Infrastructure Development Department (IDD)

GOVERNMENT OF KARNATAKA

Institutional strengthening & Sector Inventory for PPP Mainstreaming in Directorate of Municipal Administration (DMA)

Preliminary Feasibility Report

Chitradurga District – 6 Towns

Water distribution network for six towns in Chitradurga district on PPP Mode

July 2012

ICRA Management Consulting Services Limited

Contents

Exhibits

Abbreviations and Acronyms

IDD	Infrastructure Development Department
DMA	Directorate of Municipal Administration
GoK	Government of Karnataka
IMaCS	ICRA Management Consulting Services Limited
INR	Indian Rupees
IRR	Internal Rate of Return
TMC	Town Municipal Council
LPCD	Litres per capita per day
MLD	Million Litres per Day
MGD	Million Gallons per Day
TP	Town Panchayat
O&M	Operation & Maintenance
PPP	Public Private Partnership
DBFOT	Design-Build-Finance-Operate-Transfer
KUWSDB	Karnataka Urban Water Supply and Drainage Board
ULB	Urban Local Body
SPV	Special Purpose Vehicle
TOR	Terms of Reference
FDI	Foreign Direct Investment
NPV	Net Present Value

Executive Summary

The Government of Karnataka has identified Public Private Partnerships (PPPs) as one of the key elements of its infrastructure development strategy. GoK, through its Infrastructure Development Department (IDD) has initiated an exercise for Institutional strengthening and developing "Institutional Strengthening & Sector Specific Inventory for PPP Mainstreaming" across a number of departments and sectors. Under this initiative, the Department of Municipal Administration (DMA) has been identified as a nodal agency for urban infrastructure projects in Urban Local Bodies (ULBs) other than Bangalore Metropolitan Area.

In view of the above, GoK has appointed M/s ICRA Management Consulting Services Limited (IMaCS) as transaction advisors for Directorate of Municipal Administration. The objective of this report is to provide the assistance to develop pre-feasibility study.

Chitradurga District has six urban centres with urban population across towns ranging from 0.17 to 1.4 Lakh (Census 2011). Presently urban centres of Chitradurga are mainly facing the problem of shortage of safe and clean water and inadequate water supply distribution infrastructure. To augment source and phase out ground water with sustainable and safe surface drinking water, an integrated approach to bulk water development and management both for rural and urban areas of Chitradurga District has been considered under Kanada Ganga Phase – I. Presently, the water is supplied twice or thrice in a week for 1-2 hours and the population coverage for water supply varies from 13% to 82% in the urban centres which shows the poor condition of the distribution network. Subsequently, to leverage the benefit of Bulk Water Scheme in order to provide adequate water to people, improvement in distribution network becomes critical.

Thus to cater to this current and increasing water demand, this report explores the possibility of management of the local distribution of water in 6 towns in the district through a PPP arrangement covering end-to-end assistance including rehabilitation of storage, pumping, distribution network, provision of water supply connections and billing/collection services to ULBs.

The Present deliverable has been prepared as a Preliminary Feasibility Study with an objective to provide an insight of financial viability of the envisaged project – "Management of the local distribution of water in 6 towns in the district through a PPP arrangement covering end-to-end assistance including rehabilitation of storage, pumping, distribution network, provision of water supply connections and billing/collection services to ULBs".The report also presents various project structuring options, applicable laws & acts with legal and regulatory framework which shall be considered while implementing the project through PPP Mode. The report concludes with recommendations on the project structure and concession period considering the financial viability and nature of the project.

Two Scenarios have been considered for developing Project. These are:

S.No.	Component	Individual Cities (Scenario 1)	Cluster (Scenario 2)
1	Bid Variable (Rs. /KL)	Rs. 6 to 10 / KL	Rs. 8 / KL
2	IRR (%)	15.06% to 15.97%	16.40%

The way ahead for the project has been analyzed and it is recommended that the key task for all the ULBs is to select Transaction Advisor, which would develop Detailed Project Report (DPR) for the project which would allow development of realistic cost estimates. After this transaction advisor will facilitate selection of the Private Player.

1. Introduction

1.1 Project Idea

The Government of Karnataka has identified Public Private Partnerships (PPPs) as one of the key elements of its infrastructure development strategy. To build capacity across various departments for conceptualizing, developing and implementing PPP projects, GoK, through its Infrastructure Development Department (IDD) has initiated an exercise for Institutional strengthening and developing sector level inventory for mainstreaming PPPs across a number of departments and sectors.

Under this initiative, the Department of Municipal Administration (DMA) has been identified as a nodal agency for urban infrastructure projects in Urban Local Bodies (ULBs) other than Bangalore Metropolitan Area. The exercise envisages creation of sector level inventory of PPP projects, conduct pre-feasibility studies for 5 projects (with potential for replication in rest of the state), maintenance of an MIS on PPP projects in the sector.

In view of the above, Infrastructure Development Department (IDD), GoK has appointed Ms. ICRA Management Consulting Services Limited (IMaCS) to assist DMA in developing five projects in urban sector context.

Under this initiative, DMA, 6 towns' ULBs & IMaCS have taken up the concept to explore the management of the local distribution of water in 6 towns in the district through a PPP arrangement covering end-to-end assistance.

Chitradurga District has six urban centres with urban population across towns ranging from 0.17 to 1.4 Lakh (Census 2011). Currently, the water is supplied twice or thrice in a week for 1-2 hours and the population coverage varies from 13% to 82% in the urban centres.

To phase out ground water with sustainable and safe surface drinking water, an integrated approach to bulk water development and management both for rural and urban areas of Chitradurga District has been considered under Kanada Ganga Phase – I. Thus, to leverage the benefit of Bulk Water Scheme in order to provide adequate water supply to people; improvement in distribution network becomes critical.

Thus to cater to this current and increasing water demand, this report explores the possibility of ***management of the local distribution of water in 6 towns in the district through a PPP arrangement covering end-to-end assistance including rehabilitation of storage, pumping, distribution network, provision of water supply connections and billing/collection services to ULBs***.

For consensus building, meetings and discussions with IDD, DMA, ULBs in Chitradurga district and KUWSDB were held to take a go-ahead on developing and exploring sustainability of the project.

1.2 Scope of Work

The scope of this report includes:

1. Assessing Preliminary Feasibility of the envisaged project which includes:
    a. Sector Profiling and identifying the need water management its importance in developing countries.
    b. Overview and profiling of Chitradurga District and its infrastructure with respect to water supply, to understand the supply side for the project

c. Understanding the role and merits and demerits of PPP in water management and its success key factors through case studies.

d. Market Assessment through industry outlook and opportunities and demand projections

e. Preparation of preliminary financial model to explore the viability of the project on PPP mode in a sustainable manner.

f. Understanding the statutory and legal framework which prevails in this project and identifying the policy issues which may slow down the process of implementation of the project on PPP mode.

g. Identifying environmental and social impacts of the project and to suggest mitigation measures to overcome these impacts.

h. Preliminary recommendations of possible Project Structure & Project Development Framework; which includes, structure of PPP, identification of components for PPP, Benefits, risks and mitigation etc.

2. Laying the path for Way Forward which would include:

a. Prepare Procurement Plan for Selection of Transaction Advisors/ Technical Consultant for the project

b. Development of TOR for Transaction Advisor/ Technical Consultant

1.3 Approach

The approach and methodology adopted in assessing the feasibility of this project is as set out below:

1.4 Methodology

1.4.1 Project Conceptualisation

- **Sector Profile and Industry Overview**: Sector Profile details out the overview of the sector, key issues, need of project etc. As a part of secondary research, regional profile has been understood. The consultations with various stakeholders were also done to get an in-depth understanding of various issues pertaining to the project.
- **Study of Existing Infrastructure & Demand Estimation**: In order to know the marketability of the project, analysis of demand supply scenario of project components were conducted. The identified sites were studied in order to understand its suitability potential for the envisaged project.
- **Case Studies:** Case studies of similar project executed elsewhere were conducted to understand its various technical, legal and financial aspects.

1.4.2 Operational Framework

- **Risk Analysis**: Critical risk factors involved in the project, their impact & likelihood, and potential mitigation measures were analysed.
- **Project Structuring**: Various options for structuring the transaction, having varying possibilities of risks and liabilities for different parties of transaction were examined and the most suitable option has been recommended.

1.4.3 Financial Viability

Based on the data collection, analysis and discussions with stakeholders concerned, a preliminary financial model was prepared. Suitable assumptions regarding the cost, revenue and expenses were made. The financial feasibility analysis consists of:

- **Cost Estimation:** The cost of implementing the conceptualized project was derived. The base cost for O&M was arrived at after analyzing expenditure pattern for the similar projects which are already operational.
- **Revenue Projections:** Revenue projections were done based on projected demand and base price. An appropriate escalation was applied for the projection of revenue in upcoming years.
- **Financial Viability Assessment:** Financial analysis was undertaken to understand the project's potential to generate sufficient returns in order to make it a commercial venture. Financial indicators like Internal Rate of Return (IRR) have been analyzed to estimate the project's viability.
- **Scenario Analysis:** The analysis of various cases like variation in revenue or project cost and corresponding Project IRR was done.

1.5 Study of earlier reports in this sector in the relevant area

'Public Private Partnerships for Urban Water Utilities – a review of experience in developing countries' of the World Bank and PPIAF has been studied in detail to look at spread of the PPPs in urban water supply and also to understand PPP Philosophy and models.

A case study of Karnataka; 24*7 water supply in Hubli-Dharwad, Gulbarga and Belgaum have been studied in detail to realize the key aspects and benefits of the projects.

1.6 Report structure and contents

The report has been prepared based on information provided by ULBs of Chitradurga District and Karnataka Urban Water Supply and Drainage Board (KUWSDB) and is organised along the following sections:

1. Introduction
2. Sector profile
3. Existing Water Supply Infrastructure
4. Case Studies and Best Practice
5. Project Brief
6. Risk Analysis, Project Structuring and Bid Variable
7. Project Financials
8. Statutory & Legal Framework
9. Indicative environmental & social impacts
10. Way Ahead

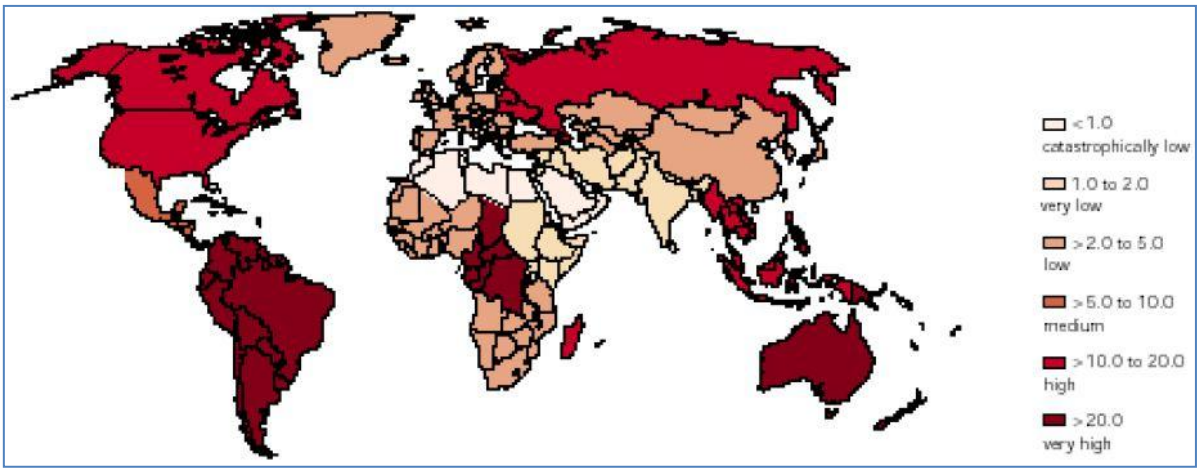
2. Sector profile

2.1 Sector overview

Water-related problems are increasingly recognized as one of the most immediate and serious environmental threats to humankind. Water use has more than tripled globally since 1950, and one out of every six persons does not have regular access to safe drinking water. Lack of access to a safe water supply and sanitation affects the health of 1.2 billion people annually (WHO and UNICEF, 2000). The latest Global Environment Outlook of the United Nations Environmental Programme (UNEP) reports that about one third of the world's populations currently live in countries suffering from moderate-to-high water stress, where water consumption is more than 10% of renewable freshwater resources. Exhibit 2-1 shows, many countries in Africa and Asia have very low or catastrophically low water availability (UNEP, 2002a).

These problems may be attributed to many factors. Inadequate water management is accelerating the depletion of surface water and groundwater resources. Water quality has been degraded by domestic and industrial pollution sources as well as non-point sources. In some places, water is withdrawn from the water resources, which become polluted owing to a lack of sanitation infrastructure and services. Over-pumping of groundwater has also compounded water quality degradation caused by salts, pesticides, naturally occurring arsenic, and other pollutants. In urban areas, demand for water has been increasing steadily, owing to population growth, industrial development, and expansion of irrigated peri-urban agriculture. Population growth in urban areas is of particular concern for developing countries. Population growth is expected to occur in developing nations, as developed regions are projected to see their population decrease by 6% over the next 50 years. Meanwhile, the rural population is expected to stabilize at around 3.2 billion (from 2.97 billion today), indicating that the growing population will settle in urban areas (WHO and UNICEF, 2000). Many parts of the world are facing changes in climatic conditions, such as rainfall patterns, flood cycles, and droughts, which affect the water cycle.

Exhibit 2-1 Water availability in 2000 (Measured in terms of 1000m^3 per capita/year)



Source: UNEP, 2002a

India, a developing nation with increasing economic growth shows that population growth, urbanization, industrialization and water-intensive agriculture will act as drivers for increased water usage in future. It is expected that population of India would increase from 1.21 billion in 2011 to 1.66 billion by 2050; urban population would grow from 27.8% of the total population in 2011 to 55.2 % by 2050. Thus, the overall economic and population growth in India would put water stress on the road of success.

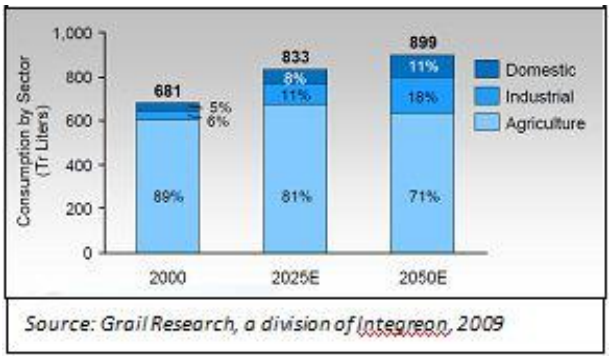
Exhibit 2-2 shows the comparison of per capita clean water availability in the future.

The estimated demand of water over the coming years shows the decreasing quantity of clean water and increasing demand of clean water. By 2050, it has been estimated that the demand of clean water would be equivalent to the availability of clean water, thus putting stress over other sectors.

Exhibit 2-2 Comparison of Per Capita Clean Water Availability and Demand in India (1997–2050E)

Exhibit 2-3 shows the water breakdown in India by Sectors from 2000 to 2050. The graph shows the steep increase in the domestic & industrial use. Thus, it can be concluded that, the huge demand for clean water will be contested in future.

Exhibit 2-3 Water Breakdown in India by Sector (2000-2050E)



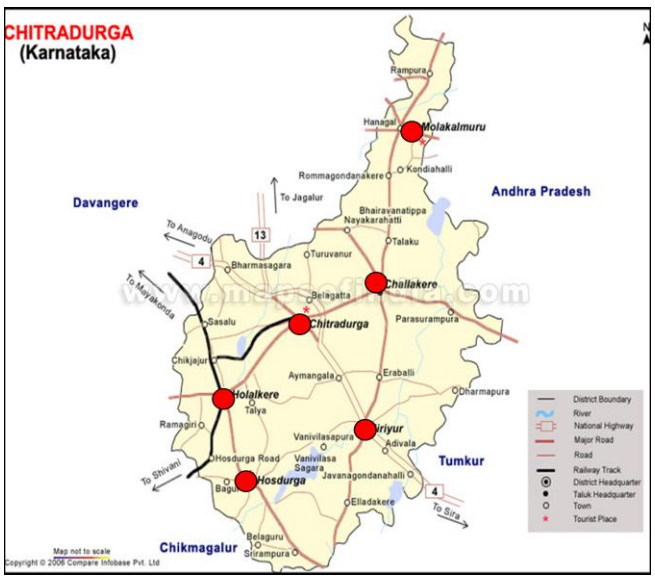
Faced with these challenges, there is an urgent need to improve the efficiency of water consumption, and to augment the existing sources of water with more sustainable alternatives. Efficient operation and maintenance with minimal losses of water also become key factors for improved water supply service.

2.2 Regional profile

Chitradurga district is an administrative district of Karnataka state in southern India. The city of Chitradurga is the district headquarters. Chitradurga gets its name from Chitrakaldurga an umbrella-shaped lofty hill found there. The whole district lies in the valley of the Vedavati River, with the Tungabhadra River flowing in the northwest.

According to the 2011 census Chitradurga district has a population of 1,660,378. The district has a population density of 197 inhabitants per square kilometre. Its population growth rate over the decade 2001–2011 was 9.39%. Chitradurga has a sex ratio of 969 females for every 1000 males, and a literacy rate of 73.82%.

Exhibit 2-4: Location of urban centres in Chitradurga District



The topography of the district is hilly, with lots of forts and villages. The district is bounded by Tumkur District to the southeast and south, Chikmagalur District to the southwest, Davanagere District to the west, Bellary District to the north, and Anantapur District of Andhra Pradesh state to the east. Davanagere District was formerly part of Chitradurga. The district is divided into 6 taluks,

namely Chitradurga, Hiriyur, Hosadurga, Holalkere,Challakere and Molakalmuru. It is rich in mineral deposits, including gold prospecting at Halekal, Kotemardi or Bedimaradi, etc., and open cast copper mines at Ingaldhal.

The district has 6 urban centres i.e. Chitradurga (CMC), Hiriyur (TMC), Challekere (TMC), Hosadurga (TMC), Holalkere (TP) and Molakalmuru (TP) are responsible for provision of water supply to the citizens.

Exhibit 2-5: Population of urban centres in Chitradurga District

S.No.	City	ULB	Population
1	Chitradurga	City Municipal Council	139,914
2	Hiriyur	Town Municipal Council	56,856
3	Challakere	Town Municipal Council	57,000
4	Hosadurga	Town Municipal Council	28,000
5	Holalkere	Town Panchayat	17,000
6	Molkalmuru	Town Panchayat	17,000
	Total		**315770**

Source: Census of India, 2011 (provisional data)

Chitradurga city has the highest population out of all the urban centres in the district, with lowest population in Holalkere and Molkalmuru.

2.3 Development Needs, Public needs & Planning Considerations

To overcome the shortage of water and impede usage of ground water, a scheme of Bulk water supply worth Rs. 2274 Crore has been proposed in Chitradurga and Bijapur districts for improving water supply provisioning under GoK's proposed Kannada Ganga Scheme. It has been found that the distribution network for water supply is inadequate in the cities as currently the population coverage of varies from 13% to 82% and frequency of water supply is irregular which varies from twice to thrice in a week for 1-2 hours. Subsequently, to leverage the benefit of Bulk Water Scheme in order to provide adequate water to people, improvement in distribution network becomes critical.

Also, lower urban population across towns ranging from 0.17 to 1.4 lakhs (Census 2011) among 6 towns, will lead to a unsustainable system at town level. Thus, there is a need to explore the management of the local distribution in 6 towns in the district through a PPP arrangement covering end-to-end assistance including rehabilitation of storage, pumping, distribution network, provision of water supply connections and billing/collection services to ULBs.

2.4 Key Issues

The major issues related to water supply in urban centres of Chitradurga district mainly include:

- **Shortage of safe and clean water:** Depleting ground water and further increase in contaminants in ground water poses a threat to the health of the citizens. To overcome this problem and provide adequate water, a scheme of Bulk water supply in Chitradurga and Bijapur districts has been proposed for improving water supply provisioning; which take care of augmentation of water.
- **Inadequate Water supply distribution infrastructure:** Inadequate distribution infrastructure which has further led to lower levels of indicators such as infrequent supply of water, and low population coverage need to be taken care by rehabilitating the existing infrastructure as detailed out in this report.

3. Existing Water Supply Infrastructure

This section gives a description of existing water supply system in 6 cities/ towns named Chitradurga, Hiriyur, Challakere, Hosadurga, Halalkere and Molkalmur of Chitradurga District.

3.1 Water Sources in Chitradurga District

Chitradurga district, located in southern region of Karnataka, located around 200 km from state capital has an area of 8449 sq Km which is approximately 4.4 % of the state area. Chitradurga district falls in Krishna Basin and has several streams and a rivers passing through it. But even then Chitradurga District has been identified as drought prone area with scanty rainfall received over 30 - 45 days in a year. At present, population of the district is highly dependent on ground water for various purposes.

Chitradurga district is drained mainly by the Vedavathi River which runs for a length of about 129 kms in the district. The Vedavathi River joins Tungabhadra River and it further meets the Krishna River in Andhra Pradesh. The other major streams in the district are Janagahalla or Chikkahagari, Swarnamukhi, Syagalahalla, Garani and the Nayakanhatti stream. As per ground water resource estimation studies (2004), Chitradurga district is over exploited with a groundwater draft of 59270 ham as against the available resource of 57623 ham thus the stage of ground water development in the district is 103%. Major part of the district is falling under overexploited category.

Karnataka State is one of the states suffering from presence of high fluoride, nitrate and salinity contents in the ground water. Efforts have been made in the past to solve this problem through various types of schemes. However, due to increasing drawl from ground water sources, poorer recharges due to lesser rainfall, fluoride and salinity contents have been reported to be increasing continuously. Chitradurga is progressively coming under the influence of ground water quality deterioration on large scale. Fluoride, salinity, hardness, iron, nitrate are the main contaminants observed in this district.

3.2 Existing Water Supply Infrastructure

Safe drinking water is essential and a fundamental right for human being. It has been considered in the state that dams would be appropriate source for drinking water as compared to ground water due to presence of high level contaminants. To phase out ground water with sustainable and safe surface drinking water, an integrated approach to bulk water development and management both for rural and urban areas of Chitradurga District has been considered under Kanada Ganaga Phase – I. Government has already ordered for the implementation of the project based on the Techno-Economic Feasibility Report (DPR). Under this project, after various considerations and alternative has been developed. In this Raw water will be directly conveyed from Bhadra Reservoir to existing and proposed WTPs. Raw water will be conveyed 12 months operational. With 533 km long transmission line, the project cost is Rs 2274 Crore.

Existing water supply infrastructure in the cities/ towns of Chitradurga District is not sufficient supply of water. And with the implementation of Kanada Ganga Phase – I project it becomes more important to upgrade the distribution system of the cities, so that high cost spent on bringing raw water from a long distance be actually be translated into getting rid of water crisis for the citizens.

The existing water supply infrastructure of 6 cities/ towns of Chitradurga District has been shown in Exhibit 3-1.

Exhibit 3-1: Existing Water Supply Infrastructure of 6 cities

S. No.	City	Source				Water supplied through Borewells (MLD)	WTP	Distribution Infrastructure		No. of Water Connections (Residential)
		Name	Distance (kms)	Capacity Designed (MLD)	Actual Quantity pumped		Capacity	Storage Reservoirs	Network Length (Km) (Existing/ Ongoing)	
1	Chitradurga	Yedavathi River	42	9.08	7.5	1.5	9	6 (10 LLs) & 4 (5 LLs)	135	15023
		Shanthi Sagar Reservoir	65	33.26	15					
2	Hiriyur	Yedavathi River	2	4.54	3.6	0.5	4.54	3 (4.54 LLs)	15.5	4217
3	Challakere	Borewells	-	5.3	2.25	2.25	3.63	1 (10 LLs) 7 1 (4.54 LLs)	26.2	1013
4	Hosadurga	Yedavathi River	7	4	4	0.4	-	1 (5 LLs) & 2 (2.5 LLs)	28.8	2537
5	Holalkere	Shanthi Sagar Reservoir	26	1.68	1.26	0.1	WTP of Chitradurga	1 (2.5 LLs) & 1 (0.5 LLs)	20	1869
6	Molkalmuru	Rangayanadurga Reservoir	13	1.6	0.36	0.35	1.6	-	10.2	1313

3.2.1 Chitradurga City

Chitradurga city is the Headquarter of the district with the highest urban population. In 1973, the first water supply scheme of 9 MLD was commissioned with Vedavathi River as source. The scheme was designed for the projected population of 70,000 for the year 1991 at 100 lpcd.

With the increasing population rise in drinking water demand, second stage water supply scheme to Chitradurga city with Shanthi Sagar source was taken up. It got sanctioned in 2002, which is designed for supplying water to Chitradurga city, Holalkere and Jagalur and enroute villages. The scheme is designed for the projected population for the year 2033. The scheme got commissioned during May – 2008 and has been handed over to Chitradurga CMC. The components of the scheme include Head Works at the source, transmission of raw water, 40 MLD capacity WTP, feeder mains and RCC reservoirs (6 of 10 LLs and 4 of 5 LLs) within the city and 135 kms of distribution network.

3.2.2 Hiriyur Town

In 1989, a scheme was commissioned for water supply to Hiriyur town with Vedvathi River as a source at a distance of 2 kms. With the implementation of this scheme, the town has a WTP with capacity of 4.54 MLD, OHTs and distribution network of 15.5 kms.

There is one proposed scheme for Hiriyur town (including Challalkere and enroute villages) designed for the population of year 2041 with a source at Vani Vilas Sagar at Vedavathi River at a distance of 18 kms from the town. The main components of the scheme include; Raw water transmission, WTP with the capacity of 12.54 MLD considered at 135 lpcd, 3 OHTs of 10 LLs & 5 OHTs of 5 LLs and 60 kms of distribution network.

3.2.3 Challakere Town

At present, water is supplied through borewells at 6 places on outskirts of town with the present rate of 35 lpcd. First water supply scheme with 5 borewells at Nagramgere Tank bed and Tayagraja nagar with discharge of 0.52 MLD was insufficient. Thus, the system was augmented with second stage water supply scheme in 1982 with main components including 3 borewells at Kanchamanahalla and 6 borewells at Ajjayanakere, along with 1 OHT of 4.54 LL and distribution network of 16 kms.

In 1997, the water supply infrastructure became insufficient. Thus, a third stage water supply scheme was introduced and it got commissioned in 2001 for the discharge of 3.63 MLD. The components include; 8 borewells at Karekalkere Tank bed, 1 OHT of 10 LL and distribution network of 10.2 Kms. Recently to augment water supply in the town one more scheme along with Hiriyur town has been proposed. Its main components include raw water transmission, 18.18 MLD WTP, 3 OHTs of 10 LL and 3 of 5 LL and 56 kms of distribution network.

3.2.4 Holalkere Town

First water supply scheme was commissioned in 1986 with borewells at Kesarukatte tank bed as source. It was designed to discharge 1.4 MLD of water along with 7 borewells, 2 OHTs of 2.27 LL and a distribution network of 14.9 Km. With the increasing population, in 2008 second water supply scheme was commissioned for design period of 2031. The main source of the water is Shanthi Sagar Reservoir for the town at a distance of 65 kms. The water is supplied at a rate of 70 lpcd through a WTP of Chitradurga WSS at Hirekandawadi at a distance of 25 kms from the town and existing borewells at Kesarukatte tank bed in Holalkere Town. This scheme has been implemented. At present, the town has 1 OHT of 2.50 LL, 1 GLSR of 0.5 LL and distribution network of 20 kms.

3.2.5 Hosadurga Town

First water supply scheme in Hosadurga town was commissioned in 1983 with a source at borewells drilled at Vedavathi River near Kellodu village, but later on this scheme was abandoned. At present, water is supplied through a newly constructed RCC vented Dam across Vedavathi River near Kellodu village at a distance of 7kms from Hosadurga, which was implemented under a scheme which was commissioned in 2005. Total water supply to the town is 4 MLD. The town has 1 OHT of 5 LL and 2 GLSR of 2.5 LL. The total distribution network of the town is 28.8 kms.

3.2.6 Molalkarmuru Town

First water supply scheme was commissioned in 1988 with a source of 6 borewells located within the town. It was designed for supplying 0.9 MLD and the components were 1 OHT of 4.54 LL and distribution network of 10.2 kms. The discharge of water was very less thus second stage water supply scheme was commissioned in 2003. In this borewells at Davalappanakunte tank bed was source and it was designed for 1.38 MLD, but it was able to dischare 0.3 MLD only. The main components of the scheme were 11 borewells, 1 OHT of 5 LL and distribution network of 11.6 kms. One more scheme was commissioned in 2008 with a source at Rangayanadurga Reservoir at a distance of 13 kms. It has been designed to discharge 1.6 MLD but due to power unavailability pumping of water is done for very less hours thus discharging only 0.36 MLD. At present, town gets water at the rate of 70 lpcd. Town has a WTP with 1.6 MLD capacity, which is at a distance of 3 kms.

3.3 Service Level Indicators

Exhibit 3-2 shows the service level indicators of the cities of Chitradurga district. It has been observed that frequency of water supply is very low in all the cities.

Exhibit 3-2: Service Level Indicators

S.No.	City/ Town	Indicators		
		supply per capita (lpcd)	Frequency/ Hours of supply	Population Coverage (%)
1	Chitradurga	135	Thrice in a week (1 hour)	81%
2	Hiriyur	90	Twice in a week (1.5 hours)	58%
3	Challakere	35	Thrice in a week (1 hour)	13%
4	Hosadurga	70	Thrice in a week (2 hour)	68%
5	Holalkere	70	Twice in a week (1.5 hours)	82%
6	Molkalmuru	70	Twice in a week (2 hours)	58%

3.4 Water Tariff and revenue collection

Exhibit 3-3 shows the current water tariffs of the urban centres of Chitradurga district.

Exhibit 3-3: Water Tariffs

S.No.	Type of Connection	New Connection (Rs/ Connection)	Tariff Before April 2012 (Rs/ Month)	Tariff wef April 2012 (Rs/ Month)
1	Residential	2000+one year advance + road cutting charge	45	120
2	Commercial		100	500
3	Industrial		100	500

4. Case Studies and Best Practice

4.1 Overview of city water supply and its management on PPP Models

Provision of water supply infrastructure has traditionally been the domain of the government. However, with increasing population, and constrained resources the government's ability to adequately address public needs through the traditional means has been hampered. This has led governments to look into joining hands with the private sector for provision of public infrastructure on a partnership mode of implementation and operations i.e. through Public Private Partnerships (PPPs).

PPP model benefits the government and the consumers by bringing in innovation, finances, efficient functioning, technology edge, and moreover, it redefines the fundamental way of asset creation while linking it with a focus on service delivery.

While over 30 projects have been bidded out for provision of water infrastructure through PPPs, about 20 projects have been grounded. These projects can be categorised broadly into 1) Bulk, 2) Distribution and 3) Integrated segments. While bulk and integrated segments largely require huge capital investments, distribution PPPs focus sharply on improvement of distribution network and enhancing the services levels. Exhibit below shows the segment coverage for various PPP projects in India.

Exhibit 4-1: PPP Projects in Water Sector in india

Segment	Project Name	Type of PPP Model	Project Duration	Capital Investment by Private operator	Current Status	Comments
Bulk / Industrial	Haldia	Concession (Brownfield BOT)	25 years from 2008	Yes (100%)	Construction / O&M in parallel	
	Tirupur	Concession (BOOT)	30 years from 2005	Minimal	O&M	Project facing low demand.
Integrated	Khandwa	Concession (BOT)	25 years from 2009	Yes (20%)	Rehabilitation in progress	
	Shivpuri	Concession (BOT)	25 years from 2009	Yes (20%)	Rehabilitation in progress	
Distribution O&M	Mysore	Management Contract	6 years from 2009	No	Construction / O&M in parallel	Baseline information in huge divergence with what was envisaged in RfP. Financial provisions restricting City wide rehabilitation
	Hubli-Dharwad, Bailgam & Gulbarga	Management Contract (Pilot)	4 years from 2005	No	Completed	Enhanced service levels achieved for 24*7 and all performance parameters met
	Nagpur Pilot	Management Contract (Pilot)	5 years from 2005	No	Pilot Project Completed, citywide is bidded out	Enhanced service levels achieved for 24*7

In Chitradurga district, given the context that provision of Bulk Water Supply exists and is under implementation, thus the project proposed through this Pre feasibility report would focus on upgradation of distribution networks. The case study and benefits reaped from the Hubli Dharwar

Gulbarga and Belgaum (Karnataka) pilot 24*7 projects is discussed below. Rational for taking these towns as case study is:

1. Comparative population targeted for 24*7 and State context is similar
2. Towns were targeted for improvement of distribution network and the bulk supply was not in the ambit of the project
3. These are completed projects and benefits are clearly captured and visible

4.2 Case Study - Hubli Dharwad, Gulbarga & Belgaum - 24*7

Background

These towns had only about 50% households with direct access to drinking water within their premises, and hence there was a huge scope of improvement of distribution infrastructure. In this context, Karnataka Urban Water and Sanitation Improvement Program (KUWASIP) initiated selection of a private partner who would be responsible for making improvements to the existing distribution systems within few zones (known as demo zones) within the municipal wards in these cities. Karnataka Urban Infrastructure Development & Finance Corporation (KUIDFC) acted as the nodal agency of the State Government to undertake multilateral assisted and financed infrastructure projects. The Karnataka Urban Water Supply & Drainage Board (KUWSDB), a statutory entity of the State partied to this contract and was responsible to supply bulk water at the entry points to these demo zones. Given this context, a private operator was selected for the project.

Key Aspects of the Contract: Private

Player was mandated to:

- Prepare an Investment Plan for approval
- Do preparatory works during implementation period
- Take-up the construction activities
- On expiry of implementation period, do the operation and maintenance for the entire period
- Payment was linked to various performance indicators

Benefits realised from the Project

- Revenue gone up from Rs. 3.5 Crores to Rs. 16 Crores.
- The loss in the demo zone was cut down to about 3% against 50% in non-demo zones.
- Nearly 3120 new connections were added in Hubli Dharwad cities
- Due to increased pressure, the water now reaches upto 20 feet without need for water to be stored in overhead tanks or to be pumped with electric motors as is usually done in the urban areas elsewhere in the State.
- Almost all public stand posts are now removed except a few more for the purpose of usage for non-drinking purpose or for use by cattle etc.
- Due to availability of water 24 hours all through the week, many people are not storing water any longer.
- Converted many unauthorized connections to authorized connections
- With 24/7 supply, the energy cost is saved.

5. Project Brief

5.1 Project Objective

The primary objective of the project is to explore feasibility for the management of the local distribution in 6 towns in the district through a PPP arrangement covering end-to-end assistance including rehabilitation of storage, pumping, distribution network, provision of water supply connections and billing/collection services to ULBs.

5.2 Description of the Project

5.2.1 Project Scope & Components

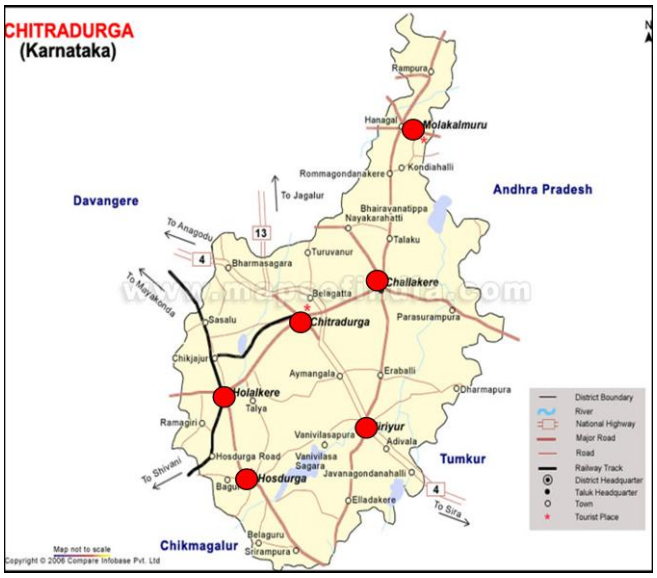
The scope of this project would involve Construction, Operation and Maintenance of Distribution infrastructure in all six towns along with Metering, Billing and collection for services. The detailsed scope is as follows:

- Construction, Operation and Maintenance of Distribution infrastructure in all six towns
  - This would comprise of a preparation of a detailed project report for all six towns to supply at least 135 lpcd water to all residents in all 6 towns throughout the day.
  - Implementation of that DPR including investing in the capital expenditure envisaged
  - Operation and maintenance of the distribution infrastructure for a total of 15 years of concession period
- Metering, Billing and Collection
  - 100 % of all the water consumers would be metered
  - Private operator would be in charge of billing and collection from the end consumer based on volumetric consumption
  - However, the tariffs at which consumer would be billed would be set by the respective ULBs/ cluster.

5.3 Description of the Site

The project has to be implemented in the six cities/ towns of Chitradurga District. The six cities are Chitradurga (CMC), Hiriyur (TMC), Challekere (TMC), Hosadurga (TMC), Holalkere (TP) and Molakalmuru (TP).

Though distances between towns do not facilitate twin city or cluster approach for water supply system. Towns have different water sources and inadequate distribution network with very low service levels. But lower urban populations across towns will lead to an unsustainable system at town level.



5.4 Interaction with Stakeholders

The key stakeholders that would play a role in implementing the above project include the following:

1. **Municipal Bodies:** ULBs of six towns i.e. Chitradurga (CMC), Hiriyur (TMC), Challekere (TMC), Hosadurga (TMC), Holalkere (TP) and Molakalmuru (TP) are responsible for provision of water supply to the citizens.
2. **Karnataka Urban Water Supply and Drainage Board:** The Board aims to provide adequate Water Supply from assured and safe sources of supply and also proper sanitation to all the Urban areas.
3. **Department of Municipal Administration:** Nodal agency for urban infrastructure projects in Urban Local Bodies (ULBs) other than Bangalore Metropolitan Area.

5.5 Studies and surveys already available

Few studies have been taken into consideration for developing this report. These are:

- Techno Economic Feasibility Report for Development of Integrated Drinking Water Supply Project for Chitradurga District, 2011 (KUWSDB)
- Brief Notes on Water Supply & UGD Schemes of Urban Areas of Chitradurga District, 2009 (KUWSDB)

6. Risk Analysis, Project Structuring and Bid Variable

6.1 Introduction

PPP in urban water supply has become an important step to supply water efficiently and effectively in the cities. Thus some key insights and findings from a recent publication 'Public Private Partnerships for Urban Water Utilities – a review of experience in developing countries' of the World Bank and PPIAF has been captured in Box 1.

Box 1: Spread of PPPs in urban water supply

Since 1990, governments in developing and emerging countries have signed more than 260 PPP contracts in the sector and it is estimated that by 2007, PPP projects were supplying water to more than 160 million people in these countries. **Nonetheless, the market share of water PPP projects in developing and emerging countries stands at only about 7% of the total urban population, though it has risen from less than 1 % in 1997 and about 4 % in 2002.**

PPP philosophy / models

A large proportion of the PPPs awarded during the 1990s, particularly in Latin America, focused on attracting private funding and adopted the concession scheme. The early termination of many of these concessions demonstrated the inherent vulnerability of this approach in the volatile economic environment of developing countries. Colombia was the first to depart from the standard concession approach, using the mixed-ownership companies approach or providing public grants to private concessionaires to accelerate investment. Many of these hybrid PPPs had positive results. Several countries experimented with long-term PPPs that combined private operation with public investment, such as leases-affermages, mixed-ownership companies, and management contracts.

More and more countries are adopting a PPP model in which investment is largely funded by public money, with the private operator focusing on improving service and operational efficiency. In the challenging environment of many developing countries, the main focus of water PPP should **not be just about attracting direct private investment, but rather about using private operators to improve service quality and efficiency**. In practice, funding for investment under these mixed-financing **PPP projects comes from a combination of direct cash flows from revenues, with a variable mix of government and private sources that tend to make the traditional dichotomy between leases-affermages and concessions increasingly obsolete.**

Several successful approaches have been developed:

- ***Concessions*** that rely largely on revenue cash flow for investment, with cross-subsidies from electricity sales (Gabon), tariff surcharges (Côte d'Ivoire), or both (Morocco).
- ***Affermages,*** as developed in Western Africa, bolstered by enhanced incentives for operational efficiency, a program of subsidized connections to expand coverage for the poor, and a gradual move to full cost recovery through tariffs (Senegal, Niger, and now Cameroon).
- ***Mixed-ownership companies***, as used in Latin America (Colombia, La Havana in Cuba, and Saltillo in Mexico) and several countries of Eastern Europe (the Czech Republic and Hungary).
- ***Concessions with public grants for investments*** to spearhead access expansion or rehabilitation while minimizing the impact on tariffs. This is typified by the PPPs in Colombia designed under that country's Programade Modernización de Empresas (PME); a similar approach has been adopted in Guayaquil in Ecuador and in a few concessions in Argentina (Cordoba and Salta).

Analysis of overall performance under various models

Often water PPPs have substantially improved service quality, especially by reducing water rationing. A good illustration is provided by the case in Colombia, where private operators have consistently succeeded in improving service continuity in many cities and towns, often starting from highly deteriorated systems. Private operators also have a good track record of reducing water rationing in Western Africa.. Several management contracts also achieved notable progress despite their short duration. This study found that many private operators succeeded in reducing water losses, notably in Western Africa, Brazil, Colombia, Morocco, and Eastern Manila in the Philippines. In some cases, private operators even reduced nonrevenue water (NRW) to

less than 15%, a rate similar to that in some of the best-performing utilities in developed countries. Operational efficiency appears to be the area in which the positive contribution of private operators has been the most consistent.

- The overall efficiency of concessionaires is hard to judge, because they are responsible for both operations and investment. In the case of Manila, a detailed analysis by the regulator showed that the concessionaire in the Eastern zone had significantly improved operational efficiency, while the one in the Western zone had not. In the case of Argentina, it is not clear whether concessionaires achieved much improvement in efficiency.
- In **leases-affermages**, the efficiency of private operators is easier to assess, because the responsibility for operation and that for investment are separated between the private and public partners. Detailed information available for such projects in Senegal and Cartagena (Colombia) showed that clear gains in operational efficiency were achieved, which were passed to consumers over time through tariff reductions in real terms.
- **Management contracts** entail only a limited transfer of responsibility to private operators, giving them limited control over a utility's labor force. Efficiency improvements under management contracts—measured using the global efficiency index (the ratio of water billed and paid for to water produced, a measure that combines water loss reduction and improved bill collection)—were significant in most cases under review.

As seen from the above, a number of possible approaches to PPP transaction emerge.

- *Management agreements:* Through a management agreement, the operation and maintenance of a service are contracted out to a private company for a predetermined period without the private company or consortium financing the asset. Instead, the public sector finances both fixed assets and pays a fixed management fee to the private company.
- *Lease agreements (affermage):* Through a lease agreement, a private company leases, operates and maintains a state-owned asset for a prescribed period. The public sector retains the responsibility of financing the investments in fixed assets; however, payment to the private operator is not on a fixed management fee basis.
- *Concessions:* Through a concession agreement, a private operator is responsible for developing or rehabilitating and operating a state-owned asset or service for a prescribed period. Concessions include agreements such as a build-operate-transfer (BOT) model.

6.2 Context in Chitradurga district ULBs

Apart from a review of the various possible PPP options available, it is critical to understand the contextual factors that influence selection of PPP model. Some of the key considerations and implications for PPP structuring are discussed below

1. **Low Baseline Tariff levels:** Baseline user charges are very low and hence PPPs that require full investment and full recovery by the Private operator in Greenfield facilities is difficult to structure as they lead to unacceptably steep increase in tariff levels. ULBs have tried to circumvent this problem by bringing in grants from JNNURM/UIDSSMT and other schemes to reduce investment by private operators to 30% of project cost. In case of Chitradurga it is possible to structure a PPP for which the incremental investment is shared by the Private Operator and the Government.
2. **Weak baseline information on loss levels:** Structuring long-term concession contracts require information on the prevailing service levels including ascertaining of loss levels. For instance in the Manila Water Supply PPP, a combination of high baseline water losses (for which baseline information was available) and high water tariffs provided the justification for moving to PPP. At the time of bidding, the user charges that eventually was discovered were lower than the prevailing water user charges and hence made the case for PPP very compelling. In CHitradurga district ULBs, ascertaining correct information on baseline losses is constrained due to lack of

metering / availability of metered reading data both at the bulk points and customer points. So a PPP contract will need to be structured in a manner where the Operator will need to implement these to ascertain loss levels in the first place. As a result, service level obligations need to be made stringent in a phased manner rather than upfront.

3. **Bankability concerns:** Given the poor consumer baseline, weak cost recovery and collection efficiency levels, private players are likely to perceive credit risks and there is therefore a need to create comfort through strengthening of policy instruments (including policies on user charges, Connection-Disconnection process to deal with non-paying consumers and to regularise and bring unauthorised connections into the records). Further, contractual provisions for certain credit enhancements including Escrow modalities and Reserve Funds would be required to address bankability concerns.
4. **Bidding for cluster:** It is not so common to bid PPP Projects on a cluster model. However, a volumetric based consumption and constant bid variable for the entire cluster would help bring the scalability and would discourage water supply area preferences.

6.3 Recommended PPP model and discussion on key structuring issues

6.3.1 Recommended PPP model - Afferimage Contract

Looking at the underlying context, an Afterimage arrangement is envisaged for the ULBs in Chitradurga district (either individually or in a cluster). As per this form of agreement, it is proposed that the design and finance of the identified augmentation works would be shared by the government and the private player at a pre fixed percentage sharing value. As per the contract, the private developer would be required to first undertake preparation of Detailed Project Report and Capital Investment Plan, then the construction/rehabilitation works for the identified section of the water system, and further to the construction activity, undertake the full operation and maintenance of the water supply distribution system for a specified period of time.

In addition, the private player would also be responsible for the operation and maintenance of the water supply distribution system, including provision of connections, installation of meters, generation of bills, and collection of revenues. The private developer is therefore responsible for:

1. Creation of identified assets in the water supply system and operate and maintain the entire system
2. Metering
3. NRW Reduction
4. Volumetric based Billing and Collection
5. Meeting other performance parameters

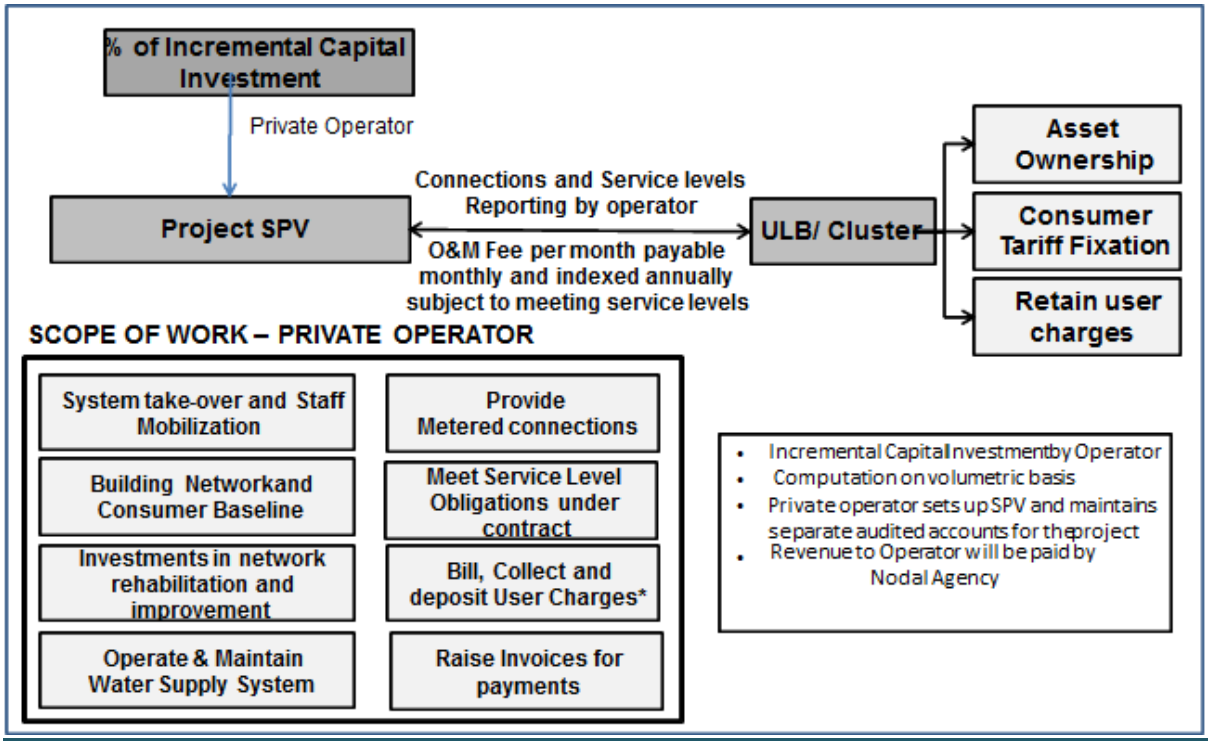
Since the towns are small and economics of scale often doesn't work, provision of bulk water supply is to be made available for the city at no cost to the private player.

The purpose of involving a private developer at the distribution end is to bring in operational efficiencies which the existing system lacks. Such a contract can be implemented for a single ULB or for a cluster of ULBs, which may have a common raw water source and face similar issues of operational inefficiencies at the distribution end. Since it's a cluster, a nodal agency would be involved in overseeing the water supply services to the cluster. A set of performance targets would be set by the state nodal agency or by the ULBs in the cluster for the operation and maintenance activity.

The philosophy of the implementation plan is to secure a comprehensive solution for water supply for six urban centres in Chitradurga districts through assigning responsibility to the selected private operator to invest, construct, operate and maintain and transfer the network and to achieve service level outcomes desired by ULBs and consumers. The proposed implementation arrangements for the project are described below:

1. The project will be executed through a Special Purpose Vehicle (SPV) set up for the project as shown. Exhibit 6.1 provides a schematic diagram of the proposed project structure.

Exhibit 6.1 Implementation structure



2. Contract period is to be kept at 15 years looking at the financial viability of the project. Assumptions used while calculating financial sustainability and arriving at the contract tenor are further detailed in subsequent chapter.

3. All incremental investments in the Project Area is envisaged to be shared by Private Operator and Government.

4. The Scope of Infrastructure to be managed by Private Operator under the project will cover the entire distribution network starting from the MBR/bulk intake point as described in the information memorandum which is to be prepared by the ULBs.

5. All these components would be handed over to the Private Operator during the period of the Contract on a nominal lease.

6. The Indicative Service level obligations of the Private Operator to be met in full during the Operations phase are given in Exhibit 6.2.

Exhibit 6.2 Operating service level obligations

Category	Service Obligation	Minimum Norm
Water Service Obligations	Quality	• Achieve quality norms as per IS 10500 • Minimum level of 0.2ppm of residual chlorine and 1 NTU Turbidity • BIS approved chemicals to be used for treatment
	Availability	• 24x7 continuous water supply - Min 135 LPCD at End User tap • Emergency stoppages < 12 hours • No more than an average of 2 Emergency stoppages of < 12 hours each in any continuous period of 3 months
	Pressure	Min. residual pressure of 7 meters at ferrule or saddle level
Network Loss obligations	Network Losses	• Raw water to WTP < 1% • At WTP < 3% • WTP – WDS - < 0.5% • WDS – Consumer meter - < 15%
Metering, Billing & Collection	Metering	100% of all connections (individual and shared) (including public stand-posts and feeds to street storage tanks if any) must be metered. All meters (bulk, DMA level and End User) must be read and reported to the Owner every month.
	Billing	A bill for water used must be issued to not less than 98% of connected properties each month
	Collection	Collection efficiency shall be stabilized at greater than 85%
Customer management	Time for Connection	Within 7 days of application with fee
	Complaint Repairs	Minor < 24 hours and Major < 2 Days
	Complaints Billing	< 24 hours

Bid variable and Compensation to Private Operator

- Bid variable would be price of water at Rs. / KL to be charged by the Private operator to ULB (individually or for cluster)
- Payment to operator by combination in terms of amount of water supplied the bid variable
  - During construction phase : based on billing
  - During rehabilitation phase : progressively transition from billed quantity to the quantity for which revenue is collected (billing based to collection based)

- Price of water quoted by private operator would be indexed every year

6.4 Institutional Arrangement- Roles and Responsibilities

Roles and responsibility of Private Player

- Design, Plan, and construct the distribution network and related infrastructure as per scope of contract
- Take over the O&M of the distribution network
- Enhancement of Connection Coverage as per scope and performance parameters described in the contract
- Provision of Metered Connections, Billing and collection
- Bear the cost of partial Cap-ex (as pre-decided during bid process and while keeping into mind sustainability of the project) and Op-ex of distribution network

Roles and Responsibility of State/ULB/Nodal Agency

- Supply of treated bulk water for distribution
- Operate and manage the water supply system till the distribution point
- Define the technical specifications for the distribution network rehabilitation works
- Bear Operating expenses till distribution point including bulk water purchase, operation of WTP, transmission etc
- Before going for such contractual arrangement, it is advised for the ULB/ or the cluster of ULBs (as the case may be) to update their information baseline by undertaking an assessment to ascertain the extent of rehabilitation works which need to be constructed by the private developer.
- Come up with a tariff policy which indicates full recovery of O&M cost, while converting the existing flat rate to volumetric consumption based billing.
- Provide with accurate information on the points of bulk water supply, the status on existing connections and properties, number of and type of connections to be served, the number and type of meters to be installed, etc.

6.5 Risk Assessment/ Mitigation

Critical risk factors, their impact and likelihood and potential mitigation measures are summarised in Exhibit 6-1 below.

Exhibit 6-1: Risk factors, impact and mitigation measures

S. No.	Risk	Private Player	ULB/ Cluster	Note
1	Design risk	Yes		Design Risk is taken by Private Player. Reason being that design of the network would define the service levels and hence it would be appropriate to let private player design the network.
2	Construction risk	Yes		Construction risk is to be taken by Private Player in order to a) complete construction in time and b) have a hold on the quality of infrastructure created

S. No.	Risk	Private Player	ULB/ Cluster	Note
3	Water Availability Risk		Yes	This would be taken by the ULB/Nodal Agency or State
4	Revenue Risk	Yes		Volumetric basis of billing and revenue realization puts this risk on Private Player. Thus providing an incentive to supply better water with lesser NRW
5	Operations Risk	Yes		The operations and maintenance of the distribution network shall be done by the private entity. All costs for the same shall be incurred by such private entity.
6	Financial Risk	Yes	Yes	Since cap-ex is shared at a pre-fixed percentage, this risk is shared
7	Payment Risk		Yes	ULB/Cluster to create a Water Payment Reserve account to cover this risk
8	Performance Risk	Yes		Since enhancing network performance is central to PPP model, this risk is to be taken by the Private player

7. Project Financials

7.1 Concept and Methodology

A preliminary financial model has been prepared to assess the Estimated Project Cost, Estimated Revenues and the Project Returns. The Cost and Revenue assumptions were taken based on gross bulk estimate only to assess the feasibility of the project. However, it is recommended that the Project Financials may be firmed up only after preparation of the Feasibility report for the project. The salient features of the preliminary financial model are highlighted in this section of the report.

The purpose of the Financial Analysis is to determine the financial viability of the investment in the project considering the cost of developing the project and the expected revenue stream over a period of time. It also includes study of different scenarios from the developer's.

7.2 Assumptions for Financial Analysis

7.2.1 Construction Period

It is assumed that development of the project will take 2 years, which includes the refurbishment of the distribution network, introduction of metering system etc.

7.2.2 Concession Period

Concession period has been taken as 15 years for the project.

7.2.3 Cost Assumptions

While calculating the project cost, the assumptions have been based on market feedback, other similar projects as well as IMaCS' own experience of advisory and project management consultancy.

7.2.4 Water Demand/ Supply Assumption

Water supply and demand has been estimated based on the projected population and per capita water supply (135 lpcd +15% losses). It has been assumed that collection efficiency and connection coverage would be raised to 95% by year 2018 from the existing levels. The connection coverage and collection efficiency would provide for water to be sold for revenue generation and also actual water sold against which money has been collected.

7.3 Summary of Financial Analysis Results

7.3.1 Cost Estimation

The estimated cost of the Project is Rs. 121.59 Crore. The details of the Project Cost estimation are set out in Exhibit 7-1

Exhibit 7-1: Estimated Project Cost

S.No.	Components	Unit Cost	Cost Estimate (Rs. Million)						
			Chitradurga	Hiriyur	Challakere	Hosadurga	Hollalkere	Molkalmuru	Cluster
1	**Capital Investment**								
A	Distribution network	1.5	330.3	40	59	170	182	46	826.3
B	Internal Plumbing	0.0025	46.6	19	19	9	6	6	105.3

S.No.	Components	Unit Cost	Cost Estimate (Rs. Million)						
			Chitradurga	Hiriyur	Challakere	Hosadurga	Hollalkere	Molkalmuru	Cluster
C	Meters	0.0015	28.0	11	11	6	3	3	63.2
D	ESR/Sump	*7.5*	33.7	1	6	30	35	5	110.6
E	Others	10%	44	7	10	21	23	6	111
	TOTAL Capital Cost		**482.5**	**78.5**	**104.8**	**235.9**	**248.3**	**65.9**	**1215.9**
2	**Total O&M Cost***	**For 1st year**	**14.5**	**3.9**	**5.2**	**11.8**	**12.4**	**3.3**	**51.1**

** Power, manpower, Repair and Maintenance*

7.3.2 Tariff Revenue Stream

The private operator would be compensated on the basis of the volume of water (meeting agreed quality specifications) supplied by the private operator to the citizens at the Rs/ KL (indexed) with an escalation as defined in Concession Agreement. Given the nature of cities (small population), implementabilty of water tariffs needs to be examined by the local bodies, where they can cross-subsidies residential water connections against commercial connections.

7.3.3 Viability Assessment

The key financial indicators for the project i.e. IRR (Internal rate of Return) has been summarized in Exhibit 7-2. From the exhibit it can be seen that the Project IRR is greater than the common benchmark of 15%, which is the IRR that investors will most likely seek from such an investment. Thus the Project is viable on a standalone basis.

7.3.4 Scenario Analysis

Two scenarios have been considered; Scenario 1 as project individual cities and Scenario 2 as project based on a cluster approach. Exhibit 7-2 shows different IRRs for two Scenarios. Preliminary assessment indicates approximate bid tariff ranging of Rs 6 to Rs 10 per KL (indexed) for individual towns and at Rs 8 for cluster as a whole 15 year concession at an IRR ranging from 15.06% to 15.97% for individual cities and 16.40% for cluster. Thus, Cluster approach may be useful to rationalize the cost of supplying water in all 6 towns.

Exhibit 7-2: Key Financial Indicator

S. No.	Item	Scenario 1 (Individual Cities)						Scenario 2
		Chitradurga	Hiriyur	Challakere	Hosadurga	Hollalkere	Molkalmuru	Cluster
1	Capex (Rs. Mn)	482.5	77.4	104.8	235.9	248.3	65.9	1214.8
2	Bid Var (Rs/KL)	6.0	10	10	9	9	9	8
3	IRR (%)	15.06%	15.19%	15.08%	15.74%	15.47%	15.97%	16.40%

7.4 Conclusion

With the proposed structure, the project seems to be sustainable on a standalone basis without any financial support from Government.

8. Statutory and Legal Framework

8.1 Applicable laws

Various state and central legislations/ acts governing the water supply have been reviewed for establishing the feasibility of the proposed project. A list of such legislations/ acts is set out below.

8.1.1 Central Legislations/ Acts:

- **National Water Policy**

The relevant sections of National Water Policy are given below:

Ground Water Development

7.2. Exploitation of ground water resources should be so regulated as not to exceed the recharging possibilities, as also to ensure social equity. The detrimental environmental consequences of overexploitation of ground water need to be effectively prevented by the Central and State Governments. Ground water recharge projects should be developed and implemented for

Private Sector Participation

13. Private sector participation should be encouraged in planning, development and management of water resources projects for diverse uses, wherever feasible. Private sector participation may help in introducing innovative ideas, generating financial resources and introducing corporate management and improving service efficiency and accountability to users. Depending upon the

Source: National Water Policy 2002

8.1.2 State Legislations/ Acts

The State formulated legislations/ Acts pertaining to waterfront development are as follows:

- **The Karnataka Ground Water (Regulation for Protection of Sources of Drinking Water) Act, 1999**

The Karnataka Ground Water (Regulation for protection of sources of Drinking water) Act, 1999 is to regulate the exploitation of ground water for the protection of public sources of drinking water and matters connected therewith and incidental thereto. This Bill is proposed to be enacted with several regulatory measures. Some of them are summarized below:

1. Sinking a well for the purpose of extracting or drawing water within a distance of 500 metres from a public drinking water source without obtaining permission of the appropriate authority is prohibited.
2. The Appropriate authority, in times of water scarcity may declare an area to be a water scarcity area for such period as may be specified in the order, but not exceeding one year at a time.
3. Upon declaration of any area as water scarcity area, the appropriate authority may order for restricting or prohibiting extraction for any purpose where such well is within 500 metres of the public drinking water source.
4. The Appropriate authority on the advice of the technical officer may declare a watershed as over exploited watershed.
5. The Appropriate authority shall have powers to prohibit sinking of wells in over exploited watersheds.
6. If the Appropriate authority is satisfied that any existing well in area of an over exploited watershed is already affecting any public drinking water source may prohibit the extraction of

- **The Karnataka Municipal Corporations Act, 1976**

The Karnataka Municipal Corporations Act is to consolidate and amend the laws relating to the establishment of Municipal Corporations in the State of Karnataka. Some of the sections of the act relevant to the envisaged project are given below:

191. Payment to be made for water supplied. - Notwithstanding anything contained in any law, contract or instrument, for all water supplied under this Act payment shall be made at such rates, at such times and under such conditions as may be specified by bye-laws and different rates may be prescribed for supply of water for different purposes.

193. Supply of water for domestic purpose not to include any supply for certain specified purpose.- The supply of water for domestic purposes shall not be deemed to include any supply for any trade, manufacture or business;

194. Water supply for domestic purposes not to be used for non-domestic purposes. - No person shall, without the written permission of the Commissioner use or allow to be used for other than domestic purposes water supplied for domestic purposes

Source: The Karnataka Municipal Corporations Act, 1976

- **The Karnataka Urban Water Supply and Drainage Board Act, 1973**

This Act is to provide for the establishment of a Water Supply and Drainage Board and the regulation and development of drinking water and drainage facilities in the urban areas of the State of Karnataka. The Board shall be charged with the functions of providing financial assistance by way of loans and advances to the local authority in the State for assisting in providing for the following amenities, namely:-

i. Water supply and drainage for urban areas; and
ii. Other activities which are entrusted to the Board from time to time by the Government.

The Board shall perform all or any of the following functions, namely:

a) at the instance of the Government or a local authority:
   i. Investigating the nature and type of schemes that can be implemented in the area of any local authority for the provision of drinking water and drainage facilities;
   ii. Planning and preparing of schemes including schemes covering areas falling within the jurisdiction of more than one local authority for the purpose of providing the supply of drinking water or drainage facilities;
   iii. Executing such schemes under a phased programme for the provision of drinking water and drainage facilities within the areas of local authorities to which such schemes relate ;
   iv. Operation and maintenance of drinking water supply and drainage undertakings either wholly or in part and subject to such terms and conditions as the Government may specify;
   v. Levy and collection of water rates, fees, rentals and other charges in respect of such undertakings as the State Government may specify.
b) Providing technical assistance or giving advice to local authorities in the execution and maintenance of urban water supply and drainage works;
c) Establishing and maintaining schemes incidental to urban water supply and drainage such as testing of water, designing of plant for purification of water, conducting research relating to urban water supply and maintaining farm schemes;
d) Any other matter which is supplemental, incidental or consequential to any of the above functions

- **The Karnataka Ground Water (Regulation and Control of Development and Management) ACT, 2011 *(Under Surveillance)***

This Act is to regulate and control the development and management of ground water and matters connected therewith or incidental thereto. Some of the sections of the act relevant to the envisaged project are given below:

11. Grant of permit to extract and use groundwater in the notified area.-

a) Subject to the provisions of any law relating to protection of public sources of drinking water, any user of ground water desiring to drill or dig a well in the notified area for any purpose either on personal or community basis shall apply to the authority for grant of permit for this purpose and shall not proceed with any activity connected with such drilling or digging unless a permit has been granted by the authority.
b) Every application under sub-section (1) shall be made in such form, shall contain such particulars and in such manner accompanied by such fee for different purposes like industrial, commercial entertainment, agricultural and domestic etc., and for different areas, as may be prescribed.
c) On receipt of an application under sub-section (1), if the Authority is satisfied that it shall not be against public interest to do so, it may grant subject to such conditions and restrictions as may be specified therein, a permit authorizing drilling or digging of a well for the extraction and use of groundwater. The conditions shall include mandatory provision of artificial recharge structures of appropriate size to be constructed by the applicant within a period as specified by the authority:
d) The decision regarding grant or refusal of their permit shall be intimated by the Authority to the applicant within a period of sixty days from the date of receipt of the application.

12. Registration of existing users in the notified areas.-

a) (1) Every existing user of groundwater in the notified area shall within a period of one hundred twenty days from the date of declaration, as notified area by the Government shall apply to the authority for grant of a certificate of a registration recognizing its existing use in such form and in such manner as may be prescribed.
b) On receipt of an application under sub-section (1), the Authority may, after such enquiry as it may deem fit and after satisfying itself, grant a registration certificate in such form, for such period and subject to such condition as may be prescribed.
c) The decision regarding the grant or refusal of the certificate of registration shall be intimated by the authority to the applicant within a period of thirty days from the date of receipt of the application.

Source: The Karnataka Ground Water (Regulation and Control of Development and Management) ACT, 2011

8.2 Key Issues and Suggestions in Legal & Regulatory framework and Tariff framework

- Ground Water extraction shall be restricted through policy intervention.
- Given the nature of cities (small population), implementabilty of water tariffs needs to be examined. Preliminary assessment indicates approximate bid tariff ranging of Rs 6 to Rs 10 per KL (indexed) for individual towns and at Rs 8 for cluster as a whole 15 year concession.

9. Indicative Environmental & Social impacts

9.1 Environmental Impacts

The current water demand of cities/ towns of Chitradurga District is partially met by extraction of ground water leading to depletion of groundwater table. Provision of safe drinking water through a surface source will inhibit rapid groundwater depletion and save it for future.

9.2 Social Impacts

Chitradurga has been identified as drought prone area, thus dependency on ground water for drinking water purposes threatens the water supply system of the towns. Also, ground water studies have showed high concentration of fluoride and iron, thus posing threat to the health of the population. Thus, supplying sufficient water by providing complete distribution network will raise the quality of life of people and it will help in reducing health issues in the district.

Another impact would be, increase of the employment opportunities due to the new jobs created by the organizations directly/ indirectly connected to the operation and maintenance; water engineering companies; suppliers of systems, equipment and chemicals for water treatment.

9.3 Mitigation Measures

The project is a green initiative & does not pose any threat to environment or society and hence any mitigation measures are not required to be adopted.

10. Way Ahead

10.1 Project Development Framework

The key task for DMA / Chitradurga District ULBs is to first form a ndal agency who would assist in bidding out the project on a cluster model afferimage contract. This nodal agency would also assist to appoint a transaction advisor to carry out feasibility studies as well as to undertake bid process management on behalf of ULBs. Project Development framework would involve:

1. Engaging a Transaction Advisor
2. Detail Feasibility Study
3. Take necessary Policy Sanctions
4. Project Structuring
5. Preparation of Bid Documents
6. Bid Process
7. Selection of Private Operator and Issuing Letter of Award (LoA)
8. Signing of Contract

10.2 Procurement Plan for further development

TOR for Transaction Advisor/ Technical Consultant and deliverables (Task, Deliverables, Timeline); Experience required for firm and experts for Transaction Advisor/ Technical Consultant Evaluation Matrix (This will be moderated by the Dept/ Agency/ IDD to remove any bias).

Activity/ Months	1	2	3	4	5	6	7
Appointment of Transaction Advisors (by Nodal Agency)							
Preparation of Detailed feasibility Reports							
Project Structuring and Bid Documents preparation							
Bidding Process							
Selection of Developers and Issue of LoA							

10.3 Summary of Findings

The preliminary feasibility suggests that the project is doable from a Technical, Strategic and Viability View Point, with approximate bid tariff at Rs 6 to Rs 10 per KL (indexed) for individual towns and at Rs 8/ KL for cluster for a 15 year concession. However there are few issues on which the Detailed Feasibility Study shall focus on:

- Project needs to be preceded by addressing the bulk water supply project
  - Can be taken up only when the construction of the Bulk water supply project is ensured
- Given the nature of cities (small population), implementabilty of water tariffs needs to be examined
  - Preliminary assessment indicates approximate bid tariff ranging of Rs 6 to Rs 10 per KL (indexed) for individual towns and at Rs 8 for cluster as a whole 15 year concession.
- This is a challenging project and would require rigorous project development efforts.

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