24/7 NORMALIZED WATER SUPPLY THROUGH INNOVATIVE PUBLIC–PRIVATE PARTNERSHIP

Case Study from Ilkal Town, Karnataka, India

This note presents a case study on improvement of urban water supply services achieved in the small town of Ilkal in the northern part of India's Karnataka state. The successful implementation of an innovative public–private partnership contract modality (known as "performance-based construct and operate contract") in this town, with support from the Asian Development Bank, has established a replicable model that is now used not only in other cities of Karnataka state but also in other states of India as well as in other countries in South Asia.

Introduction

Public–private partnerships (PPPs) are seen, in particular by the Government of India, as a mechanism to improve the performance of utilities and generate efficiency gains in the delivery of water services, even though their potential for leveraging private financing is much lower than was originally expected.[1] The Asian Development Bank (ADB), together with other multilateral and bilateral financial institutions, has supported the design and implementation of alternative contract modalities that allow participation of the private sector to generate efficiency in design, construction, or operations of facilities, or a combination thereof, while relying on public funding. The performance-based construct and operate contract (PBCOC) that was initially used in Ilkal can be seen as a pragmatic introduction to PPPs, with the aim of ensuring sustainability of investments and effectively improving the delivery of water services for beneficiary populations.

Challenge of Delivering Improved Water Services

Despite large capital investments in urban water supply and sewerage systems in the past, hundreds of cities in Asia still suffer from low levels of water services. Typically, large capital investments have increased bulk water supply and extended utilities' service areas and their customer bases. However, the level of services—in terms of water pressure and hours of service per day—has not improved substantially. Before the implementation of ADB-funded project in Ilkal, there was only unreliable intermittent water supply. This intermittent supply situation perpetuates a downward spiral where poor services mean that customers are unwilling to pay, which leads to insufficient revenues for system maintenance, let alone improvement, resulting in worsening services.[2]

On the regulatory side, many countries still lack the political will to apply cost-recovery tariffs. India's tariffs are low—an average household only pays $0.15 per cubic meter on a combined basis for water and wastewater services, while many water service providers fail to apply any tariffs.[3]

Despite the government's ambitious targets for continuously pressurized safe water supply with full coverage and full operation and maintenance (O&M) cost recovery, no city in India has achieved these targets.[4] In many cities in India,

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1 P. Marin. 2009. *Public-Private Partnerships for the Water Sector.* Washington, DC: World Bank.
2 Before the 24/7 water supply improvement, collection efficiency was a mere 3%. Practically nobody was paying for the water.
3 Footnote 1.
4 Water and Sanitation Program. 2014. *Running Water in India's Cities: A Review of Five Recent Public-Private Partnership Initiatives.* Washington, DC.

Before commencement of 24/7 water supply, many people in Ilkal used to receive water only once every 2–5 days. Hence, people who queued up for water kept their pots at the cistern.

municipal corporations and city municipal councils (CMCs) that are responsible for water supply often lack the technical capacity to oversee infrastructure development or to operate the system efficiently. Those were precisely the case for Ilkal CMC until most, if not all, of the issues have been successfully overcome under the ADB-funded project. The case study explains the prior status, innovative PPP process, implementation challenges, and current status of the service delivery.

Water Services in Ilkal before the Project

Before the project, the small town of Ilkal (estimated population 51,000; known for its Ilkal *sarees* and red granite) received bulk water from three sources: bore wells (five fitted with power pumps and 17 fitted with hand pumps), infiltration wells, and surface water from Krishna River. The total amount of bulk water from these sources was 5.21 million liters per day.

The Karnataka Urban Water Supply and Drainage Board provides the bulk water for Ilkal. An augmentation scheme with surface water from Narayanpur Dam with Krishna River as source and headworks at Dhannur village was completed and commissioned in 2000. Another improvement scheme to provide permanent solution with headworks at Almatti Dam was completed in 2010. Raw bulk water is transmitted from Almatti Dam to Hungund water treatment plant, which is located 37 kilometers (km) away and has a capacity of 25 million liters per day. Treated water is then transmitted from Hungund water treatment plant to Ilkal town at the entry point of the Inspection Bungalow, which is located 12 km away (Figure 1).

The water supply distribution system operated by Ilkal CMC covered approximately 57% residential area with the remaining 43% still unserved.

Bringing in Private Sector Expertise for Improving Urban Water Supply

Overview of Contract Models Considered

In a bid to improve the outcomes of public sector investments in urban water supply, where private sector financing is not forthcoming, ADB supported the introduction of contract model to bring in private sector expertise in challenging institutional and regulatory contexts. ADB initiated a water supply project with Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC)[5] for Ilkal, which is one of the 25 urban local bodies covered under the ADB-funded North Karnataka Urban Sector Investment Program.[6] Two types of potential contract modalities were initially considered, including PBCOC and the performance-based deferred payment structure (PBDPS) contract. However, PBDPS, which

[5] KUIDFC is a financial intermediary set up by the Government of Karnataka to formulate projects for infrastructure in urban areas, mobilize funds, and implement the projects. KUIDFC also provides technical and financial assistance (e.g., through loans) to urban local bodies for development schemes.

[6] ADB. 2006. *Report and Recommendation of the President to the Board of Directors: Proposed Multitranche Financing Facility to India for the North Karnataka Urban Sector Investment Program.* Manila. https://www.adb.org/sites/default/files/project-document/66707/38254-ind-rrp.pdf

was developed as an analogy to PPP-style toll road contracts, was found unrealistic under the prevailing poor cost-recovery tariff regime that is highly political and, hence, unlikely to change any time soon. Thus, PBCOC was chosen as the model for the program. Under PBCOC, the responsibility for capital investments under brownfield project is left with the public sector. But in line with current global PPP trends and with a recent surge in performance-based contracts, the private operator is called in as a "specialist contractor."[7] To balance risks, performance incentives through penalties and performance-based fees are introduced. This type of contract can be used to strengthen and modernize the management of water services by establishing long-term management practices that will put municipal departments and public utilities on the path to cost recovery. Such contracts aim to ensure that contractors deliver quality investments as their future remuneration will depend on their later performance during the O&M phase.

After commencement of 24/7 water supply, queuing up pots at the cistern is no longer necessary.

Performance-Based Construct and Operate Contract Model

KUIDFC had already tested the performance-based management contract (PBMC) approach (Box 1) and was keen to test an alternative approach that would give the private operator or specialist contractor direct responsibility during the construction phase. In the contract proposed by ADB, the public sector retained responsibility for the detailed design (through the procurement of an engineering consultant). The private operator carries out the construction works based on detailed engineering designs provided by the public sector and operates the system over 4 years before transferring responsibility back to the public authority. As in the World Bank-supported PBMC, Ilkal's PBCOC includes a mixed remuneration structure during the operating period, with 40% of the fees being performance based. As shown in Table 1, while PBMC gives the private sector responsibility for designing and operating the system and overseeing the construction, PBCOC leaves design risks to the public sector by means of ordinary engineering design consultancy contracting. Table 1 further provides a summary of these contracts' key features. Box 2 presents the main features of Ilkal's PBCOC. Currently in the operations phase, Ilkal's PBCOC is proving to be a suitable model. Please see Appendixes 1 through 5 for details.

[7] C. Gasson. 2014. Private Water's Brighter but Fragmented Future. *Global Water Intelligence.* December.

Table 1: Summary of Contracts' Main Features

Contract Model	Responsibilities			Financing	Remuneration
	Design	Build	Operate		
PBCOC					• Fixed during construction, with potential early completion bonus • Fixed and performance-based during operations
PBMC					• Fixed during design and construction, with potential bonus based on savings from capital expenditure • Fixed and performance-based during operations
PBDPS					• Fixed during construction, with potential early completion bonus • Fixed and performance-based during operations

 = public responsibilities,  = private operator's responsibilities,  = other contractors recruited by the public sector,
 = overall contract scope for the operator.

PBCOC = performance-based construct and operate contract, PBDPS = performance-based deferred payment structure, PBMC = performance-based management contract.

Source: Asian Development Bank.

Box 1: Karnataka's Prior Experience with the World Bank-Supported Performance-Based Management Contract

In the context of a project supported by the World Bank, the Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC) introduced a performance-based management contract in pilot zones (covering about 10% of the population of each city) of the three cities of Belgaum, Gulbarga, and Hubli-Dharwad. The objective was to test private sector participation in water services management in order to bring water supply services to pressurized 24/7 standards. The private operator (Veolia Eau-Compagnie Générale des Eaux) was recruited as an "operator-consultant," as its responsibilities included the detailed engineering design for extending and improving the distribution system with associated investment planning before operating the system over 2 years (including billing and collecting tariff proceeds on behalf of the municipalities). The private operator was not directly in charge of construction works, but procured them separately on behalf of KUIDFC, acting as its procurement agent. In terms of remuneration, the private operator received a fixed fee during the design phase, with a bonus linked to capital expenditure savings, if any. During the operations phase, the remuneration was a combination of fixed fees (60%) and performance-based fees (40%), with performance indicators related to nonrevenue water reduction and continuous supply. The performance-based management contract model implemented in Karnataka was successful: by 2010, Veolia Eau-Compagnie Générale des Eaux (the contracted private operator) had supported an increase in domestic coverage from 50% to 100% and brought service levels to 24/7 standards in the pilot areas. In 2014, KUIDFC and Hubli-Dharwad municipality initiated a bidding process for scaling up the water supply improvements under a similar performance-based management contract. In 2014, KUIDFC and Hubli-Dharwad municipality initiated a bidding process for scaling up the water supply improvements for the remaining parts of the city under a similar performance-based management contract. A new contract was awarded to the joint venture of Z&A P. Antonaropoulos and Associates (Greece), Ranhill Utilities Sdn. Bhd (Malaysia), and Infrastructure Leasing and Financial Services (IL&FS) Water Limited (India) in 2017.

Source: Water and Sanitation Program. 2010. *The Karnataka Urban Water Sector Improvement Project: 24x7 Water Supply Is Achievable.* Washington, DC.

Box 2: Performance-Based Construct and Operate Contract for Improving Water Supply in Ilkal, Karnataka, India

Contract scope.

Works, equipment, materials, and services are to be provided in three main phases:

- Phase 1, construction (18 months): network extension, bulk meters, and customer meter installation.
- Phase 2, preparatory (3 months): handover period between Ilkal City Municipal Council and the new private operator.
- Phase 3, operation and maintenance (48 months): maintenance, connections management, customer service center setup, monitoring, billing, employee management, and training of Ilkal City Municipal Council staff to prepare for the second handover back to the government.

Financing

Karnataka Urban Infrastructure Development and Finance Corporation (through an Asian Development Bank loan) bears all the capital investment costs. During the preparatory and operation and maintenance phases, the private operator bears all costs for operation and management, except power charges and salary for deputed personnel from Ilkal City Municipal Council, both of which are paid by the public sector. This means that the private operator has to finance such costs before it is remunerated based on the contract.

Private operator's remuneration

- Construction phase: bill of quantities-based fixed remuneration, with early completion bonus.
- Operations phase: fixed (60%) and performance-based (40%) remuneration.

Performance indicators

Measured by an independent technical auditor, indicators include continuous supply to 98% of authorized connections, water loss reduction, minimum pressure level, and customer service targets. Before the project, water was supplied only for 1–2 hours once in 2–3 days during the wet season and once in 4–5 days during the dry season to 66% of the households that have a service connection; with generally very low pressure; and with no decent customer services provided. Under such supply conditions, it was practically impossible to measure the level of nonrevenue water accurately, and most customers did not bother to pay for the water at all. The total number of house service connections increased from less than 3,000 before the project to more than 10,000 as of February 2017. Tariff collection efficiency is now usually higher than 70%.

Current status

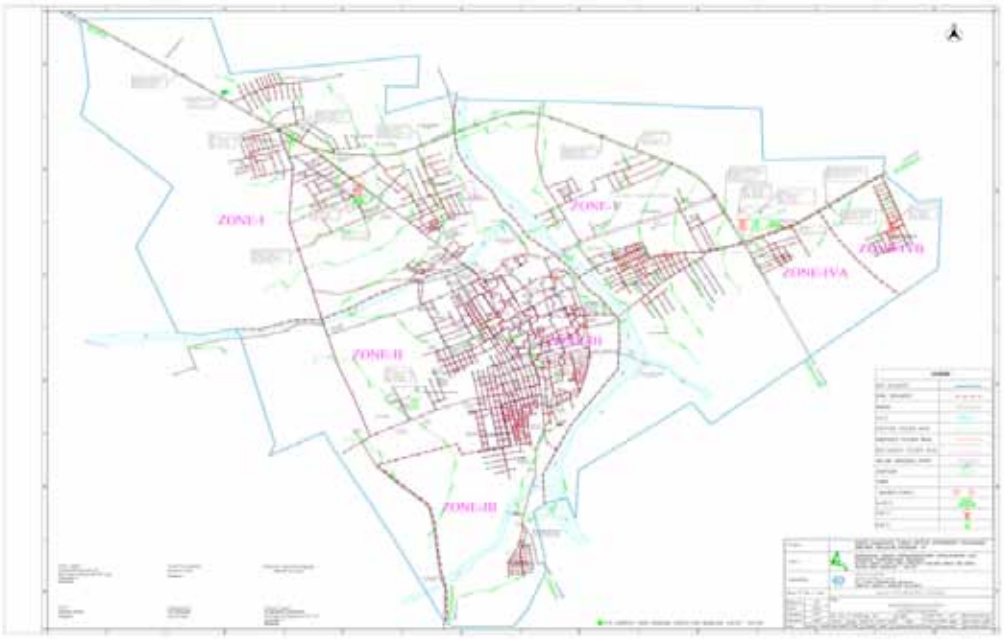
The contract was awarded in December 2012 to Veolia Eau-Compagnie Générale des Eaux (Bangalore Project Office). The total value of the contract was ₹273,387,473 (or about $4.27 million) including (up to) ₹31,649,256 (or about $0.49 million) for operations for 48 months.

Source: ADB. 2006. *North Karnataka Urban Sector Investment Program.* Manila.

Practical Implementation Experiences of Performance-Based Construct and Operate Contract

While the PBCOC contractor (Veolia Eau-Compagnie Générale des Eaux) is obviously the most important player assisting the Ilkal CMC and KUIDFC for project implementation, collaboration with a few other key parties is also essential. The Karnataka Urban Water Supply and Drainage Board supplied treated bulk water from the Hungund water treatment plant to Ilkal's main ground-level service reservoir, as well as to two other beneficiary cities. The supervising engineering consultant team (SNC-Lavalin) and the independent technical auditor (CDM Smith) periodically monitored the PBCOC contractor's performance, based on predetermined indicators. The nongovernment organization Advi-Siddeshwar Rural Development Society provided implementation support and carried out the information, education, and communication activities for the project.[8]

[8] The information, education, and communication activities cover various aspects, including door-to-door socioeconomic survey; ward-level awareness campaign on the advantages of 24/7 water supply; assistance on house service connection and awareness raising about water tariff; program update for municipal councilors, media and opinion makers; program update and gender sensitization for municipality staff; awareness raising programs for high school students; health awareness programs; and use of toilet in line with the government's Swachh Bharat initiative for open defecation-free India. There were significant changes after the implementation of the scheme including decrease in the incidences of water-borne diseases; improved school attendance; improved earnings of the urban poor; and improved water tariff collection efficiency.



The present Ilkal city pipe network fully covers the city's entire residential areas, as opposed to the mere 57% service coverage before the project.

Due to low-pressure and intermittent water supply, many households used a pit or sump in front of their houses to collect water from the substandard services, and the water pumped to a rooftop tank in storing.

Under the PBCOC, early completion bonus for the whole of the works under phase 1 (construction period) was 0.05% of the contract price for part 1 (works) for each day that the completion is earlier than the intended completion date. The PBCOC contractor successfully collected this early completion bonus for 89 days (i.e., 4.45%).[9] Phase 2 (preparatory period) was also completed with successful commissioning.[10]

Phase 3 (O&M period) was commenced cautiously on 1 September 2015 with the first 3 months as the test period for the transition from flat rate tariff to volumetric tariff during which volumetric bills were issued while the tariffs were still based on the old flat-rate tariff schedule. During the 18-month' period, the PBCOC performed fully satisfactorily, collecting full bonuses for the six quarterly periods completed.

The minimum operating pressure (often called "head," which is an engineering term) is 7 meters and, hence, the water reaches the third floor (or the second floor, if the first floor is referred to as the "ground floor") without pumping. Before the project, many households had installed "sump" in the ground, "rooftop tank" and electric pump before the 24/7 supply came. Many are now using only the "rooftop tank" from which internal plumbing starts. Although storing water in the "rooftop tank" is unnecessary and harmful for maintaining the chlorine residual in the supplied water, they say re-plumbing will be costly and the "rooftop tank" may be good for emergency supply disruption, which

[9] With 10 months' extension granted due to reasons arising from the client's side (e.g., lack of timely availability of certain resources to be provided by the client).
[10] With 2 months' extension granted due to reasons arising from the client's side.

Now with 24/7 water supply, each household has an individual house service connection, receiving water with adequate pressure whenever needed, obviating pit or sump, rooftop tank, and internal pumping.

With volumetric tariff, a house service connection with lock system allows customers to lock their taps to prevent water theft and use quality piped water as and when required.

Pressure control valve.

actually has not happened so far. But it appears that newly built houses are no longer installing such unnecessary facilities. Since pumping of water from the sump to rooftop tank became unnecessary, power bill was reduced by about $3–$4 per month at each household.

After the 24/7 water supply improvement, customers' habits drastically changed and they started drinking water off the tap, which is normal in developed countries but totally unheard of in India. After the 24/7 water supply improvement, a "colony" (or suburban expansion) developed for Ilkal *saree* (hand-loom and power-loom) cottage industries in Zone 4B, which had been largely abandoned due to poor water supply, was fully revived. As with the earlier experiences of World Bank-financed Karnataka Urban Water Sector Improvement Project's "demo zones" in three other cities in north Karnataka, overall water usage measured in liters per capita per day (lpcd) was significantly reduced to below 100 lpcd (about 95 lpcd in March 2017) against India's standard of 135 lpcd. Relinquishment of the old habit of excessive storage and discharge (throwing away) under the intermittent supply period appears to have made this savings possible.

Connection charge was ₹5,143 in detailed project report and adjusted to ₹6,365 after 1 September 2015, which was the commencement day of phase 3 (O&M period). One-quarter of the amount needs to be paid up front as down payment, with the remainder to be paid in no-interest-bearing installment for the subsequent 15 months. Increasing block tariff-style[11] volumetric tariff was approved by the Ilkal CMC on 7 October 2014. A new customer service center operates in the CMC office for 24 hours a day (three-shift staffing by the PBCOC contractor) with tariff payment counter open from 10 a.m. to 5 p.m. (staffed by CMC officers). Delayed payment penalty is 1% per month.

Outcome and Way Forward

Given that water supply services already have normalized (i.e., continuously pressurized, or "24/7") in Ilkal for more than 18 months by successfully escaping from the vicious downward spiral of intermittent supply (i.e., aggravating services and revenue generation by negatively contributing to each other), it would be fairly easy to adopt advanced but affordable technologies for further efficiency improvements. The CMC and KUIDFC are currently considering the introduction of (i) spot billing by means of hand-held unit connected to the central server through Global

[11] Locally known as "telescopic tariff." The lowest water tariff rate is ₹7 per cubic meter (m^3) for the mandatory minimum monthly consumption of 8 m^3. It goes up to ₹9 per m^3 for the monthly consumption between 8 m^3 and 15 m^3; ₹11 per m^3 for the monthly consumption between 15 m^3 and 25 m^3; and ₹13 per m^3 for the monthly consumption beyond 25 m^3.

Customers wait for their turn to pay their water bills at the customer service center.

Customer registering his complaint.

Customer paying his water bill at cash counter.

Water is now available whenever needed.

A small town, Ilkal showed that a performance-based construct and operate contract can ensure sustainability of investments and improve the delivery of water services.

System for Mobile Communications (GSM);[12] (ii) online payment system by means of mobile phone or computer; (iii) simple Supervisory Control and Data Acquisition (SCADA) system by equipping each flow meter and data logger with a GSM transmitter as shown in Figure 2;[13] and (iv) publicly accessible web portal for customer information dissemination (including water consumption).

[12] Currently, meter readers need to make two trips to each customer every month—first for reading the meter and second for delivering the bill printed at the office based on the reading. Spot billing by hand-held unit (with thermal printer) to be carried by each meter reader will obviate the need for a second trip.

[13] At present, data from these flow meters and data loggers are collected manually and stored in notebook computers or flash drives. With the introduction of such a SCADA system, monitoring (in particular by the technical auditor) can be done more efficiently, i.e., remotely and in real time.

The PBCOC model worked well for the Ilkal water supply improvement scheme because the model holds a single contractor responsible for both construction and O&M under a reasonably long contract. Bill of quantities-based remuneration during the construction phase reduced the risk of brownfield projects (in particular, uncertainties of underground physical assets) to the contractor. Remuneration partly based on performance, monitored by an independent technical auditor during the O&M phase, ensured continuous and dependable service delivery to the customers.

The PBCOC model is now widely replicated in 12 additional cities under the program,[14] and the government now intends to use it for further 20 cities in Karnataka. This model is also adopted for Gaya (Bihar), Tonk and Pali (Rajasthan), Cossipore (Kolkata), and Dhaka (Bangladesh) with various modifications. For example, the performance fee is only 20%, instead of 40%, of the total remuneration during operations for the city of Gaya in Bihar.

New house service connection over polyethylene pipe (less prone to leakage).

Installation of new house service connection over polyethylene pipe.

[14] Nippani, Gokak, Shahabad, Yadgir, Bidar, Basavakalyan, Bellary, Hospet, Raichur, Sindhanur, Gadag-Betageri, and Haveri.

Connecting medium-density polyethylene pipe to galvanized iron pipe for house service connection.

New house service connection.

Figure 1: Schematic Diagram of Ilkal City 24/7 Water Supply Scheme

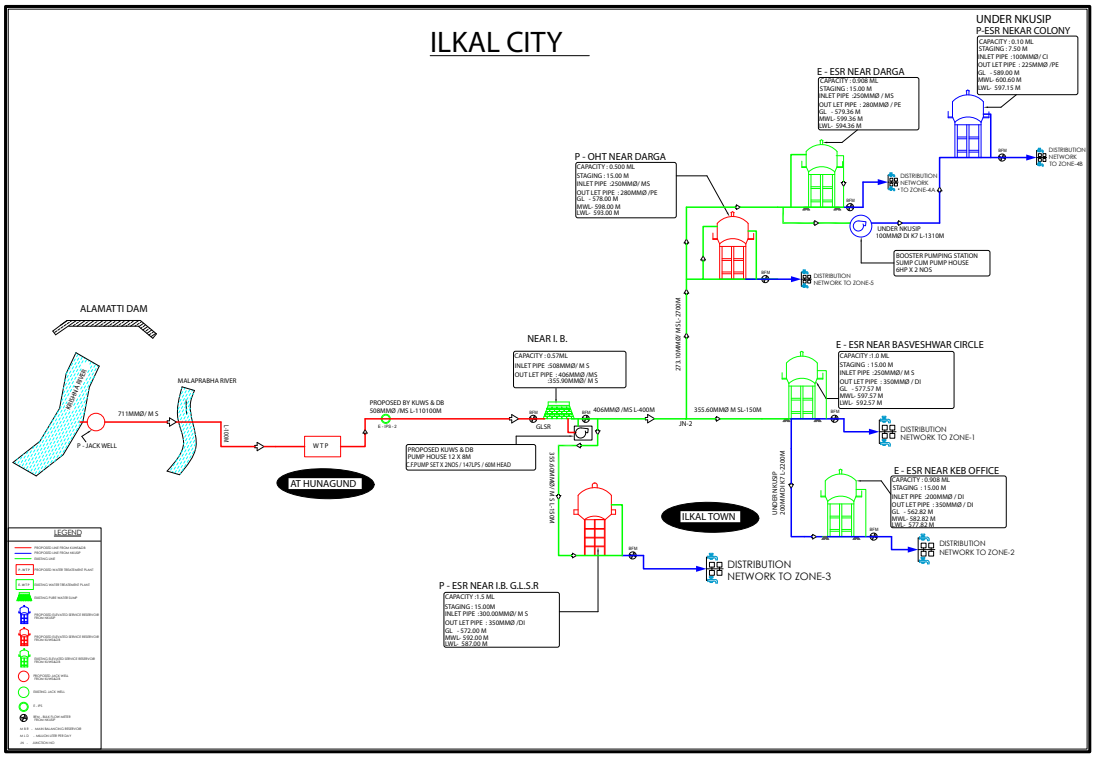
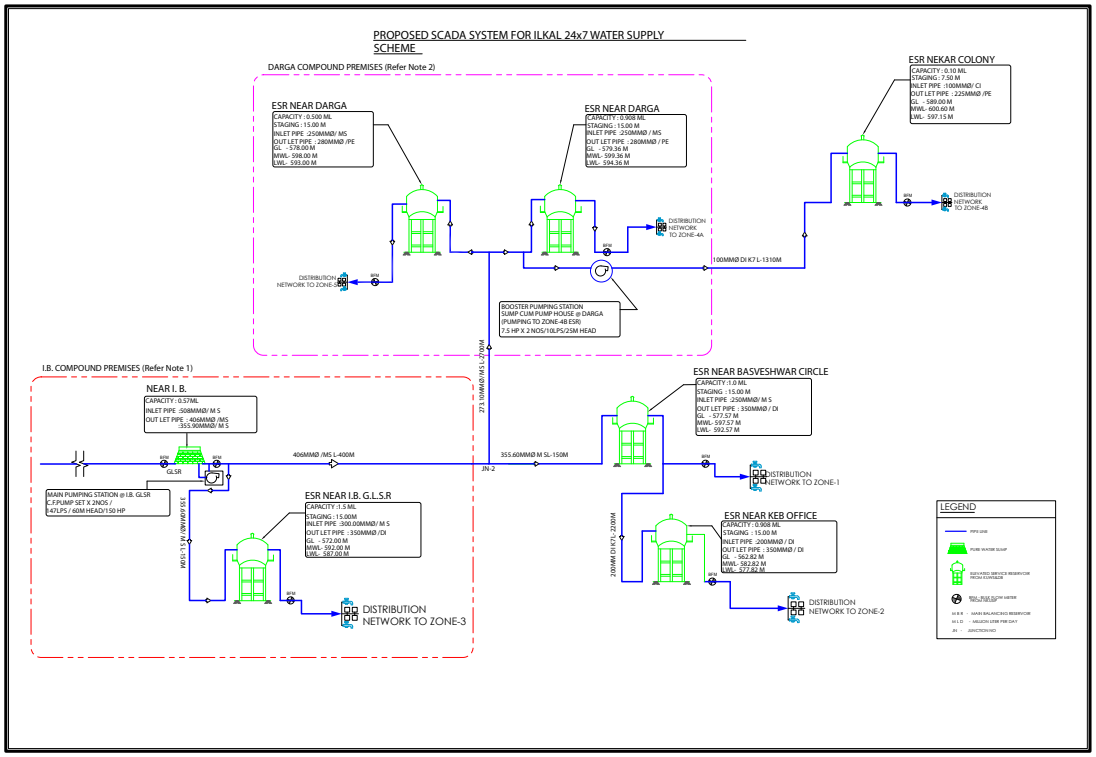


Figure 2: Schematic Diagram of SCADA System for Ilkal City 24/7 Water Supply Scheme



Note:
1. I.B. GLSR (0.57 ML), I.B. Main Pumping Station & Zone-3 ESR (1.5 ML) are located inside I.B. Compund Premises.
2. Zone-5 ESR (0.5 ML), Zone-4 ESR (0.908 ML) & Booster Pumping Station at Darga are located inside Darga Compound Premises.

Source: Karnataka Urban Infrastructure Development and Finance Corporation.

House service connection with customer water meter and protection box.

Since Ilkal is a small town, improvements could be done "in one go." But for larger cities, zone-by-zone sequencing of improvements must be well thought out in advance and appropriate contractual arrangements incorporated accordingly. In other words, there will be a long wait before the households in the last zone can benefit from the improved water supply services while the households in the first zone will continue enjoying the improved water supply during that waiting period. The use of differentiated tariff schedules commensurate with the service level provided would be an obvious option to ensure the equity between early beneficiaries and late beneficiaries. For example, change from flat-rate tariff schedule to volumetric tariff schedule can be done zone by zone in a city upon each commissioning of the 24/7 water supply services.

Key Lessons

The successful implementation of alternative contract modalities for water supply service improvement requires an environment that is ripe for modernizing water services management. On the institutional side, public bodies must be willing to engage in reforms that aim toward higher recovery of, at least, O&M costs and the provision of transparent subsidies for other service costs that cannot be borne through tariffs (such as capital investment costs). Such political will existed in Ilkal. To increase willingness to pay for piped water services, contractual obligations should include outreach activities to local populations to explain the ongoing reforms and the need to pay for water services. The introduction of modern water management practices can contribute to building a positive relationship between water service providers and the local population.

The private sector can be called upon to provide key expertise in technically complex infrastructure. The private operator's performance can be enhanced with the use of a "carrot and stick" approach. This can take the form of penalties when operational efficiency targets are not met; bonuses for early completion or for savings on available capital expenditure budget; and, more crucially, performance-based remuneration based on clear indicators to be measured, e.g., nonrevenue water reduction and continuity of supply. However, depending on the context, the allocation of risks needs to be carefully designed to attract the private sector, while limiting undue risks on the public side.

Typical house service connection over unplasticized polyvinyl chloride pipe (conventional method before 24/7 water supply).

The PBCOC holds potential for improving water supply services in challenging institutional and regulatory contexts, as attested by the ongoing experience in Ilkal. A PBCOC is well suited to situations where the public sector has reasonable capacity to prepare detailed engineering design (and supported, if necessary, by external engineering consultants) because the works involved tend to be "brownfield" (i.e., rehabilitation, replacement, and/or repair) rather than "greenfield" (brand-new development of previously undeveloped areas). However, the public sector must provide reasonably accurate engineering information to attract the private sector. Its tender procedure would be fairly simple and straightforward so that the works can be started without delay.

Despite the limited risks involved in the contracts under review, the context in South Asia, particularly in India, is such that international private operators remain wary of bidding for such contracts. In fact, during the tendering of Ilkal contract, one international private operator declined to extend the validity of its bid and, thus, dropped out. Indeed, although most follow-on contracts have been successfully tendered (or are on the path to a successful tender), most international firms that have won the contracts have generally mobilized local staff rather than international experts. This contributes to the development of local expertise in water supply services management but at the same time reduces the potential benefits from bringing in state-of-the-art expertise from other countries.

Finally, the benefits of private sector participation are more likely to be maximized when such contracts are associated with technical assistance to improve the policy and institutional framework for urban water services, with a particular focus on improving governance, building capacity, and rationalizing tariffs. Karnataka benefited from the long-term involvements of ADB and the World Bank in this regard.

Electro fusion of saddle for house service connection (to ensure watertight joint).

Appendix 1: Project Overview

	Ilkal (Karnataka)
Project name	North Karnataka Urban Sector Investment Program
Contract start date	January 2013
Current status	Operations phase (from September 2015)
Population	51,000
Funders	Asian Development Bank and Government of India
Service provided	Water distribution
Brownfield or greenfield	Brownfield
Contract type	Performance-based construct and operate contract
Contract scope	Rehabilitation + construction + operations
Duration (years) Construction Operations	 1.75 4
Public signatory	Karnataka Urban Infrastructure Development and Finance Corporation
Private signatory	Veolia India
Bid parameters	Lowest bid price
Remuneration and incentives	Fixed (60%) and performance-based (40%) for operation and maintenance services

Sources: Asian Development Bank and Karnataka Urban Infrastructure Development and Finance Corporation.

Appendix 2: Technical Details of the Ikal City 24/7 Water Supply Scheme

Diameter of Pipe (mm)	Pipe Material (HDPE/DI)	Length of Pipes Laid (m) (as of end of February 2017)
75	PE100, PN10	69,240
90	PE100, PN10	14,108
110	PE100, PN10	12,713
140	PE100, PN10	5,166
160	PE100, PN10	9,481
225	PE100, PN10	4,531
280	PE100, PN10	8,350
350	DI-K7	1,904
100	DI-K7	1,173
200	DI-K7	2,089
Total		**128,755**

Diameter of Pipe (mm)	Pipe Material	Existing Pipe Length (m) (as of end-February 2017)
406	MS	400
355.6	MS	300
273	MS	2,700
Total		**3,400**

Type of Storage Reservoir	Location	Capacity (m^3)	Serving Zone
GLSR	IB Compound	570	Main GLSR
ESR	IB Compound	1,500	Zone 3
ESR	PWD Compound	1,000	Zone 1
ESR	KEB Compound	908	Zone 2
ESR	Darga Compound	908	Zone 4A
ESR	Darga Compound	500	Zone 5
ESR	New Nekar Colony	100	Zone 4B

DI = ductile iron pipe, ESR = elevated service reservoir, GLSR = ground-level service reservoir, HDPE = high-density polyethylene, m = meter, mm = millimeter, m^3 = cubic meter.

Source: Karnataka Urban Infrastructure Development and Finance Corporation.

Accesories with Size (mm)	Total Quantity Installed (as of end-February 2017)
Sluice Valves/Butterfly valve	
80	59
100	43
150	43
200	9
250	31
350	6
Total	**191**
Air Valves	
50	3
80	3
100	7
Pressure Control Valves	
100	4
150	3
200	3
Electro-Magnetic Flow Meters	
100	2
150	3
200	1
250	1
300	5
350	1
Data Loggers	
DL	19
Scour Valves	
80	29
100	1
150	1
Fire Hydrants	
80	13

Appendix 3: Financial Details of the Ilkal City 24/7 Water Supply Scheme

Volumetric Tariff Approved by Ilkal City Municipal Council				
Consumer Category	Tariff Slab (m^3/month)		Tariff Rate	Minimum Charge per Connection
	Min	Max	₹/m^3	
Domestic	0	8	7	₹56
	8	15	9	
	15	25	11	
	>25		13	
Nondomestic	0	8	14	₹112
	8	15	18	
	15	25	22	
	>25		26	
Commercial or Industrial	0	8	28	₹224
	8	15	36	
	15	25	44	
	>25		52	

Number of Connections at Ilkal City (as of end-February 2017)	
Consumer Category	
Domestic	9,978
Nondomestic	57
Commercial or Industrial	110
Total	**10,145**

[a] "Number of Connections" excludes disconnected connections.

[b] All house service connections use 15 mm pipes.

Month	Bulk Water Supplied (m^3/month)	Billed Consumption (m^3/month)	Billed (₹)	Collected (₹)	Balance (₹)
December 2016	192,796	169,162	1,732,076	1,178,519	553,557
January 2017	194,342	170,743	1,949,529	1,751,818	197,711
February 2017	193,839	175,841	2,054,147	1,534,316	519,831

Consumption Range (m^3)	Number of Customers		
	December 2016	January 2017	February 2017
0-8	3,955	3,925	3,659
8-15	2,653	2,656	2,666
15-25	1,728	1,816	1,959
>25	1,566	1,697	1,844
Total	**9,902**	**10,094**	**10,128**

m^3 = cubic meter, min = minimum, max = maximum.

Note: "Number of Customers" is at the beginning of each month and excludes disconnected customers.

Source: Karnataka Urban Infrastructure Development and Finance Corporation.

Appendix 4: Staffing Details of the Ikal City 24/7 Water Supply Scheme

Contractor Staff	
Category of Staff	**Number of Staff**
Manager	1
Water Supply Engineer	1
Distribution Engineer	2
Network Assistant or Meter Reader	7
Total	**11**

City Municipal Council Staff	
Category of Staff	**Number of Staff**
Revenue Officers	6

City Municipal Council Staff Deputed to Contractor		
Category of Staff	**Expected**	**Actual (as of February 2017)**
Assistant Engineer or Junior Engineer	1	0
Work Inspector	1	1
Valve Man	2	2
Fitter	2	1
Clerk	1	1
Bill Collector	1	0
Total	**8**	**5**

Source: Karnataka Urban Infrastructure Development and Finance Corporation.

Appendix 5: Chronology of the Ikal City 24/7 Water Supply Scheme

Preexecution	
Detailed project report approved by the chief engineer	27 November 2009
Prequalification invitation published	22 June 2010
30 firms purchased the documents	
Prequalification documents submitted and opened	9 August 2010
Eight firms submitted the documents and after evaluation two were prequalified	
Invitation for bid from prequalified bidders called	21 April 2011
Technical bids submitted and opened	30 July 2011
Price bids submitted and opened	16 April 2012
Letter of acceptance issued	13 November 2012
Execution	
Contract signed	14 December 2012
Contract divided into three phases:	
(i) Phase 1 (construction period) 18 months (from 14 Dec 2012 to 13 Jun 2014)	
(ii) Phase 2 (preparatory period) 3 months (from 14 Jun 2014 to 13 Sep 2014)	
(iii) Phase 3 (operation and maintenance period) 48 months (from 14 Sep 2014 to 13 Sep 2018)	
Phase 1 commenced	27 February 2013
Phase 1 completed	31 March 2015
(With 10 months' time extension granted due to reasons arising from the client's side)	
Works carried out:	
Polyethylene (PE) pipeline works started	27 February 2013
PE pipeline works stopped by local political intervention from 9 Jul 2013 to 25 Aug 2013	
Rehabilitation of existing ground-level service reservoir completed	March 2014
2.08 kilometers (km) of ductile iron (DI) 200-millimeter (mm) pipeline completed	March 2104
Construction of sump-cum-pump-house completed	September 2014
1.173 km of DI 100 mm pipeline completed	October 2014
Construction of one elevated service reservoir (ESR) completed	November 2014
1.90 km of DI 350 mm pipeline completed	November 2014
Installation of 13 bulk water flow meters (eight at ESRs and five in network) completed	December 2014
Installation of 10 pressure control valves completed	December 2014
Installation of pressure monitoring units completed	December 2014
Construction of compound walls for three ESRs (Darga, Basavanagar, and New Nekhar colony)	December 2014
Electrical installations in pump house completed	December 2014
15-kilovolt-ampere generator set installation completed	December 2014
Electrical installations of 25-kilovolt-ampere transformer completed	February 2015
112 km of PE pipeline completed	February 2015
Billing and collection unit and customer service center at municipality building commenced	March 2015
Postexecution	
Phase 2: Demonstration of performance targets commenced	1 April 2015
Phase 2: Demonstration of performance targets completed	31 August 2015
with 2 months' time extension granted (due to reasons arising from the client's side)	
Phase 3: Operation and maintenance period commenced	1 September 2015
for a period of 4 years	

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