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# 1. Nagpur: PPP in city-wide water supply

## 1.1. Case abstract

This case profiles the initiative of Nagpur Municipal Corporation (NMC) to implement a 25-year Public-Private Partnership (PPP) project for provision of continuous water supply on a city-wide scale. The Project, among the first few initiatives in India to attempt continuous water supply on a city-wide scale, seeks to build on positive experience from a demonstration pilot to provide 24x7 water supply to 15,000 connections in the Dharampeth zone of the city.

The case discusses pre-cursor actions leading up to the Project, reviews the salient features of the PPP agreement and traces its progress and current status. It summarises positive outcomes achieved, challenges faced, and distils lessons for other Indian cities that are considering use of PPPs for provision of reliable and continuous water supply.

## 1.2. City profile

### 1.2.1. About Nagpur city

Nagpur, located in the Vidarbha region of Maharashtra is among India's fast growing cities. It is an important political/administrative centre and hosts the State Assembly's winter sessions. It is home to several Government agencies and Research institutions including the National Environmental Engineering and Research Institute (NEERI) and is a centre for Maintenance Command of Indian Air Force. Nagpur is also a hub of industrial activity in the Vidarbha region. While Butibori is the largest industrial estate in its vicinity (located 25-30 km from Nagpur city), other industrial areas around Nagpur include Kamptee, Hingna, Wadi, Khapri, Butibori and Kalmeshwar. The Government of Maharashtra (GoM) has also initiated efforts to develop the existing airport at Nagpur as a Multimodal International Hub Airport at Nagpur (MIHAN) along with creation of a Special Economic Zone (SEZ) and allied facilities. MIHAN is being developed as a multi-dimensional, multidisciplinary project of global standards.

### 1.2.2. About Nagpur Municipal Corporation

Nagpur Municipal Corporation (NMC) is mandated with provision of civic services in Nagpur city. At the time of Census 2011, NMC had a population of 2.46 million, spread over an area of 218 sq.km, (average population density of 113 persons per hectare). Of this, about 8.6 lakh people (or 34% of population) live in slums. A slum-mapping exercise undertaken by NMC in 2010-11 identified 447 slums, 287 of which were notified slums while the rest were non-notified slums.

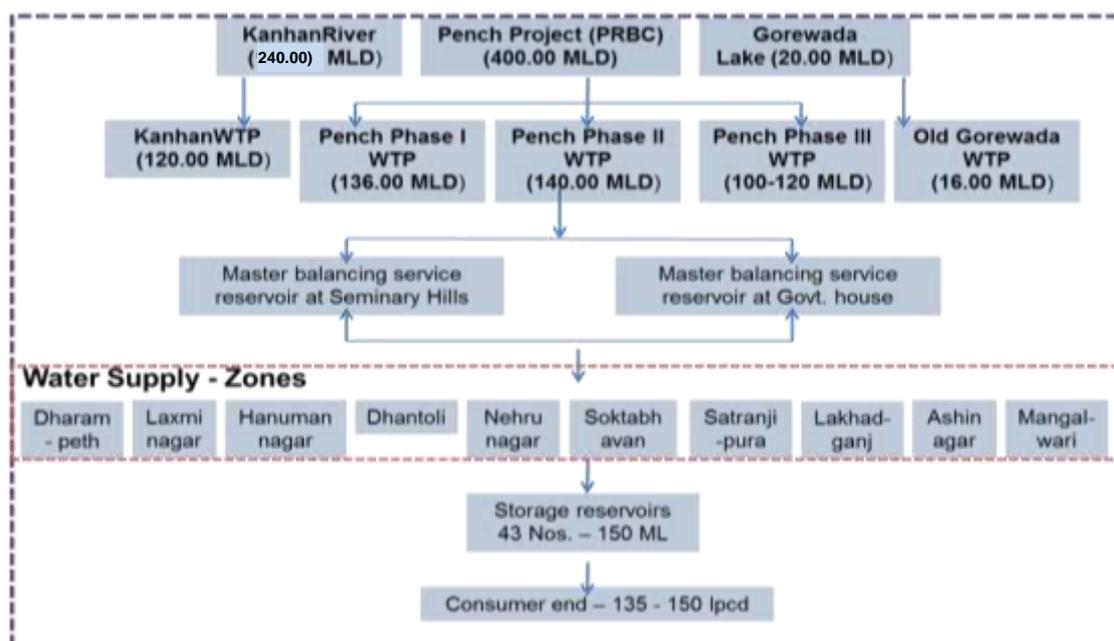
## 1.3. Water supply scenario prior to Project

### 1.3.1. Water supply system in Nagpur

Water supply service delivery in Nagpur city is the responsibility of NMC. Even prior to the Project, NMC had piped water supply access to over 80% of its citizens. Supply was intermittent with an average duration of 4 hours (ranging from 2 hours in some areas to 12 hours in others). Thus NMC was doing relatively better vis-à-vis several Indian cities on access and duration of supply indicators. Refer Exhibit 1.1 for a snapshot of Nagpur city water supply system.

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**Exhibit 1.1 NMC - Water Value Chain**



Source: Draft CSP & NMC

NMC gets its water supply from three surface sources namely Pench canal, Kanhana river and Gorewada Tank, with the treatment capacity of Water Treatment Plants (WTPs) at approximately 500-530 Million Litres per Day (MLD).

Water from these WTPs flow into two master balancing reservoirs at Seminary Hills and at the Government House, from where it is supplied through a distribution network of approximately 2,100 km organised across three areas namely, (a) parts of North/East/South supplied from Kanhana Head Works/WTP, (b) parts of North/West/South/Central areas from Pench and from Gorewada and (c) parts of North/Central parts from Pench and Kanhana.

The distribution network is also organised along ten zones for efficient Operations and Maintenance (O&M). The storage capacity in the 43 service reservoirs (spread across 31 locations in the city) is 151 Million Litres (ML) which translated to about 29% of daily supply.

### 1.3.2. Pench III augmentation project and water audit findings

In March 2003, NMC had completed commissioning of the Pench III project (involving increase in raw water pumping capacity, construction of Water treatment facilities, water mains, 14 Elevated service reservoirs and distribution network) which augmented bulk water supply capacity by 120 MLD. Even though input volume of treated water into NMC's water supply system went up by nearly 32% post this project (from 370 MLD to 490 MLD), billed output volume remained static at 240 MLD.

Dissatisfaction among stake holders including citizens and elected representatives went up post commissioning of Pench-III when actual water supply to their door-step did not improve despite the bulk infrastructure being in place. The output of Pench III was not translating to increase in effective supply or into revenues for NMC. This dissatisfaction and inability to supply reflected in the financials. Water billings actually dipped from Rs. 73 crore to Rs. 71 crore between 2002-03 and 2003-04, even as receipts marginally went up from Rs. 4.5 crore to Rs. 5 crore during this period.

Earlier in 2000, the Government of Maharashtra had appointed the Sukthankar committee to review efficiency of urban water supply systems, following which the Government of Maharashtra provided

75% funding to cities for undertaking water audits. NMC was among the first cities to undertake a water audit under this initiative. This brought to light the excessive losses in its water supply and identified areas for improvement.

NMC's water audit assessed its Non-Revenue Water (NRW) at a high 62%. (Refer Exhibit 1.2) Of the 625 MLD of water raw water available to NMC, only 241 MLD was assessed as billed authorised consumption. Real losses (on account of technical and network losses) accounted for an estimated 148 MLD (39% of NRW) and apparent losses / unbilled consumption account for 226 MLD or (61% of NRW).

**Exhibit 1.2 Findings of Water Audit (2005)**

<b>System Input Volume</b> 625 MLD	<b>Authorised Consumptions (Billed + Unbilled)</b> 263 MLD	<b>Billed consumption</b> 241 MLD	<b>Revenue Water</b> 241 MLD
	<b>Water Losses</b> 362 MLD	<b>Unbilled consumption</b> 22 MLD	<b>Non-Revenue Water</b> 384 MLD
		<b>Apparent losses</b> 214 MLD	
		<b>Real Losses</b> 148 MLD	
		<b>Unidentified Losses</b> 43 MLD	

Source: NMC Detailed Project Report for 24x7 supply

Apart from helping in assessing the extent of water losses, the water audit also identified specific areas for improvement and NRW reduction. It facilitated NMC in taking a structured response in three steps; firstly, NMC initiated a series of performance improvement measures to tackle 'real' or technical losses, secondly it initiated a pilot project to demonstrate reduction of NRW and improve supply standards from intermittent to continuous water supply and finally, it sought to use the experience from the pilot project to scale-up 24x7 supply on a city-wide scale.

### 1.3.3. Measures to augment water availability and reduce technical losses

NMC undertook a series of measures to reduce losses in its water intake and sources. The water audit observed that of the 625 MLD that was made available to NMC, it was losing 120-140 MLD in the canals from where it was drawing the water owing to seepage, illegal use and evaporation losses. NMC since then initiated a project with funding under JnNURM to replace canal supply with pipelines. Further, it has undertaken a project to increase treatment capacity at Kanhan from 120 MLD to 240 MLD. As a result of these initiatives, treatment capacity is expected to increase to 765 MLD sufficient to meet water demand till 2021, without additional investments in new source development. Further, these initiatives are expected to bring down effective cost of raw water by 75%.

### 1.3.4. PPP initiatives in water supply

NMC had experience of using private participation in several areas of its water supply system. Since 1999, all new facilities that were implemented by NMC in water supply including WTPs, pumping stations, valve operation etc., were being managed through Service Contracts. A couple of facility projects including the Pench I WTP and Kanhan improvement project are being done on a Built-Operate-Transfer format with private investment accounting for 30% of Project Cost. While the Pench I WTP was built with a 5 year O&M period, the Kanhan system involved a 15-year O&M period.

Thus, when NMC initiated a pilot project for continuous water supply in the Dharampeth zone, it had some experience in structuring and managing PPPs in water supply, although these were in the nature of service contracts and bulk facility PPPs.

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### 1.3.5. Pilot project for 24x7 supply

While NMC initiated several upstream projects to improve its water supply system, it became clear from the findings of the water audit that a perceptible improvement in service delivery required tackling last-mile challenges relating to inequitable and intermittent supply, inconsistent water supply pressure and high NRW. As a first step to address this challenge, NMC initiated a pilot project in the Dharampeth zone in 2007. The project covered 15,000 connections (including 10 slum areas) and covered implementation of continuous water supply, 100% metering, rehabilitation of tertiary network, hydraulic modelling, installation of new billing and customer management system.

The project was implemented through a 7-year Performance Management Contract and was sequenced with 9 months preparatory work, 15 months for rehabilitation and 60 months of O&M at a cost of Rs. 27 crore. The Operator was contracted on a Performance-fee model with bonuses built in with respect to five Key Performance Indicators (KPIs) namely (i) Reduction in Unaccounted for Water level to below 30%, (ii) 10% increase in volume billed over 2007-08 baseline, (iii) 24x7 supply with pressure higher than 2m, (iv) Water quality with residual chlorine greater than 2 ppm and (v) handling of customer complaints within three days.

At the request of NMC, the Administrative Staff College of India (ASCI) had carried out a post-impact assessment of the pilot project and reported the following outcomes:

- Over 7,500 connections were converted to continuous water supply. The entire zone experienced improved pressures, eliminating the need for booster pumps deployed by households earlier.
- Coverage improved with an incremental 5000 connections being given in slum households in the zone (although all these connections did not receive continuous supply)
- Billed water volume increased from 22 MLD to 33 MLD in the zone (an increase of 50%) although part of this increase was attributed to leakages at the customer end.
- NRW reduced from 50% to 38% and was attributed to reduction in illegal connections and improved accuracy of meter reading.

Further, it made the following observations on challenges and shortcomings of the pilot project:

- Stakeholder communication could have been handled better. Consumers were not adequately informed of the need to fix internal leakages when they transitioned to metered supply resulting in higher billed volumes. A tariff hike along with such billed volumes led to spikes in billing (in some cases, billings went up by two to three times) and caused disquiet among citizens. This triggered protests from citizens' organisations.
- Continuous 24x7 supply was achieved only in 7500 connections or 50% of total connections. While this was partly due to challenges in addressing last-mile connection within consumer premises and non-replacement of pipelines in 70% of network, this became an additional sore point that was highlighted by consumer organisations in their protests.

Eventually, NMC was forced to back down from its intended tariff reforms. Yielding to protests, NMC rolled back tariffs from Rs. 8 per KL (as revised in 2009) to Rs. 5 per KL and capped user charges at 50 units of supply, till such time a detailed assessment of metering was not completed.

## 1.4. The Project: PPP for City-wide water supply

### 1.4.1. Project rationale and preparatory activities

Notwithstanding challenges discussed above in the pilot project, the Dharampeth pilot project did provide evidence for improvement in service delivery with single-point accountability for last-mile distribution revamp. Interestingly, an independent assessment undertaken among urban poor living in

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slum areas in the pilot zone revealed that 80% of those surveyed favoured implementation of the project city-wide. Even though the corresponding figure for general public (56%) was relatively muted, a majority were still in favour of expansion of the pilot project. While early PPP efforts of NMC which involved outsourcing facilities on service contracts to multiple players, the pilot project demonstrated tangible benefits of a performance-led PPP and helped align political and administrative support in NMC in favour of a single city-wide PPP contract.

Thus in 2008, encouraged by early results from the pilot project, the General Body of NMC passed a resolution for implementing 24x7 water supply city-wide. Following this NMC appointed a Project Management Consultant to take the process forward. A Detailed Project Report for city wide 24x7 supply along on a PPP format was prepared by NMC's consultants and obtained approval for funding support for the Project under JnNURM in early 2009.

Around this time, the Government of Maharashtra also approved an earlier proposal from NMC's General Body to ring-fence water supply assets of NMC (managed under its water works department since 1936) and transfer of water supply functions under a separate company, namely, the Nagpur Environmental Services Limited (NESL) as a wholly owned subsidiary of NMC. The Board of NESL comprises select elected representatives and officials of NMC. In April 2009, the municipal byelaws for water supply were revised to include a provision for annual tariff revision to avoid tariff spikes and include telescopic metered tariff to promote water conservation.

The bid process for inducting a Private Operator was initiated with a Request for Qualification (RFQ) in 2008. Three of the ten applicants were shortlisted following an evaluation of responses to the RFQ. Efforts were made to keep the bidding process transparent. Meetings were held with citizens, local organisations and elected officials. The draft RFP was made available on NMC's website and extensive efforts to reach out to stakeholders were undertaken during the Bid process. However, as in the case of the pilot project, pockets of opposition continued during the course of the bidding process.

Post formation of NESL and securing approvals for Request for Proposal (RFP) from NMC's General Body, bids were invited in 2010 from the three shortlisted consortiums namely, Veolia-Vishvaraj consortium, IVRCL-Aqualia, and Cascal-Nagarjuna Construction. The evaluation involved an assessment of technical proposals followed by a series of meetings with bidders to seek clarifications or amendments. The bidder with the lowest evaluated bid (which is the Operator Rate in Rs. per cubic metre of water billed and collected), consistent with technical and financial requirements was awarded the contract. At the end of the evaluation process, the consortium comprising Veolia India and Vishvaraj Infrastructure Ltd. was declared the winning bidder. A Special Purpose Vehicle was set up by Veolia-Vishvaraj consortium called 'Orange City Water Private Limited' (OCWPL). A tri-party agreement was signed in June 2011, among OCWPL, NMC and NESL for executing the Project.

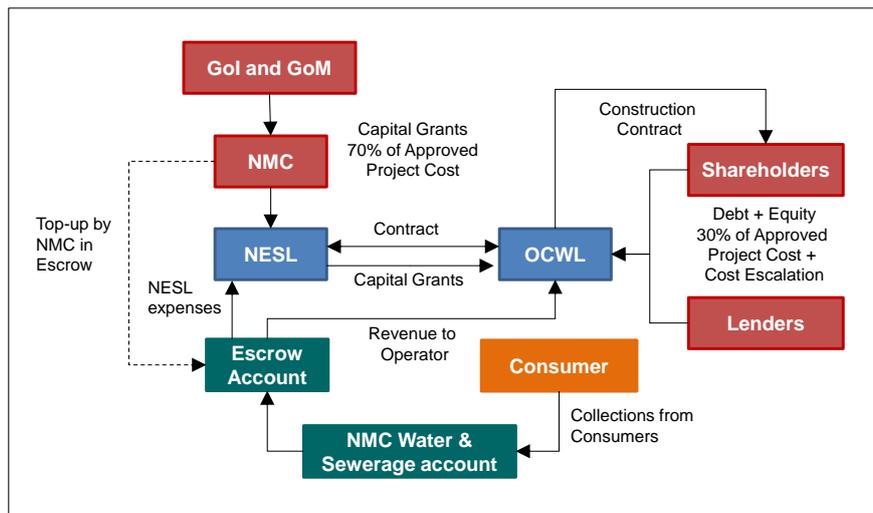
Bidding effectiveness hinges on achieving the oft-delicate balance between stringent pre-qualification and competition. Of the three applicants that got shortlisted, only two bids were received and the final bid price of Rs. 7.90 per KL was only marginally lower than the base price set. On hindsight, it would not be incorrect to conclude that the project could have done with a keener contest.

#### **1.4.2. Features of the PPP agreement**

Refer Exhibit 1.3 for an overview of the PPP structure of Nagpur city wide 24x7 water supply project. The scope of project and salient features of the agreement are discussed below.

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### Exhibit 1.3 Nagpur city wide water supply: PPP structure



Source: NMC PPP contract and IMaCS analysis

- Term, Transition Period and Project Scope:** The Project is being implemented through a 25-year Performance Management Contract (extendable by mutual agreement for another 25 years) between NESL, NMC and OCWPL. The Term included first 5-years as Transition Period during which OCWPL is responsible for operating and maintaining the existing network and have to undertake rehabilitation of the network (including replacement of consumer connections and metering). Post the Transition Period, the operator will carry out O&M of the water supply system for next 20 years during which the revenue and collection risk is also loaded on to the Operator. During this period, operator's performance will be monitored against a set of performance parameters and the remuneration is based on metered volume that is billed and collected.
- Financing of Initial Performance Improvement project:** The Initial Performance Improvement program is envisaged to be completed with funding under JnNURM within the 5-year transition period. The approved project cost of the DPR for this program was Rs. 387.86 crore and 70% of this will be brought in by NMC through grants from Government of India and Government of Maharashtra. The remaining funds (30% of the approved project along with escalation over the initial estimate) are to be brought in by OCWPL. The rehabilitation program is to be implemented through a Bill-of-Quantities item rate contract. The Contract allowed for revisions to the approved project cost to address any additional elements to meet performance standards subject to NESL's approval and cost escalations on the basis of a Bill-of-quantities contract. The incremental capital cost (over and above the 30% of approved Project Cost) incurred by OCWPL was to be compensated through an increase in his base Operator Rate to ensure a fixed Project IRR of 14.5% for OCWPL.
- Staffing:** Employees of NMC's water works department were deputed to OCWPL at the start of the contract for three phases covering (i) Mobilisation period of 120 days, (ii) Personnel Integration Period of 90 days and (iii) Change Consolidation phase of 180 days and (iv) Revocation period of 60 days. The costs of NMC employees thus deputed would be borne by OCWPL. At the end of the Change consolidation period, NMC's employees may choose to join OCWPL and Operator can make offers to NMC employees who wish to join. At the end of the Revocation period, NMC employees not joining OCWPL would revert back to NMC and will be redeployed in other departments of NMC. OCWPL will need to mobilise staff replacements during this period.

- **Revenue model:** During the Transition period, the Operator is compensated on the basis of Operator Rate (in Rs. Per KL) for a fixed volume of 250 MLD or actual metered volume billed and collected by Operator on behalf of NMC whichever is higher. Thus there is a minimum guaranteed offtake and hence assured revenue during this period. After the Transition Period, the revenue payable to the Operator will be compensated on the basis of the escalated Bid Tariff on the basis of actual metered volumes that are billed and collected.
- **Performance standards, linkages with Operator payments and maximum liability:** The Operator is expected to complete the Initial Performance Improvement Program and achieve continuous water supply during the Transition period. During this period, Contract does not specify intermediate performance standards. From the fifth year of contract, there are specific deductions from Operator's remuneration for excess raw water consumption and excess electricity charges vis-à-vis norms specified. From the sixth year, revenue and collection risk is also loaded on to the Operator as his remuneration is based on metered volume that is billed and collected. Refer Exhibit 1.4 for a list of other performance targets specified in the contract. While there are no specific penalties or incentives against performance indicators other than for collection efficiency, raw water and electricity charges, the contract allows levy of liquidated damages for performance non-compliance, which is capped at 5% of annual Operator revenue.

**Exhibit 1.4 Performance targets specified in the Contract**

Performance Indicator	Target as per Contract
<b>Technical Aspects</b>	
Treatment Efficiency (%) (Volume delivered/Volume produced)	97.5%
<b>Water Quality</b>	
Bacteriological conformity (%)	96%
Conformity to physical / chemical parameters (%)	95%
<b>Quality of service</b>	
Incidental interruption for repairs > 12 h (%)	100
Operational Efficiency (Volume billed/Volume supplied)	60% progressively by 60 <sup>th</sup> month Achieve 75% by 120 <sup>th</sup> month, maintain
Bills based on metered consumption	100%
<b>Financial</b>	
On-time payment of NMC dues	100%
Collection Rate (Effective collection /billings)	75% progressively by 60 <sup>th</sup> month 98% by 120 <sup>th</sup> month and maintain

Source: PPP contract agreement between NESL and OCWPL

- **Operator's Rate adjustments:** The Contract provides for two kinds of rate adjustments; (i) Standard Rate adjustment, which is done annually to provide for changes in price inflation, and (ii) Extraordinary Rate adjustment once every five years or whenever an event deemed to be a Ground for such extraordinary rate adjustment occurs. Even though the operating risks are borne by the Operator, the Extraordinary Rate Adjustment clause allows for rate adjustments against amendments to Operator obligations, Change in Law, availability of grant financing for NESL, changes in Business plan, increase in Operator's cost due to delay / overruns, failure of NESL to supply water, non-insurable Force Majeure events and additional capital expenditure by Operator.
- **Escrow mechanisms and Payment Security:** The collections from end-consumers by OCWPL will be routed through NMC's water and sewerage account into an Escrow account maintained by NESL. This escrow account would be used to make Operator payments. Under the contract, NESL is required to maintain a minimum amount equivalent to three months of expenses at all points in time. In case collections fall short of outflows from the account, NMC is required to make

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good the shortfall from its general budget. NMC is also responsible for provision of raw water (from irrigation department) and electricity (from MSEDCL) as both the service providers are committed to subsidise the services to public utility.

The PPP Agreement addresses bankability concerns effectively through several features: a realistic 5-year transition period, minimum off-take, annual indexation of Operator rate, Re-basing for extraordinary events, capital grant support and escrow mechanism for payment security. However, with a relatively high capital grant support, minimum off-take and guaranteed revenues during the Transition Period, incentives for capital investment efficiency appear somewhat limited.

There has also been some criticism in several quarters, that the performance requirements could have been more stringent. The relatively long transition period of 5 years, trajectory of NRW reduction targets, non-inclusion of penalties for 24x7 supply, non-inclusion of intermediate milestones and performance targets during Transition period, have been questioned in several forums. Yet, given the information baseline limitations, legacy challenges in rehabilitation and replacement of internal plumbing in existing water connections, low baseline tariffs and challenges of cost recovery etc., it seems that NMC took a considered view in favour of conservative yet impactful targets to avoid the 'set-up to fail' syndrome that has plagued water supply PPPs with unrealistic targets in the past. Notwithstanding this limitation, Operator's revenues after the Transition Period are indeed contingent on actual water delivery at doorstep, collection efficiency and norms on raw water use and energy consumption, which if achieved will be path-breaking outcomes on their own.

## **1.5. Project progress and current status**

The Project commenced in November 2011 and is in the middle of the Transition period of the Contract. OCWPL has taken over the water supply system and is currently in the process of implementing the Initial Rehabilitation and Improvement Program. The rehabilitation is being sequenced along command areas of Elevated Service Reservoirs and capital works for the same have been contracted out. NMC also has a Project Management Consultant to monitor and report on the implementation progress.

Interactions with NMC reveal that the improvement program is progressing as per the timeline. As of August 2014, physical progress of nearly 75% has been achieved with over 400 km out of 539 km of pipeline replacement having been completed. Following the positive experience from its pilot project, NMC is using HDPE pipes in the network in view of favourable costs and hydraulic properties. However, there have been delays in provision of house service connections. As against a target of 321,000 connections, only about 61,000 connections have been completed. The delay was due to protests against imposition of connection charges and low pressure in some existing connections.

NMC has attempted to overcome some of these issues. In July 2014, as a means to enlist public support to get the rehabilitation program moving, NMC passed a resolution waiving connection charges for all connections. This is also expected to help bring erstwhile unauthorised connections (close to 100,000 unauthorised connections have been identified during the rehabilitation phase till July 2014) into the consumer database and this will help in reduce commercial losses and improve NMC's revenues. The service delivery related issues are also being tackled through infrastructure augmentation and increase in capacity of Elevated Service Reservoirs.

OCWPL has also set up a round-the-clock call centre with a toll-free number to address consumer grievances. Bill payments are currently managed through zone-level kiosks set up by OCWPL and through Bank of Maharashtra. OCWPL plans to launch a web portal for information dissemination and billings in the next few months. Discussions with OCWPL reveal that it has also initiated efforts to update and clean up the consumer connections database. Till July 2014, it has identified and

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submitted for NMC's approval and regularisation, close to 100,000 incremental unauthorised connections which when regularised and added could potentially add to NMC's revenues.

NMC has faced severe resistance on tariff increases and the tariffs have been retained at the level they were reduced in 2009. Even though NMC had revised their bye-laws to revise water tariffs annually, NMC has made little headway on this front. On staffing, it is understood that most of the NMC staff deployed to OCWPL have been transferred back and are getting re-deployed in other departments within NMC. As of July 2014, of the 495 employees that were in NMC's water works department and deputed to OCWPL, OCWPL has 66 employees and NESL has 70 employees. Rest of the employees have been transferred back to NMC.

## **1.6. Challenges ahead**

Notwithstanding the progress made, the Project continues to face a number of challenges:

- The foremost challenge relates to continued stakeholder engagement and communication to build trust and credibility. Pockets of opposition to the project have continued from time of the demonstration pilot. A project of this nature calls for pro-active stakeholder engagement, awareness creation and building bridges with all concerned. While NMC and OCWPL will need to continue to address this aspect, building positive behavioural disposition will require delivering on service improvements expeditiously.
  - NMC will need to find ways to deal with sequencing and moving forward on tariff reforms. Though NMC took a positive step towards revising its Byelaws in 2009, it has not been able to carry forward with its tariff increases. In addition to the Operator's payment, NMC bears the electricity and raw water costs and therefore user charges at the present levels are unlikely to recover O&M costs in full. With an annual revision built into Operator's Rate, this will imply that additional resources from NMC's general budget will be needed to bridge the gap between revenue collection and operator payments, even though NMC has sufficient resources at this stage. NMC could have greater flexibility when rehabilitation is completed and when service levels improve.
  - Replacement of consumer connections and addressing last-mile and internal plumbing issues will need to be tackled head-on as these aspects are critical to consistently deliver 24x7 supply. Inadequate customer awareness and spike in billings following implementation of 24x7 supply during the pilot project did contribute to negative vibes for the project. Therefore, it is critical that lessons learnt in this process are adequately factored during the rehabilitation program. NMC's recent decision to waive connection charges could potentially help with this and in monetising erstwhile unauthorised connections.
  - Given that the initial Improvement program started in 2011, two years after the DPR was approved under JnNURM, it is likely that there could be an escalation in costs of the Initial Improvement Program. While NESL is vested with the responsibility of contract supervision and management, it may be important for NESL to ensure that formal mechanisms and build in capabilities for contract monitoring and information dissemination not just during the Transition Period but also throughout the duration of the Contract.
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## 1.7. Lessons learnt and insights for replication

Most urban water supply systems in India continue to be stuck in a vicious circle of poor service quality-low tariffs-weak investment capacity. While conceptually, PPPs could help ULBs break this vicious circle by separating monitoring and regulation from service provision and bringing in technical and managerial know-how, structuring and implementation challenges have often led to sub-optimal outcomes. While a few pilot scale projects notably in Karnataka and in Nagpur have managed to make an impact, Nagpur is probably among the first few city-scale PPP taking shape. Therefore, even in its early days of implementation, this Project offers vital lessons and insights for other cities seeking ways to transform their water supply service delivery including the following:

- **Implementation of city-scale PPPs will need holistic planning and integrated set of actions.** The genesis of this Project can get traced back to NMC's water audit which highlighted the need for focus on customer-end distribution infrastructure. Even as NMC continued to invest in bulk supply augmentation, the results of the water audit triggered NMC taking concrete actions for reducing NRW and for delivering water to the consumer's doorstep in a consistent reliable manner. As is documented earlier, the PPP project was not a one-off effort. On hindsight, it does seem that the city wide PPP was only a logical step in the series of actions that NMC had set sights on, and articulated post its water audit. Cities would be well-advised to not see PPPs as a panacea to their ills, but as a strategic lever to leapfrog on performance even as they fix other elements of the water value chain.
  - **Institutional clarity on the public side helps; needs to be backed with building adequate contract monitoring and administration capacity:** Anchoring the PPP contract in an SPV of NMC provided a good institutional basis for contract management. NMC went an extra step and ring-fenced its water assets under NESL prior to executing the PPP structure. At the same time, PPPs are complex agreements with changes that could happen during the course of the contract. NMC's PPP agreement builds in some flexibility by providing for tariff re-basing and for partly expanding scope using the Bidders IRR as a benchmark. However, administering complex contracts requires a very high level of maturity and capability on the ULB side and it is critical that these capabilities are build as cities move towards implementing PPPs.
  - **Political and administrative commitment is critical; so is wider stakeholder engagement and achieving consumer support.** Notwithstanding several challenges and protests from various quarters at various stages, there to be reasonable policy continuity and commitment for the Project within NMC right from the stages of the pilot, during the preparatory phases and in the implementation phase currently. Notwithstanding efforts take by NMC, protests and opposition to the project in some form has persisted. A coherent and strategic approach to communication, to inform and engage stakeholders, is critical for sustained broad-based positive support for successful implementation.
  - **Sequencing tariff reform:** Average water tariffs in urban India continue to be low relative to costs, even as affordability concerns often constrain meaningful progress on user charge led cost recovery. Even though, NMC's early efforts to raise tariffs have been thwarted by protests, it has had the cushion of other revenue streams and resources to support the project in early stages to achieve improvements in service delivery, which can hopefully provide it the flexibility with tariff revision in future. The case suggests that it would be difficult to sequence tariff rationalisation upfront and cities attempting to structure PPPs will therefore need to find alternative resources at least in the early stages.
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