According to the financial data provided by the CMC, there has been no debt servicing during the assessment period. The municipality has an outstanding amount of Rs. 21.559 million, hence it is clear that the CMC had been defaulting or the expenditure is not accounted if deducted directly from SFC devolution.

**Key Financial Indicators:**

Analyzing CMC's financials provides some key inputs which would form the key parameters of exploring the feasibility of PPP for O&M. Through the analysis it is understood that income from the Non-Tax Sources is only 23.10% of the CMCs Revenue income and the O&M cost of municipal services forms 32.26 % of the Revenue Expenditure. About 67.74 percent of the total expenditure is on establishment-related heads, leaving relatively lower amounts for expenditure on operation and maintenance of services. The per Capita Growth Rate of O&M expenses is – 3.37 %. It is also observed that the CMC is

able to collect 75.13 % of the user charges for water supply and 63.61% of the property tax and spends Rs.162.27/- per Rs.1000/- collection of taxes.

**Table 5-9: Key Financial Indicators**

Indicators		Value	Unit
<b>A</b>	<b>RESOURCE MOBILISATION</b>		
1	Per Capita Income	206.90	Rs. p.a
2	Sources of Funds		
	a Share of Own Sources - Taxes in Total Revenue Income	15.24	%
	b Share of Own Sources - Non-Tax items in Total Revenue Income	23.10	%
	c Share of Assigned Revenue in Total Revenue Income	4.37	%
	d Share of Revenue Grants in Total Revenue Income	57.29	%
3	Growth in Revenue Income	0.81	% p.a
4	Growth in Own Sources of Revenue Income	13.24	%
<b>B</b>	<b>FUND APPLICATION</b>		
1	Per Capita Expenditure	172.49	Rs. p.a
2	Application of Funds		
	a Share of Establishment Expenditure in Total Revenue Expenditure	67.74	%
	b Share of O&M Expenditure in Total Revenue Expenditure	32.26	%
	c Functional Allocation of Municipal Expenditure		
	General Administration & Tax Collection	14.25	%
	Municipal Services	85.75	%
	Debt Servicing - Interest Payment	-	%
	d Share of Establishment Expenditure to Total Revenue Income	56.68	%
3	Growth in Establishment Expenditure	1.89	%
4	Growth in O&M Expenditure	(0.67)	%
5	Growth in Total Revenue Expenditure	1.04	% p.a
<b>C</b>	<b>PERFORMANCE INDICATORS</b>		
1	Operating Ratio	0.84	Ratio
2	Growth in Per Capita Own Income	19.36	% p.a
3	Growth in Per Capita Revenue Grant	(12.72)	% p.a
4	Growth in Per Capita Revenue Income	0.62	% p.a
5	Growth in Per Capita Establishment Expenditure	(0.88)	% p.a
6	Growth in Per Capita O&M Expenditure	(3.37)	% p.a
7	Growth in Per Capita Revenue Expenditure	(1.70)	% p.a
9	Capital Utilisation Ratio	126.29	Ratio
<b>D</b>	<b>EFFICIENCY INDICATORS</b>		
1	Tax Collection Performance		
	a Property Tax	63.61	%
	b Water Tax	75.13	%
	c Drainage Tax	--	%
2	Cost of Collecting Rs. 1000 of Taxes	162.27	Rs.
3	Property Tax Demand per Assessment	294.39	Rs. p.a

Indicators	Value	Unit
4   r P.T Assessment	5.47	Persons

Source: NKUSIP CLIP Report.

## 5.5 Development Initiatives for Bidar and its region by GoK

### 5.5.1 Proposed land use (2011)

**Bidar City Development Plan, 2001**-The Comprehensive Development Plan (CDP) for Bidar, 2011, by the Town Planning Department (TPD) was approved in 2001. The Plan identifies goals for a well-planned city and accordingly proposed future land use. According to the CDP, the Local Planning Authority (LPA) plans to develop an additional area of 1,900 ha of land. The share of residential area has increased to 47 % of the total proposed area. The LPA proposes to develop more parks and playgrounds in the town, meeting the proposed increase of 160 % over current allocation.

Table 5-10: Proposed Land use

Land Use	Proposed Land-Use for 2011	
	Area(hectares)	% to Developed area
Residential	1,478.90	47.12
Commercial	118.58	3.78
Industrial	269.02	8.57
Governmental	7.74	0.25
Recreational	413.85	13.19
Public & Semi- public	241.82	7.70
Tourist Facilities	56.00	1.78
Circulation	552.75	17.61
<b>Developed Area</b>	<b>3,138.66</b>	

### 5.5.2 Suvarna Karnataka Development Corridor (SKDC) Programme

The State government in its 2008-09 Budget has identified Bidar District for development of Sugar and textile zone and also to promote mega sugar and textile industries & allied infrastructure components in the district (as part of the SKDC programme), which would promote economic development of the region.

## 5.6 NKUSIP PROPOSAL and Investment for Water Supply, Sewerage and Storm Water Drains

GoK, through its North Karnataka Urban Investment Plan (NKUSIP), proposes to improve the Environmental sanitation infrastructure, water supply, urban roads and slum development of Bidar city. The following are the summary of Urban Water Supply, Sewerage and Drain improvements proposed through NKUSIP.

### 5.6.1 Summary of NKUSIP Project Interventions

#### (i) Water Supply

Interventions in this sector comprise of the proposed works are in two groups. One group is for rehabilitation of existing water supply scheme, while the other group is for an augmentation scheme from Karanja reservoir.

#### (ii) Sewerage and Sanitation

As per the NKUSIP **Detailed Design Report for Proposed Under Ground Drainage Works in Bidar City**, the design horizon for the detailed project is 2041. The sewerage system works are proposed in three phases. It is considered that the works under first phase will be implemented under NKUSIP and the works under the second phase may be taken up under UDISSMT & third phase works will be taken up in future in other projects. Based on water demand, population growth, and town topography, a treatment plant of 42.9 MLD is proposed. Rehabilitation of existing sewer line along with construction of 5.41 km of new trunk and sub main has been proposed.

### (iii) Flood and Drainage Control:

Given the scanty rainfall in the area and the prevalent condition of roads, the projects proposed under this category include creation of 4 km. Of road side drains in addition to improvements of primary and secondary drains.

### Estimated Cost of Intervention

The total cost of water supply, Sewerage & Sanitation and Storm water Drainage and environmental sanitation infrastructure cost is **Rs.742.6 million (USD 15.5 million)**; project costs by sector are elucidated in the following table.

**Table 5-11: Estimated Cost of High Priority Interventions (Cost in Million Rupees)**

Water Supply	549.43
Sewerage and Sanitation	155.88
Storm Water Drainage	37.3

Source: KUIDFC

**Note:** As per the information received from KUIDFC, the final investments to be made by ADB under NKUSIP project is under three categories i.e Water Supply, Sanitation and Slum Improvement. Storm water drainage is not considered as separate entity but proposals for improvement and construction of various components for the same are made. So considering it as a part of sanitation investment and after deducting the estimated total cost for the proposals made under Sewerage and sanitation NKUSIP detailed report, investments for storm water drainage has been worked out.

### 5.6.2 Water Supply

The proposals under this component includes the ;

**Rehabilitation of Existing Water Supply System,** It is proposed that the New Manjra Water Supply Scheme will continue to serve and necessary rehabilitation of the scheme is taken up under NKUSIP. Assured supply of water considered from the new Manjra water supply Scheme is 11.4 MLD.

#### **Rehabilitation of New Manjra water supply scheme will include the following works:**

- Replacement of defective air valves, sluice valves, etc. in raw water and clear water pumping mains
- Installation of surge protection device in raw and treated water pumping main
- Repair of valve chambers of raw and treated water pumping mains
- Rehabilitation of water treatment plant by replacement of filter media, replacement of defectives valves, installation of flash mixer and alum solution tanks.
- Repair of service reservoirs

A major water supply augmentation scheme is proposed in Bidar city with Karanja reservoir as source of water. The capacity of the scheme will be 49.70 MLD. This scheme will cater to the need of Bidar City, till the design year 2041. The major components of the scheme are:

**Intake Well and Jack Well cum Pumping Station near Karanja reservoir:** An intake well will be constructed within the reservoir, where reservoir water will enter through openings of the intake well. A sump cum pump house will be constructed on the bank of the reservoir. There will be an interconnecting RCC pipe between the intake well and the sump cum pumping station.

**Raw water pumping main from Jack Well as well as Pumping Station to Water Treatment Plant at Niramanahalli Tanda area:** The raw water pumping main will convey water from Jackwell to water treatment plant. The length of the pipe line will be about 8.7 Km.

**WTP near Niramanahalli Tanda village:** The water treatment plant is proposed for treatment capacity of 49.70 MLD. The location of the water treatment plant is decided in such a way that gravity flow is possible from the clear water reservoir of the water treatment plant to Bidar City by gravity.

**Clear Water Sump as well as Pumping Station at Naubad:** A master balancing reservoir is proposed at Naubad, where treated water will be stored. A pumping station is proposed at the same location. From the pumping station, water will be pumped to different service reservoirs in the city.

**Feeder Mains to Service Reservoirs:** A network of feeder mains has been proposed from the proposed pumping station at Naubad. These feeder mains will convey water to existing and proposed overhead tanks. Existing Feeder main from pumping station at Janawada is augmented.

**Service Reservoirs:** Eight new overhead tanks are proposed. Along the existing overhead tanks, total number of overhead tanks will become 20. The total numbers of proposed distribution zones in the city are 20.

**Distribution system covering unserved areas and extension zones:** New distribution network is proposed in presently uncovered area in the Bidar City. The new areas are Naubad, Shahapur gate, Lalwadi village, Gumpa Area. Re-zoning of the distribution zones has been proposed and accordingly there will be remodeling of the distribution network.

**Table 5-12: Benefits expected from Water Supply Component**

	Item	Existing Situation	Post NKUSIP
1.	Duration of water supply	Once every day for One hour and thirty minutes	Four hours each in morning and evening every day (total 8 Hours)
2.	Population covered	94500 by house service connection 100,000 by public stand post	Additional 1,00,000 population covered by HSC
3.	Pressures	Low	High
4.	Water metering	Un metered	Metered

The estimated investment for the above components is **Rs. 549.43 Million**.

As per the CLIP Report, an additional of 10,000 connections was proposed as part of the proposed water supply scheme and an additional cost of Rs.15.0 million is estimated for the same. The finalized proposed Water Supply Scheme for Bidar proposes an additional 20,000 HSCs for the year 2011, but this

component has to be implemented by the CMC. The proposed water supply component is expected to benefit about 27,682 households in Bidar by 2011.

### 5.6.3 Proposed Sewage Component

The proposals under this component include rehabilitation of the existing sewerage network and provision of new network and sewage treatment plant for uncovered areas. The estimated cost for the projects identified is **Rs. 155.88 million**.

**Table 5-13: Implementable Sub-projects under NKUSIP – Sewerage and Sanitation**

S. No	Name of the Component	Amount in Million (Rs)
<b>Phase -1 under NKUSIP</b>		
1	Construction of Trunk Mains in Zone 1	39.63
2	Construction of STP	89.83
3	Electrical Works	26.42
<b>Total Cost of Phase -1 under NKUSIP</b>		<b>155.88</b>

Source: NKUSIP CLIP Report

It is assumed to provide as sewerage connection to 60% of the total households by 2011 so an additional of 15200 connections are considered as a part of the proposed Sewerage System and an additional cost of Rs.38.0 million is estimated for the same. The finalized proposed Sewerage Scheme for Bidar proposes an additional 15,200 HSCs for the year 2011, but this component has to be implemented by the CMC. The proposed sewerage component is expected to benefit about 19,700 households in Bidar by 2011.

The following table illustrates the details of the benefits expected from proposed Sewerage System.

**Table 5-14: Benefits expected from proposed Sewerage System**

	Item	Existing Situation	Post NKUSIP
1.	House service connection	4,500 Nos	Additional 15,200 HSC
2.	Population covered	40,000 by house service connection	Additional 1,00,000 population covered by Hsc
3.	Existing STP	Not Functional	Functional

**Estimate of Sewage Flow:** Water demand of the town has been projected at the rate of 90 lpcd. However, the sewer network needs to be designed to carry a minimum sewage flow of 100 lpcd, as per CPHEEO Manual on Sewerage and Sewage Treatment. The treatment plant can, however, be developed in phases. Initially, the capacity may be provided at 80% of 90 lpcd i.e. 72 lpcd and may be augmented subsequently to treat 100 lpcd. Hence the demand for sewerage system is worked out at, 100 lpcd for sewer network, and 72 lpcd for sewage pumping and treatment plant, upto year 2011.

**Demand of Sewerage System:** The capacity of sewerage system, required for Bidar town, is worked out as below.

**Table 5-15: Demand of Sewerage System**

Component	Population and Demand		
	Year 2004	Year 2011	Year 2021

**Pre-feasibility study for carrying out O&M of Water Supply, Sewerage & Storm Water drains (WSS &SW) on Public Private Partnership (PPP) basis for 6 CMCs in Karnataka: Final Report**

	Population	Demand	Population	Demand	Population	Demand
		MLD		MLD		MLD
Sewer network	192,000	19.20	243,730	24.37	329,540	32.95
Pumping station		13.82		17.55		32.95
STP		13.82		17.55		32.95

Following table compares the capacity of various components of the existing and proposed sewerage system with the projected demand.

**Table 5-16: Comparison of Additional Demand and Anticipated Supply of Sewerage Facilities**

Component	Unit	Demand							
		Supply		Year 2004		Year 2011		Year 2021	
		Year 2004	Year 2009	Demand	Supply (Shortfall)	Demand	Supply (Shortfall)	Demand	Supply (Shortfall)
Sewer network	Population	80,000	347,769	192,000	(112,000)	243,730	104,039	329,540	18,229
Sewage treatment	MLD	-	19	13.82	(13.82)	17.55	1.45	32.95	(13.95)

Source: Detailed Design Report for Proposed Under Ground Drainage Works in Bidar City

**Adequacy:**

Once the proposed augmentation of UGD facilities is done, the sewer network will cover the entire population.

**Table 5-17: Household Connections in Sewerage System Component**

Details	Existing (2008)	Projected (2011)
No of household connections	4500	19,700
Percentage to total town's households	14%	60%

**5.6.4 Storm Water Drainage Network**

**Urban Drainage**

Under this component, it is proposed to improve the condition of the existing nallah and providing a proper outlet for the storm water drain in the low-lying areas. The total estimated investment required for the improvement is **Rs. 37.3 Million**.

**5.7 O&M and its cost as recommended by NKUSIP**

**5.7.1 Proposed Improvements in O & M (water supply)**

Considering the constraints of the CMC, it is proposed by NKUSIP to improve the O & M operations in stages, so as not to change the current set up and practices drastically, but at the same time bring in discipline and control in O & M operations. It is recommended to post following key persons for the operation and Maintenance of pumping installations and treatment plants.

**Table 5-18: Proposed O&M team – Water Supply**

Category of Staff	Qualification	Requirements
Pump Operator	ITI	1 at each pumping station.



Category of Staff	Qualification	Requirements
Electrician	ITI	1 at each pumping station.
Water Treatment Plant Operator	B.Sc. (Chemistry)	1 at each water treatment plant.
Team of Engineers (to be appointed for overall control of water supply and sewerage operations)	Civil/Mechanical Engineer.	A team consisting of one Assistant Executive Engineer assisted by two Assistant Engineers for bigger cities and one Assistant Engineer for smaller cities / towns.

- Providing laboratory set up at the water treatment plants for carrying out daily analysis of raw water turbidity, determination of dose of the coagulant and testing residual chlorine of treated water.
- Providing laboratory set up at the sewage treatment plants for analyzing the parameters like pH, suspended solids and Biochemical Oxygen Demand (BOD) of the influent and effluent.
- Developing training program for the existing unqualified staff to improve the skills in operation and maintenance of the respective components.
- Preparing O & M plan at the beginning of each year with details about staff, energy consumption, requirement of material such as chemicals and spares, maintenance and repairs, raw water bills and other miscellaneous items.

**O & M Expenditure.** After the existing system is rehabilitated and planned augmentation works are constructed, it will be necessary to plan for an efficient O & M of the system. To calculate the O&M cost of water supply component at Bidar, the existing O&M cost of existing water supply component is projected till 2011-12 @ 10% per annum (as the current growth rate of CMC's O&M expenses is -3.37%, a nominal growth rate of 10% is assumed for projection) and the O&M cost due to additional new components is project at @ 2% of the proposed cost of investment estimated as per NKUSIP. Thus the O&M cost is estimated to be Rs. 20.5 million/annum.

### 5.7.2 Proposed Improvements in O & M. (Sewerage System)

Table 5-19: Proposed O&M team – Sewerage System

Category of Staff	Qualification	Requirements
Pump Operator	ITI	1 at each pumping station.
Electrician	ITI	1 at each pumping station.
Sewage Treatment Plant Operator	B.Sc. (Biology)	1 at each Sewage treatment plant.
Team of Engineers (to be appointed for overall control of water supply and sewerage operations)	Civil/Mechanical Engineer.	A team consisting of one Assistant Executive Engineer assisted by two Assistant Engineers for bigger cities and one Assistant Engineer for smaller cities / towns.

The above table illustrates the proposed O&M team for the sewerage system.

- Providing laboratory set up at the sewage treatment plants for analysing the parameters like PH, suspended solids and Biochemical Oxygen Demand (BOD) of the influent and effluent.
- Developing training program for the existing unqualified staff to improve the skills in operation and maintenance of the respective components.
- Preparing O & M plan at the beginning of each year with details about staff, energy consumption, requirement of material such as chemicals and spares, maintenance and repairs, raw water bills and other miscellaneous items.

**O & M Expenditure.** After the existing system is rehabilitated and planned augmentation works are



constructed, it will be necessary to plan for an efficient O & M of the system. To calculate the O&M cost of sewage component at Bidar, the existing O&M cost of existing sewage component is project till 2011-12 @ 10% per annum (as the current growth rate of CMC's O&M expenses is -3.37%, a nominal growth rate of 10% is assumed for projection) and the O&M cost due to additional new components is project at @ 2% of the proposed cost of investment estimated as per NKUSIP. Thus the O&M cost is estimated to be Rs. 3.12 million/annum.

## 5.8 Need for Private Partnership in O&M of Municipal services in Bidar

### Water Supply

The supply to the town during the summer months works to 11.40 MLD at 57 liters per capita per day (lpcd), gross supply – as per data provided under NKUSIP initial report it is stated that 30% of water supplied is lost through transmission and distribution. Lack of efficiency in the existing O&M of water supply system has resulted in excess of loss in water during transmission and distribution. Also most of the equipments and set ups are in bad shape as owing to lack of maintenance. This has also resulted in a low average tariff level. Private sector participation in O&M is expected to bring in skilled, trained and attentive work force and latest technology through which it is expected to reduce the water losses due to leakages and pilferage during transmission and distribution. Thus the UFW water can be reduced to 25 to 30%, which would increase the quantity of supply by 20 to 25%. It can also improve the efficiency level of O&M of treatment plants, thus reducing the water lose and also optimizing the uses of chemical and consumption of power. Case studies illustrate that through private sector participation O&M costs can be reduced by 10 to 20%.

### Sewerage & Drainage System

Maintenance of Sewerage system is not a primary component of Bidar CMC's O&M services, due to which no sewage treatment facility has been provided. The untreated sewage flows freely in three directions to the existing valleys. The sewers appear to be functional but frequent blockages and damages to the manholes affects the drainage system of the area. Private sector participation of O&M of sewerage system and storm water drains with dedicated work force and an organized operation schedule would improve the environmental sanitation conditions of the city.

## 5.9 Preliminary Financial Analysis

Based on the information collected, collated and analyzed regarding existing scenario of urban water supply, sewerage and storm water drains of the CMC, its O&M system and CMC's revenue income and expenditure, a preliminary financial analysis is carried out in order to explore the viability of PPP in O&M of water supply, sewerage and Storm water drainages starting from the year 2011-2012. The following are the key assumptions considered for preliminary financial analysis:

### 5.9.1 Commencement of O&M operations:

As Bidar is among the cities indentified under second tranche of funding and the preparation of DPR documents and other tender related procedures for establishment of additional assets & improvement of urban water supply and sewerage systems is currently under process. As part of the key assumptions, it is assumed that the assets would be established within a time span of two years and it is assumed that the O&M of the urban services would commence by 2011-12.

### 5.9.2 Demography:

Bidar population is expected to reach 226,025 by 2011. As per the CMC's records Bidar has 7,682 house hold properties and 117 Non-domestic/commercial properties.

### 5.9.3 Number of Service Connections:

**Water Supply:** The number of House Service Connection (HSC) is expected to cover a total of 27,682 by 2011 including the additional 20,000 connections. Since, there is no information available on the proposed additional number of non-domestic/commercial connections, it is assumed that by 2011 the direct service connections would cover 100% of the existing number of non-domestic/commercial properties of 4317(2008).

**Sewage:** The total number of HSC is expected to cover at least 60 % of total households (32835) by 2011 and the same is considered for the analysis. As there is no information available on service connections to Non-domestic /Commercial and industrial properties , these are not considered for the preliminary analysis.

### 5.9.4 Tariff & Collection efficiency:

Existing water tariff of Rs.55/- , Rs.110/- and Rs.220/- per month for domestic, Non-domestic/ Commercial and Industrial connections respectively as recommended by GoK is assumed without any revisions for the year 2011-12 and is expected to remain same for the next 5years (till 2015-16). An increase of 30% on the existing tariff is assumed from year 2016-17. Further, it is assumed that there would not be any tariff for water consumed through Public Stand Post. For sewage connections, it is assumed that 10% of the water tariff charges would be collected as sewage tariff (as per inputs provided by KUIDFC) and there would not be any charges collected for O&M of drains.

Collection efficiency of Bidar CMC for water tariff is 75.1 % and property tax is 63.6%. Existing collection efficiency of 75.1 % is assumed for the analysis.

**Table 5-20: Key Assumption & Parameters for Preliminary Financial Analysis**

Key Parameters	Existing (2008)	Proposed Additional (2011)	Total
<b>Total Population</b>	<b>209058</b>	<b>34672</b>	<b>243730</b>
<b>Total House Hold Properties</b>	<b>32,835</b>		
<b>Total Commercial Properties</b>	<b>4,317</b>		
<b>Water Supply</b>	<b>7,682</b>	<b>20000</b>	<b>27682</b>
Total House Service Connections (No. of Connections)	94,500	100,000	194,500
Population to be covered by HSC (No.)	<b>117</b>		
Non domestic (No. of Connections)	-		
Commercial/Industrial Connections(No. of Connections)			
Tariff for Domestic/Household (Rs/Household)	55.00		
Tariff for Non-Domestic/Commercial(Rs/Connection)	110.00		
Tariff for Industrial (Rs/Household)	220.00		
Water Supply New Connection Charge- Domestic (one time)	1500.00		
Water Supply New Connection Charge- Non Domestic (one time)	3000.00		

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Collection Performance-% of HSC (water charges)	75.1%		
Collection Performance - % of (Property Tax)	63.6%		
<b>Sewage</b>			
Total House Service Connections (HSC)	4500.00	15,200	19,700
Population to be covered by HSC	40000.00	100,000	
Tariff for Domestic ( assumption- 10% of water tariff)	5.50		
Tariff for Non-Domestic( assumption- 10% of water tariff)	11.0		
Sewage New Connection Charge (one time)	1000.00		

### 5.9.5 O&M expenditure:

The O&M cost of water supply amounts to Rs.1.69 million per annum considering that the cost of O&M for water supply accounts to be 5.50% of the total revenue expenditures of the CMC. This cost is projected at the rate of 10.00% till 2011-12(-3.37% is the rate of growth of the CMC's O&M cost of all urban services between 1998-2002 but considering that a negative growth rate of 3.37% is relatively low and there would be regular increase in salaries and other operational expenses, an optimal growth rate of 10% per annum is considered for projecting the O&M cost.) Thus the O&M cost of existing water supply components is estimated to be Rs.3.98 million for the year 2011-12.

Based on case studies, the O&M cost for water supply due to additional connections & improvements is assumed to be 3% of the total capital cost estimated for water supply component under NKUSIP project i.e. an additional cost of Rs.16.49 million per annum. Based on the above computations the total O&M cost for water supply for the year 2011-12 is estimated to be Rs. 20.5 million.

**Table 5-21: Assumptions for O&M Expenditure**

Sector	O&M as % of capital cost
Water Supply	3.00
Sewerage & Sanitation	2.00
Storm water Drain	1.00

As per the secondary data collected, Bidar CMC does not have any major expenditure towards O&M of existing sewerage & drainage system. Majority of the existing sewerage system including the STP would be improved and rehabilitated as a part of the proposed investment through NKUSIP. The O&M cost was estimated by assuming 2% of the estimated capital cost of investment planned for the sewerage components of Bidar through NKUSIP, which is around Rs. 3.12 million per annum and is assumed for the preliminary analysis. The O&M cost for storm water drains is estimated at a cost of Rs.0.37million per annum (assuming @ of 1% of the estimated capital investment of Rs. 37.3 million)

### 5.9.6 Expenses of O&M operator:

As provision of HSC connections would be the CMCs responsibility and is not factored under NKUSIP project, provision of HSC connections (Water Supply & Sewage) is factored as part of the O&M. Therefore, the operator has to invest in the provision of 20,000 & 15,200 new House Service Connections for both water supply and sewage , which is estimated to cost of Rs. 82.0 million (@ of Rs.2,200/- per connection for water supply and Rs.2500/- for sewage connection)



**Table 5-22: Cost of Provision of New House Service Connections**

	<b>New Infrastructure</b>	<b>Proposed No. of Connections</b>		<b>Unit Cost as per consultant's inputs in Rs.</b>	<b>Total Investment in Rs. million</b>
1.	Water Supply - House Service Connection Cost	20,000	Nos	2,200	44.0
2.	Sewage - House Service Connection Cost	15,200	Nos	2,500	38.0
<b>Total</b>					<b>82.0</b>

Source: NKUSIP CLIP Report

Apart from the above-mentioned O&M expenses, a private O&M operator would have its initial investment like procurement of equipments for maintenance, communication instruments and vehicles for transportation to carry out the O&M operations and is estimated to be around Rs.1.00 million and monthly office administrative expenses like rentals of office space, salary of administrative office staff and other office over heads is estimated to Rs. 0.69 million per annum.

**Table 5-23: Administrative Expenses of the O&M Operator**

<b>Office expenditure of the O&amp;M Operator</b>	<b>Rs. Per Month</b>	<b>Rs. Million per annum</b>
Rentals/month	10000.00	<b>0.12</b>
Increment in office rentals		5%
<b>Office Staff Salary and Overheads</b>		
Salary of Manager	15000.00	0.18
Salary of Office technical Assistant	7500.00	0.09
Accounts officer	10000.00	0.12
Office Attender	5000.00	0.06
Overheads	20000.00	0.24
Total		<b>0.69</b>
Increment in salaries 10%		10%

### 5.9.7 Other Assumptions:

It is assumed that the cost due to depreciation of assets would be at the rate of 0.02% (CPEEHO) of the total estimated O&M expenditure per annum. Cost of collection of water charges is assumed to be Rs.162.27 for every Rs.1000/- collected as per cost for cost of collecting property tax and water cess (CLIP Report).

### 5.9.8 O&M Revenue Income:

As discussed earlier, the revenue income from water supply & sewerage are assumed only from the properties with HSC and based on the existing tariff rates of GoK. As provision of new HSC connections would be part of the O&M services. The existing new water supply connection charges of Rs.1500 (Per Domestic Connection) & Rs.3000 (per Commercial Connection) and new sewage connection charge of Rs.1000 per connection would also be considered as part of the Revenue income of the operator.

### 5.10 Financial Viability for PPP mode of O&M for Bidar CMC:

The preliminary financial analysis carried out based on the above-mentioned key assumption illustrates that the O&M expenditure for the year 2011-12 would be around Rs. 26.24 million and the Operator has to invest around Rs.82.0 million to provide 20,000 & 15,200 new HSC each for water supply & Sewage. Thus, the total expenses of the first year (2011-12) of operation are estimated around Rs.110.05 million. The revenue income through tariff collection (assuming 75 % collection efficiency) for the same years would be only Rs.8.31 million as the income from the additional new connections would start only from the second year. Thus, there is a deficit of Rs.101.74 million for the year 2011-12, which is around 1223 % of the revenue income for the first year.

During the second year of operations, the operator would get Rs.45.20 million as income from the new connection charges and additional income from water & sewage tariffs from the 20,000 & 15,200 new connections, thus increasing the revenue income to Rs.52.94 million (assuming 75% collection efficiency), with a surplus of Rs. 13.73 million. The revenues for 3<sup>rd</sup>, 4<sup>th</sup> & 5<sup>th</sup> year would remain constant with Rs. 18.98 million with a deficit of Rs.15.66, Rs.18.71 & Rs.22.06 million respectively.

The outcome of the preliminary financial analysis indicates that a PPP mode for O&M of water supply, sewerage and Storm water drains at existing tariff levels is not financially viable for Bidar CMC. However, with tariff rationalization and support from GoK in terms of annuity payments, O&M of water supply, sewerage and storm water drainage systems on PPP basis can be considered.

#### 5.10.1 Assumptions for Viability:

The preliminary financial analysis also indicates that a 30% increase in the revenue income by increase in tariff rates by 2011-12 and achieving 100% collection efficiency would provide positive cash flow during second and third year but still resulting in deficits for the rest of the years. Further, private participation is expected to bring down the overall O&M cost through efficient handling of the system and it is assumed that a PPP mode would reduce the O&M cost at least by 10% of the existing or estimated cost. This would further improve the cash flows.

#### 5.10.2 Revenue from reuse of STP water:

The prime objective of the pre-feasibility is to explore a PPP mode for O&M of water supply, sewage and drainage as one package. Therefore, to make the project viable under PPP mode, revenue income from sale of treated water from STP is also explored. It is estimated that the proposed STP would release 20 MLD (assuming 80% of the proposed STP Capacity of 25MLD) of treated water every day. As part of the O&M, the private operator has to maintain and operate the STP; therefore CMC, as a part of the PPP agreement can provide the rights over the treated water from the STP to the private operator. This would facilitate the operator to generate income by sale of the treated water to industrial areas, construction industries, landscape maintenance and for other non-domestic consumptions. The Bellary example indicates that treated water is sold at Rs.20/ Kilo liter; however, a nominal rate of Rs.5/- per Kilo liter of treated water is assumed for projections at Bidar. Thus, the income which can be generated by sale of Treated water would be around Rs.36.5 million per annum. A detailed study need to be carried out as a part of a detailed feasibility study to understand the demand and viable rates for treated water.

Assuming 75% realization, the operator can generate Rs 27.3 million /annum. This additional income would provide positive cash flows for remaining 4 years of the contract period, but the estimated IRR is only around 11.5% to 12%. However the estimated quantity of the treated water is already considered 25% less than the actual capacity of the STP and also the sale of treated water is fixed at very low rate of Rs.5.0/ Kl, so even a 10% reduction on the annual income would be sufficient enough to be considered



as a safe limit for the sensitivity assessment of returns. This would improve the IRR and further, improvement in IRR can be supported through the following recommended initiatives by GoK and CMC, which would also make the project viable under PPP mode.

### **5.11 Recommendations to make a PPP of O&M viable in Bidar CMC:**

The following are some of the recommendations which might make a PPP mode viable:

1. Increase in water tariff rates by 2011-12 or Introducing metered tariff collection for all consumer categories
2. Improving collection efficiency to 100%
3. Increasing the existing sewerage charges

The CMC has to carry out the above-mentioned recommendations in order to make the O&M cost of urban services self sustainable, which would also improve the viability of the project under PPP mode. Especially in water supply the current tariff of Rs. 55 per month for an average monthly consumption of 18.73 kl (assuming 98 lpcd and average house hold size of 6.4) accounts to a very low tariff rate of Rs. 2.94/kl. It is also observed through secondary data collection that each HSC serves to more than one household and therefore the average consumption level per HSC is around 40.50 kl per month against 18.73 kl considered for estimation, therefore the actual tariff collection is only Rs.1.36/kl. Considering these facts, it is recommended to carry out the above mentioned measures in order to make the CMC's O&M component financially self sustainable, which would also improve the viability for a PPP mode.

### **5.12 Project Structure & Way Forward:**

#### **5.12.1 Option - 1**

The O&M of water supply, sewerage and storm water drains in Bidar CMC can be made viable on PPP basis only by packaging the sale of treated water from STP. But, the actual demand for treated water and viable rates for the same shall be studied to explore the viability. The following can be considered as the prime components of Project structure.

- The water supply, sewage & drainage assets can be leased to a private operator for a period of 5 years
- Provision of 20,000 new water supply HSCs and 15,200 new sewage HSCs within one year from the date of lease agreement and O&M of the assets (water supply, sewage & storm water drainage) for a period of 5 years as per the Key Performance Indicators (KPI) would be the Minimum Development Obligation (MDO) of the project.
- The CMC would provide the Private Operator the right to sell the treated water from the STP, starting from the second year of the lease agreement. The Operator shall quote an annual amount payable to the CMC for the same which shall be the bid-parameter and shall be finalized based on a detailed feasibility study.
- Operator shall collect the monthly tariff charges/user charges for the services indirectly from the consumers/households through the CMC and the CMC/ULB shall facilitate the same.
- The private operator shall compulsorily recruit at least 25% (% shall be fixed based a detailed assessment) of the existing O&M staff under water supply & sewerage divisions of the CMC. If

possible, the remaining staff under Water Supply & Sewage divisions shall be transferred to other departments within the CMC or shall be assigned to monitor the KPI of the O&M carried out by the Private Operator. If transfer is not viable then the remaining staff also shall be temporarily deputed to the O&M operator and the operator would remit the CMC staff salary to the CMC. This arrangement would mutually benefit both CMC & the O&M operator as CMCs staffs would get benefited in terms of their technical & technological capacity building and O&M operator would get benefited as the CMCs staff would have the best knowledge of the system, network & the town.

**Benefits:**

This option would enable the city to get the good O&M services, without the CMC having to invest for the new HSCs. This would bring down the O&M cost and the CMC would generate income through the annual payments made by the operator for the right to sell STP water. Also, the operator would aim to achieve the KPI as its returns are directly linked to the monthly tariff collection and quantity & quality of the STP water. And also there is a possible additional income for CMC through the annual payments made by the operator for the right to sell STP water.

**Risks:**

- Risks include Force Majeure events like droughts; earthquakes etc. due to which the water supply would get directly affected. These risks shall be resolved through a detailed compensation mechanism as a part of the agreement.
- The operator risks also include poor tariff collection or lack of demand for treated water. The operator has to factor the same as part of the Bid parameter.

**Initiatives Required from CMC/GoK:**

- CMC should carry out an audit of the existing assets of the water supply, sewage and storm water components/infrastructure which would be leased to the O&M operator, in order to provide details & inventory of the existing components and the status of the assets.
- CMC should enforce stringent regulations to curb illegal and unauthorized supply of water within the CMC limits and also implement norms which would restrict and regulate the number of bore holes/bore wells permitted within certain surface area limits or within a ward.
- CMC also should implement norms restricting the use of potable water for construction activities and landscape uses.
- CMC should appoint an Independent Engineer for frequent Monitoring of the KPI of the agreement.

**Alternative Options/Performance Based Management Contract (PBMC)**

However if there is no sufficient demand for STP water in Bidar, O&M can be carried out through other PPP & PSP modes, through a combination of the following measures:

- Financial support from CMCs/Govt. of Karnataka by means of Annuity payments
- Phased increase in water and sewerage tariff across all consumer categories

- Introduction of meter based tariff rates
- PSP for O&M of systems can also be explored through Management Contract model
- The O&M contract shall be structured factoring in performance based incentives and penalties and lowest Annuity payment basis from CMC/GoK (i.e. PBMC)
- Term of a PBMC contract including installation of HSC can be for a maximum period of 5 years including the HSC installation period.
- Installation of HSC shall be completed within 1 year.
- The contract can be structured based on annuity payment and the annuity amount shall be arrived based on the actual O&M expenses The O&M expenses quoted can be the first bid parameter, with a weightage of 70%.
- Price quote for installation of the HSC shall be the second bid parameter, with a weightage of 30%.
- The bidder shall be selected based on the lowest overall evaluated bid after taking into account the first and second Bid Parameters, as per their respective weightages mentioned above.
- The following Key Performance Indicators (KPI) may be considered to monitor the performance of the O&M contractor:
  - a. **Quality of water distributed to the consumers**  
Achieving the best drinking water quality as recommended by WHO/CPEEHO standards can earn the O&M operator a bonus of up to 5% of the fixed annuity amount. On the other hand, a penalty of 5% for water quality supplied below the recommended quality standards can be levied.
  - b. **Reduction in the overall UFW to a maximum range not exceeding 25 to 30%**  
A reduction up to 25% within the second year of operation can earn operator a bonus of 10% and reduction up to 20% can earn a bonus of 15%. If the UFW is not reduced below 40% then the operator would face a penalty up to 10%.
  - c. **Quantity and quality of the treated water from STP**  
Treated STP water with a quantity of at least 80% of the installed STP capacity and with a water quality of BOD level less than 12 can earn the operator a bonus of another 5%. A BOD level above 15 can face a 5% penalty.
  - d. **Minimizing system downtime**  
Minimizing system-downtime and time for repairs & maintenance with minimal impact on water supply timings, duration, quantity and quality of supply & treatment assessed as per consumer feedback would provide the operator an additional bonus of 5%
  - e. **An overall reduction in the O&M cost**  
An overall reduction in the O&M cost of the existing infrastructure components/network of water supply, sewage and storm water drains up to 10% (especially reduction in consumption of electricity) can earn the operator a bonus of



5% of the quoted annuity amount. An increase in O&M cost exceeding 10% and above can have a penalty of 5%.

- Thus the operator can achieve an additional bonus of 35% of Annuity payments per annum based on his performance. Consistent performance by achieving 30% & above bonus for 2 consecutive year shall provide an additional bonus of 10% at the end of the term. Further the bonus payment shall be paid only at the end of the 3<sup>rd</sup> year and the 5<sup>th</sup> year. But the penalty if any shall be deducted every year.
- The annuity payment would start from the second year.
- CMC shall appoint an independent engineer to monitor the Performance indicators of the contract.

*The above-mentioned Key Performance Indicators (KPI), incentives & penalty clauses are indicative and the exact quantification of the indicators can be determined only through a detailed audit and assessment of the services and its components and also through a detailed financial analysis as part of a detailed project report preparation.*

## 6 Gadag – Betageri

### 6.1 Gadag - Betageri City Profile

Gadag-Betageri City Municipal Council (CMC) is comprised of the twin cities Gadag and Betageri. The twin cities are located at a distance of 480 km north of the state capital, Bangalore, and 55 km south of Hubli. Gadag-Betageri is the district headquarters and is also an important multi-functional centre. Owing to its connectivity and location it is one of the most important trading centers in the region. The city is famous for commercial crops and is renowned for the trading of chillies and cotton.

#### Latitude, Longitude & Altitude:

Gadag-Betageri is located in the dry region of the Deccan Plateau. It is situated at of 15° 25'N latitude and 75° 38'E longitude, at an altitude of 650 m above Mean Sea Level (MSL).

#### Connectivity:

Gadag-Betageri is well connected by roads and railways to neighboring cities, towns, and villages. The National Highway No. 63 (Karwar-Bellary) passes through the city, connects it to the Pune-Bangalore National Highway No. 4 at Hubli. It is connected to the neighbouring talukas of Navalgund, Naragund, Koppal and other important centres like Bijapur, Gulbarga, Raichur by means of state highways and major district roads. The city has a railway junction connecting it to Hubli, Guntakal and Sholapur. The nearest airport is at Hubli, 55 km north of the city and the nearest seaport is at Karwar, located 230 km to the northwest of the city.

#### Climate:

Gadag comes under the hot and humid zone of the country. The summer temperature reaches a maximum of 37°C during April and the winters are pleasant with temperature dropping to a minimum of 15°C during December. The city receives an annual average rainfall of 668 mm.

#### CMC Jurisdiction:

The City Municipal Council's (CMC) jurisdiction extends up to an area of 54.55 sq. Km, with 35 wards.

### 6.1.1 Demography

#### Population:

The population of the city has grown from 133,918 in 1991 to 154,849 in 2001, indicating a decadal growth rate of 15.63 % and compounded annual growth of 1.46%.

#### Household Size:

The total number of households in Gadag-Betageri has increased from 25,126 in 2001 to 29,263 in 2007. The household size for Gadag-Betageri is 6.16, which is below the national average household size of 6.3 (Census 2001). NKUSIP's CLIP report projects a population of 1,72,717 (2011) and 2,13,813 (2031) which is considered for this study.

### 6.1.2 Economy

Gadag-Betageri is famous for handloom industry and agricultural marketing since the last century. In 1901, wholesale trade in cotton marketing was established. The Cotton Sale Society, Gadag, established in 1977, contributes substantially to the cotton trade in the region. Apart from cotton, groundnut, and chilies, jowar and cereals, also find importance as a wholesale trade commodity. The Agriculture Produces Marketing and Cooperatives (APMC) is the largest market for agricultural products.

**Industries:**

Gadag-Betageri is known for its handloom industry. The Karnataka Handloom Development Corporation has developed a colony at Narasapura, a village close to Betageri in the conurbation area along Pala-Badami road. The Davangere Cotton Mill is another major important industry employing more than 500 workers. The Karnataka Small Scale Industries Development Corporation (KSSIDC) has developed an industrial estate in an area of 5.0 Ha along Hatalgeri road in the eastern part of Gadag. The maximum industrial units present were of power looms followed by flourmills. Gadag is also known for its printing and processing units.

**6.1.3 Landuse Plan/CDP, Regulations:**

The Town and Country Planning Department (TCPD) carried out a land use survey in 1987-88, to determine the land utilization details of 1987 and also proposed a land use for 2001. The survey results formed the basis of the Comprehensive Development Plan (2001), indicated in table below:

**Table 6-1: Land use Pattern**

Land use Category	Existing Landuse-1987		Proposed Landuse-2001	
	Area	%	Area	%
	Ha	%	Ha	%
Residential	222.51	35.08	1,168.55	45.90
Commercial	66.69	10.51	149.97	5.89
Industrial	50.24	7.92	298.1	11.71
Public and Semi-Public	68.63	10.82	258.21	10.14
Parks, Playgrounds and Open Spaces	18.64	2.94	215.89	8.48
Public Utilities	6.70	1.06	9.12	0.36
Transport and Communication	163.90	25.84	407.56	16.01
Water Sheet	36.96	5.83	38.6	1.52
<b>Total</b>	<b>634.27</b>	<b>100.00</b>	<b>2,546.00</b>	<b>100.00</b>
Vacant Land*	84.83			
Agriculture (Dry)*	24.00			
Agriculture (Wet)	1802.90			
<b>Grand Total</b>	<b>2,546.00</b>			

In the existing land use of 1987, 35.08 % of the total developed area was under residential use while 25.84 % was for traffic and transportation. The net density of 1,056 persons per ha in 1987 indicates that the city particularly the old part of the city is very congested. In order to reduce the congestion, the TCPD has proposed an increase in the residential use to 1,168.55 Ha considering the need of the future population demand. In the CDP (2001), the proposed area under traffic and transportation is 407.56 ha, which is 16.01 % of total area proposed for development.

**6.2 Existing UWSS&SD – Supply/collection System & Coverage**

**6.2.1 Existing water supply**

Gadag-Betageri City Municipal Council meets its water supply requirement through both surface and sub-surface sources. River Tungabhadra is the main surface source of water supply to Gadag-Betageri. The sub-surface sources mainly comprise of borewells and openwells. The sub-surface sources cater to small pockets of population within their respective service areas. Tungabhadra water supply scheme was commissioned in the year 1992 with a designed capacity of 15.9 MLD for intermediate stage (2006)



and 31.8 MLD for ultimate stage (2021). At this rate of supply, the gross per capita supply of water is 205.36 lpcd.

**Table 6-2: Water Supply Overview**

Description	Units	Details
Total Quantity of Water supplied	MLD	17.37
Frequency of Supply	Nos.	Four times a week
<b>Sources of Supply</b>		
Surface Sources		Tungabhadra River
Quantity Supplied	MLD	13.64
Distance of Source	km	55.0
Ground Water Sources		
Borewells (CMC Maintained wells)	Nos.	112 pumps and 212 hand pumps
Borewells (Private Maintained wells)	Nos.	536
Openwells	Nos.	240
Quantity Supplied	MLD	3.73
<b>Water Treatment Plant</b>		
No of Plants	Nos.	1
Location of Plants		Mundargi
Capacity of Plants	MLD	31.8
Type of Treatment		Filtration

**Coverage:**

The CMC has given 13,432 water supply connections in the city. Out of which 13,019 connections are domestic and the remaining 412 connections are given to commercial establishments. There are no industrial water supply connections in the city. All connections in the city are unmetered. In 2002-03, the CMC assessed 27,075 properties for payment of property taxes. This indicates that only 48 % of the assessed properties have water supply connections, which is a low connection rate. The total length of roads in CMC (including PWD roads) is 134.25 km.

**Table 6-3: Consumer Connections Details**

Type of connection	Total(nos)
Domestic connections	13,019
Non domestic / commercial connections	412
Industrial connections	0
<b>Total</b>	<b>13,431</b>

**Per Capita Supply:**

The present drawn of water from River Tungabhadra is 15.9 MLD. Certain enroute villages, located along the transmission main are supplied water (about 2.3 MLD) from the same source. Thus, effectively **13.64 MLD** of bulk water is available to the city providing a per capita supply of 88 lpcd. Apart from this source, the city has 290 wells, which supply 3.73 MLD of water. Thus, the total per capita supply for Gadag-Betageri is 112 lpcd.

**Duration of Supply:**

Distribution is maintained three to four days a week in the distribution areas i.e., alternate day supply

for about 1 – 1 ½ hour.

### **Tungabhadra Water Supply Scheme**

This water supply scheme draws water from River Tungabhadra. The river is a perennial water source with sufficient quantity of water except during summer. There are two intake wells on the river, located at 55 km south of the city. A jack well cum pump house is located on the left bank of the river.

The raw water pump house is located at Korlahalli and situated above the jackwell on the left bank of the river. The water is pumped with the help of 550 Horse Power (HP) pump to Mundargi Water Treatment Plant, which is 14 km from Korlahalli. The treated water is transmitted using 550 HP Pump to the Break Pressure Tank (BPT) situated at Mundargi hill-top such that the flow downstream of the BPT upto Dambal is through gravity; Dambal is 19 km from the treatment plant. From Dambal pure water pumping station, the water is pumped to Singatarayanakere GLSR, which is at a distance of 9.6 km. This reservoir acts as a balancing reservoir for supply to Gadag-Betageri City. The conveyance of pure water downstream of Singatarayanakere is by gravity. The flow is carried up to point 'A' located within the city. A tapping is taken on the main line before point 'A' to feed the Overhead Tank (OHT) located at Sarvodaya Colony.

### **Sub Surface source:**

The CMC owns 349 bore-wells out of which 112 are fitted with power pumps and 212 bore-wells are fitted with the hand pumps. In addition to these bore-wells, there are 536 private bore-wells and 240 open-wells in the city. With these sources, the city is supplied 3.73 MLD of water.

### **Water Treatment Facilities:**

The water treatment plant at Mundargi located 42 km from Gadag-Betageri is designed for an intermediate stage requirement (15.9 MLD), which will be strengthened 31.8 MLD for the ultimate stage requirement. The CMC supplies 13.64 MLD of treated water to the city. The treatment process is conventional which includes aeration, chemical addition, flocculation, clarification, filtration and chlorination for disinfection.

**Water Distribution System:** The distribution system in the city includes 4 Ground Level Service Reservoirs (GLSR) and 10 Elevated Service Reservoirs (ESR) with a total capacity of 14.64 ML; the reservoir serves 17 water supply zones in the city. **Table** below presents an overview of the storage and distribution network in the CMC.

**Table 6-4: Salient features of water supply storage and distribution**

<b>Component</b>	<b>Units</b>	<b>Value</b>
Storage Reservoir		
Number of Reservoirs	Nos.	14
Storage Capacity	ML	14.64
Length of distribution network	km	350.62
Number of water supply connections	Nos.	13,432
Population covered		
Through house service connections	%	49.18
Through tanker Supply (summer season)		
Through public stand posts	%	34.61
Uncovered population depending either on hand	%	16.21

### 6.2.2 Existing Sewerage System:

Gadag-Betageri City Municipal Council has made provisions of a sewerage system in a small portion of the city, to dispose night soil and sullage. The sewerage system serves residents in HUDCO colony and houses constructed under Ashraya Scheme. The sewerage system runs to a length of 15 km in the city, which is inadequate. In remaining parts of the city, the residents depend on individual septic tanks, dry latrines, and public conveniences for defecation. As there is no proper sewerage system in most of the areas, the sewage is mainly disposed into the open drains.

**Table 6-5: Summary of sewage disposal/sanitation facilities**

Item	Description	Population Coverage
Centralized sewerage system	Not available	-
Individual Sewage Disposal Means	-	-
Septic tank	4,568	22,840
Low cost sanitation units	-	-
Sub Total – Individual Units	4,568	22,840
Public Toilets		
Number of public toilet units	36	-
Number of seats	730	35,150
Dry latrines	116	46,400
Sub Total - Public Toilets		81,550
<b>Total</b>		<b>104,390</b>

There are 4,568 septic tanks serving a population of 22,840 in Gadag-Betageri. This constitutes 14.75 % of the total city population. The city has 36 public conveniences have 730 seats. These facilities serve about 35,150 persons accounting for 22.70 % of the city population. Overall, about 47 % of the city population has safe facilities for disposing their waste. This is an area of concern, as the remaining population uses either dry latrines or defecates in the open space. The total length of roads in the city is 134.25 km (including PWD maintained roads). It indicates that about 11 % of the city roads have sewer lines.

**Coverage:** The sewerage system in HUDCO colony was provided 15 years ago with 1,500 house connections; the coverage is only 6 % of the total city area.

#### **Sewage Treatment Plant:**

The community septic tank provided at HUDCO colony treats the sewage and discharges the effluent into the nearby Manvi Nallah.

### 6.2.3 Proposed / Ongoing Sewerage Scheme

KUWSDB in their new sewerage network project for Gadag-Betageri, has a design period of 2030. They have proposed to construct Sewage Treatment Plant in Chikappa village on 80 acres of land. As mentioned earlier, the twin cities have been divided into five sewerage districts (A, B, C, D and E) which are further divided into 33 sewerage zones. The implementation work has commenced during 2002-03. Under this project, all the houses (1,060) in Ashraya colony are provided with sewerage system that extends over 8 km.

### 6.2.4 Drains

The storm water drain system in the city covers only 13.41 % of the city's road network. Besides being

inadequate to carry storm water runoff, the drains are dilapidated and are in poor condition. Details of the city's drains are provided in table below:

**Table 6-6: Existing Drainage system**

Drain Type	Length	Distribution
	km	%
Open Drain		
Pucca Drain	10.00	55.56
Kutchra Drain	8.00	44.44
<b>Total Open Drains</b>	<b>18.00</b>	<b>100.00</b>
Closed Drains	-	-
<b>Total</b>	<b>18.00</b>	<b>100.00</b>

As the open drains are constructed 15 years ago, the capacity of these drains is very low compared to the actual flow. The drains are clogged with solid waste and during monsoons; they tend to overflow, thereby affecting the hygienic of neighboring areas. The city has three natural nallahs, which carry the storm water to the major nallah, Jawal Nallah, which ultimately disposes the storm water outside the city. It flows from west to east and then to the north, along with the city's natural topography.

### 6.3 Existing O&M Structure of the CMC for Water Supply, Sewage and Drains

City Municipal Council takes care of the Operation and Maintenance (O&M) of Water Supply, Sewerage System, Drainage, Solid Waste Management, Roads etc. The KUWSDB is maintaining the water supply components until the bulk supply point in the city.

#### O&M of Existing Water Supply System

The following table illustrates the staff details of the CMC's and KUWSDB's, O&M team for water supply system

**Table 6-7: Staff Details of Water Supply O&M in CMC and KUWSDB:**

Name of Post	Posts Filled
<b>CMC</b>	
Assistant Engineer	-
Junior Engineer	1
Work Inspector	1
Pump operators	1
Pump Helpers	15
Valve men	7
Helpers	1
<b>Total</b>	<b>26</b>
<b>KUWSDB</b>	
Executive Engineer	1
Assistant Executive Engineer	1
Assistant Engineer	2
Junior Engineer	2
Valve men	7
<b>Total</b>	<b>12</b>

Source: NKUSIP Clip report

### **Systems and Procedures:**

Complaint redressal and system operations are paramount regarding systems and procedures in water supply management. Complaints are registered either in the help line, wireless handsets, telephonically or in person. The maintenance team attends to complaints on seniority cum priority basis, i.e., complaints are attended to based on the register seniority taking due consideration of the importance of each in the system functioning through help line. Outsourcing is done only in the case of routine and breakdown maintenance, to local repair centres on piece meal basis.

### **Maintenance Practices:**

KUWSDB staff attends routine work and small repairs but due to shortage of staff, the repairs are outsourced to local repair centres. Only in the absence of local repair centers, the repair works are entrusted to authorized/reputed agencies. Special repairs are also outsourced to local repair centres.

### **6.3.1 Operation and Maintenance of the Existing Sewage system:**

#### **Problem Areas**

1. **Lack of Sewerage Facilities and Associated Impacts.** The absence of safe sanitation facilities for a large section of population has resulted in occasional outbreak of water borne diseases as maximum cases of dysentery (4,997) were registered followed by cases of gastroenteritis (680) in 2002-03 in the city.
2. **Disposal into Drains.** Large quantities of the sullage and wastewater from all areas of the city flows through storm water drains into major drainage channels or nallahs. During monsoons, the drains are choked and flood surrounding areas, creating unhygienic conditions.
3. **Overall Sustainability of Sewerage System.** The total length of roads in the city is 134.25 km (includes roads maintained by CMC, PWD and other departments) It is reported that 11.70 % of the city is provided with sewerage network. Since the system was installed more than 15 years ago, about 50 % of the system is needed to be repaired and rehabilitated, especially in the initial stretches of the system with stoneware pipes. Total length of sewers to be rehabilitated will be about 15 km. Other sections of the sewer network involving RCC pipes and higher size of pipes, the sewer network may have to be reconstructed since the RCC pipes might have been damaged and collapsed due to corrosion.

### **6.3.2 Storm Water Drains**

Maintaining the storm water drains are also responsibility of CMC, but there is inadequacy of storm water drains.

#### **Problem Areas:**

1. **Disposal of Domestic Sewage-**In the absence of adequate sewerage system, a large amount of the domestic sewage is let into storm water drains. This has resulted in overflowing of the wastewater into roads and neighbouring areas.
2. **Silting and Solid Waste Accumulation-**Silting and uncontrolled solid wastes dumping cause blockage and stagnate storm water/wastewater runoff. Consequently, storm water drains choke and overflow into neighbouring areas.
3. **Storm Water Drain Inadequacy-**Storm water drains cover about 13.41 % of the total road length in the city. It is recommended that at least 150 % of the city roads are covered by drains – the problem is also accentuated due to storm water drains acting as conduits for wastewater/sullage.



### 6.3.3 Constraints of Existing O&M system

The CMC is operating and maintaining the system, with the staff employed on the permanent roll, on daily wages or through contract. While a complete overhaul of the present O & M set up may be ideal, it is not practical, on account of the following constraints.

(a) A large number of people are already employed on this job and their termination or redeployment elsewhere will not be possible. Most of the staff, engaged in actual operation and maintenance, needs to be imparted training.

(b) The O & M of water supply or sewerage system gets lower priority, due to which there is difficulty in getting required staff, material and funds in time. This results in deterioration in both operation and maintenance.

## 6.4 CMC's Revenues and Expenses & Cost of O&M of municipal Services

### 6.4.1 Summary of Municipal Finances

Table 6-8: Summary of Municipal Finances

Item	1998-99	1999-00	2000-01	2001-02	2002-03
	Amount in Rs. Million				
<b>Revenue Account</b>					
Revenue income	51.280	59.129	71.223	73.422	-
Revenue expenditure	39.557	44.029	59.484	55.917	-
Surplus/Deficit	11.723	15.100	11.739	17.506	-
<b>Capital Account</b>					
Capital income	.236	.331	5.269	1.231	-
Capital expenditure	9.470	6.998	12.364	8.331	-
Surplus/Deficit	(9.234)	(6.666)	(7.095)	(7.100)	-
Fiscal Status	2.488	8.433	4.644	10.405	-
<b>Debt &amp; Suspense Account</b>					
Extraordinary income	2.257	3.063	6.933	4.752	-
Extraordinary expenditure	4.940	5.646	7.678	4.195	-
Surplus/Deficit	(2.683)	(2.583)	(.745)	.557	-
Overall Fiscal Status		<b>5.850</b>	<b>3.899</b>	<b>10.962</b>	-

The Revenue Account comprises of recurring items of income and expenditure. These are essentially all financial transactions related to the day-to-day operations of the municipality. Table below summarizes the status of the Revenue Account.

Table 6-9: Revenue Account Status

Item	1998-99	1999-00	2000-01	2001-02	2002-03
	Amount in Rs. Million				
<b>Revenue Income</b>					
Own Source/Tax	4.893	5.023	6.944	8.371	-
Own Source/Non Tax	13.140	13.468	12.147	17.545	-
Assigned Revenue	3.224	4.532	4.545	4.227	-
Revenue Grants	30.023	36.106	47.586	43.280	-
<b>Total- Revenue Income</b>	<b>51.280</b>	<b>59.129</b>	<b>71.223</b>	<b>73.422</b>	-
<b>Revenue Expenditure</b>					
Establishment	26.037	34.636	36.095	36.437	-

**Pre-feasibility study for carrying out O&M of Water Supply, Sewerage & Storm Water drains (WSS &SW) on Public Private Partnership (PPP) basis for 6 CMCs in Karnataka: Final Report**

Operation and Maintenance	13.520	9.393	23.389	19.480	-
Debt Servicing	-	-	-	-	-
<b>Total- Revenue Expenditure</b>	<b>39.557</b>	<b>44.029</b>	<b>59.484</b>	<b>55.917</b>	-
Revenue Account Status	11.723	15.100	11.739	17.506	-

**Own Sources/Tax:**

This item head comprises of income primarily sourced from consolidated property tax (general purpose tax, water tax, lighting tax and scavenging tax) and taxes on ferries. On an average, through the assessment period, own source/tax income constitutes 9.80 % of the CMC's revenue income, constituted almost entirely by consolidated property. Gadag-Betageri CMC levies a consolidated property tax of 22 per cent of the Annual Rateable Value (ARV). Income from the aforesaid sources has increased significantly over the assessment period, registering a CAGR of 19.60 per cent.

**Own Sources/Non Tax:**

This item head comprises of income from municipal properties, fees on municipal services (building permission, etc.), user charges (water and sewerage tariffs) and income from special services (educational and medical). On an average, through the assessment period, own source/non tax income constitutes 22.34 % of the total revenue income. Water charges, income from fees and fines and rental income from municipal properties constitute the major revenue sources under this item head. Income through non-tax own sources of the CMC has grown over the assessment period at a CAGR of over 10 per cent.

**Assigned Revenues:**

This item head comprises of income from Government of Karnataka (GoK)/State transfers of municipal income collected by the state line department. The income items include surcharge on stamp duty, entertainment tax, motor vehicle tax, and other transfers. Collection of entertainment tax has been discontinued for the last three years. Surcharge on stamp duty has been the major item of assigned revenue during the assessment period. The total assigned revenue transferred to the CMC has remained stagnant at around Rs. 4.5 Million during the last three years of the assessment period. Assigned revenue constitutes about 6.5 per cent of the CMC's total revenue income and has grown at a CAGR of about 9.5 per cent.

**Revenue Grants and Contribution:**

This item mainly comprises octroi compensation grants, SFC grants, special establishment grants and other special grants that the State Government may transfer from time-to-time to the CMC. In case of Gadag- Betageri, revenue grants and contributions constitute about 61 per cent of the total revenue income. The grants are largely in the form of octroi compensation from the state government – the CMC has also received special establishment grants and other small grants during the assessment period. Income under this head has grown at a CAGR of about 13 per cent over the assessment period.

**Revenue expenditure** comprises broadly of three categories of expenditure—establishment, operation and maintenance and debt servicing. Unlike in many other ULBs, Gadag - Betageri CMC has provided a consolidated figure pertaining to the total establishment.



#### **General Administration and Tax Collection:**

This head comprises expenditure on pay and allowances of elected representatives, salary and other operational expenses related to general administration and revenue collection, pension and gratuity payouts and provident fund contributions. The annual expenditure under this head is to the tune of about Rs. 5.4 Million (1999-00 to 2001-02) accounting for about 10.71 per cent of the revenue expenditure.

#### **O&M Cost of Public Works:**

Expenditures under this item head comprise repair and maintenance works on buildings, roads and drains. Gadag-Betageri CMC spends about 12.5 of its total expenditure on public works, but the expenditure under this head has declined in absolute terms, registering a negative CAGR of about 2 per cent.

#### **O&M Cost of Water Supply:**

This is the single largest cost center of the CMC, accounting for over 26 per cent of the total revenue expenditure. Expenditure on water supply comprises salaries of all relevant staff, bulk water charges payable to KUWSDB and operating expenditure incurred largely on electricity charges and purchase of chemicals for water treatment. Expenditure under this head has grown at a CAGR of about 27 per cent during the assessment period.

#### **O&M Cost of Sewerage and Sanitation:**

Though Gadag-Betageri does not have a centralized sewerage system, the annual accounts attribute a sizeable portion (17 per cent) of the total revenue expenditure under this head. This is primarily due to the establishment expenditure on maintenance of the storm water drainage system, which appears to be very high. The expenditure under this head has increased significantly over the assessment period, at a CAGR of about 17.5 per cent.

#### **O&M Cost of Solid Waste Management:**

Expenditure under this head accounts for about 13.76 % of the revenue expenditure over the assessment period. This head covers expenditure incurred in conservancy operations of the CMC, including salaries of supervisory and field staff and operation and maintenance of a fleet of vehicles for solid waste collection and transportation. On an average, over 90 per cent of expenditure under this head is attributed to salary expenses. Expenditure under this head has increased at a CAGR of about 16.73 per cent over the assessment period.

#### **O&M Cost of Street Lighting:**

Street Lighting accounts for about 6 per cent of the revenue expenditure and comprises primarily of expenditure on electricity charges and replacement of lighting fixtures. Expenditure under this head has also registered a negative CAGR – about 10.5 per cent.

#### **Other Services and Miscellaneous Expenditure Heads:**

Expenditure on other services accounts for about 10 per cent of the revenue expenditure, comprising essentially of expenditure on public safety and fire services, public gardens, vehicles maintenance, markets, education, etc.

#### **Debt Servicing:**

This item head comprises interest payments on external borrowings. According to the financial data

provided by the CMC, there has been no debt servicing during the assessment period. In the absence of data regarding borrowings, it is not possible to ascertain whether the municipality is defaulting on debt servicing or whether there is not commitment.

**Key Financial Indicators:**

Analyzing CMC's financials provides some key inputs which would form the key parameters of exploring the feasibility of PPP for O&M. Through the analysis it is understood that income from the Non-Tax Sources is only 22.34% of the CMCs Revenue income and the O&M cost of municipal services forms 32.42 % of the Revenue Expenditure. About 67.58 % of the total expenditure is on establishment-related heads, leaving relatively lower amounts for expenditure on operation and maintenance of services. The per Capita Growth Rate of O&M expenses is 10.76 %. It is also observed that the CMC is able to collect 46.67 % of the user charges for water supply and 72.36 % of the property tax and spends Rs.328/- per Rs.1000/- collection of taxes.

**Table 6-10: Key Financial Indicators**

Indicators		Value	Unit
<b>A</b>	<b>RESOURCE MOBILIZATION</b>		
1	Per Capita Income	414.25	Rs. p.a
2	Sources of Funds		
	a Share of Own Sources - Taxes in Total Revenue Income	9.80	%
	b Share of Own Sources - Non-Tax items in Total Revenue Income	22.34	%
	c Share of Assigned Revenue in Total Revenue Income	6.52	%
	d Share of Revenue Grants in Total Revenue Income	61.34	%
3	Growth in Revenue Income	12.71	% p.a
4	Growth in Own Sources of Revenue Income	12.85	%
<b>B</b>	<b>FUND APPLICATION</b>		
1	Per Capita Expenditure	323.14	Rs. p.a
2	Application of Funds		
	a Share of Establishment Expenditure in Total Revenue Expenditure	67.58	%
	b Share of O&M Expenditure in Total Revenue Expenditure	32.42	%
	c Functional Allocation of Municipal Expenditure		
	General Administration & Tax Collection	10.73	%
	Municipal Services	89.27	%
	Debt Servicing - Interest Payment	-	%
	d Share of Establishment Expenditure to Total Revenue Income	52.41	%
3	Growth in Establishment Expenditure	11.85	%
4	Growth in O&M Expenditure	12.95	%
5	Growth in Total Revenue Expenditure	12.23	% p.a
<b>C</b>	<b>PERFORMANCE INDICATORS</b>		
1	Operating Ratio	0.78	Ratio
2	Growth in Per Capita Own Income	10.67	% p.a
3	Growth in Per Capita Revenue Grant	10.78	% p.a



Indicators		Value	Unit
4	Growth in Per Capita Revenue Income	10.53	% p.a
5	Growth in Per Capita Establishment Expenditure	9.69	% p.a
6	Growth in Per Capita O&M Expenditure	10.76	% p.a
7	Growth in Per Capita Revenue Expenditure	10.06	% p.a
9	Capital Utilization Ratio	17.40	Ratio
<b>D</b>	<b>EFFICIENCY INDICATORS</b>		
1	Tax Collection Performance		
	a Property Tax	72.36	%
	b Water Tax	46.67	%
	c Drainage Tax	--	%
2	Cost of Collecting Rs. 1000 of Taxes	328.00	Rs.
3	Property Tax Demand per Assessment	344.69	Rs. p.a
4	Population per P.T Assessment	5.98	Persons

Source: NKUSIP CLIP Report.

## 6.5 Development Initiatives for Gadag - Betageri and its region by GoK

### 6.5.1 Suvarna Karnataka Development Corridor (SKDC) Programme

The State government in its 2008-09 Budget has identified Gadag District for development of steel and food processing zone and to promote mega steel & food industries and allied infrastructure components in the district (as part of the SKDC programme), which would promote economic development of the region.

## 6.6 NKUSIP PROPOSAL and Investment for Water Supply, Sewerage and Storm Water Drains

GoK, through its North Karnataka Urban Investment Plan (NKUSIP), proposes to improve the Environmental sanitation infrastructure, water supply, urban roads and slum development of Gadag-Betageri CMC. The following are the summary of Urban Water Supply, Sewerage and Drain improvements proposed through NKUSIP.

### 6.6.1 Summary of NKUSIP Project Interventions

#### (i) Water Supply:

Interventions in this sector comprise of replacement of raw and clear mains pumping mains, provision of pumps and installation of flow meters and level indicators.

#### (ii) Sewerage and Sanitation:

As per revised proposal for NKUSIP Project, no investments are allotted for this component under the project.

#### (iii) Flood and Drainage Control:

As per revised proposal for NKUSIP Project, no investments are allotted for this component under the project.

### Estimated Cost of Intervention

The total cost of water supply, Sewerage & Sanitation and Storm water Drainage and environmental sanitation infrastructure cost is Rs.871.59 million (USD 17.84 Million); project costs by sector are elucidated in the following table.

**Table 6-11: Estimated Cost of High Priority Interventions in Million INR**

Water Supply	871.59
Sewerage and Sanitation	0.00
Storm Water Drainage	0.00

Source: as per ADB- KUIDFC meeting dated 08/07/09.

Note: 1USD = 46.58 INR

### **6.6.2 Water Supply**

As per the NKUSIP initial clip report ,Under this component it was proposed to carry out the following improvements; construction of jack-well and pump house, installation of raw water pumps, laying of raw water pumping main for a length of 15km, construction of 30 MLD water treatment plant, laying of clear water rising mains for length of 20 km, replacement of PSC pipes (800 mm) for a length of 5 km, replacement of CI pipes (600 mm) for a length of 2 km and supply and laying of distribution system and construction of reservoirs. The total estimated cost for this proposal was Rs. 515.10 million, but now the proposed project components will vary as per revised investment of Rs. 871.59 Million. As anticipated, an additional of 10,390 connections has been proposed as part of the water supply scheme. This component has to be implemented by the CMC.

### **6.6.3 Sewage**

KUWSDB is currently implementing a sewerage scheme at an estimated cost of Rs.114.47 million. The twin cities have been divided into five sewerage districts (A, B, C, D, E) which are further divided into 33 sewerage zones. Under the new scheme only the district A, C and D in Gadag are going to be covered. KUWSDB is also constructing a sewerage treatment plant at Chikappa village spread over 32 hectares. Under NKUSIP the remaining drainage districts of B & E in Betageri will be taken up. As per NKUSIP initial report base cost estimates of investment proposed under the sewerage component was Rs. 155.00 million, but now there is no investment has been proposed under this component. So no new additional connections or network proposed to be taken under NKUSIP but in this study we are assuming to cover 60% of the total households under sewerage component, thus providing additional connections to 15,315 households. These additional connections have been proposed as part of the other sewerage schemes for the town. So, this component has to be implemented by the CMC.

## **6.7 O&M and its cost as recommended by NKUSIP**

### **6.7.1 Proposed Improvements in O & M. (water supply)**

Considering the constraints of the CMC, it is proposed by NKUSIP to improve the O & M operations in stages, so as not to change the current set up and practices drastically, but at the same time bring in discipline and control in O & M operations.

### **6.7.2 Proposed Improvements in O & M. (Sewage)**

O&M of sewerage system and sewage treatment plant requires considerably large number of workers, tools and plant and efficient supervisory staff. The Gadag-Betageri CMC does not have adequate strength of staff for looking after the important O&M of sewerage system. As proposed the maintenance should be under the control of one experienced and knowledgeable Assistant Executive Engineer.

**Table 6-12: Proposed O&M team – Sewerage System**

Category of Staff	For sewerage net work	For pumping station	For sewage treatment plant		Total nos.
			ASP	WSP	
Assistant Engineer/ Junior Engineer	One/100 Km	One for 4 PSs	One/STP	One/STP	3
Sewer Inspector/ Foremen	One/50 Km				2
Electrician /Fitter	-	4/PS	Four/STP	One/STP	28
Chemist / Analyst	-		One/STP	-	2
Laboratory Asst.	-		Four/STP	One/STP	8
Cleaner / Watchman/ Gardener	4/25 Km	4/PS			36
Driver for Tanker lorry	One/30 Km				3
Cleaner for lorry	One/30 Km				3

**O & M Expenditure:** To calculate the O&M cost of sewage component at Gadag- Betageri, the existing O&M cost of existing sewage component is projected till 2011-12 @ of 10.76% per annum and the O&M cost due to additional new components as anticipated is projected at @ 2% of the proposed cost of investment under new works, estimated as per NKUSIP. Thus the O&M cost is estimated to be Rs. 31.72 million/annum.

## 6.8 Need for Private Partnership in O&M of Municipal services in Gadag - Betageri

### Water Supply

Lack of efficiency in the existing O&M of water supply system has resulted in very low rate of Tax collection performance i.e. only 46 % .Also use of out dated technology is one of the major reasons for loss of water and in turn low supply. Private sector participation in O&M is expected to bring in skilled, trained and attentive work force and latest technology through which it is expected to reduce the water loses due to leakages and pilferage during transmission and distribution. Thus the water loss can be reduced to 10 to 15%, which increase the quantity of supply by 5 to 8 % more than the existing situation. It can also improve the efficiency level of O&M of treatment plants, thus reducing the water lose and also optimizing the uses of chemical and consumption of power. Case studies illustrate that through private sector participation the O&M cost can be reduced by 10 to 20%.

### Sewerage & Drainage System

The absence of safe sanitation facilities for a large section of population has resulted in occasional outbreak of water borne diseases. During monsoons, the drains are choked and are flooded in surrounding areas. Since the existing sewerage system was installed more than 15 years ago, about 50 % of the system is needed to be repaired and rehabilitated, especially in the initial stretches of the system with stoneware pipes. If the same system of O&M is continued, the environmental sanitation conditions in the town will continue to deteriorate as population density increases. Similarly, O&M of storm water drains is not given requisite attention leading to silting and uncontrolled solid wastes dumping cause blockage and stagnate storm water/wastewater runoff. Consequently, storm water drains choke and overflow into neighbouring areas. Private sector participation of O&M of sewerage system and storm water drains with dedicated work force and an organized operation schedule which would improve the

environmental sanitation conditions of the city.

## 6.9 Preliminary Financial Analysis:

Based on the information collected, collated and analyzed regarding, existing scenario of urban water supply, sewerage and storm water drains of the CMC, its O&M system and CMC's revenue income and expenditure, a preliminary financial analysis is carried out in order to explore the viability of PPP in O&M of water supply, sewerage and Storm water drainages starting from the year 2011-2012. The following are the key assumptions considered for preliminary financial analysis:

### 6.9.1 Commencement of O&M operations:

As Gadag - Betageri is among the cities identified under second tranche of funding and the preparation of DPR documents and other tender related procedures for establishment of additional assets & improvement of urban water supply and sewerage systems is currently under process. As part of the key assumptions, it is assumed that the assets would be established within a time span of two years and it is assumed that the O&M of the urban services would commence by 2011-12.

### 6.9.2 Demography:

Gadag – Betageri's population is expected to reach 172,717 by 2011. As per CMC's record Gadag - Betageri has 29,263 house hold properties in 2007.

### 6.9.3 Number of Service Connections:

**Water Supply:** Since, there is no information available on the proposed additional number of domestic/non-domestic/commercial connections; it is assumed that by 2011 the direct service connections would cover 80% (as mentioned in NKUSIP Clip report) of the existing number of total household properties of 29,263.

### 6.9.4 Tariff & Collection efficiency:

Existing water tariff of Rs.50/- , Rs.100/- and Rs.200/- per month for domestic, Non-domestic/ Commercial and Industrial connections respectively as recommended by GoK is assumed without any revisions for the year 2011-12 and is expected to remain same for the next 5years (till 2015-16). An increase of 30% on the existing tariff is assumed from year 2016-17. Further, it is assumed that there would not be any tariff for water consumed through Public Stand Post. For sewage connections, it is assumed that 10% of the water tariff charges would be collected as sewage tariff (as per inputs provided by KUIDFC) and there would not be any charges collected for O&M of drains.

Collection efficiency of Gadag - Betageri CMC for water tariff is 46.7 % and property tax is 72.4 %. Existing collection efficiency of 46.7 % is assumed for the analysis.

**Table 6-13: Key Assumption & Parameters for Preliminary Financial Analysis**

Key Parameters		Proposed Additional (2011)	Total
Total Population 2001	154,849	17,868	172717
Total House Hold Properties 2001	25126		
Total Commercial Properties	-		
<b>Water Supply</b>			
Total House Service Connections (No. of Connections)	13,019	10,390	23409
Population to be covered by HSC (No.)	-	-	-



**Pre-feasibility study for carrying out O&M of Water Supply, Sewerage & Storm Water drains (WSS &SW) on Public Private Partnership (PPP) basis for 6 CMCs in Karnataka: Final Report**

Non domestic (No. of Connections)	<b>412</b>		
Commercial/Industrial Connections(No. of Connections)	-		
Tariff for Domestic/Household (Rs/Household)	50.00		
Tariff for Non-Domestic/ Commercial(Rs/Connection)	100.00		
Tariff for Industrial (Rs/Household)	200.00		
Water Supply New Connection Charge- Domestic (one time)	3500.00		
Water Supply New Connection Charge- Non Domestic (one time)	5000.00		
Collection Performance-% of HSC(water charges)	46.7%		
Collection Performance - % of (Property Tax)	72.4%		
<b>Sewage</b>			
Total House Service Connections (HSC)	<b>1500.00</b>	<b>15315</b>	<b>16,815</b>
Population to be covered by HSC	104390	-	
Tariff for Domestic ( assumption- 10% of water tariff)	5.00		
Tariff for Non-Domestic( assumption- 10% of water tariff)	10.00		
Sewage New Connection Charge (one time)	1500.00		

#### **6.9.5 O&M expenditure:**

The O&M cost of water supply amounts to Rs.13.9 million per annum considering that the cost of O&M for water supply accounts to be 26% of the total revenue expenditures of the CMC. This cost is projected at the rate of 10.76% (which is the rate of growth of the CMC's O&M cost of all urban services between 1998-2002) till 2011-12. Thus the O&M cost of existing water supply components is estimated to Rs.38.8 million for the year 2011-12.

Based on case studies, the O&M cost for water supply due to additional connections & improvements is assumed to be 3% of the total capital cost estimated for water supply component under NKUSIP project (excluding the estimated cost for water audit) i.e. an additional cost of Rs.26.15 million per annum. Based on the above computations the total O&M cost for water supply for the year 2011-12 is estimated to be Rs. 64.99 million.

**Table 6-14: Assumptions for O&M Expenditure**

<b>Sector</b>	<b>O&amp;M as % of capital cost</b>
Water Supply	3.00
Sewerage & Sanitation	2.00
Storm water Drain	1.00

As per the secondary data collected, Gadag - Betageri CMC the O&M cost of existing sewerage & drainage system accounts to Rs.9.5 million considering that the cost of O&M for sewerage & drainage system accounts to be 17% of the total revenue expenditures of the CMC. This cost is projected at the rate of 10.76% (which is the rate of growth of the CMC's O&M cost of all urban services between 1998-2002) till 2011-12. The O&M cost due to new additional connections as anticipated is projected at @ 2% of the proposed cost of investment under new works, estimated as per NKUSIP CLIP report .Thus the O&M cost of existing sewerage & drainage system components is estimated to Rs.31.72 million for the



year 2011-12.

### 6.9.6 Expenses of O&M operator:

As provision of HSC connections would be the CMCs responsibility and is not factored under NKUSIP project, provision of HSC connections (Water Supply) is factored as part of the O&M. Therefore, the operator has to invest in the provision of 10,390 & 15,315 new House Service Connections for both water supply and sewage. It is estimated to cost Rs. 61.15 million (@ of Rs.2200/- and 2500 per connection for water supply and sewerage connection)

Table 6-15: Cost of Provision of New House Service Connections

	<b>New Infrastructure</b>	<b>Proposed No. of Connections</b>		<b>Unit Cost as per consultant's inputs in Rs.</b>	<b>Total Investment in Rs. million</b>
1.	Water Supply - House Service Connection Cost	10,390	Nos	2200	22.86
2.	Sewage - House Service Connection Cost	15,315	Nos	2500	38.29
<b>Total</b>					<b>61.15</b>

Source: NKUSIP CLIP Report

Apart from the above-mentioned O&M expenses, a private O&M operator would have its initial investment like procurement of equipments for maintenance, communication instruments and vehicles for transportation to carry out the O&M operations and is estimated to be around Rs.1.00 million and monthly office administrative expenses like rentals of office space, salary of administrative office staff and other office over heads is estimated to Rs. 0.69 million per annum.

Table 6-16: Administrative Expenses of the O&M Operator

<b>Office expenditure of the O&amp;M Operator</b>	<b>Rs. Per Month</b>	<b>Rs. Million p.a.</b>
Rentals/month	10000.00	<b>0.12</b>
Increment in office rentals		5%
<b>Office Staff Salary and Overheads</b>		
Salary of Manager	15000.00	0.18
Salary of Office technical Assistant	7500.00	0.09
Accounts officer	10000.00	0.12
Office Attender	5000.00	0.06
Overheads	20000.00	0.24
<b>Total</b>		<b>0.69</b>
Increment in salaries 10%		10%

### 6.9.7 Other Assumptions:

It is assumed that the cost due to depreciation of assets would be at the rate of 0.02% (CPEEHO) of the total estimated O&M expenditure per annum. Cost of collection of water charges is assumed to be Rs.328 for every Rs.1000/- collected as per cost for cost of collecting property tax and water cess (CLIP Report).

### **6.9.8 O&M Revenue Income:**

As discussed earlier, the revenue income from water supply & sewerage are assumed only from the properties with HSC and based on the existing tariff rates of GoK. As provision of new HSC connections would be part of the O&M services. The existing new water supply connection charges of Rs.3500 (Per Domestic Connection) & Rs.5000 (per Commercial Connection) and new sewage connection charge of Rs.1500 per connection would also be considered as part of the Revenue income of the operator.

### **6.10 Financial Viability for PPP mode of O&M for Gadag - Betageri CMC**

The preliminary financial analysis carried out based on the above-mentioned key assumption illustrates that the O&M expenditure for the year 2011-12 would be around Rs. 101.23 million and the Operator has to invest around Rs.61.15 million to provide 10,390 & 15,315 new HSC for water supply & sewerage respectively. Thus, the total expense of the first year (2011-12) of operation is estimated around Rs.164.19 million. The revenue income through tariff collection (assuming 46.7% collection efficiency) for the same years would be only Rs.3.69 million as the income from the additional new connections would start only from the second year. Thus, there is a deficit of Rs.160.50 million for the year 2011-12.

During the second year of operations, the operator would get Rs.59.34 million as income from the new connection charges and additional income from water tariffs from the 10,390 & 15,315 new connections, thus increasing the revenue income to Rs.34.72 million (assuming 46.7% collection efficiency), with a deficit of Rs. 99.82 million. The revenues for 3<sup>rd</sup>, 4<sup>th</sup> & 5<sup>th</sup> year would remain constant with Rs. 7.03 million with a deficit of Rs.119.89, Rs.133.0 & Rs.147.52 million respectively.

The outcome of the preliminary financial analysis indicates that a PPP mode for O&M of water supply at existing tariff levels is not financially viable for Gadag - Betageri CMC. However, with tariff rationalization and support from GoK in terms of annuity payments, O&M of water supply system on PPP basis can be considered.

#### **6.10.1 Assumptions for Viability:**

The preliminary financial analysis also indicates that a 30% increase in the revenue income by increase in tariff rates by 2011-12 and achieving 100% collection efficiency would narrow down the deficits. Further, private participation is expected to bring down the overall O&M cost through efficient handling of the system and it is assumed that a PPP mode would reduce the O&M cost at least by 10% of the existing or estimated cost. This would further improve the cash flows.

#### **6.10.2 Revenue from reuse of STP water:**

The prime objective of the pre-feasibility is to explore a PPP mode for O&M of water supply, sewage and drainage as one package. Therefore, to make the project viable under PPP mode, revenue income from sale of treated water from STP is also explored. It is estimated that the proposed STP would release 20 MLD (assuming 80% of the proposed STP Capacity of 25 MLD) of treated water every day. As part of the O&M, the private operator has to maintain and operate the STP; therefore CMC, as a part of the PPP agreement can provide the rights over the treated water from the STP to the private operator. This would facilitate the operator to generate income by sale of the treated water to industrial areas, construction industries, landscape maintenance and for other non-domestic consumptions. The Bellary example indicates that treated water is sold at Rs.20/ Kilo liter; however, a nominal rate of Rs.5/- per Kilo liter of treated water is assumed for projections at Gadag-betageri. Thus, the income which can be generated by sale of treated water would be around Rs.36.50 million per annum. A detailed study need to be carried out as a part of a detailed feasibility study to understand the demand and viable rates for treated water.

Assuming 75% realization, the operator can generate Rs 27.37 million /annum. This additional income would further help in reducing the deficits.

### 6.11 Recommendations to make a PPP of O&M viable in Gadag - Betageri CMC:

The following are some of the recommendations which might make a PPP mode viable:

1. Increase in water tariff rates by 2011-12 or Introducing metered tariff collection for all consumer categories
2. Improving collection efficiency to 100%
3. Increasing the existing sewerage charges

The CMC has to carry out the above-mentioned recommendations in order to make the O&M cost of urban services self sustainable. Especially in water supply the current tariff of Rs. 50 per month for a average monthly consumption of 16.29 kl (assuming 88 lpcd and average house hold size of 6.2) accounts to a very low tariff rate of Rs. 3.07/kl per. But it is also observed through secondary data collection that each HSC serves to more than one household and therefore the average consumption level per HSC is around 40.50 kl per month against 16.29 kl considered for estimation, therefore the actual tariff collection is only Rs.1.23/kl. Considering these facts, it is recommended to carry out the above mentioned measures in order to make the CMC's O&M component financially self sustainable, which would also improve the viability for a PPP mode.

### 6.12 Project Structure & Way Forward:

#### 6.12.1 Alternative Options/Performance Based Management Contract (PBMC)

With existing tariff structures, O&M of water supply on PPP basis in Gadag- betageri CMC doesn't seem to be viable so an alternative option **for carrying out O&M of water supply is through Performance Based Management Contract (PBMC)**.The following can be considered as the prime components of Project structure.

O&M can be carried out through other PPP & PSP modes, through a combination of the following measures:

- Financial support from CMCs/Govt. of Karnataka by means of Annuity payments
- Phased increase in water and sewerage tariff across all consumer categories
- Introduction of meter based tariff rates
- PSP for O&M of systems can also be explored through Management Contract model
- The O&M contract shall be structured factoring in performance based incentives and penalties and lowest Annuity payment basis from CMC/GoK (i.e. PBMC)
- Term of a PBMC contract including installation of HSC can be for a maximum period of 5 years including the HSC installation period.
- Installation of HSC shall be completed within 1 year.

- The contract can be structured based on annuity payment and the annuity amount shall be arrived based on the actual O&M expenses. The O&M expenses quoted can be the first bid parameter, with a weightage of 70%.
- Price quote for installation of the HSC shall be the second bid parameter, with a weightage of 30%.
- The bidder shall be selected based on the lowest overall evaluated bid after taking into account the first and second Bid Parameters, as per their respective weightages mentioned above.
- The following Key Performance Indicators (KPI) may be considered to monitor the performance of the O&M contractor:
  - a. **Quality of water distributed to the consumers**

Achieving the best drinking water quality as recommended by WHO/CPEEHO standards can earn the O&M operator a bonus of up to 5% of the Fixed annuity amount. On the other hand, a penalty of 5% for water quality supplied below the recommended quality standards can be levied.
  - b. **Reduction in the overall UFW**

A reduction up to 25% within the second year of operation can earn the operator a bonus of 10% and reduction of up to 20% can earn a bonus of 15%. If the UFW is not reduced below 40% then the operator would face a penalty up to 10%.
  - c. **Quantity and quality of the treated water from STP**

Treated STP water with a quantity of at least 80% of the installed STP capacity and with a water quality of BOD level less than 12 can earn the operator a bonus of another 5%. A BOD level above 15 can face a 5% penalty.
  - d. **Minimizing system-downtime**

Minimizing system-downtime and time for repairs & maintenance with minimal impact on water supply timings, duration, quantity and quality of supply & treatment assessed as per consumer feedback would provide the operator an additional bonus of 5%
  - e. **An overall reduction in the O&M cost**

An overall reduction in the O&M cost of the existing infrastructure components/network of water supply, sewage and storm water drains up to 10% (especially reduction in consumption of electricity) can earn the operator a bonus of 5% of the quoted annuity amount. An increase in O&M cost exceeding 10% and above can have a penalty of 5%.
- Thus the operator can achieve an additional bonus of 35% per annum based on his performance. Consistent performance by achieving 30% bonus and above for 2 consecutive year shall provide an additional bonus of 10% at the end of the term. Further the bonus payment shall be paid only at the end of the 3<sup>rd</sup> year and the 5<sup>th</sup> year. But the penalty if any shall be deducted every year.
- The annuity payment would start from the second year.

- CMC shall appoint an independent engineer to monitor the Performance indicators of the contract.

*The above-mentioned Key Performance Indicators (KPI), incentives & penalty clauses are indicative and the exact quantification of the indicators can be determined only through a detailed audit and assessment of the services and its components and also through a detailed financial analysis as part of a detailed project report preparation.*

**Initiatives Required from CMC/GoK:**

- CMC should carry out an audit of the existing assets of the water supply, sewage and storm water components/infrastructure which would be leased to the O&M operator, in order to provide details & inventory of the existing components and the status of the assets.
- CMC should enforce stringent regulations to curb illegal and unauthorized supply of water within the CMC limits and also implement norms which would restrict and regulate the number of bore holes/bore wells permitted within certain surface area limits or within a ward.
- CMC also should implement norms restricting the use of potable water for construction activities and landscape uses.

CMC should appoint an Independent Engineer for frequent Monitoring of the KPI of the agreement.

## 7 Ilkal

### 7.1 Ilkal Town Profile

Ilkal is situated in Hungund Taluka of Bagalkot District. It is located at a distance of 60 km from the district headquarters and National Highway 13 (Sholapur-Chitradurga) traverse through the town in north-east direction. The town is spread over an area of 12.98 sq. km, with a population of 51,956 (Census 2001) and 58,180 (2008). It is an important educational, commercial and industrial town in the district. Ilkal is known for its handloom saris known as 'Ilkal Saris' and pink-colored granite stones.

#### Latitude, Longitude & Altitude:

Ilkal is located at 15°57' N latitude and 76°07' E longitude. The town's altitude is 563 m above the mean sea level (MSL).

#### Connectivity:

The town is well connected by a network of national and state highways. Sholapur - Chitradurga i.e National Highway - 13 passes through the town and the State Highway - 6 connects Ilkal town with important cities like Belgaum, Karwar, etc. Besides these roads, a network of major and minor roads leads to neighboring towns and villages of the region. The nearest railway station is at Bagalkot, 60 kms from Ilkal town.

#### Climate:

Ilkal town falls under temperate semi-arid region with salubrious climate. The mean annual maximum and minimum temperatures are 33.4°C and 20.33°C respectively. During rainy season, the mean annual maximum and minimum humidity recorded are 54.37 percent and 24.4 percent respectively. The average annual rainfall of the town is around 732.44 mm.

#### CMC Jurisdiction:

Ilkal Town Municipal Council (TMC) JURISDICTION extends up to an area of 12.98 sq. km, divided in 27 wards.

### 7.1.1 Demography

#### Population:

Ilkal's population has grown significantly from 40,101 in 1991 to 51,956 in 2001 indicating a decadal growth rate of 29.56 % and annual compounded growth of around 2.62 %. As per the information gathered from CMC and the SPAN consultants, the Ilkal's Population has grown to 58,180 by 2008.

Ilkal is witnessing an increase in the population especially during 1991-01. Few of the reasons that can be attributed for the increase in population are educational institutions, commercial establishments and industrial units. The town is known for handloom weaving and has a unit of Handloom Development Corporation. 'Ilkal Saris' has good commercial value. Ilkal has set up its mark on the world map, as it is exporting pink granite all over the world. Ayurvedic College, science and Commerce College, college of arts adds more educational value to the town. The town has Agricultural Produce Marketing Committee (APMC) yard that caters to the surrounding towns and villages. All the above said reasons are the main contributing factors for the population increase in the town.

#### Household Size:

In Ilkal, the total number of households is 9029 (census 2001) and 11269 in 2008 with an average



household size of 5.75. As per the DPR Prepared for the NKUSIP project the population projected taking 2001 population as a base for the year 2011 is 58,111, but looking to present population growth trend the estimated population for the year 2011 is 58,222 which is taken as the base for this study.

### 7.1.2 Economy

Ilkal is considered as an important trade and commerce centre but at the same time, it is also recognized as an educational centre. Ilkal residents are engaged mainly in handloom weaving and export of pink granite and marble. Few units of saw mills also exist in the town. It has APMC yard that caters to the surrounding towns and villages, which mainly deals with cotton, paddy and oil seeds. Due to good connectivity by roads with other parts of the region, it has become a focal point for trade and commerce.

#### Industries:

About 55 granite-polishing industries are located in the town. There is large number of small-scale textile industries in the town, of which about 305 industries are with power looms and 1500 industries are with handlooms.

### 7.1.3 Land use Plan/CDP, Regulations:

According to the 1997- land use statistics, residential area occupies around 44.75 % of the total developed area and industrial area is around 4% . Agriculture lands are spread over 59 hectares accounting for around 15% of the local planning area. The following table provides detailed break – up of various land uses of Ilkal CMC.

**Table 7-1: Land Use Distribution - 1997**

Land Use	Area (in Ha)	Distribution (%)
Residential	132	44.75
Commercial	14.5	4.92
Industrial	12.6	4.27
Recreational	16.2	5.49
Public & Semi-public	35.6	12.07
Public Utility	4.1	1.39
Circulation	80	27.12
<b>Developed Area</b>	<b>295</b>	<b>100</b>
Agricultural	59	
Other Vacant Land	41	
<b>Total Area</b>	<b>395</b>	

Source: ODP (2011)

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

## 7.2 Existing UWSS&SD – Supply/collection System & Coverage

### 7.2.1 Existing water supply

Ilkal CMC is getting water supply from three sources, ie. from bore wells, infiltration wells and surface water from river Krishna. There are 5 nos of operational wells fitted with power pump and 17 bore wells fitted



with hand pumps. The town is getting water for duration of 1-2 hours once in 2-3 days. The present service area for water supply covers 57% of the constructed residential areas inside the town.

The first protected water supply scheme for Ilkal was implemented in the year 1950 with three infiltration wells sunk in Hire Hallah. The water from the infiltration wells is collected in the collection well by gravity and pumped for distribution. During summer months, the yield from the infiltration wells dwindles. The CMC is also getting water from bore wells fitted with power pumps and hand pumps.

The main source of water supply for the CMC in future for the ultimate population is surface water from Krishna River.

**Table 7-2: Water Supply Overview**

Description	Unit	Quantum
Total area of Ilkal	Sq. Km.	12.98
Total no. of Households (2008)	Nos.	11269
Households covered by house service connections	Nos.	2662
% households served by HSC	%	22.44
Property Tax assessments with service connections	%	31.55
Gross Water Supply (Ground and Surface)	MLD	5.21
Frequency of Supply	Nil	Once in two days (3 - 4 Hours)
Present Supply (as per CMC website)	Lpcd	45

Source: Ilkal DPR

**Table 7-3: Capacity and Supply from existing water supply sources**

Source	Actual Supply (Feb 2005) in MLD
Bore Well	0.53
First Stage Water Supply Scheme (FSWSS)	3.49
Infiltration wells	1.19
<b>Total</b>	<b>5.21</b>

Source: Ilkal CMC/KUWSDB

**Coverage:**

Piped water supply is made available to the citizen through 2662 house connections and 154 public stand posts. The house connections account for only 23.6 percent of the total 11269 residential properties. There are 187 commercial connections.

The population covered by piped water supply is stated to be 27,680. It is, however, likely that more than one property may be using one house connection. A reasonable guess may be to assume about 10 persons using one house connection. As per the report, the piped water supply system is likely to supporting about 19,580 population, indicating coverage of 36.38 percent of the person population of the town.

**Table 7-4: Consumer Connections Details**

Type of Connection	Total (Nos.)
Domestic Connections	2662
Non domestic / Commercial connections	187
Industrial Connections	0

Type of Connection	Total (Nos.)
<b>Total</b>	<b>2849</b>

Source: Ilkal DPR

**Per Capita Supply:**

In normal times, existing water supply system is operated for 16 hours every day. The total supply is thus 5.21 MLD. As per Ilkal CMC website presently the actual per capita supply is 45 lpcd but based on total supply if otherwise calculated the per capita supply comes out to be 89.5 lpcd, so this gap of 44.5 lpcd can be accounted for transmission losses and unaccounted supply. Hence the actual supply to the consumers is very less, when system losses are accounted for so the supply position is not satisfactory.

**Duration of Supply:**

The supply is intermittent, alternative days and for 3 hours every day (12.20 PM - 12.00 AM). The water is supplied to one zone at a time from one ESR / GLSR and supply continues to other areas on a predetermined rotation basis.

**Pressures:**

Pressures are generally acceptable. However, some areas like old Ilkal, market area, CMC area, etc suffers from low pressure due to old pipe network and distance from the service reservoir.

**First Stage Water Supply Scheme (FSWSS)**

This scheme was developed in year 2000, with Krishna River as the source, which is located near Dhannur Village, 28km from Ilkal Town. The River will go dry during three summer months, i.e., March to May.

**Source Works:**

These works consist of

- (a) Canal intake well 3.0m dia and 9.00 m depth,
- (b) 600 mm diameter RCC NP-3 pipeline, laid for a length of 100 m and designed to carry 13.62 MLD flow,
- (c) Jack Well, which is a RCC circular sump of 12 m diameter and 15.0 m depth, and
- (d) Circular pump house above the Jack well, 4 m height.

The source is thus very dependable except three summer months. The source works are new and in good condition.

**Raw Water Pumps:**

Two vertical discharge pumps, with 270 HP and auto transformer starters

**Raw Water Pumping Main-1:**

This is a 450 mm diameter pre-stressed concrete pipe line (18 kg/cm<sup>2</sup>) laid for a length of 8.1 km up to the Intermediate pumping station-1 (IPS-1).

**Intermediate Pumping Station-1:**

The raw water from Dhannur Head works is collected in a 60,000 Gallons capacity RCC sump and pumped to Hungund water treatment plant.

**Raw Water Pumping Main-2:**

This is a 450 mm diameter pre-stressed concrete pipe line (12 kg/cm<sup>2</sup>) laid for a length of 7.56 km from Intermediate pumping station-1 (IPS-1) to water treatment plant at Hungund. IPS-1 pumps raw water to



WTP located at Hungund.

**Water Treatment Plant:**

This plant is designed to treat 9.08 MLD (2.0 MGD). It is located about 2 km from Hungund city. The treated water is supplied to Hungund, Ilkal and Kushtagi towns and has following units.

- (a) Cascade aerator.
- (b) Raw water channel.
- (c) Alum dosing tank connected to raw water channel
- (d) Flash mixer, with 0.5 hp stirrer.
- (e) Clariflocculator.
- (f) Four rapid sand filter beds, two on each side.
- (g) Laboratory
- (h) Wash water tank, 1.80 lakh liters capacity.
- (i) Chlorination Room
- (j) Pure Water Sump

**Clear Water Pumping Station:**

Treated water is pumped to a clear water sump, through the following works, located in the water treatment plant premises.

- (a) Circular Sump of 2.73 lakh liters capacity, 12m dia x 3.0m depth.
- (b) Rectangular pump house, located by the side of the sump.
- (c) Two horizontal centrifugal pumps (100 percent standby) of 170 HP each with auto transformer starters.

**Clear Water Transmission:**

This 400 mm dia PSC pumping main of 9.02 km length carries water to the Intermediate Pumping Station-2 (IPS-2) located in between Ilkal and Hungund.

**Intermediate Pumping Station-2:**

The clear water from WTP is collected in a 60,000 Gallons capacity RCC sump and pumped to Ilkal ESRs & GLSRs. Two discharge pumps, with 120 HP and auto transformer starters are provided. All the pumping stations, transmission mains and water treatment plant are new and in good condition, except leakages in PSC pumping main. The PSC main at several parts of its stretch, starting from raw water intake works to Darga GLSR, has reported leakages. A few rehabilitation and operational improvement works are to be taken up, to improve the operational efficiency.

**Distribution System:**

**Service Reservoirs:** 3 GLSRs are constructed and commissioned in year 1980, while 3 more were added in the first stage water supply scheme. The details are given below.

**Table 7-5: Details of Service Reservoirs**

Location	Type	Storage Capacity (ML)
Near PWD Quarters	ESR	1.00
Near KEB office	ESR	1.00
At Darga IPS	ESR	1.00
<b>Sub-Total</b>		<b>3.00</b>
Near IB	GLSR	0.55



Location	Type	Storage Capacity (ML)
At Nekar colony	GLSR	0.05
At Darga IPS	GLSR	0.20
<b>Sub-Total</b>		<b>0.80</b>
<b>Total</b>		<b>3.80</b>

Source: Ilkal CMC / KUWSDB

### **Distribution Network:**

The distribution system, laid in 1980s, consists of

- (a) PVC pipelines of diameters ranging from 90 mm to 160 mm and
- (b) CI pipes of 90 mm and 300 mm.
- (c) PSC pipes of 90 mm to 160 mm.

### **7.2.2 Existing Sewerage System:**

The sewerage system in Ilkal town has been constructed in year 1958. Only, about 20 % of the town is covered with sewerage system. The existing sewerage system comprises of gravity sewers, sewage pumping station and sewage treatment plant. The pumping main discharges the sewage to an existing sewage treatment plant at Joshi galli extension area. The STP was designed to treat 0.8 MLD using oxidation ponds. At present, the ponds are not in use and the sewage is discharged to open lands, which is being used for irrigation. In absence of complete sewerage system, the domestic wastewater flows through the roadside drains into the nallahs and pollutes the watercourses. In addition, the sewerage generated from granite and dyeing industries is highly corrosive in nature, flows through open drains polluting the downstream water bodies.

### **House Service Connections:**

2,573 properties have been connected to the sewerage system.

### **Sewage Pumping Station:**

There is an existing sewage pumping station (SPS) which pumps sewage through 200 mm dia RCC pumping main of total length of 2.5 kms to the sewage treatment plant (STP) located at Joshi galli extension area. The pumping machinery comprises of two 10 HP centrifugal pumps.

### **Sewage Treatment Plant:**

One sewage treatment plant consisting of one anaerobic pond 0.8 mld capacity with sludge drying beds is existing at Joshigalli extension area. The STP was designed to treat 0.8 MLD of sewage. The details of oxidation pond are given as below. At present, the ponds are not in use and the sewage is discharged to open lands, which is being used for irrigation.

### **7.2.3 Drains**

The drainage system in Ilkal town consists of three major nallahs (Ilkal Nallah flowing from west to east meeting Hirehalla near bus stand, Hirehalla Uppanal flowing from west to east joining Hirehalla, Hirehalla which flows from south to north-east) and a network of secondary and tertiary drains built around the main channel. Total length of the primary drains is 5.95 km while that of secondary and tertiary drains is 12.0 km.

Table 7-6: Existing Drainage system

Drain Type	Length (Km)	Distribution(%)
<b>Storm water Drains</b>		
• Open drains (Pucca)	12	100
• Closed drains (Pucca)		
• Open drains (Kutchra)		
<b>Total Storm Water Drains</b>	<b>12</b>	<b>100</b>
<b>Primary drain channels</b>		
• Ilkal Nallah	1.92	
• Hirehalla Uppanal	0.67	
• Hirehalla	3.36	
<b>Total Primary Drains</b>	<b>5.95</b>	

Source: Ilkal CMC

#### Primary Drains:

There are three natural drains, which flows through the town.

- Ilkal Nallah: This nallah flows from North of Indira Nagar flows from West to East of Ilkal. It is a natural stream, irregular in shape, full of vegetation and trees, and with average width varying from 30 to 40 m. It carries the rainwater, which is used by the farmers for agricultural purpose. Some area of Ilkal is supplied this nallah water directly without any treatment.
- Hirehalla Uppanal: This nallah flows from west to east of Ilkal. It is a natural stream, irregular in shape, full of vegetation and trees.
- Hirehalla: This natural nallah flows from south to northeast of Ilkal. It is irregular in shape, full of vegetation and trees, and with average width varying from 40 to 130m.

#### Secondary and Tertiary Drains:

A few roads are provided with both side drains. A few drains are cement concrete and a few of them were side stone drains with cement concrete bottom. All the built up drains are rectangular in shape.

#### Coverage:

Drains are provided on both sides of the roads. Total length of the roads is 84 Km and the drains are required for a total length of 168 Km. Thus, the built up drains of 12.00 Km length cover only 14.29 percent of the roads.

### 7.3 Existing O&M Structure of the CMC for Water Supply, Sewerage and Drains

Town Municipal Council takes care of the Operation and Maintenance (O&M) of Water Supply, Sewerage System, Drainage, Solid Waste Management, Roads etc. The Engineering Section along with Public Health Sections of the CMC is responsible for the O&M of assets of the town's urban services.

**Engineering Section:** An Assistant Executive Engineer (AEE) heads the Engineering Section and is assisted by one assistant engineer, two junior engineers, one junior town planner and other staff. The AEE has overall responsibility and supervises all the work taken up by the department. The assistant and junior engineers have Ward specific responsibilities. The major duties and responsibilities of the Engineering Section include construction and maintenance of roads, maintenance of the water supply infrastructure and maintenance of public buildings and structures.

**Public Health Section:** The Public Health Section is responsible for ULB services such as water supply, public lighting, garbage clearance, etc., apart from other public health duties. This section is also responsible for sanitation facilities of the ULB. The Senior Health Inspector (SHI) has the overall responsibility for the section. Two junior health inspectors, deputed from Health and Family Welfare Department, assist the SHI. Junior officers are in-charge of works execution at the field level, which includes monitoring and supervising the work of sanitary labourers in the wards under their charge and attending to specific local complaints.

**O&M of Existing Water Supply System**

KUWSDB operates and maintains the Krishna River water supply systems. CMC maintains the Hire Halla water works. The Chief Officer and a junior engineer supervise the O & M of water supply. Staff actually operating the system includes:

**Table 7-7: Staff Details of Water Supply O&M in CMC**

Description	No of post filled (Nos.)
Staff and helpers hired by CMC	17
Pump operators	30
<b>Total</b>	<b>47</b>

*Source: Ilkal CMC*

**Preventive Maintenance:**

A formal maintenance manual is not prepared. However, the operating staff does not carries out the preventive maintenance of the electrical and mechanical equipment of the pumping stations such as pumps, valves, piping, motors, breakers, panel boards, meters capacities, cables etc. Maintenance of flash mixer, flocculator, and clarifier, piping valves and dosing equipment etc of the water treatment plants is taken up by the KUWSDB staff. The maintenance of civil works, such as painting and minor repairs, is attended to, as and when required. However, the CMC staff will attend regular leakages / blockages in distribution mains, as per the daily complaints registered in a complaint register.

**Maintenance Facility:**

- (a) Routine Maintenance and Small Repairs. Repairs such as routine checking of distribution lines, cleaning blockages, plugging leakages etc are done by the CMC staff.
- (b) Special Repairs. Special repairs required for electrical, mechanical equipment or for civil structures are done through private workshops and through contracts.

**Water Quality Monitoring:**

- (a) **Raw Water Quality:** There is no regular schedule followed to test the physical, chemical and bacteriological tests of the raw water at the source. The turbidity of raw water is also not measured daily, at the water treatment plants.
- (b) **Quality of Water Supplied to Consumers:** There is no formal system of testing the samples of tap water for either the bacteriological quality or the residual chlorine.

**Records:**

- (a) **O&M Manual:** A formal O & M manual is not prepared for the installations of the water supply system.
- (b) **Record at Pumping Stations and Water Treatment Plant:** Logbooks are maintained at each pumping station and water treatment plant.



### 7.3.1 Operation and Maintenance of the Existing Sewage system:

**Operation and Maintenance of Sewers:** The CMC is operating and maintaining the system, with the staff already employed on the permanent roll, on daily wages or through contract.

### 7.3.2 Storm Water Drains

Maintaining the storm water drains are also responsibility of CMC, but maintenance of drains is not a regular phenomenon and not given importance. Maintenance of drains are carried out only during flooding and other emergency occasions only.

**Problem Areas:** No serious flooding incidents are reported. Some of the existing drains overflow on the road, as they are often blocked due to indiscriminate throwing of the garbage and plastic bags. Only 14.29 % of the roads have built up drains indicating a very poor coverage.

1. **Disposal of Domestic Sewage:** Due to inadequate sewerage system and sanitation facilities, a large amount of the domestic sewage is let into storm water drains. This is resulting in pollution of the public water bodies such as river and canals, as the waste runoff leads to these watercourses.
2. **Silting and Solid Waste Accumulation:** Silting and uncontrolled solid waste dumping cause blockage and stagnate storm water/wastewater runoff. Consequently, storm water drains choke and may overflow into neighboring areas.

### 7.3.3 Constraints of Existing O&M system

The CMC is operating and maintaining the system, with the staff employed on the permanent roll, on daily wages or through contract. While a complete overhaul of the present O & M set up may be ideal, it is not practical, on account of the following constraints.

(a) A large number of people are already employed on this job and their termination or redeployment elsewhere will not be possible. Most of the staff, engaged in actual operation and maintenance needs to be imparted training. (b) The O & M of water supply or sewerage system gets lower priority, due to which there is difficulty in getting required staff, material and funds in time. This results in deterioration in both operation and maintenance.

## 7.4 CMC's Revenues and Expenses & Cost of O&M of municipal Services

### 7.4.1 Summary of Municipal Finances

Table 7-8: Summary of Municipal Finances

Item	Amount in Rs. Million				
	1998-99	1999-00	2000-01	2001-02	2002-03
<b>Revenue Account</b>					
Revenue income	8.305	10.861	10.689	9.01	10.466
Revenue expenditure	12.712	10.516	10.01	8.923	9.241
Surplus/Deficit	(4.407)	.345	.679	.087	1.224
<b>Capital Account</b>					
Capital income	-	-	-	-	-

**Pre-feasibility study for carrying out O&M of Water Supply, Sewerage & Storm Water drains (WSS &SW) on Public Private Partnership (PPP) basis for 6 CMCs in Karnataka: Final Report**

Item	Amount in Rs. Million				
	1998-99	1999-00	2000-01	2001-02	2002-03
Capital expenditure	-	-	-	-	-
Surplus/Deficit	-	-	-	-	-
<i>Fiscal Status</i>	<i>(4.407)</i>	<i>.345</i>	<i>.679</i>	<i>.087</i>	<i>1.224</i>
<b>Debt &amp; Suspense Account</b>					
Extraordinary income	-	-	-	-	-
Extraordinary expenditure	-	-	-	-	-
Surplus/Deficit	-	-	-	-	-
<i>Overall Fiscal Status</i>	<i>(4.407)</i>	<i>.345</i>	<i>.679</i>	<i>.087</i>	<i>1.224</i>

Source: Ilkal clip report

The Revenue Account comprises of recurring items of income and expenditure. These are essentially all financial transactions related to the day-to-day operations of the municipality. The following table summarizes the status of the Revenue Account.

**Table 7-9: Revenue Account Status**

Item	1998-99	1999-00	2000-01	2001-02	2002-03
	Amount in Rs. Million				
<b>Revenue Income</b>					
Own Source/Tax	0.907	1.227	1.106	0.525	0.021
Own Source/Non Tax	2.069	3.028	3.091	2.731	3.438
Assigned Revenue	0.285	0.474	0.368	0.564	0.088
Revenue Grants	5.044	6.132	6.124	5.19	6.919
<b>Total- Revenue Income</b>	<b>8.305</b>	<b>10.861</b>	<b>10.689</b>	<b>9.01</b>	<b>10.466</b>
<b>Revenue Expenditure</b>					
Establishment	10.923	5.879	6.13	6.111	6.91
Operation and Maintenance	1.789	4.637	3.88	2.812	2.331
Debt Servicing	-	-	-	-	-
<b>Total- Revenue Expenditure</b>	<b>12.712</b>	<b>10.516</b>	<b>10.01</b>	<b>8.923</b>	<b>9.241</b>
<i>Revenue Account Status</i>	<i>-4.407</i>	<i>0.345</i>	<i>0.679</i>	<i>0.087</i>	<i>1.224</i>

Source: Ilkal clip report

**Own Sources/Tax:** This item head comprises of income sourced primarily from octroi, consolidated property tax (general purpose tax, water tax, lighting tax and scavenging tax) and professional tax. On an average, through the assessment period, own source/tax income constitutes only 7.72 percent of the CMC's revenue income, constituted only by property tax 1999-00 to 2003-04. Ilkal CMC levies a property tax of 22 per cent of the Annual Rateable Value (ARV). Income from the own tax sources have registered decline in growth (CAGR) of 61.14 per cent with exceptionally high decline in growth rate of 52.51 per cent during the period 2003-04.



**Own Sources/Non Tax:** This item head comprises of income from municipal properties, fees on municipal services (building permission, etc.), user charges (water and sewerage tariffs) and miscellaneous services. On an average, through the assessment period, own source/non tax income constitutes 28.97 percent of the total revenue income. Rental income from municipal properties, water charges and income from fees and fines and constitute the major revenue sources under this item head. Income through non-tax own sources of the CMC has grown over the assessment period at a CAGR of over 13.54 per cent.

**Assigned Revenues:** This item head comprises of income from Government of Karnataka (GoK)/State transfers of municipal income collected by the state line department. The income items generally include surcharge on stamp duty, entertainment tax, motor vehicle tax, and other transfers. Collection of entertainment tax has been discontinued for the last three years. In case of Ilkal CMC, surcharge on stamp duty has been the only item of assigned revenue during the assessment period. Assigned revenue constitutes about 3.67 per cent of the CMC's total revenue income and has declined at a CAGR of about 25.46 per cent.

**Revenue Grants and Contribution:** This item mainly comprises octroi compensation grants, SFC grants, special establishment grants and other special grants that the State Government may transfer from time-to-time to the CMC. In case of Ilkal, revenue grants and contributions constitute about 59.64 per cent of the total revenue income. The entire grant amounts are from SFC devolution only.

**Revenue expenditure:** The revenue expenditure of Ilkal CMC has registered declined at a CAGR of 7.66 per cent during the assessment period, just in pace with the growth in revenue income. Revenue expenditure comprises broadly of three categories of expenditure – establishment, operation and maintenance and debt servicing. Ilkal CMC is one of few ULBs, which has provided establishment expenditure department wise.

**General Administration and Tax Collection:** This head comprises expenditure on pay and allowances of elected representatives, salary and other operational expenses related to only general administration, pension and gratuity payouts and provident fund contributions. Expenditure under this head accounts for about 19.66 per cent of the total revenue expenditure during the assessment period.

**O&M Cost of Public Works:** Expenditures under this item head comprise repair and maintenance works on buildings, roads and drains. This head constitutes the second largest cost center for the CMC. Ilkal CMC spends about 13.18 per cent of its total expenditure on public works. Expenditure under this head has registered declined in CAGR of 15 per cent.

**O&M Cost of Water Supply:** Expenditure under this item comprises of regular maintenance of water works. This head accounts for over 11.43 per cent of the total revenue expenditure. Expenditure under this head has declined significantly by 28 per cent during the year 2001-02 to 2002-03 in comparison to the previous year. The CMC had spent on miscellaneous item to an extent of Rs. 10.32 lakhs during the year 2001-02.

**O&M Cost of Solid Waste Management:** Expenditure under this head accounts for about 41 per cent of the revenue expenditure over the assessment period. This head covers expenditure incurred in conservancy operations of the CMC, including salaries of temporary staff and rent and operation and maintenance of a fleet of vehicles for solid waste collection and transportation. The expenditure under this head during the assessment period was grown at an average of three percent.

**O&M Cost of Street Lighting:** Street Lighting accounts for about 3.36 per cent of the revenue expenditure and comprises primarily of expenditure on electricity charges and replacement of lighting fixtures. The expenditure this head has registered a CAGR of 3, due inconsistency in expenditure over the assessment period.

**Other Services and Miscellaneous Expenditure Heads:** Expenditure on other services accounts for about 4 per cent of the revenue expenditure, comprising essentially of expenditure on public safety and fire services, public gardens, markets, education, etc. Expenditure on other services accounts for about 1.47 per cent of the revenue expenditure, comprising essentially of expenditure on education.

**Debt Servicing:** This item head comprises interest payments on external borrowings. According to the financial data provided by the CMC, there has been no debt servicing during the assessment period. In the absence of data regarding borrowings, it is not possible to ascertain whether the municipality is defaulting on debt servicing or whether there is not commitment.

**Key Financial Indicators:** Analyzing CMC's financials provides some key inputs which would form the key parameters of exploring the feasibility of PPP for O&M. Through the analysis it is understood that income from the Non-Tax Sources is only 28.97% of the CMCs Revenue income. About 80 % of the total expenditure is on establishment-related heads, leaving relatively lower amounts for expenditure on operation and maintenance of services. The per Capita Growth Rate of O&M expenses is 3.44%. It is also observed that the CMC is able to collect 46.75 % of the user charges for water supply and 61.33% of the property tax.

Table 7-10: Key Financial Indicator

Indicators		Value	Unit
<b>A</b>	<b>RESOURCE MOBILISATION</b>		
1	Per Capita Income	188.58	Rs. p.a.
2	Sources of Funds		
	a Share of Own Sources - Taxes in Total Revenue Income	7.72	%
	b Share of Own Sources - Non-Tax items in Total Revenue Income	28.97	%
	c Share of Assigned Revenue in Total Revenue Income	3.67	%
	d Share of Revenue Grants in Total Revenue Income	59.64	%
3	Growth in Revenue Income	4.50	% p.a
4	Growth in Own Sources of Revenue Income	3.83	%
<b>B</b>	<b>FUND APPLICATION</b>		
1	Per Capita Expenditure	197.80	Rs. p.a
2	Application of Funds		
	a Share of Establishment Expenditure in Total Revenue Expenditure	69.27	%
	<b>b Share of O&amp;M Expenditure in Total Revenue Expenditure</b>	<b>30.73</b>	<b>%</b>
	c Functional Allocation of Municipal Expenditure	19.66	
	General Administration & Tax Collection	80.34	%

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		Municipal Services	-	%
		Debt Servicing - Interest Payment	75.37	%
	d	Share of Establishment Expenditure to Total Revenue Income	-14.07	%
3		Growth in Establishment Expenditure	6.85	%
4		Growth in O&M Expenditure	-10.98	%
5		Growth in Total Revenue Expenditure	1.06	% p.a
<b>C</b>		<b>PERFORMANCE INDICATORS</b>	0.52	
1		Operating Ratio	1.06	Ratio
2		Growth in Per Capita Own Income	0.52	% p.a
3		Growth in Per Capita Revenue Grant	4.77	% p.a
4		Growth in Per Capita Revenue Income	2.57	% p.a
5		Growth in Per Capita Establishment Expenditure	-13.66	% p.a
<b>6</b>		<b>Growth in Per Capita O&amp;M Expenditure</b>	<b>3.44</b>	<b>% p.a</b>
7		Growth in Per Capita Revenue Expenditure	-10.61	% p.a
9		Capital Utilization Ratio	-	Ratio
<b>D</b>		<b>EFFICIENCY INDICATORS</b>		
1		Tax Collection Performance		
	a	Property Tax	61.33	%
	b	Water Tax	46.75	%
aaaaz	c	Drainage Tax	-	%
2		Cost of Collecting Rs. 1000 of Taxes	-	Rs.
3		Property Tax Demand per Assessment	181.97	Rs. p.a
4		Population per P.T Assessment	8.59	Persons

Source: NKUSIP CLIP Report

## 7.5 Development Initiatives for Ilkal and its region by GoK

### 7.5.1 Proposed land use (2011):

According to the ODP, the Local Planning Authority (LPA) proposes to develop an area of 739.90 Ha of land. Based on the requirements of 2011, the LPA has proposed to develop 357.20 Ha for residential use with a residential density of 100 persons per Ha and most of the development is proposed towards northern side of the town between Gajendragad road and NH-13. In order to decentralise the commercial activities in the central part, LPA has proposed to develop the commercial activities along NH-13 and the retail commercial centres in residential areas.

The proposed land for commercial use is 32.60 Ha. As predominant wind direction is towards east, the development of industrial units is proposed towards east and northeast part of the town. The use under traffic and transportation has been proposed to increase from 80 Ha to 174.60 Ha, which occupies 23.60 % of the proposed area for the development. The proposed areas under public and semi-public, public utilities, parks and playgrounds are 51.0 Ha, 5.90 Ha and 59.70 Ha respectively.

**Table 7-11: Proposed Land use -2011**

Land Use	Area (in Ha)	Distribution (%)
Residential	357.2	48.28



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Land Use	Area (in Ha)	Distribution (%)
Commercial	32.6	4.41
Industrial	58.9	7.96
Recreational	59.7	8.07
Public & Semi-public	51	6.89
Public Utility	5.9	0.8
Circulation	174.6	23.6
<b>Developed Area</b>	<b>739.9</b>	<b>100</b>
Agricultural	45.1	
<b>Total Area</b>	<b>785.00</b>	

Source: NKUSIP CLIP Report

### 7.5.2 Suvarna Karnataka Development Corridor (SKDC) Programme:

The State government in its 2008-09 Budget has identified Bagalkot District for development of food, sugar, steel and cement zone and to promote mega steel, cement and agro based industries and allied infrastructure components in the district (as part of the SKDC programme), which would promote economic development of the region.

### 7.6 NKUSIP PROPOSAL and Investment for Water Supply, Sewerage and Storm Water Drains

GoK, through its North Karnataka Urban Investment Plan (NKUSIP), proposes to improve the Environmental sanitation infrastructure, water supply, urban roads and slum development of Ilkal city. The following are the summary of Urban Water Supply, Sewerage and Drain improvements proposed through NKUSIP.

#### 7.6.1 Summary of NKUSIP Project Interventions

**(i) Water Supply:** Interventions in this sector comprise of provision of additional distribution network for uncovered areas, a water treatment plant of 8.40 MLD capacity, raw water transmission main from Almatti dam to Dhannur head works, intermediate pumping station and additional heads works at Dhannur. Rehabilitation of raw water pumping main, intermediate pumping station and water treatment plant.

**(ii) Sewerage and Sanitation:** Based on water demand, population growth, and town topography, a Waste Stabilization Pond (WSP) system of 7.64 MLD is proposed for sewage treatment with sewer network of 74 km.

**(iii) Flood and Drainage Control:** Given the scanty rainfall in the area and the prevalent condition of roads, the projects proposed under this category include creation of road side drains in addition to improvements of primary and secondary drains.

#### Estimated Cost of Intervention\*

The total cost of water supply and environmental sanitation infrastructure cost is Rs. 444.07 lakh; project costs by sector are elucidated in the following table.

**Table 7-12:** Estimated Cost of High Priority Interventions

Sector	Capital Expenditure (Rs. million)
Water Supply	186.60
Sewerage and Sanitation	257.47

Sector	Capital Expenditure (Rs. million)
Storm Water Drainage	0.00

Source: Revised KUIDFC Investments

\* NOTE: Distribution of revised investments among sewerage & sanitation and Storm water drainage is not available

### 7.6.2 Water Supply

- Under this component, there is an implementing a combined water supply scheme to augment the supply in three ULBs, which includes Ilkal CMC. KUWS & DB will give bulk water of 17.70 MLD.
- Storage capacity in Ilkal area will be enhanced up to 4.80 MLD
- The Construction of additional storage reservoirs will be completed within one year.
- It is proposed to carry out innovative changes in water distribution system. The work will be taken up during third quarter of 2009. This shall bring entire area under 24 x 7 water supply.
- The water supply coverage in Ilkal CMC area will be 95% by gravity
- Replacement of old and energy in-efficient pumping machinery and install capacitors to maintain power factor more than 0.95.
- Up-gradation of Distribution Networks as well as feeder mains in Ilkal CMC area. This will reduce the water losses and will result in minimizing the customer complaints.
- The Entire area including urban and slum area in Ilkal limit will be covered by distribution Network up to 100%. This will fulfill the basic need of water of Urban Poor in Ilkal CMC area.
- Introduction to 100% metering system in Ilkal CMC.
- KUIDFC will introduce Bulk water meters, Commercial water meters, and institutional water meters 100 %. KUIDFC has proposed to shift the existing house connections from the old mains to the new mains with domestic water meters in residential area at their own cost and process of installing water meters in the remaining households will be completed by middle of 2010.
- This will enable the ULB to Provide 24 X 7 water supply for the total city.
- Reduction of unaccounted & non-revenue water will be reduced to within 5%
- Billing system will be fully computerized for full accounting and bills recovery.

As per the DPR it is envisaged to provide 6000 additional connections by 2041 as part of the proposed water supply scheme, so we assume to provide 60% of total connections by 2011 i.e. 3600 connections and an additional cost of Rs.7.92 million is estimated for the same. But this component has to be implemented by the CMC. The proposed water supply component is expected to benefit about 6449 households in Ilkal by 2011.

### 7.6.3 Proposed Sewage Component

Under this component, it is proposed to replace the entire existing sewer system of the CMC with new sewer system. A new Sewage collection system is proposed for whole of the master plan area. Considering the master plan development and availability of adequate fund, it is recommended to implement the project in single phases.

Based on the topography and sewage collection feasibility, the CMC area is divided in to 3 districts. The main components of the sewage collection system includes laying of gravity sewers, laying of pressurized mains, construction of wet well cum pump house including erection and commissioning of pumps, providing backup generator and transformer, construction of operator room, generator room and other utilities. The sewage collection network will be laid at the center of the roads wherever possible. Sewage thus collected from the municipal area is treated in the proposed STP to be located on the north side of the municipal boundary and it is at about 3.00 km from the town boundary. Facultative

Aerated lagoon followed by maturation pond process has been selected for sewage treatment. The STP is proposed to be implemented simultaneously.

**Table 7-13: Household Connections in Sewerage System Component**

Details	Existing (2007)	Projected (2011)
No of household connections	2,573	5,573
%age to total town's households	31.55%	63.2%

As per the DPR, an additional of 5000 connections was envisaged for the year 2041, as part of the proposed Sewerage System. Taking an assumption of providing 60% of total connections by the year 2011 i.e.3000 connections so an additional cost of Rs.7.5 million is estimated for the same. But this component has to be implemented by the CMC. The proposed sewerage component is expected to benefit about 5,573 households in Ilkal by 2011.

#### 7.6.4 Storm Water Drainage Network:

##### Urban Drainage

As per NKUSIP Clip report, under this component, it is proposed to improve the condition of the existing nallah and providing a proper outlet for the storm water drain in the low-lying areas. The total estimated investment required for the improvement is Rs. 12 Million.

The nallahs, passing through the town, need to be cleared of all the blockages and provided with properly designed built up sections at certain strategic locations. The construction may be in cement concrete for the base and stone masonry with cement plaster for the side walls. The estimate provides for the built up section for a total length of about 6.97 Km. the primary drains also need to be de-silted and cleared of the obstructions of trees and weeds.

#### 7.7 O&M and its cost as recommended by NKUSIP

##### 7.7.1 Proposed Improvements in O & M. (water supply)

- Taking into consideration the constraints, it is proposed to improve the O & M operations in stages, so as not to change the current set up and practices drastically, but at the same time bring in discipline and control in O & M operations.
- It is recommended to post following key persons for the operation and maintenance of pumping installations and treatment plants.

**Table 7-14: Proposed O&M team – Water Supply**

Category of Staff	Qualification	Description	Total
Assistant Executive Engineer	B.E (Civil)		1
Assistant Engineer	B.E (Civil)/ Dip		3
Plant Operator	B.Sc (Chemistry)	1 for water treatment plant	1
Pump Operator	ITI (Mech)	1 for each PS	4
Electrician	ITI (Electrical)	1 for each PS	4

Source: NKUSIP CLIP Report

- Providing laboratory set up at the water treatment plants for carrying out daily analysis of raw water turbidity, determination of dose of the coagulant and testing residual chlorine of treated water.
- Providing laboratory set up at the sewage treatment plants for analyzing the parameters like pH, suspended solids and Biochemical Oxygen Demand (BOD) of the influent and effluent.
- Developing training program for the existing unqualified staff to improve the skills in operation and

maintenance of the respective components.

- (d) Preparing O & M plan at the beginning of each year with details about staff, energy consumption, requirement of material such as chemicals and spares, maintenance and repairs, raw water bills and other miscellaneous items.

To calculate the O&M cost of water supply component at Ilkal the existing O&M cost of existing water supply component is projected till 2011-12 @ of 10% per annum (3.44% is the rate of growth of CMC's O&M cost of all urban services between 98-2002, considering that here would be regular increase in salaries and other operational expenses, an optimal growth rate of 10% per annum is considered for projecting the O&M cost.) and the O&M cost due to additional new components is project at @ 3% of the proposed cost of investment estimated as per NKUSIP. Thus the O&M cost is estimated to be Rs. 7.86 million/annum.

### **7.7.2 Proposed Improvements in O & M. (Sewerage System)**

**Table 7-15:** Proposed O&M team – Sewerage System

<b>Description</b>	<b>Number of Posts</b>
Sewage treatment plant operator, with minimum B.Sc. (Biology) qualification	1 at each sewage treatment plant
Team of engineers (civil or mechanical) to be appointed for overall control of sewerage operations	A team consisting of one assistant Executive Engineer assisted by two Assistant Engineers for bigger cities and one Assistant Engineer for smaller cities / towns

Source: NKUSIP CLIP Report

- i. **Approach-** Taking into consideration the constraints as above, it is proposed to improve the O & M operations in stages, so as not to change the current set up and practices drastically, but at the same time bring in discipline and control in O & M operations.
- ii. **Staff-** It is recommended to post following key persons for the operation and maintenance of pumping installations and treatment plants.
- iii. Providing laboratory set up at the sewage treatment plants for analyzing the parameters like pH, suspended solids and Biochemical Oxygen Demand (BOD) of the influent and effluent.
- iv. Developing training programs for the existing unqualified staff to improve the skills in operation and maintenance of the respective components.
- v. Preparing O & M plan at the beginning of each year with details about staff, energy consumption, requirement of material such as chemicals and spares, maintenance and repairs, raw water bills and other miscellaneous items.

**O & M Expenditure.** Expenditure on various items of O & M is estimated at Rs. 7.11 million per year. To calculate the O&M cost of sewage component at Ilkal, the existing O&M cost of existing sewage component is project till 2011-12 @ of 10% per annum (3.44% is the rate of growth of CMC's O&M cost of all urban services between 98-2002, considering that here would be regular increase in salaries and other operational expenses, an optimal growth rate of 10% per annum is considered for projecting the O&M cost)and the O&M cost due to additional new components is project at @ 2% of the proposed cost of investment estimated as per NKUSIP.

## 7.8 Need for Private Partnership in O&M of Municipal services in Ilkal

### Water Supply

Ilkal town is a fast growing city where potable water is an essential component for its growth. Water scarcity in most of the area is common scenario in Ilkal CMC area. The management of water supply is also very difficult and strenuous task. Low water pressure or inadequate water supply was a cause of concern in certain areas. Old, Rusty and Leaking distribution network and feeder main at various places. Water Metering System is also non-existent which has resulted in high rate of Unaccounted For Water (UFW). This has also resulted in a low average tariff level of Rs.1.36/kl. Private sector participation in O&M is expected to bring in skilled, trained and attentive work force and latest technology through which it is expected to reduce the water losses due to leakages and pilferage during transmission and distribution. Thus the UFW water can be reduced to 25 to 30%, which would increase the quantity of supply by 20 to 25%. It can also improve the efficiency level of O&M of treatment plants, thus reducing the water loss and also optimizing the uses of chemical and consumption of power. Case studies illustrate that through private sector participation the O&M costs can be reduced by 10 to 20%.

### Sewerage & Drainage System

In the absence of complete sewerage system, the domestic wastewater flows through the roadside drains into the nallahs and pollutes the water-courses. The wash water generated from granite and dyeing industries is highly corrosive in nature, flows through open drains polluting the downstream water bodies. Maintenance of Sewerage system (designed more than 30 years back) is not a matter of prime concern for Ilkal CMC's O&M services. So, if the same system of O&M is continued, the environmental sanitation conditions in the town will continue to deteriorate as population density increases. Private sector participation of O&M of sewerage system and storm water drains with dedicated work force and organized operation schedule would improve the environmental sanitation conditions of the city.

## 7.9 CMC Preliminary Financial Analysis:

Based on the information collected, collated and analyzed regarding, existing scenario of urban water supply, sewerage and storm water drains of the CMC, its O&M system and CMC's revenue income and expenditure, a preliminary financial analysis is carried out in order to explore the viability of PPP in O&M of water supply, sewerage and Storm water drainages starting from the year 2011-2012. The following are the key assumptions considered for preliminary financial analysis:

### 7.9.1 Commencement of O&M operations:

Ilkal is among the cities identified under second tranche of funding and the preparation of DPR documents and other tender related procedures for establishment of additional assets & improvement of urban water supply and sewerage systems is currently under process. As part of the key assumptions, it is assumed that the assets would be established within a time span of two years and it is assumed that the O&M of the urban services would commence by 2011-12.

### 7.9.2 Demography:

Ilkal population is expected to reach 62623 by 2011. Presently Ilkal has 11,269 house hold properties and 656 Non-domestic/commercial properties.



### 7.9.3 Number of Service Connections:

**Water Supply:** The number of House Service Connection (HSC) is expected to cover a total of 6,262 by 2011 including the additional 3,600 connections proposed through NKUSIP project. Since, there is no information available on the proposed additional number of non-domestic/commercial connections, it is assumed that by 2011 the direct service connections would cover 100% of the existing number of non-domestic/commercial properties of 656.

**Sewage:** The total number of HSC is expected to be 5,573 by 2011 and the same is considered for the analysis. As there is no information available on service connections to Non-domestic /Commercial and industrial properties, these are not considered for the preliminary analysis.

### 7.9.4 Tariff & Collection efficiency:

Existing water tariff of Rs.55/- , Rs.90/- and Rs.180/- per month for domestic, Non-domestic/ Commercial and Industrial connections respectively as recommended by GoK is assumed without any revisions for the year 2011-12 and is expected to remain same for the next 5 years (till 2015-16). An increase of 30% on the existing tariff is assumed from year 2016-17. Further, it is assumed that there would not be any tariff for water consumed through Public Stand Post. For sewage connections, existing tariff is Rs.180 per year and there would not be any charges collected for O&M of drains.

Collection efficiency of Ilkal CMC for water tariff is 46.8% and property tax is 61.3%. Existing collection efficiency of 46.8% is assumed for the analysis.

**Table 7-16: Key Assumption & Parameters for Preliminary Financial Analysis**

Key Parameters	Existing (2008)	Proposed Additional (2011)	Total
Total Population	58,180	4443	62623
Total House Hold Properties	11269		
Total Commercial Properties	656		
<b>Water Supply</b>			
Total House Service Connections (No. of Connections)	2,662	3600	6262
Population to be covered by HSC ( No.)	19,580	25000	44580
Non domestic (No. of Connections)	187		
Commercial/Industrial Connections(No. of Connections)	-		
Tariff for Domestic/Household (Rs/Household)	55.00		
Tariff for Non-Domestic/ Commercial(Rs/Connection)	90.00		
Tariff for Industrial (Rs/Household)	180.00		
Water Supply New Connection Charge- Domestic (one time)	1200.00		
Water Supply New Connection Charge- Non Domestic (one time)	1200.00		
Collection Performance-% of HSC(water charges)	46.8%		
Collection Performance - % of (Property Tax)	61.3%		
<b>Sewage</b>			

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Key Parameters	Existing (2008)	Proposed Additional (2011)	Total
Total House Service Connections (HSC)	2573.00	3,000	5,573
Population to be covered by HSC	15000.00	12,000	
Tariff for Domestic ( assumption- 10% of water tariff)	15.00		
Tariff for Non-Domestic( assumption- 10% of water tariff)	15.00		
Sewage New Connection Charge (one time)	500.00		

### 7.9.5 O&M expenditure:

The O&M Cost of water supply amounts to Rs.1.06 million per annum considering that the cost of O&M for water supply accounts to be 11.4% of the total revenue expenditures of the CMC. This cost is projected at the rate of 10% till 2011-12 (3.44% is the rate of growth of the CMC's O&M cost of all urban services between 1998-2002 but considering that a rate of 3.44% is relatively low and there would be regular increase in salaries and other operational expenses, an optimal growth rate of 10% per annum is considered for projecting the O&M cost.). Thus the O&M cost of existing water supply components is estimated to be Rs.2.26 million for the year 2011-12.

Based on case studies, the O&M cost for water supply due to additional connections & improvements is assumed to be 3% of the total capital cost estimated for water supply component under NKUSIP project i.e. an additional cost of Rs.5.60 million per annum. Based on the above computations the total O&M cost for water supply for the year 2011-12 is estimated to be Rs. 7.86 million.

**Table 7-17: Assumptions for O&M Expenditure**

Sector	O&M as % of capital cost
Water Supply	3.00
Sewerage & Sanitation	2.00
Storm water Drain	1.00

The O&M Cost of sewerage & drainage system accounts to Rs.0.91 million per annum considering that the cost of O&M for water supply accounts to be 9.9% of the total revenue expenditures of the CMC. This cost is projected at the rate of 10 % (3.44% is the rate of growth of CMC's O&M cost of all urban services between 1998-2002, considering that here would be regular increase in salaries and other operational expenses, an optimal growth rate of 10% per annum is considered for projecting the O&M cost.) till 2011-12. Thus the O&M cost of existing sewerage components is estimated to be Rs.1.96 million for the year 2011-12.

The O&M cost was also estimated by assuming 2% of the estimated capital cost of investment planned for the sewerage components of Ilkal through NKUSIP, which is around Rs. 5.15 million per annum and the same is assumed for the preliminary analysis. Based on the above computations the total O&M cost for sewerage & drainage system for the year 2011-12 is estimated to be Rs. 7.11 million.

### 7.9.6 Expenses of O&M operator:

As provision of HSC connections would be CMCs responsibility and is not factored under NKUSIP project, provision of HSC connections (Water Supply & Sewage) is factored as part of the O&M. Therefore, the operator has to invest in the provision of 3,600 & 3,000 new House Service Connections for both water supply and sewage, which is estimated to cost Rs. 15.42 million (@ of Rs.2,200/- per connection for



water supply and Rs.2,500/- for sewage connection)

**Table 7-18: Cost of Provision of New House Service Connections**

	<b>New Infrastructure</b>	<b>Proposed No. of Connections</b>		<b>Unit Cost as per consultant's inputs in Rs.</b>	<b>Total Investment in Rs. million</b>
1.	Water Supply - House Service Connection	3,600	Nos	2200	7.92
2.	Sewage - House Service Connection Cost	3,000	Nos	2500	7.5
<b>Total</b>					<b>15.42</b>

Source: NKUSIP CLIP Report

Apart from the above-mentioned O&M expenses, a private O&M operator would have its initial investment like procurement of equipments for maintenance, communication instruments and vehicles for transportation to carry out the O&M operations and is estimated to be around Rs.1.00 million and monthly office administrative expenses like rentals of office space, salary of administrative office staff and other office over heads is estimated to Rs. 0.69 million per annum.

**Table 7-19: Administrative Expenses of the O&M Operator**

<b>Office expenditure of the O&amp;M Operator</b>	<b>Rs. Per Month</b>	<b>Rs. Million per annum</b>
Rentals/month	10000.00	<b>0.12</b>
Increment in office rentals		5%
<b>Office Staff Salary and Overheads</b>		
Salary of Manager	15000.00	0.18
Salary of Office technical Assistant	7500.00	0.09
Accounts officer	10000.00	0.12
Office Attender	5000.00	0.06
Overheads	20000.00	0.24
<b>Total</b>		<b>0.69</b>
Increment in salaries 10%		10%

### 7.9.7 Other Assumptions:

It is assumed that the cost due to depreciation of assets would be at the rate of 0.02% (CPEEHO) of the total estimated O&M expenditure per annum.

### 7.9.8 O&M Revenue Income:

As discussed earlier, the revenue income from water supply & sewerage are assumed only from the properties with HSC and based on the existing tariff rates of GoK. As provision of new HSC connections would be part of the O&M services. The existing new water supply connection charges of Rs.1200 (Per Domestic Connection) & Rs.1200 (per Commercial Connection) and new sewage connection charge of Rs.500 per connection would also be considered as part of the Revenue income of the operator.

### 7.10 Financial Viability for PPP mode of O&M for Ilkal CMC:

The preliminary financial analysis carried out based on the above-mentioned key assumption illustrates that the O&M expenditure for the year 2011-12 would be around Rs. 15.27 million and the Operator has to invest around Rs.15.42 million to provide 3,600 & 3,000 new HSC each for water supply & Sewage respectively. Thus, the total expense of the first year (2011-12) of operation is estimated around Rs.32.50 million. The revenue income through tariff collection (assuming 46.8 % collection efficiency) for

the same years would be only Rs.1.37 million as the income from the additional new connections would start only from the second year. Thus, there is a deficit of Rs.31.13 million for the year 2011-12.

During the second year of operations, the operator would get Rs.5.82 million as income from the new connection charges and additional income from water & sewage tariffs from the 3,600 & 3,000 new connections, thus increasing the revenue income to Rs.5.45 million (assuming 46.8% collection efficiency), with a deficit of Rs. 12.23 million. The revenues for 3<sup>rd</sup>, 4<sup>th</sup> & 5<sup>th</sup> year would remain constant with Rs. 2.73 million with a deficit of Rs.16.71, Rs.18.65 & Rs.20.78 million respectively.

The outcome of the preliminary financial analysis indicates that a PPP mode for O&M of water supply, sewerage and Storm water drains at existing tariff levels is not financially viable for Ilkal CMC. However, with tariff rationalization and support from GoK in terms of annuity payments, O&M of water supply, sewerage and storm water drainage systems on PPP basis can be considered.

#### **7.10.1 Assumptions for Viability:**

The preliminary financial analysis also indicates that a 30% increase in the revenue income by increase in tariff rates by 2011-12 and achieving 100% collection efficiency will lower the expected deficits. Further, private participation is expected to bring down the overall O&M cost through efficient handling of the system and it is assumed that a PPP mode would reduce the O&M cost at least by 10% of the existing or estimated cost. This would further improve the cash flows.

#### **7.10.2 Revenue from reuse of STP water:**

The prime objective of the pre-feasibility is to explore a PPP mode for O&M of water supply, sewerage and drainage as one package. Therefore, to make the project viable under PPP mode, revenue income from sale of treated water from STP is also explored. It is estimated that the proposed STP would release 6.93 MLD (assuming 80% of the proposed STP Capacity of 8.66MLD) of treated water every day. As part of the O&M, the private operator has to maintain and operate the STP; therefore CMC, as a part of the PPP agreement can provide the rights over the treated water from the STP to the private operator. This would facilitate the operator to generate income by sale of the treated water to industrial areas, construction industries, landscape maintenance and for other non-domestic consumptions. The Bellary example indicates that treated water is sold at Rs.20/ Kilo liter; however, a nominal rate of Rs.5/- per Kilo liter of treated water is assumed for projections at Ilkal. Thus, the income which can be generated by sale of Treated water would be around Rs.12.64 million per annum. Ilkal being an industrial city, the demand for treated water should not be an issue and a detailed study shall be carried out as a part of a detailed feasibility study to understand the demand and viable rates for treated water.

Assuming 75% realization, the operator can generate Rs 9.5 million /annum. This additional income would further help in reducing the deficits.

#### **7.11 Recommendations to make a PPP of O&M viable in Ilkal CMC:**

The following are some of the recommendations which might make a PPP mode viable:

1. Improving collection efficiency to 100% by Introducing metered tariff collection for all consumer categories
2. Increasing the existing sewerage charges of water charges or introducing meter tariff collection
3. Increasing the existing sewerage charges

The CMC has to carry out the above-mentioned recommendations in order to make the O&M cost of

urban services self sustainable. Especially in water supply the current tariff of Rs. 55 per month for a average monthly consumption of 13.87 kl (assuming 89.5lpcd and average house hold size of 5.2) accounts to a very low tariff rate of Rs. 3.97/kl. But it is also observed through secondary data collection that each HSC serves to more than one household and therefore the average consumption level per HSC is around 40.50 kl per month against 13.87 kl considered for estimation, therefore the actual tariff collection is only Rs.1.36/kl. Considering these facts, it is recommended to carry out the above mentioned measures in order to make the CMC's O&M component financially self sustainable, which would also improve the viability for a PPP mode.

## 7.12 Project Structure & Way Forward:

### 7.12.1 Alternative Options/Performance Based Management Contract (PBMC)

With existing tariff structures, O&M of water supply on PPP basis in Ilkal CMC doesn't seem to be viable so an alternative option **for carrying out O&M of water supply is through Performance Based Management Contract (PBMC)**.The following can be considered as the prime components of Project structure.

O&M can be carried out through other PPP & PSP modes, through a combination of the following measures:

- Financial support from CMCs/Govt. of Karnataka by means of Annuity payments
- Phased increase in water and sewerage tariff across all consumer categories
- Introduction of meter based tariff rates
- PSP for O&M of systems can also be explored through Management Contract model
- The O&M contract shall be structured factoring in performance based incentives and penalties and lowest Annuity payment basis from CMC/GoK (i.e. PBMC)
- Term of a PBMC contract including installation of HSC can be for a maximum period of 5 years including the HSC installation period.
- Installation of HSC shall be completed within 1 year.
- The contract can be structured based on annuity payment and the annuity amount shall be arrived based on the actual O&M expenses The O&M expenses quoted can be the first bid parameter, with a weightage of 70%.
- Price quote for installation of the HSC shall be the second bid parameter, with a weightage of 30%.
- The bidder shall be selected based on the lowest overall evaluated bid after taking into account the first and second Bid Parameters, as per their respective weightages mentioned above.
- The following Key Performance Indicators (KPI) may be considered to monitor the performance of the O&M contractor:
  - a. **Quality of water distributed to the consumers**  
Achieving the best drinking water quality as recommended by WHO/CPEEHO standards can earn the O&M operator a bonus of up to 5% of the Fixed annuity

amount. On the other hand, a penalty of 5% for water quality supplied below the recommended quality standards can be levied.

**b. Reduction in the overall UFW**

A reduction up to 25% within the second year of operation can earn the operator a bonus of 10% and reduction of up to 20% would provide a bonus of 15%. If the UFW is not reduced to 30% then the operator would face a penalty up to 10%.

**c. Quantity and quality of the treated water from STP**

Treated STP water with a quantity of at least 80% of the installed STP capacity and with a water quality of BOD level less than 12 can earn the operator a bonus of another 5%. A BOD level above 15 can face a 5% penalty.

**d. Minimizing system-downtime**

Minimizing system-downtime and time for repairs & maintenance with minimal impact on water supply timings, duration, quantity and quality of supply & treatment assessed as per consumer feedback would provide the operator an additional bonus of 5%

**e. An overall reduction in the O&M cost**

An overall reduction in the O&M cost of the existing infrastructure components/network of water supply, sewage and storm water drains up to 10% (especially reduction in consumption of electricity) can earn the operator a bonus of 5% of the quoted annuity amount. An increase in O&M cost exceeding 10% and above can have a penalty of 5%.

- Thus the operator can achieve an additional bonus of 35% per annum based on his performance. Consistent performance by achieving 30% bonus and above for 2 consecutive year shall provide an additional bonus of 10% at the end of the term. Further the bonus payment shall be paid only at the end of the 3<sup>rd</sup> year and the 5<sup>th</sup> year. But the penalty if any shall be deducted every year.
- The annuity payment would start from the second year.
- CMC shall appoint an independent engineer to monitor the Performance indicators of the contract.

*The above-mentioned Key Performance Indicators (KPI), incentives & penalty clauses are indicative and the exact quantification of the indicators can be determined only through a detailed audit and assessment of the services and its components and also through a detailed financial analysis as part of a detailed project report preparation.*

**Initiatives Required from CMC/GoK:**

- CMC should carry out an audit of the existing assets of the water supply, sewage and storm water components/infrastructure which would be leased to the O&M operator, in order to provide details of the existing components and the status of the assets.
- CMC should enforce stringent regulations to curb illegal and unauthorized supply of water

within the CMC limits and also implement norms which would restrict and regulate the number of bore holes/bore wells permitted within certain surface area limits or within a ward.

- CMC also should implement norms restricting the use of potable water for construction activities and landscape uses.
- CMC should appoint an Independent Engineer for frequent Monitoring of the KPI of the agreement.

## 8 Summary of Recommendations & Way-forward for 6 CMCs:

The existing water supply & sanitation networks/components are being augmented/upgraded and new assets are added under the NKUSIP. It is expected that these improvement/up gradation works & establishment of new assets would be completed by 2011-12.

On expansion/improvement of the network, there is need for investment to provide House Service Connections (HSC) and an operator for O&M of the system ( existing and proposed).

The pre-feasibility study explored the possibility of carrying out O&M of the urban services (water supply, sewerage & storm water drains) as a single package including provision of new HSCs for Hospet, Raichur, Davanagere, Bidar, Gadag- Betageri and Ilkal. The following are the summary of the recommendations & way-forward based on the pre-feasibility study:

### 1. Hospet & Bidar :

**Recommendation:** O&M of the urban services (water supply and sewerage) including provision of independent new HSCs is **viable under PPP mode** by providing rights on the sale of treated water from STP to the private operator.

#### **Way- Forward:**

- i. A detailed **TFR (Techno-Commercial Feasibility Report)** shall be carried in order to explore the demand for treated water, detailed project structuring, business plan, details of PPP mode & framing of KPIs and MDOs.
- ii. **Bid-Process management** shall be carried out to prepare the RFP document, preparing the project Lease Agreement, Inviting tenders, project marketing, Bid Evaluation & selection of successful Private Operator through transparent process.

### 2. Raichur, Davanagere, Gadag- Betageri & Ilkal:

**Recommendation:** O&M of the urban services (water supply and sewerage) including provision of independent new HSCs is **not self-sustainable under PPP** mode (even after considering the sale of STP water) and **shall be implemented through PBMC**.

#### **Way- Forward:**

- i. A detailed **TFR (Techno-Commercial Feasibility Report)** in order to frame a detailed Contract structure, KPIs, MDOs, structure of Incentives & Penalties.
- ii. **Bid-Process management** shall be carried out to prepare the RFP document, preparing the Management Contract Agreement, Inviting tenders, project marketing, Bid Evaluation & selection of successful Private Operator through transparent process.



## Annexure – 1: Case Studies

The GoI defines a **Public Private Partnership (PPP) Project** as "a project based on a contract or concession agreement, between a Government or statutory entity on the one side and a private sector company on the other side, for delivering an infrastructure service on payment of user charges" (Government of India, Undated).<sup>5</sup>

### Public Private Partnerships – Case Studies

#### **1. Tiruppur Water Supply and Sewerage Project ( operational since 2005)- First water supply project in the Public Private Partnership framework**

New Tiruppur Area Development Corporation Limited (**NTADCL**) was established as a special purpose vehicle for development and implementation of the Tiruppur Water Supply and Sewerage Project. The three partners, The Tamil Nadu Corporation for Industrial Infrastructure Development (**TACID**), Tiruppur Exporters Association (**TEA**) and Infrastructure Leasing and Financial Services (**IL&FS**), together designed the Tiruppur Area Development Project (**TADP**) as a public-private partnership, with technical assistance from the Indo-US Financial Institutions Reform and Expansion (**FIRE**) Project. The NTADCL contracted out the construction and maintenance of the system to Mahindra Consortium (**Mahindra & Mahindra, United International, North West Water, and Bechtel**) on Build, Operate and Transfer (**BOT**) basis.

Under the project; facilities have been constructed to extract, treat and supply 185 Million Liters of Water per Day (MLD) from the river Cauvery. Water is being supplied to the dyeing and bleaching industries and domestic consumers in Tiruppur Local Planning Area (**TLPA**), which comprises of the Tiruppur Municipality (TM), 14 villages Panchayats and 2 Town Panchayats. In addition to TLPA, water is also to be supplied to five rural settlements which lie enroute on the water transmission system corridor (collectively called the "Service Area") The project also includes construction of a sewerage system for covering over 60 per cent of Tiruppur Municipality and onsite sanitation facilities for slums within Tiruppur Municipality (TM).

#### **Project Structure**

The total cost of the project was Rs. 1,023 crores (US \$ 220million); with a concession period of 30 years. Project funding was a mixture of debt and equity, an approach which involved a number of sources including public money, various commercial interests, financial institutions and international funding agencies. The financing structure is as follows:

Equity: Rs. 322.7 Crores (US \$ 69 million); senior Debt Rs. 613.8 crores (US \$ 132 million); subordinate debt: Rs. 86.5 Crores (US \$ 18 million). The total amount of Rs. 1023 Crores (US \$ 220 million): EPC Cost – 650 crores, owners cost – 127 crores, contingency cost – 93 crores, interest during construction – 142 crores and initial working capital – 11 crores. The project cost is to be financed through a debt: equity ratio of 1.5:1 viz Equity - 322.70 Crores, Subordinate Debt - 86.50 Crores, Debt - 613.80 Crores. Assistance came from the Infrastructure Leasing and Financial Services (IL&FS) and from the US Agency for International

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<sup>5</sup> [www.pppinindia.com/pdf/PPPGuidelines.pdf](http://www.pppinindia.com/pdf/PPPGuidelines.pdf)



Development (USAID) with loan guarantees over 30 years for \$ 25 million (US). The World Bank provided a line of credit to IL & FS and the ADB through its private arm ADIQUA Holdings has a 27 % stake in the project.

This is the first water project in India to be funded on a Project Finance, non-recourse basis. It also leverages State support by 19 times {Rs.55 crores of state financing helps raise over Rs.1, 000 crores for the project}.

Investments in the water supply and sewerage systems are proposed to be recovered through a composite water charge. The pricing of water supply to industry was determined on the basis of its opportunity cost, considering the rates paid to private tankers. Therefore, NTADCL charges differing prices for water used for domestic purpose and water used for industrial use. The charges are Rs. 3 per kilolitre (KL) for villages, Rs. 5 per KL for domestic use in the Tiruppur Municipality and Rs. 35 per KL for industrial and commercial consumers.

The project not only benefitted the domestic consumer's with better health & hygiene conditions for households, Free-up waiting time (in particular for women for water collection from tankers), in providing dignity of life (particularly for women through private in-house sanitation) ; but also helped in industrial growth by positioning Tamil Nadu as the premier location for textile (knitwear export) industry. It has also enhanced the opportunities for employment in the service area.

Treatment and reuse of waste water for industrial purposes has also helped in protecting groundwater exploitation, which can be then used for agricultural growth, productivity and development.

## 2. Mysore Water Supply<sup>6</sup>

A six-year Performance Based Water Management Contract for Mysore city was signed between Jamshedpur Utilities & Services Company Limited (**JUSCO**), Karnataka Urban Water Supply and Drainage Board (**KUWSDB**) and Mysore City Corporation (**MCC**) for "*Remodeling of Water Supply Distribution Network and Providing Integrated Management System at Mysore city under Jawaharlal Nehru National Urban Renewal Mission( JNNURM)*" in the year 2008.

The total project cost is **Rs. 162 Crores**, out of which 80% would be funded by Govt. of India, 10% by Govt. of Karnataka and remaining 10% by MCC.

The Project covers an area of 85 Sq. km. providing 1, 50,000 water supply connections. It includes remodeling of 1300 Km of water supply network to make it compatible for 24 X 7 pressurized systems, through advanced network modeling technology. The project also comprises of Operation and Maintenance of Water Distribution of Mysore city with capacity of 142 MLD, 6 Master Balancing Reservoirs and 34 overhead reservoirs spread across the city. It aims at overall customer complaint and billing & collection management for Mysore city and also Capacity building of all existing MCC employees on various advanced network management practices.

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<sup>6</sup> <http://www.indiawaterportal.org/blog/2009/05/26/jusco-debate/>



JUSCO will manage and maintain the supply system for six years for which it will be paid **Rs 16.2 crores** annually. The agreement will benefit the MCC as well the citizens, some of the benefits are as listed below:

- It will regularize the present water supply with day-long supply.
- There will be increase in MCC revenues and decrease in O&M costs. Presently, MCC is spending around Rs. 30 crores per annum for maintenance of water supply in the city while its revenue is only Rs 18 crores per annum, with the monthly collection of water charges standing at Rs 1.5 crores. Of this amount, 10 per cent was paid to the KUWS&DB. As JUSCO will be paid Rs. 16.2 crores annually for maintenance, it will result in considerable savings for the MCC. The 50% reduction in operating costs can be achieved as a result of acting on unauthorized connections, acting on non-revenue water and reducing leakages.
- Will regularize unauthorized and non-metered connections (which number around 1.3 lakhs) improve mobilization of water charges, with JUSCO issuing computerized bills every month.
- It will install 1.3 lakhs meters to monitor all the non-metered connections in the city.
- There would be no increase in the water rates and the present staff would continue. The MCC itself would make payment of salaries to the water supply staff. JUSCO will only supervise the personnel.

For creating an Integrated Management Information System for the water supply, doing all the work required making the present intermittent non-pressurized water supply system into a continuous pressurized 24x7 water supply system and maintaining the system for 6 years JUSCO will get a fixed compensation of Rs.162 crores. Other than the bonuses it will get for reaching performance targets earlier, it will not get any other money. JUSCO is being pitched as a partner in modernizing the water supply than privatizing it.

### **3. Nagpur Water Supply (2008)**

Nagpur has a population of over 25 lakhs spread across 217 sq. km. The total water supply of the city is over 500 MLD per day with 225,000 connections and 2,100 km of pipeline network. As per the proposal floated by the Nagpur Municipal Corporation (**NMC**), it will grant 25years exclusive rights of operating of water supply services to the selected bidder, including collection of water charges on behalf of the civic body and retain an operator's fee in proportion of the quantum of water supplied and sold. The operator's fee is intended to cover eligible expenditure incurred by the operator for running the project.<sup>7</sup>

Before implementing the above project the NMC had outsourced water distribution network in Dharampeth zone where the PPP model is being implemented on a pilot basis. It is being proposed to extend the model to the entire city.<sup>8</sup> A five-year pilot project for distribution of water, bill collection, operation and maintenance works has been awarded to the Veolia Water (India) Pvt Ltd with an aim to provide 24X7 supply to residents of the zone.

The project was awarded to Veolia Water (India) under the JNNURM. Under the project, all the components of the water treatment cycle within the plant were repaired, and an additional coagulation based water-clarifying unit was installed using patented technology of Veolia Water

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<sup>7</sup> PPP in Water Sector ,Nagpur –Experience; Aseem Gupta,IAS,Commissioner, Nagpur

<sup>8</sup> <http://www.indiainfrastructure.com/news/sub/uwsn.pdf>

(India). This ensured a higher quality of treated water. Further, the energy costs have been reduced by about 30 per cent.<sup>9</sup> Under the contract, Veolia Water (India) was also responsible for the operations and maintenance (O&M) of the plant and machinery for a period of five years, for which NMC would pay a fee. To incentivize maximum efficiency, the performance based management contract includes bonus and penalties, for exceeding or missing the decided level of water production respectively. To ensure efficiency in power consumption, the contract specifies penalties for excessive electricity usage. With such incentives, the private operator puts in efforts to ensure optimal utilization of the plant.

Today, Nagpur has been able to demonstrate the benefits of an asset maintenance approach in contrast to the traditional asset creation approach, in terms of saving costs, increasing water supply and enhancing efficiencies.

#### 4. *Privatizing the Operation and Maintenance of Urban Water Supply: The Experience of Ajmer, Rajasthan, India*<sup>10</sup> (1998)

The Public Health Engineering Department (PHED) in Ajmer, Rajasthan, has privatized the operation and maintenance of the filtration plant, pipelines and pumping stations of the new water supply scheme from Bisalpur Dam. This has reduced labor management problems, decreased time taken for repairs and resulted in substantial savings in the operation and maintenance cost for the PHED. Consumers were also benefited from a better maintained and more reliable drinking water service.

The new Bisalpur Dam scheme on the river Banas supplies water to 6 towns in Ajmer district, namely, Ajmer, Beawar, Kishangarh, Nasirabad, Kekri and Sarwar, through 112 kilometers (km) of pre-stressed cement concrete (PSCC) pipelines and 5 pumping stations. The table below provides an insight on the savings on the O&M cost which was achieved by privatizing the O&M operations in Bisalpur.

Comparative Costs and Savings of the O&M of ( in million Rupees @ 1998 prices ) Water Supply			
O&M of water supply	Costs if done by the	Costs if done by	% saving over
Pipelines (112 km)	10.00	3.00	70
Pumping Stations (5)	11.20	8.30	26
Filtration Plant (1)	1.50	1.50	—
<b>Total</b>	<b>22.70</b>	<b>12.80</b>	<b>44</b>

Source: The office of the Superintending Engineer, PHED, Ajmer, Rajasthan. Note: 1 Alternate cost calculated from costs incurred in the existing pump-houses and pipelines. 2 Comparative costs for the filtration plant are not available since there is no other similar plant in the State.

All the stakeholder groups (the Consumers, Private Contractors and PHED of the State Government) have been benefited from the contracting system.

The consumers not only enjoy the additional availability of water following the commissioning of the new project, but were also benefitted by immediate response on repair works, redressing mechanism and minimized disrupted supplies. According to the PHED, the average time taken to

<sup>9</sup> Asset Maintenance, Initiative by Nagpur Municipal Corporation; India Infrastructure Volume 11; February 2009

<sup>10</sup> Privatizing the Operation and Maintenance of Urban Water Supply: The Experience of Ajmer, Rajasthan, India, SPI Series: 1; Department for International Development

repair leaks and bursts in the pipeline has come down from 60-72 hours to 24-30 hours.

**Private contractors**, who were earlier engaged mostly in construction work, have found a new avenue for diversification of their business and also to make profits. The contractors are paid 20 per cent of the total cost of spares and repairs as overheads and margins.

**The State Government** is pleased that the drinking water supply is better managed, there are monetary savings due to increased efficiency in service delivery, and also there is consumer satisfaction.

**The PHED** has benefited in several ways, largely because of the system of incentives and penalties being put in place, which increases the efficiency of the private contractors. The major benefits enjoyed by the PHED are:

- Managing privately contracted staff is much easier since such staff is accountable for inefficiency, negligence and absence. The PHED also does not have to directly deal with labor union protests and strikes.
- Maintenance is now carried out on a preventive basis rather than on a 'breakdown' basis, which reduces the frequency and duration of interruptions in the service.
- Private contracting has reduced the average time taken to repair bursts and leaks in the pipeline, which reduces consumer complaints and dissatisfaction, as well as the O&M costs.
- Contracted work is cheaper than work done by the Government and is getting cheaper every year. The annual savings to the PHED from contracting out the O&M of water supply from the Bisalpur Dam are presented in the above table above. The savings on pipeline and pumping stations maintenance are rising because bids are becoming cheaper over time, as firms become more efficient and learn that preventive maintenance is more cost-effective.

### Inference

The above-referred case studies illustrate various modes of Private Sector Participation (PSP) and possibilities of PPP in water supply and sanitation projects especially in O&M. The Tiruppur Water Supply and Sewage project illustrates the viability of a PPP mode of implementing Water Supply & Sanitation projects including asset establishment and O&M for a period of 30 years. The case studies and other on-going project in the country illustrate the advantages and value additions a private player can bring in O&M of water supply and sanitation.

The following are some of the advantages /benefits through a private player in O&M of water supply & sanitation:

- Increase in the efficiency of service delivery through structured O&M process.
- Application of latest technology & system in O&M.
- Reduction in unaccounted water loses, therefore increase in water supply duration & subsequently increase in per capita supply.
- Reduction in O&M costs in terms of power consumption, chemical usage etc., therefore reducing ULB's O&M cost.
- Improvement in water quality.
- Immediate & timely complaint redressing mechanism
- Increase in consumer satisfaction.

Inspite of the above-mentioned advantages, there are number of the disadvantages, limitation and concerns which needs to be addressed, in facilitate private participation.

- Urban Services like water supply, sanitation etc. are considered as primary urban services of the

ULBs, therefore privatizing these components is a sensitive issue. This situation in some cities/towns would directly impact the direct cost recovery from service charges/tariffs.

- Privatised O&M system also requires strict performance indicators and monitoring mechanism which would avoid private operators to cut cost in terms of using inferior quality materials, repairs and services.
- In general private players/operators would prefer to bring their own skilled work forces/Human resources in order to carry out a O&M services which would provide them better control and monitoring mechanism. This would directly affect the ULB's work force which is currently executing the O&M. It won't be a major issue if the ULBs can utilize the existing work force/human resources by employing them in other departments, otherwise it would be major concern for the ULBs & the private operator.
- Private sector participation in water supply, particularly in the O&M, is very limited in India. Most of the private firms bidding for these contracts are large construction firms willing to diversify. The number of such firms with relevant experience, infrastructure, manpower and access to credit is small. One consequence of the small number of firms bidding for the contract is an increased risk of collusion among these firms.

Thus, taking into account both advantages and limitations of the PPP in O&M of water supply schemes and after giving each a due consideration, a need is felt to introduce some extra efforts to make the system flawless. Thus in this attempt, some improvements are thought of, which should come into and help in the cause, some of them are listed below:

- The State-level agency responsible for the entire water supply system can successfully assume a new role, which is from a monopolistic provider to supervisor of a number of private sector operators.
- There should be proper supervising and strict quality control over the contractors.
- A system has to be designed, which minimizes/eliminates the adoption of malpractices and keeps a strict vigilance on the contractor.
- A third party control (both contractual and supervisory) should be impinged to improve the quality and avoid disputes.
- There should be a regular improvement in the contracting procedures providing a dispute free and shutting of the loopholes in the present system, which also help in continuous alleviation in the contracting design
- A well-designed contract with clearly defined responsibilities of the Government and private sector partners and a performance-linked system of payments and penalties is essential for the success of a public-private partnership.

Given the advantages of this system, this is clearly one way to improve urban water supply in India. Using the contracting method would, however, require a careful scrutiny of the ground realities, an assessment of the nature and size of the market, availability of private sector operators and, of course, willingness of the Government agencies to privatize water supply.

## Annexure – 2: North Karnataka Urban Sector Investment Programme

### NKUSIP Project

The primary objective of NKUSIP is to promote economic development in North Karnataka through urban infrastructure provision, focusing on environmental sanitation improvement. The total investment in each city varies, depending on the level of current basic needs, the city's affordability, and the assessed implementation capacity of the city or its agencies. Overall, project component selection is influenced by affordability and implementation capacity, rather than total ADB loan size. In the interest of integrated city development, another criterion considered in project component selection has been to ensure inter-sector linkages and optimization. For instance, water supply, sewerage and sanitation have been seen as a composite sector and not in isolation from each other. Components were selected based on social, financial, economic, environmental and institutional criteria.

NKUSIP comprises five components in two phases:

#### Phase – I

- (i) Part A: Environmental Sanitation Infrastructure;
- (ii) Part B: Water Supply Infrastructure;
- (iii) Part D: Poverty Alleviation;

#### Phase – II

- (iv) Part C: Urban Roads Infrastructure;
- (v) Part E: Non-Municipal Infrastructure;

Parts A through D is designed to address the urban development needs of the 25 Project ULBs; Part E is designed to incorporate the tourism and heritage, sports facilities, and disaster management services in the region.

### Annexure – 3: Policies, Legislative and Administrative Framework

Government of Karnataka has undertaken various legislative and administrative reforms for infrastructure provision, to improve basic service delivery and financial management in local self-governments.

#### Policies and Guidelines

**(i) GoK Infrastructure Policy (1997):** GoK's Infrastructure Policy aims at (a) expanding infrastructure facilities (covering but not limited to roads, airports, water supply, sewerage, urban transport, tourism, agriculture and industrial infrastructure) in the State to meet rapid growth; (b) promoting private sector participation in infrastructure development; and (iii) adopting an integrated approach to infrastructure development in the State. Through the Infrastructure Policy, GoK envisages qualitative improvement in infrastructure facilities and increase in the number of commercially viable projects in the State. The Policy also provides for adequate incentives and concessions to attract private sector equity/participation in infrastructure provision.

**(ii) GoK Policy on Urban Drinking Water and Sanitation (2002):** The Policy statement confirms the commitment of the following institutions to provide water supply and sanitation facilities to all residents of urban areas – GoK, the State's ULBs, Karnataka Water Supply and Drainage Board (KUWSDB) and Bangalore Water Supply and Sewerage Board (BWSSB). The policy aims at (a) ensuring universal coverage of water and sanitation services to all households willing to pay for the services; (b) providing such facilities so as to preserve water resources; (c) ensuring that the facility operations are commercially and economically viable; and (d) ensuring that all citizens receive minimum service levels. The policy identifies appropriate institutional mechanisms to address the objectives, tariff frameworks for commercial sustainability and the role of private sector in service delivery.

**(iii) GoK Water Policy (2002) :** Government of Karnataka's State Water Policy, 2002, issued by the Water Resources Department takes cognizance of the depleting water resources and the need for water conservation/management in the State. A key objective in relation to drinking water supply is to provide drinking water at the following rates (a) 55 litres per person per day in the rural areas; (b) 70 litres per person per day in towns; (c) 100 litres per person per day in the city municipal council areas; and (d) 135 litres per person per day in city corporation areas. Salient features of the GoK Water Policy comprise (a) conservation of surface water based on the fact that surface water sources are key providers of drinking water; (b) future vision lays emphasis on efficient operation and maintenance and repairs and modernization of water supply systems with a planned approach to completing ongoing schemes/committed projects and promoting participatory management of resources; (c) water rates for various users to be revised in a phased manner and fixed so as to cover at least the operation and maintenance charges of providing services.

**(iv) GoK Accounting and Budgeting Policies for ULBs (2005):** The Draft Accounting and Budgeting Policies for ULBs in Karnataka cover (a) accounting policies for each item of revenue, expenditure, assets and liabilities; and (b) budgeting and reporting guidelines. The accounting policies have been made considering the recommendation of the National Municipal Accounts Manual (NMAM), released by the Ministry of Urban Development, Government of India, December 2004, and use a simplified activity oriented Fund Accounting System. This policy document shall form the basis for developing the Regulations and the Accounting Manual for ULBs in the State.



## Acts

**(i) Municipal Corporations and Municipalities Act:** The Karnataka Municipal Corporations Act (1976) governs the management of municipal corporations (MCs) and the Karnataka Municipalities Act (1964) governs the management of city municipal councils (CMCs) and town municipal councils (TMCs) of the State. Amendments to the Corporations Act (1976) and Municipalities Act (1964), in 2001, provide impetus to resource mobilization initiatives by way of infrastructure and solid waste management cess, and property tax rationalization.

**(ii) Karnataka Local Fund Authorities Fiscal Responsibility Act (2003):** In addition to the existing municipal acts, GoK, in the last financial year (2003-04), enacted the Karnataka Local Fund Authorities Fiscal Responsibility (LFAFR) Act, 2003. The LFAFR Act empowers Local Fund Authorities to ensure best practice of financial management in ULBs to enhance the scope of improving social and physical infrastructure, and human development by achieving sufficient revenue surplus, and by ensuring prudent management of public fiscal operations. This Act is likely to be made effective from the financial year 2005-06.

## Government Orders and Proceedings

**(i) Water Supply Government Order (1996):** A critical framework governing project implementation is the Government Order (GO) regarding project financing pattern and contributions by ULBs to the project cost. GOs issued from time to time deal with project specific interventions; project financing measures, service delivery standards, etc. Planning and implementation of infrastructure is governed by the respective GO. The GOs also define the tariff structures for water supply cost recovery. For example, the funding pattern for water supply projects is governed by GO No. UDD 204 UMS 95 dated November 15, 1996, which details out loan: grant: own share mix in case of water supply projects based on the town's 1991 population.

**(ii) Cadre and Recruitment Rules of Karnataka Municipalities (2004):** In line with the 74th CAA and the need to strengthen ULBs, the Urban Development Department (UDD) brought into force the Karnataka Municipalities (Recruitment of Officers and Employees) Rules, 2004. The Rules is a revision of the 1971 Rule and provides details on the type of staff (qualification, job responsibilities and strengthens) required for manning positions in the State's ULBs. The Rules lay emphasis on creating new posts focusing on environmental engineering, computerization, and water supply operation and maintenance, community affairs and accounting.

**(iii) Creation of the District Urban Development Cell (2003):** GoK's Urban Development Department (UDD) created the District Urban Development Cell (DUDC) based on the need to oversee the following functions in the State's ULBs – poverty alleviation, solid waste management, water supply, computerization, and other core municipal functions. The DUDC works under the administrative control of the Deputy Commissioner (DC) in each District; a Project Director and Engineers (of different scales) assist him/her in discharging the duties mentioned above. Expenditures incurred by the DUDC is drawn from State Finance Commission (SFC) funds.

## Twelfth Central Finance Commission Grants (2006-2010)

Article 280 of the Constitution describes the duties of the Finance Commission, the core of which relates to sharing of central taxes under Article 270 and determination of grants for the states as provided for under Article 275. The Twelfth Finance Commission (TFC) based on the current assessment of central and state taxes has made recommendations for sharing of grants for the period 2005-06 to 2009-10.

With specific reference to urban local bodies the TFC has made the following recommendations:

- (i) States should avoid delays in the constitution of the State Finance Commissions 150 (SFCs);
- (ii) It is desirable that the SFCs follow the procedure adopted by the central finance commission for transfer of resources from the centre to the states in respect of resource transfers from state governments to local bodies;
- (iii) While estimating the resources of the local bodies, the SFCs should follow a normative approach in the assessment of revenues and expenditure rather than make forecasts based on past trends;
- (iv) A sum of Rs.200,000 million for the panchayats and Rs.50,000 million for the municipalities may be provided as grants-in-aid to augment the consolidated fund of the states for the period 2005-10 to transportation of solid waste;
- (v) At least 50 per cent of the grants-in-aid provided to each state for the urban local bodies should be earmarked for the scheme of solid waste management through public-private partnership. The municipalities should concentrate on collection, segregation and transportation of solid waste. The cost of these activities whether carried out in house or out sourced could be met from the grants.



## Annexure – 4: Process of Finalization of Scope of Work and Identification of 10 Towns/Cities

IDD has mandated KIPDC to undertake the Pre-feasibility study for the development of water supply, sewerage and solid waste management systems for 10 cities/towns across Karnataka. As part of inception report KIPDC has shortlisted the ten CMCs i.e **Shimoga, Bijapur, Tumkur, Raichur, Bidar, Hospet, Bhadravathi, Robertson Pet (KGF), Gadag-Betageri and Hassan** in Karnataka for carrying out this study, based on the population of these CMCs.

Initial Scope was submitted to carry out pre-feasibility to explore the possibility of establishing water supply, solid waste management & sewage as one package under PPP mode for top 10 CMCs. As KUIDFC is already in the process of establishing the above-mentioned components through ADB & other funds for the above-mentioned towns (except KGF), it was decided to explore other 10 CMCs across Karnataka. ADB's NKUSIP covers around 25 towns and there was an overlap of other external funding projects with the selected second set of towns. Therefore, KUIDFC recommended IDD & KIPDC to explore the possibility of identifying 10 towns from the list of 146 TMCs & TPs which are currently not covered under any external funding schemes and their investment plans are under preparation. This proposition was explored and third set of 10 towns were shortlisted based on their locational proximity to Bangalore (for PPP viability) and various other factors. The towns are, *Anekal (33,157), Devanahalli(23,406), Hosakote(36,323), Malur (27,815) and Nelmangala (TP)(25,287) along with other CMCs like Robertsonpet (1,41,424), Bagalkot (90,988), Mandya (1,31,179), Tumkur (2,48,929) & Udupi (1,13,112)*. But, majority of these smaller towns (TMCs & TPs) were found unviable for PPP mode. Hence, it was decided to carry out Operation & Maintenance (O&M) for the initially identified 10 towns, for which the assets would be established by KUIDFC. A proposal with revised scope of work was submitted by KIPDC to IDD and the approval on revised scope for 10 CMC project from Pre-Feasibility on Establishment of Water Supply, Sewerage & Solid waste Management in PPP to **O&M for Water Supply, Sewerage & Solid waste management** was issued through letter dated **8<sup>th</sup> June 09**.

Further, as recommended by the Commissioner of Municipal Administration (DMA) the O&M component of Solid waste Management was removed from the scope of work, as DMA is already in the process of carrying out similar studies. Later, as recommended by KSIIDC, O&M of Storm Water Drain component was added to the scope of work.

On **8<sup>th</sup> July 2009** KUIDFC decided to prioritize implementation of NKUSIP projects at Davangere, Bidar, Gadag-Betageri & Ilkal in addition to the already tendered out towns of Hospet, Raichur & Haveri. KUIDFC also expressed ADB team's concern to have an appropriate O&M system in place in order to take of the assets which would be established by 2011-12. Based on which 6 out of the 7 NKUSIP towns were finalized for the pre-feasibility study (as Haveri is a smaller town and may not be viable for PPP mode). The remaining four towns of Mandya, Tumkur, Ramanagaram & Channapatna were identified based on the parameter that the urban services were established for these 4 towns in the recent past through KUIDP scheme and there is a need for an appropriate O&M system. Later on during the meeting on **7<sup>th</sup> August 2009**, with KUIDFC and its consultants it was discussed that the provision of independent HSCs for water supply & sewerage is not part of ADB funding and has to be implemented by the respective CMCs. In this regard KUIDFC requested to explore the possibility of packaging provision of HSCs as part of the O&M operator's scope; accordingly the scope of Pre-Feasibility study was revised.

*Note: The project was started to conduct Pre-feasibility study for 10 CMCs. However, due to non-availability of information from 4 CMCs (Ramanagara, Chanapatana, Mandya & Tumkur) in spite of repeated follow-ups including direct visits to Mandya, Ramanagara & Chanapatana KUWS&DB/CMCs for obtaining the information, the study is conducted for 6 CMCs (Raichur, Hospet, Bidar, Davanagere, Gadag-Betageri and Ilkal)*

## Annexure – 5: Financial Model



Preliminary Financial Analysis - Cash Flow Statement - Hospet			Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
<b>Provision of new HSC</b>									
Cost of Provision of New Water Supply Connections	38.5								
Cost of Provision of New Sewage Connections	43.75								
<b>Total</b>	<b>82.25</b>		<b>82.25</b>						
<b>O&amp;M Expenditure</b>									
O& M Expenditure of water supply/ Annum	28.08	Rs. Million							
Scenario -2 . Projecting Existing Cost and additional cost of 3% of capex for water supply	12.55	Rs. Million							
O& M Expenditure of Sewage/Annum	7.96	Rs. Million							
O& M Expenditure of Drains	0.00	Rs. Million							
<b>Total O&amp;M expenses of water supply, Sewage &amp; Drain</b>	<b>20.51</b>	Rs. Million	20.51	23.92	27.88	32.51	37.90	44.19	
Appreciation of O&M Cost /annum	16.59%	%							
Tariff Collection Charges (Rs 0.01073m/Rs.1m collection) Rs.m/annum	0.22	Rs. Million	0.19	0.86	0.33	0.33	0.33	0.42	0.42
Cost Due to Depreciation (2%) in Rs m	0.41	Rs. Million	0.41	0.48	0.56	0.65	0.76	0.88	
<b>Total O&amp; M Expenditure/annum</b>	<b>21.14</b>	Rs. Million	21.11	25.25	28.77	33.48	38.99	45.50	
<b>Investments &amp; Admin Expenses of O&amp;M Operator</b>									
Office rentals	0.12	Rs. Million	0.12	0.13	0.13	0.14	0.15	0.15	
Increment in rentals	5.00%	%							
Staff Salaries & overheads	0.69	Rs. Million	0.69	0.76	0.83	0.92	1.01	1.11	
Increment in salaries	10.00%	%							
Initial Investment (Machinery, Communication equipments, establishment charges)	1	Rs. Million	1.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total Expenditure of Investment &amp; Office expenses</b>			1.81	0.89	0.97	1.06	1.16	1.26	
<b>TOTAL OPERATION COST</b>			<b>105.17</b>	<b>26.14</b>	<b>29.73</b>	<b>34.54</b>	<b>40.14</b>	<b>46.76</b>	
<b>Total Revenue Requirements</b>			<b>105.17</b>	<b>26.14</b>	<b>29.73</b>	<b>34.54</b>	<b>40.14</b>	<b>46.76</b>	
<b>Assuming 10% reduction in O&amp;M cost</b>	10%		94.65	23.53	26.76	31.09	36.13	42.08	
<b>Revenues</b>									
<b>Number of Connections</b>									
Number of HSC (Water Supply)	27,144.00	No. of units							
Number of Non Domestic/Commercial	350.00	No. of units							
Number of Industrial	28.00	No. of units							
Number of HSC (Sewage)	25,080.00	No. of units							
Number of Non Domestic/Commercial (assuming 100%)	8,093.00	No. of units							
Number of Industrial	28.00	No. of units							
Annual Income from water HSC Tariff Collection(domestic) Rs.m (100%)	17.92	Rs. Million							
Annual Income from water SC Tariff Collection(Non-domestic/Commercial) Rs.m (100%)	10.68	Rs. Million							
Annual Income from water SC Tariff Collection(Industrial) Rs.m (100%)	0.07	Rs. Million							
<b>Total Income from Water Supply</b>	<b>28.67</b>	Rs. Million							
Annual Income from Sewage HSC Tariff Collection(domestic) Rs.m (100%)	1.66	Rs. Million							
Annual Income from Sewage SC Tariff Collection( Non-domestic/Commercial) Rs.m (100%)	0.00	Rs. Million							
Annual Income from Sewage SC Tariff Collection(Industrial) Rs.m (100%)	0.00	Rs. Million							
<b>Total Income from Sewage</b>	<b>1.66</b>	Rs. Million							
<b>Revenue from New Connection Charges</b>									
New Connection charges for water Supply - Domestic	32.38	Rs. Million							
New Connection charges for water Supply - Non Domestic	0.00	Rs. Million							
New Connection charges for Sewage - Domestic	17.50	Rs. Million							
Less Income from water & sewage tariff of new connection for the first year	17.62	Rs. Million							
Revenue from new connection Charges as additional Revenue in Second Year	49.88	Rs. Million							
<b>Total Revenues</b>	<b>30.33</b>	Rs. Million	<b>17.62</b>	<b>80.20</b>	<b>30.33</b>	<b>30.33</b>	<b>30.33</b>	<b>39.43</b>	
Assuming 80% Collection	23.58	Rs. Million	13.70	62.37	23.58	23.58	23.58	30.66	
Increment in revenue income /tariff every 5 years	30%	%							
<b>Surplus/(deficit)</b>			(91.47)	36.23	(6.15)	(10.96)	(16.56)	(16.10)	
<b>Considering Income from Sale of STP water</b>	<b>29.57</b>	Rs. Million	<b>(91.47)</b>	<b>65.79</b>	<b>23.41</b>	<b>18.61</b>	<b>13.01</b>	<b>13.46</b>	
Surplus/(deficit) as percentage of total revenues ( as per 77.8%efficiency)		15%							
Surplus/(deficit) as percentage of total revenues ( as per 100%efficiency)			-667.52%	58.09%	-26.08%	-46.47%	-70.22%	-52.53%	
			-519.06%	45.17%	-20.28%	-36.14%	-54.60%	-40.85%	
Total Revenues assuming 30% increase in tariff from 2011-12(100%)			22.91	89.30	39.43	39.43	39.43	51.25	
Total Revenues assuming 30% increase in tariff from 2011-12 (80%)			22.91	80.53	30.66	30.66	30.66	39.85	
<b>Surplus/(deficit) with 77.8% collection and 30% increase in tariff from 2011-12</b>		(16.44)	(82.26)	54.39	0.92	(3.88)	(9.48)	(6.91)	
<b>Surplus/(deficit) with 100% collection and 30% increase in tariff from 2011-12</b>		(7.23)	(82.26)	63.16	9.69	4.88	(0.72)	4.49	
	IRR			23%					



<b>Preliminary Financial Analysis - Cash Flow Statement - Raichur</b>			Unit	2011-12	2012-13	2013-14	2014-15	2015-16
<b>Provision of new HSC</b>								
Cost of Provision of New Water Supply Connections	20.18							
Cost of Provision of New Sewage Connections	48.16							
<b>Total</b>	<b>68.33</b>		<b>68.33</b>					
<b>O&amp;M Expenditure</b>								
O& M Expenditure of water supply/ Annum	3.23	Rs. Million						
Scenario -2 . Projecting Existing Cost and additional cost of 3% of capex for water supply	39.24	Rs. Million						
O& M Expenditure of Sewage/Annum	4.29	Rs. Million						
O& M Expenditure of Drains	0.00	Rs. Million						
<b>Total O&amp;M expenses of water supply, Sewage &amp; Drain</b>	<b>43.52</b>	<b>Rs. Million</b>	<b>43.52</b>	<b>47.88</b>	<b>52.66</b>	<b>57.93</b>	<b>63.72</b>	
Appreciation of O&M Cost /annum	10.00%	%						
Tariff Collection Charges (Rs 0.01073m/Rs.1m collection) Rs.m/annum	10.26	Rs. Million	4.44	15.03	6.17	6.17	6.17	
Cost Due to Depreciation (2%) in Rs m	0.87	Rs. Million	0.87	0.96	1.05	1.16	1.27	
<b>Total O&amp; M Expenditure/annum</b>	<b>54.65</b>	<b>Rs. Million</b>	<b>48.83</b>	<b>63.86</b>	<b>59.88</b>	<b>65.25</b>	<b>71.16</b>	
<b>Investments &amp; Admin Expenses of O&amp;M Operator</b>								
Office rentals	0.12	Rs. Million	0.12	0.13	0.13	0.14	0.15	
Increment in rentals	5.00%	%						
Staff Salaries & overheads	0.69	Rs. Million	0.69	0.76	0.83	0.92	1.01	
Increment in salaries	10.00%	%						
Initial Investment (Machinery, Communication equipments, establishment charges)	1	Rs. Million	1.00	0.00	0.00	0.00	0.00	
<b>Total Expenditure of Investment &amp; Office expenses</b>			<b>1.81</b>	<b>0.89</b>	<b>0.97</b>	<b>1.06</b>	<b>1.16</b>	
<b>TOTAL OPERATION COST</b>			<b>118.98</b>	<b>64.75</b>	<b>60.85</b>	<b>66.31</b>	<b>72.32</b>	
<b>Total Revenue Requirements</b>			<b>118.98</b>	<b>64.75</b>	<b>60.85</b>	<b>66.31</b>	<b>72.32</b>	
Assuming 10% reduction in O&M cost	10%		107.08	58.27	54.76	59.68	65.09	
<b>Revenues</b>								
<b>Number of Connections</b>								
Number of HSC (Water Supply)	26,842.55	No. of units						
Number of Non Domestic/Commercial	240.00	No. of units						
Number of Industrial	95.00	No. of units						
Number of HSC (Sewage)	26,842.55	No. of units						
Number of Non Domestic/Commercial (assuming 100%)	4,869.00	No. of units						
Number of Industrial	95.00	No. of units						
Annual Income from water HSC Tariff Collection(domestic) Rs.m (100%)	17.72	Rs. Million						
Annual Income from water SC Tariff Collection(Non-domestic/Commercial) Rs.m (100%)	6.43	Rs. Million						
Annual Income from water SC Tariff Collection(Industrial) Rs.m (100%)	0.25	Rs. Million						
<b>Total Income from Water Supply</b>	<b>24.39</b>	<b>Rs. Million</b>						
Annual Income from Sewage HSC Tariff Collection(domestic) Rs.m (100%)	1.77	Rs. Million						
Annual Income from Sewage SC Tariff Collection( Non-domestic/Commercial) Rs.m (100%)	0.00	Rs. Million						
Annual Income from Sewage SC Tariff Collection(Industrial) Rs.m (100%)	0.00	Rs. Million						
<b>Total Income from Sewage</b>	<b>1.77</b>	<b>Rs. Million</b>						
<b>Revenue from New Connection Charges</b>								
New Connection charges for water Supply - Domestic	18.34	Rs. Million						
New Connection charges for water Supply - Non Domestic	0.00	Rs. Million						
New Connection charges for Sewage - Domestic	19.26	Rs. Million						
Less Income from water & sewage tariff of new connection for the first year	18.84	Rs. Million						
Revenue from new connection Charges as additional Revenue in Second Year	37.61	Rs. Million						
<b>Total Revenues</b>	<b>26.17</b>	<b>Rs. Million</b>	<b>18.84</b>	<b>63.77</b>	<b>26.17</b>	<b>26.17</b>	<b>26.17</b>	
Assuming 87.2% Collection	22.83	Rs. Million	16.44	55.63	22.83	22.83	22.83	
Increment in revenue income /tariff every 5 years	30%	%						
<b>Surplus/(deficit)</b>			<b>(102.54)</b>	<b>(9.11)</b>	<b>(38.02)</b>	<b>(43.48)</b>	<b>(49.49)</b>	
Considering Income from Sale of STP water	30.11	Rs. Million	(102.54)	21.00	(7.91)	(13.37)	(19.38)	
Surplus/(deficit) as percentage of total revenues ( as per 87.2%efficiency)			-623.84%	-16.38%	-166.57%	-190.50%	-216.81%	
Surplus/(deficit) as percentage of total revenues ( as per 100%efficiency)			-544.24%	-14.29%	-145.32%	-166.19%	-189.15%	
Total Revenues assuming 30% increase in tariff from 2011-12(100%)			24.49	71.62	34.02	34.02	34.02	
Total Revenues assuming 30% increase in tariff from 2011-12 (87.2%)			24.49	67.28	29.67	29.67	29.67	
<b>Surplus/(deficit) with 87.2% collection and 30% increase in tariff from 2011-12</b>			(49.37)	(94.48)	2.53	(31.17)	(36.64)	(42.64)
<b>Surplus/(deficit) with 100% collection and 30% increase in tariff from 2011-12</b>			(44.81)	(94.48)	6.87	(26.83)	(32.30)	(38.30)
IRR			-22.74%	-86.18%	32.43%	-13.00%	-20.17%	-26.80%



<b>Preliminary Financial Analysis - Cash Flow Statement - Davanagere</b>								
		Unit	2011-12	2012-13	2013-14	2014-15	2015-16	
<b>Provision of new HSC</b>								
Cost of Provision of New Water Supply Connections	22							
Cost of Provision of New Sewage Connections	51.573							
<b>Total</b>	<b>73.573</b>		<b>73.573</b>					
<b>O&amp;M Expenditure</b>								
O& M Expenditure of water supply/ Annum	9.92	Rs. Million						
Scenario -2 . Projecting Existing Cost and additional cost of 3% of capex for water supply	48.10	Rs. Million						
O& M Expenditure of Sewage/Annum	3.32	Rs. Million						
O& M Expenditure of Drains	0.00	Rs. Million						
<b>Total O&amp;M expenses of water supply, Sewage &amp; Drain</b>	<b>51.42</b>	<b>Rs. Million</b>	<b>51.42</b>	<b>57.22</b>	<b>63.67</b>	<b>70.84</b>	<b>78.83</b>	
Appreciation of O&M Cost /annum	11.27%	%						
Tariff Collection Charges (Rs 0.01073m/Rs.1m collection) Rs.m/annum	6.51	Rs. Million	3.32	10.14	4.33	4.33	4.33	
Cost Due to Depreciation (2%) in Rs m	1.03	Rs. Million	1.03	1.14	1.27	1.42	1.58	
<b>Total O&amp; M Expenditure/annum</b>	<b>58.96</b>	<b>Rs. Million</b>	<b>55.78</b>	<b>68.51</b>	<b>69.27</b>	<b>76.59</b>	<b>84.73</b>	
<b>Investments &amp; Admin Expenses of O&amp;M Operator</b>								
Office rentals	0.12	Rs. Million	0.12	0.13	0.13	0.14	0.15	
Increment in rentals	5.00%	%						
Staff Salaries & overheads	0.69	Rs. Million	0.69	0.76	0.83	0.92	1.01	
Increment in salaries	10.00%	%						
Initial Investment (Machinery, Communication equipments, establishment charges)	1	Rs. Million	1.00	0.00	0.00	0.00	0.00	
<b>Total Expenditure of Investment &amp; Office expenses</b>			<b>1.81</b>	<b>0.89</b>	<b>0.97</b>	<b>1.06</b>	<b>1.16</b>	
<b>TOTAL OPERATION COST</b>			<b>131.16</b>	<b>69.39</b>	<b>70.24</b>	<b>77.65</b>	<b>85.89</b>	
<b>Total Revenue Requirements</b>			<b>131.16</b>	<b>69.39</b>	<b>70.24</b>	<b>77.65</b>	<b>85.89</b>	
Assuming 10% reduction in O&M cost	10%		118.04	62.45	63.21	69.88	77.30	
<b>Revenues</b>								
<b>Number of Connections</b>								
Number of HSC (Water Supply)	26,800.00	No. of units						
Number of Non Domestic/Commercial	129.00	No. of units						
Number of Industrial	0.00	No. of units						
Number of HSC (Sewage)	46,726.20	No. of units						
Number of Non Domestic/Commercial (assuming 100%)	10,201.00	No. of units						
Number of Industrial	0.00	No. of units						
Annual Income from water HSC Tariff Collection(domestic) Rs.m (100%)	17.69	Rs. Million						
Annual Income from water SC Tariff Collection(Non-domestic/Commercial) Rs.m (100%)	13.47	Rs. Million						
Annual Income from water SC Tariff Collection(Industrial) Rs.m (100%)	0.00	Rs. Million						
<b>Total Income from Water Supply</b>	<b>31.15</b>	<b>Rs. Million</b>						
Annual Income from Sewage HSC Tariff Collection(domestic) Rs.m (100%)	3.08	Rs. Million						
Annual Income from Sewage SC Tariff Collection( Non-domestic/Commercial) Rs.m (100%)	0.00	Rs. Million						
Annual Income from Sewage SC Tariff Collection(Industrial) Rs.m (100%)	0.00	Rs. Million						
<b>Total Income from Sewage</b>	<b>3.08</b>	<b>Rs. Million</b>						
<b>Revenue from New Connection Charges</b>								
New Connection charges for water Supply - Domestic	15.00	Rs. Million						
New Connection charges for water Supply - Non Domestic	0.00	Rs. Million						
New Connection charges for Sewage - Domestic	30.94	Rs. Million						
Less Income from water & sewage tariff of new connection for the first year	26.28	Rs. Million						
Revenue from new connection Charges as additional Revenue in Second Year	45.94	Rs. Million						
<b>Total Revenues</b>	<b>34.24</b>	<b>Rs. Million</b>	<b>26.28</b>	<b>80.18</b>	<b>34.24</b>	<b>34.24</b>	<b>34.24</b>	
Assuming 82.3% Collection	28.17	Rs. Million	21.62	65.96	28.17	28.17	28.17	
Increment in revenue income /tariff every 5 years	30%	%						
<b>Surplus/(deficit)</b>			<b>(109.54)</b>	<b>(3.43)</b>	<b>(42.07)</b>	<b>(49.48)</b>	<b>(57.72)</b>	
<b>Considering Income from Sale of STP water</b>	<b>21.30</b>	<b>Rs. Million</b>	<b>(109.54)</b>	<b>17.87</b>	<b>(20.77)</b>	<b>(28.18)</b>	<b>(36.43)</b>	
Surplus/(deficit) as percentage of total revenues ( as per 82.3%efficiency)			-506.74%	-5.19%	-149.37%	-175.67%	-204.93%	
Surplus/(deficit) as percentage of total revenues ( as per 100%efficiency)			-416.89%	-4.27%	-122.88%	-144.52%	-168.60%	
Total Revenues assuming 30% increase in tariff from 2011-12(100%)			34.16	90.45	44.51	44.51	44.51	
Total Revenues assuming 30% increase in tariff from 2011-12 (82.3%)			34.16	82.56	36.62	36.62	36.62	
<b>Surplus/(deficit) with 82.3% collection and 30% increase in tariff from 2011-12</b>		(56.57)	(97.00)	13.17	(33.62)	(41.03)	(49.27)	
<b>Surplus/(deficit) with 100% collection and 30% increase in tariff from 2011-12</b>		(48.28)	(97.00)	21.06	(25.73)	(33.14)	(41.38)	
IRR			-33.21%	-83.52%	25.75%	-29.58%	-36.30%	-42.41%



<b>Preliminary Financial Analysis - Cash Flow Statement - Bidar</b>								
		Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
<b>Provision of new HSC</b>								
Cost of Provision of New Water Supply Connections	44							
Cost of Provision of New Sewage Connections	38							
<b>Total</b>	<b>82</b>		<b>82</b>					
<b>O&amp;M Expenditure</b>								
O& M Expenditure of water supply/ Annum	32.33	Rs. Million						
Scenario -2 . Projecting Existing Cost and additional cost of 3% of capex for water supply	20.48	Rs. Million						
O& M Expenditure of Sewage/Annum	3.12	Rs. Million						
O& M Expenditure of Drains	0.37	Rs. Million						
<b>Total O&amp;M expenses of water supply, Sewage &amp; Drain</b>	<b>23.97</b>	Rs. Million	23.97	26.36	29.00	31.90	35.09	38.60
Appreciation of O&M Cost /annum	10.00%	%						
Tariff Collection Charges (Rs 0.01073m/Rs.1m collection) Rs.m/annum	3.89	Rs. Million	1.80	11.43	4.10	4.10	4.10	5.33
Cost Due to Depreciation (2%) in Rs m	0.48	Rs. Million	0.48	0.53	0.58	0.64	0.70	0.77
<b>Total O&amp; M Expenditure/annum</b>	<b>28.33</b>	Rs. Million	26.24	38.33	33.68	36.64	39.89	44.70
<b>Investments &amp; Admin Expenses of O&amp;M Operator</b>								
Office rentals	0.12	Rs. Million	0.12	0.13	0.13	0.14	0.15	0.15
Increment in rentals	5.00%	%						
Staff Salaries & overheads	0.69	Rs. Million	0.69	0.76	0.83	0.92	1.01	1.11
Increment in salaries	10.00%	%						
Initial Investment (Machinery, Communication equipments, establishment charges)	1	Rs. Million	1.00	0.00	0.00	0.00	0.00	0.00
<b>Total Expenditure of Investment &amp; Office expenses</b>			1.81	0.89	0.97	1.06	1.16	1.26
<b>TOTAL OPERATION COST</b>			<b>110.05</b>	<b>39.21</b>	<b>34.65</b>	<b>37.69</b>	<b>41.05</b>	<b>45.96</b>
<b>Total Revenue Requirements</b>			<b>110.05</b>	<b>39.21</b>	<b>34.65</b>	<b>37.69</b>	<b>41.05</b>	<b>45.96</b>
Assuming 10% reduction in O&M cost	10%		99.05	35.29	31.18	33.93	36.94	41.37
<b>Revenues</b>								
<b>Number of Connections</b>								
Number of HSC (Water Supply)	27,682.00	No. of units						
Number of Non Domestic/Commercial	117.00	No. of units						
Number of Industrial	0.00	No. of units						
Number of HSC (Sewage)	19,700.00	No. of units						
Number of Non Domestic/Commercial (assuming 100%)	4,317.00	No. of units						
Number of Industrial	0.00	No. of units						
Annual Income from water HSC Tariff Collection(domestic) Rs.m (100%)	18.27	Rs. Million						
Annual Income from water SC Tariff Collection(Non-domestic/Commercial) Rs.m (100%)	5.70	Rs. Million						
Annual Income from water SC Tariff Collection(Industrial) Rs.m (100%)	0.00	Rs. Million						
<b>Total Income from Water Supply</b>	<b>23.97</b>	Rs. Million						
Annual Income from Sewage HSC Tariff Collection(domestic) Rs.m (100%)	1.30	Rs. Million						
Annual Income from Sewage SC Tariff Collection( Non-domestic/Commercial) Rs.m (100%)	0.00	Rs. Million						
Annual Income from Sewage SC Tariff Collection(Industrial) Rs.m (100%)	0.00	Rs. Million						
<b>Total Income from Sewage</b>	<b>1.30</b>	Rs. Million						
<b>Revenue from New Connection Charges</b>								
New Connection charges for water Supply - Domestic	30.00	Rs. Million						
New Connection charges for water Supply - Non Domestic	0.00	Rs. Million						
New Connection charges for Sewage - Domestic	15.20	Rs. Million						
Less Income from water & sewage tariff of new connection for the first year	11.07	Rs. Million						
Revenue from new connection Charges as additional Revenue in Second Year	45.20	Rs. Million						
<b>Total Revenues</b>	<b>25.27</b>	Rs. Million	<b>11.07</b>	<b>70.47</b>	<b>25.27</b>	<b>25.27</b>	<b>25.27</b>	<b>32.85</b>
Assuming 75% Collection	18.98	Rs. Million	8.31	52.94	18.98	18.98	18.98	24.68
Increment in revenue income /tariff every 5 years	30%	%						
<b>Surplus/(deficit)</b>			<b>(101.74)</b>	<b>13.73</b>	<b>(15.66)</b>	<b>(18.71)</b>	<b>(22.06)</b>	<b>(21.29)</b>
<b>Considering Income from Sale of STP water</b>	<b>27.38</b>	Rs. Million	<b>(101.74)</b>	<b>41.11</b>	<b>11.71</b>	<b>8.66</b>	<b>5.31</b>	<b>6.09</b>
Surplus/(deficit) as percentage of total revenues ( as per 75%efficiency)			-1223.76%	25.94%	-82.50%	-98.56%	-116.22%	-86.25%
Surplus/(deficit) as percentage of total revenues ( as per 100%efficiency)			-919.41%	19.49%	-61.98%	-74.05%	-87.31%	-64.80%
Total Revenues assuming 30% increase in tariff from 2011-12(100%)			14.39	78.05	32.85	32.85	32.85	42.70
Total Revenues assuming 30% increase in tariff from 2011-12 (75%)			14.39	69.88	24.68	24.68	24.68	32.08
<b>Surplus/(deficit) with 75% collection and 30% increase in tariff from 2011-12</b>		(21.86)	(95.67)	30.67	(9.97)	(13.02)	(16.37)	(13.88)
<b>Surplus/(deficit) with 100% collection and 30% increase in tariff from 2011-12</b>		(13.28)	(95.67)	38.84	(1.80)	(4.85)	(8.20)	(3.26)
IRR			16.43%	-92.45%	104.84%	33.81%	22.99%	12.94%





<b>Preliminary Financial Analysis - Cash Flow Statement - Gadag-Betageri</b>							
		Unit	2011-12	2012-13	2013-14	2014-15	2015-16
<b>Provision of new HSC</b>							
Cost of Provision of New Water Supply Connections	22.86						
Cost of Provision of New Sewage Connections	38.29						
<b>Total</b>	<b>61.15</b>		<b>61.1459274</b>				
<b>O&amp;M Expenditure</b>							
O& M Expenditure of water supply/ Annum	0.00	Rs. Million					
Scenario -2 . Projecting Existing Cost and additional cost of 3% of capex for water supply	64.99	Rs. Million					
O& M Expenditure of Sewage/Annum	31.72	Rs. Million					
O& M Expenditure of Drains	0.00	Rs. Million					
<b>Total O&amp;M expenses of water supply, Sewage &amp; Drain</b>	<b>96.71</b>	<b>Rs. Million</b>	<b>96.71</b>	<b>107.11</b>	<b>118.64</b>	<b>131.40</b>	<b>145.54</b>
Appreciation of O&M Cost /annum	10.76%	%					
Tariff Collection Charges (Rs 0.01073m/Rs.1m collection) Rs.m/annum	31.72	Rs. Million	2.59	24.40	4.94	4.94	4.94
Cost Due to Depreciation (2%) in Rs m	1.93	Rs. Million	1.93	2.14	2.37	2.63	2.91
<b>Total O&amp; M Expenditure/annum</b>	<b>130.36</b>	<b>Rs. Million</b>	<b>101.23</b>	<b>133.66</b>	<b>125.95</b>	<b>138.97</b>	<b>153.39</b>
<b>Investments &amp; Admin Expenses of O&amp;M Operator</b>							
Office rentals	0.12	Rs. Million	0.12	0.13	0.13	0.14	0.15
increment in rentals	5.00%	%					
Staff Salaries & overheads	0.69	Rs. Million	0.69	0.76	0.83	0.92	1.01
increment in salaries	10.00%	%					
Initial Investment (Machinery, Communication equipments, establishment charges)	1	Rs. Million	1.00	0.00	0.00	0.00	0.00
<b>Total Expenditure of Investment &amp; Office expenses</b>			<b>1.81</b>	<b>0.89</b>	<b>0.97</b>	<b>1.06</b>	<b>1.16</b>
<b>TOTAL OPERATION COST</b>			<b>164.19</b>	<b>134.54</b>	<b>126.92</b>	<b>140.03</b>	<b>154.55</b>
<b>Total Revenue Requirements</b>			<b>164.19</b>	<b>134.54</b>	<b>126.92</b>	<b>140.03</b>	<b>154.55</b>
Assuming 10% reduction in O&M cost	10%		147.77	121.09	114.23	126.03	139.09
<b>Revenues</b>							
<b>Number of Connections</b>							
Number of HSC (Water Supply)	23,409.00	No. of units					
Number of Non Domestic/Commercial	412.00	No. of units					
Number of Industrial	0.00	No. of units					
Number of HSC (Sewage)	16,815.17	No. of units					
Number of Non Domestic/Commercial (assuming 100%)	0.00	No. of units					
Number of Industrial	0.00	No. of units					
Annual Income from water HSC Tariff Collection(domestic) Rs.m (100%)	14.05	Rs. Million					
Annual Income from water SC Tariff Collection(Non-domestic/Commercial) Rs.m (100%)	0.00	Rs. Million					
Annual Income from water SC Tariff Collection(Industrial) Rs.m (100%)	0.00	Rs. Million					
<b>Total Income from Water Supply</b>	<b>14.05</b>	<b>Rs. Million</b>					
Annual Income from Sewage HSC Tariff Collection(domestic) Rs.m (100%)	1.01	Rs. Million					
Annual Income from Sewage SC Tariff Collection( Non-domestic/Commercial) Rs.m (100%)	0.00	Rs. Million					
Annual Income from Sewage SC Tariff Collection(Industrial) Rs.m (100%)	0.00	Rs. Million					
<b>Total Income from Sewage</b>	<b>1.01</b>	<b>Rs. Million</b>					
<b>Revenue from New Connection Charges</b>							
New Connection charges for water Supply - Domestic	36.37	Rs. Million					
New Connection charges for water Supply - Non Domestic	0.00	Rs. Million					
New Connection charges for Sewage - Domestic	22.97	Rs. Million					
Less Income from water & sewage tariff of new connection for the first year	7.90	Rs. Million					
Revenue from new connection Charges as additional Revenue in Second Year	59.34	Rs. Million					
<b>Total Revenues</b>	<b>15.05</b>	<b>Rs. Million</b>	<b>7.90</b>	<b>74.39</b>	<b>15.05</b>	<b>15.05</b>	<b>15.05</b>
Assuming 46.7% Collection	7.03	Rs. Million	3.69	34.72	7.03	7.03	7.03
Increment in revenue income /tariff every 5 years	30%	%					
<b>Surplus/(deficit)</b>			<b>(160.50)</b>	<b>(99.82)</b>	<b>(119.89)</b>	<b>(133.00)</b>	<b>(147.52)</b>
Considering Income from Sale of STP water	27.38	Rs. Million	(160.50)	(72.45)	(92.52)	(105.63)	(120.15)
Surplus/(deficit) as percentage of total revenues ( as per 46.7%efficiency)			-4352.50%	-287.52%	-1706.43%	-1893.04%	-2099.72%
Surplus/(deficit) as percentage of total revenues ( as per 100%efficiency)			-2031.31%	-134.18%	-796.39%	-883.48%	-979.94%
Total Revenues assuming 30% increase in tariff from 2011-12(100%)			10.27	78.91	19.57	19.57	19.57
Total Revenues assuming 30% increase in tariff from 2011-12 (47.6%)			10.27	68.47	9.13	9.13	9.13
<b>Surplus/(deficit) with 46.7% collection and 30% increase in tariff from 2011-12</b>			<b>(161.36)</b>	<b>(153.92)</b>	<b>(66.07)</b>	<b>(117.78)</b>	<b>(130.89)</b>
<b>Surplus/(deficit) with 100% collection and 30% increase in tariff from 2011-12</b>			<b>(150.40)</b>	<b>(153.92)</b>	<b>(55.63)</b>	<b>(107.35)</b>	<b>(120.46)</b>
IRR			-75.53%	-97.75%	-53.85%	-72.90%	-75.43%
							-77.74%



<b>Preliminary Financial Analysis - Cash Flow Statement - Ilkal</b>								
		Unit	2011-12	2012-13	2013-14	2014-15	2015-16	
<b>Provision of new HSC</b>								
Cost of Provision of New Water Supply Connections	7.92							
Cost of Provision of New Sewage Connections	7.5							
<b>Total</b>	<b>15.42</b>		<b>15.42</b>					
<b>O&amp;M Expenditure</b>								
O& M Expenditure of water supply/ Annum	18.10	Rs. Million						
Scenario -2 . Projecting Existing Cost and additional cost of 3% of capex for water supply	7.86	Rs. Million						
O& M Expenditure of Sewage/Annum	7.11	Rs. Million						
O& M Expenditure of Drains	0.00	Rs. Million						
<b>Total O&amp;M expenses of water supply, Sewage &amp; Drain</b>	<b>14.97</b>	Rs. Million	14.97	16.47	18.12	19.93	21.92	
Appreciation of O&M Cost /annum	10.00%	%						
Tariff Collection Charges (Rs /Rs.1m collection) Rs.m/annum	0.00	Rs. Million	0.00	0.00	0.00	0.00	0.00	
Cost Due to Depreciation (2%) in Rs m	0.30	Rs. Million	0.30	0.33	0.36	0.40	0.44	
<b>Total O &amp; M Expenditure/annum</b>	<b>15.27</b>	Rs. Million	15.27	16.80	18.48	20.33	22.36	
<b>Investments &amp; Admin Expenses of O&amp;M Operator</b>								
Office rentals	0.12	Rs. Million	0.12	0.13	0.13	0.14	0.15	
Increment in rentals	5.00%	%						
Staff Salaries & overheads	0.69	Rs. Million	0.69	0.76	0.83	0.92	1.01	
Increment in salaries	10.00%	%						
Initial Investment (Machinery, Communication equipments, establishment charges)	1	Rs. Million	1.00	0.00	0.00	0.00	0.00	
<b>Total Expenditure of Investment &amp; Office expenses</b>			1.81	0.89	0.97	1.06	1.16	
<b>TOTAL OPERATION COST</b>			<b>32.50</b>	<b>17.68</b>	<b>19.45</b>	<b>21.38</b>	<b>23.52</b>	
<b>Total Revenue Requirements</b>			<b>32.50</b>	<b>17.68</b>	<b>19.45</b>	<b>21.38</b>	<b>23.52</b>	
<b>Assuming 10% reduction in O&amp;M cost</b>	10%		29.25	15.92	17.50	19.25	21.16	
<b>Revenues</b>								
<b>Number of Connections</b>								
Number of HSC (Water Supply)	6,262.00	No. of units						
Number of Non Domestic/Commercial	187.00	No. of units						
Number of Industrial	0.00	No. of units						
Number of HSC (Sewage)	5,573.00	No. of units						
Number of Non Domestic/Commercial (assuming 100%)	656.00	No. of units						
Number of Industrial	0.00	No. of units						
Annual Income from water HSC Tariff Collection(domestic) Rs.m (100%)	4.13	Rs. Million						
Annual Income from water SC Tariff Collection(Non-domestic/Commercial) Rs.m (100%)	0.71	Rs. Million						
Annual Income from water SC Tariff Collection(Industrial) Rs.m (100%)	0.00	Rs. Million						
<b>Total Income from Water Supply</b>	<b>4.84</b>	Rs. Million						
Annual Income from Sewage HSC Tariff Collection(domestic) Rs.m (100%)	1.00	Rs. Million						
Annual Income from Sewage SC Tariff Collection( Non-domestic/Commercial) Rs.m (100%)	0.00	Rs. Million						
Annual Income from Sewage SC Tariff Collection(Industrial) Rs.m (100%)	0.00	Rs. Million						
<b>Total Income from Sewage</b>	<b>1.00</b>	Rs. Million						
<b>Revenue from New Connection Charges</b>								
New Connection charges for water Supply - Domestic	4.32	Rs. Million						
New Connection charges for water Supply - Non Domestic	0.00	Rs. Million						
New Connection charges for Sewage - Domestic	1.50	Rs. Million						
Less Income from water & sewage tariff of new connection for the first year	2.93	Rs. Million						
Revenue from new connection Charges as additional Revenue in Second Year	5.82	Rs. Million						
<b>Total Revenues</b>	<b>5.84</b>	Rs. Million	<b>2.93</b>	<b>11.66</b>	<b>5.84</b>	<b>5.84</b>	<b>5.84</b>	
Assuming 46.8% Collection	2.73	Rs. Million	1.37	5.45	2.73	2.73	2.73	
Increment in revenue income /tariff every 5 years	30%	%						
<b>Surplus/(deficit)</b>			<b>(31.13)</b>	<b>(12.23)</b>	<b>(16.71)</b>	<b>(18.65)</b>	<b>(20.78)</b>	
<b>Considering Income from Sale of STP water</b>	<b>9.48</b>	Rs. Million	<b>(31.13)</b>	<b>(2.75)</b>	<b>(7.23)</b>	<b>(9.17)</b>	<b>(11.30)</b>	
Surplus/(deficit) as percentage of total revenues ( as per 46.8%efficiency)			-2273.99%	-224.29%	-611.72%	-682.65%	-760.66%	
Surplus/(deficit) as percentage of total revenues ( as per 100%efficiency)			-1063.09%	-104.86%	-285.98%	-319.14%	-355.61%	
Total Revenues assuming 30% increase in tariff from 2011-12(100%)			3.81	13.42	7.60	7.60	7.60	
Total Revenues assuming 30% increase in tariff from 2011-12 (46.8%)			3.81	9.37	3.55	3.55	3.55	
<b>Surplus/(deficit) with 46.8% collection and 30% increase in tariff from 2011-12</b>		(22.54)	(28.69)	(8.31)	(15.89)	(17.83)	(19.96)	
<b>Surplus/(deficit) with 100% collection and 30% increase in tariff from 2011-12</b>		(18.29)	(28.69)	(4.27)	(11.85)	(13.79)	(15.92)	
IRR			-47.89%	-95.79%	-15.54%	-37.19%	-42.88%	-48.06%



## Annexure – 6: Checklist for Acceptance of Report of Pre-Feasibility Studies

**Project Name:** Pre-feasibility study for carrying out O&M of Water Supply, Sewerage & Storm Water drains (WSS &SW) on Public Private Partnership (PPP) basis for 10 cities/towns in Karnataka

**Consultant:** KSIIDC-IL&FS Project Development Company Limited

Sr. no.	Particulars	Yes/ No	If Yes, Section no. & Page no.
1	<b>Introduction</b>		
	Project Background (if any) & Idea	Yes	Section No. 1.1 (Page 4)
	Approach & Methodology	Yes	Section No. 1.3 (Page 6)
<b>Note:</b> This report covers details pertaining to six city municipal corporations, the sections (starting with section number 2) & page numbers mentioned in this table refers to first –Hospet CMC. Similar information is covered for all other 5 towns/cities.			
2	<b>Sector profile</b>		
	Industry Overview	Yes	Section 1.6 & 2.2 (Page8 & 13)
	Regional /City Profile	Yes	Section 2.1(Page 11)
	Key Issues	Yes	Section 2.3 & 2.8 (Page 19 & 31)
3	<b>Project Concept</b>		
	Description of the project	Yes	Section 1.2 & 1.4 (Page 4 & 7)
	Components of the project	Yes	Section 1.5 , 2.2& 2.6 (page 7 ,13 & 25)
	Site (as applicable)	No	N.A.
4	<b>Market Assessment</b>		
	Industry Outlook	Yes	Section 2.4 (Page 21)
	Opportunity for the project	Yes	Section 2.7 & 2.8 (Page 29 -31)
	Preliminary projections	Yes	Section 2.6 & 2.7 (Page 20)
5	<b>Statutory &amp; Legal Framework</b>		
	Applicable Law	Yes	Annexure 3 (Page 178)
	Keys Issues	Yes	Section 2.11 &2.12 (page 36 -37)
6	<b>Environmental and Social impacts</b>		
	Environment impacts	NA	NA
	Social impacts	Yes	Section 2.3.3 & 2.12.1 (page 20 & 37)

Sr. no.	Particulars	Yes/ No	If Yes, Section no. & Page no.
	Mitigation Measures	Yes	section 2.12.1 (page 36 -37)
7	<b>Preliminary Project Financials</b>		Section 2.9 (page 31-34)
	Cost Estimation	Yes	Section 2.9.5 & 2.9.6 (Page 33 - 34)
	Revenue streams	Yes	Section 2.9.8 & 2.10.2 (Page 35 & 36)
	Preliminary Viability Assessment	Yes	Section 2.10 (Page 35-36)
	Scenario Analysis (as applicable & where possible)	Yes	Section 2.10.1 & 2.10.2 (Page 35 - 36)
8	<b>Operating Framework</b>		
	Risk & Mitigation	Yes	Section 2.12.1 (Page 37-38)
	Indicative Project Structure	Yes	Section 2.12 (Page 37-38)
	Indicative Qualification & selection Criteria (where possible)	No	
	List/profile of prospective developers	No	
9	<b>Way Ahead</b>		
	Project Development Needs	Yes	Sections 2.8, 2.9 & 2.11 (page 31-36)
	Government Obligations	Yes	Section 2.11 & 2.12.1 ( page 36 & 38 )
	Project Development time frames	No	
10	<b>Establish in the Inception Reports</b>		
a	Whether the infrastructure in question comprises of public good/service	Yes	Section 2.3 (Page 19)
b	Whether the user is willing to pay	Yes	Table 2.9 & Section 2.9.4 (page 24 & 27)
c	If the project can be taken up under PPP	Yes	Section 2.10 & 2.11 (Page 35 & 36)
d	The possible revenue streams based on footfall/demand analysis	Yes	Section 2.9.8 & Annexure 5 (Page 35 & 183)
e	Whether the project takes care of future growth demand	Yes	Section 2.6 & 2.9 (Page 25 & 31)
f	Traffic impact	NA	NA
g	Learning from similar projects else where	Yes	Section 1.6 & Annexure – 1 (page 8 & 172)
h	The policy changes required	Yes	2.11 & 2.12 (page 36 -38)

**Pre-feasibility study for carrying out O&M of Water Supply, Sewerage & Storm Water drains (WSS &SW) on Public Private Partnership (PPP) basis for 6 CMCs in Karnataka: Final Report**

Sr. no.	Particulars	Yes/ No	If Yes, Section no. & Page no.
11	<b>Establish the issues that may stall the project, viz</b>		
a	Environmental	NA	NA
b	People/ local issues	No	
c	Statutory issues	Yes	Section 2.11 & 2.12 (page 37 – 38)
d	Public hearing if required	NA	NA
e	The study should examine the value chain where mainstreaming of PPP is done	No	
f	Asset creation & maintenance	Yes	Section 2.9.3 & 2.9.6 (page 32 & 34)
g	Operation & maintenance	Yes	Section 2.9.4 (page 32)
h	Any other	Yes	Section 2.10.2 (page 35)
12	Make sure & confirm that, there is no duplication of the identified projects or proposals under other government	Yes	Section 1.7 (page 9) & Annexure 4 (page 182)
13	Check the project's impact on the economy of the local areas	No	
14	Ascertain that, the asset (land, etc.) is available with the Government agency.	Yes	Section 2.6 ( page 25)
15	ADD: Any clauses as per the Terms of Reference Document	Yes	Section 2.12.2 (page 37-39)
16	Are the project locations evenly distributed across the state, balancing north & south	Yes	5 towns in the North Zone & 5 towns in the central & South Zone
17	5 hard copies and 2 CD/soft copy	Yes	
18	If IIPDF documents submitted	NA	