SAVE WATER, SAVE LIFE

WATER FOR PUNE'S FUTURE

24X7 WATER SUPPLY PROJECT

BEST DESIGN AND ARCHITECTURE AWARD
WATER INFRASTRUCTURE INNOVATION AWARD
INNOVATION SMART SOLUTION INFRASTRUCTURE AWARD

(पुणे महानगरपालिका)

H2O PUNE
"WATER FOR PUNE'S FUTURE"
www.h2opune.com

Smart City
MISSION TRANSFORM-NATION

पुणे Pune
अद्वितीय & Unique

पुणे PUNE
स्मार्ट सिटी SMART CITY
डेव्हलपमेंट DEVELOPMENT
कॉर्पोरेशन लिमिटेड CORPORATION LTD.

SGI
life, first

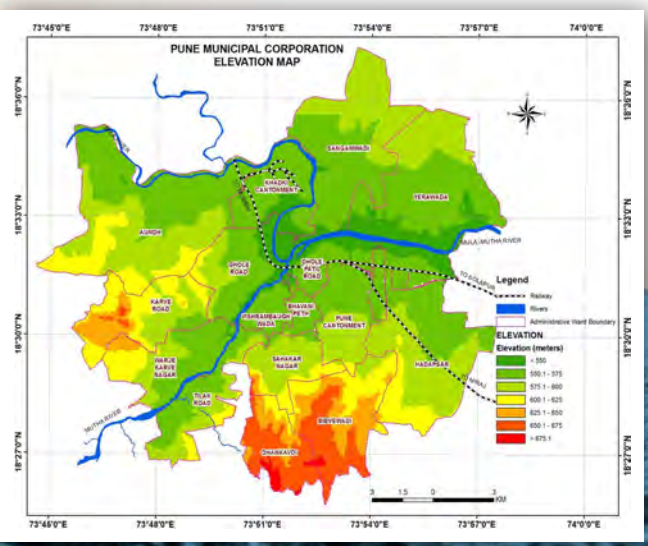
PUNE MUNICIPAL CORPORATION, PUNE

PROJECT AREA

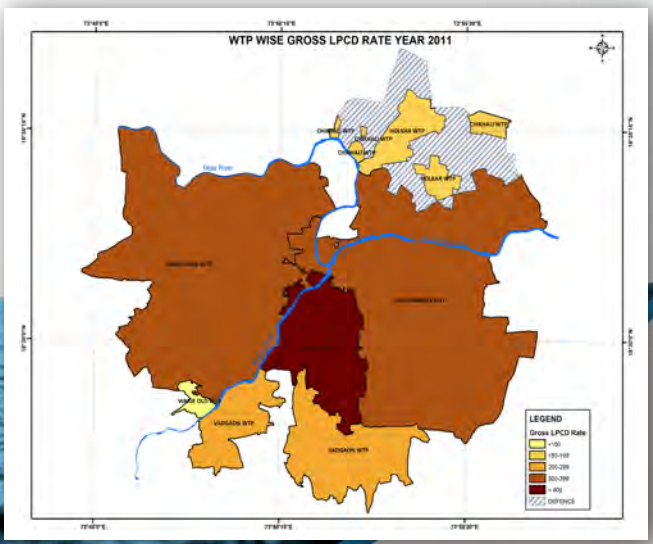
MAHARASHTRA

WATER SUPPLY SOURCES FOR PUNE CITY

TOPOLOGY DIFFERENCE



LPCD VARIATION



PRESENT WATER SUPPLY SYSTEM

SOURCES

- Khadakwasla Dam-Allocation 11.5 TMC - 890 MLD
- Pavana River-30 MLD, through Chikhali WTP

WTP CAPACITIES

- Total Existing: 1489 MLD

SERVICE RESERVOIRS

- Numbers of Reservoir: 83
- Total Storage Capacity: 328 ML

DISTRIBUTION & TRANSMISSION NETWORK

- Total length of Network: 2688KM

HOUSE SERVICE CONNECTION & LPCD

- The coverage by house service connection is over 94%
- Average per capita water supply: 194lpcd.

CHALLENGES OF PRESENT SYSTEM

- Intermittent supply-wide variation of supply hours
- Quantity of per capita supply varies substantially, very low in North of Mula-Mutha River
- Distribution network very old in many areas-high physical losses
- High level of Non Revenue Water (NRW)
- Inadequate storage capacity (23%)
- Reservoirs working as distribution reservoirs and also feeding other SRs using distribution mains
- Fast depletion of reservoirs, resulting in high peak factors and small number of supply hours
- High Electricty Consumption

AIMS

- Establish an equitable distribution of water
- Identify and minimize water losses
- Promote sustainable development
- Provide a fair way to allocate costs
- Improve system energy efficiency
- Improve customer service level
- Implement best management practices

OBJECTIVES

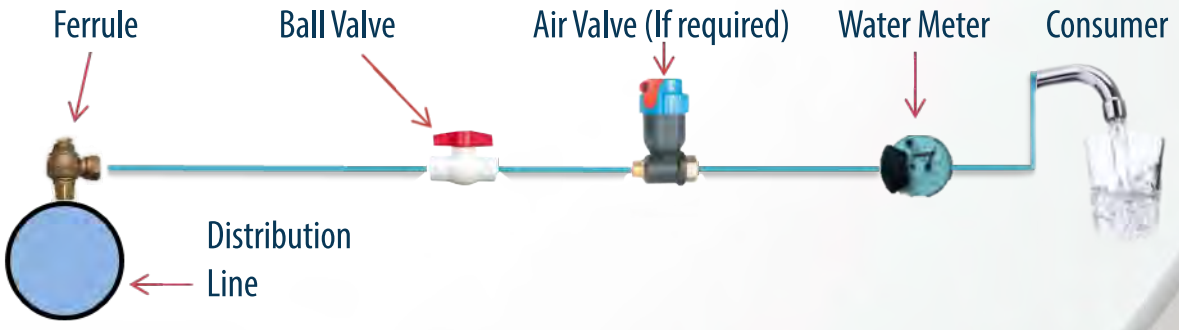
The main objectives of the project are:

- To ensure safe & equitable water supply to the entire population in Pune city for the next 30 years
- To ensure the distribution of the water during the entire day (24x7 modality)
- To reduce the level of water losses and Non-Revenue Water
- To ensure the technical and economical sustainability of the water supply service

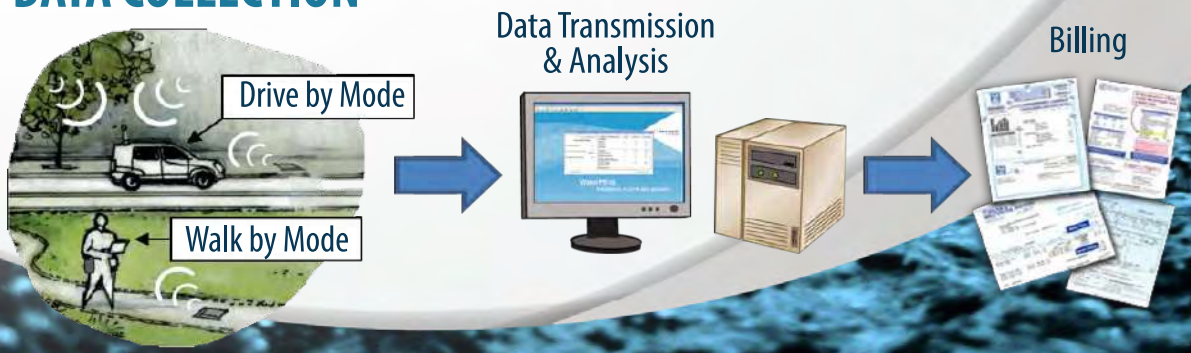
PRESENT SYSTEM Vs SMART SYSTEM

	Present System	New "SMART" Water Supply
Distribution Infrastructure	• No metering and volumetric measurement	• 100% consumer metering • Accountability for Water balance • Promotes transparency
Tariff and incentives	• Fixed Tariff • No incentive for conservation	• Volumetric Tariff • Promotes conservation of water
Service levels to Citizens	• Intermittent water supply • High proportion of NRW/UFW	• Pressurised 24x7 water supply • High reduction in NRW/ UFW • High Service Level Benchmark

HOUSE CONNECTION



DATA COLLECTION



HOLISTIC APPROCH FOR 24 X 7 WATER SUPPLY PROJECT

Water Security
- Sustainable Source
- Adequate Supply

Willingness
- Political
- Citizens
- Administration

Policies
- Service Level Benchmark
- Stake Holders Consulatation
- Volumetric Tariff
- Bylaws / Act
- Funding

Infrastructure
- Source to Consumer
- Organisational Structure/SPV
- Automization
- Customer Service

O & M
- Service Level Benchmark
- Supply Side Efficiency
- Demand Side Efficiency

EXISTING & PROPOSED

Sr. No.	Particulars	Existing/Under Construction	Proposed
1	Raw Water Source	1242 MLD	358 MLD
	Khadakwasla	22 MLD (Chikhali WTP)	(Mulshi Dam)
	Pavana River	200 MLD (Bhama Askhed)	85 MLD (Bhama Askhed)
2	WTP Capacities	1489 +825 MLD	300 MLD
3	Water Supply Zones	67	141
4	Service Reservoirs	58	103
5	Storage Capacity of Reservoirs	250.37 ML	384.00 ML
6	Distribution Network	2325.86 KM	1618.40 KM
7	Transmission Network	93.54 KM	139.23 KM
8	Automatic Meter Reading (AMR) System	-	3.15 Lakh

STUDY & DESIGN

- Entire Water Supply Network on Latest Satellite Image 243 sq.km area (GIS PLATFORM)
- Population projection & Demand calculation
- City divided in to 141 Water Supply Zones & 328 DMA's
- Consumer Survey & Water Audit for more than 10,000 connections on Pilot basis
- Hydraulic Modeling - 3500 KM pipe length
- Proposed SMART Metering for all consumers
- Leakage detection–Carried out for Bulk system for Two WTP's
- Zone wise SCADA system planned for entire city

GIS MAPPING

- Procurement of Satellite Imagery
- Creation of Base Map
- Field survey for network & land mark updating
- Geo-Spatial data integration
- Project Report
- Use of consumer data in Hydraulic modeling, water audit, demand supply analysis

CONSUMER SURVEY

- Map each house and consumer in GIS
- Carry out house to house survey
- Collect information related to no. of inhabitants Water requirement, Income, Connection size etc.
- Attach database of each house to GIS
- Find out the unregistered / illegal connections

PUBLIC AWARENESS

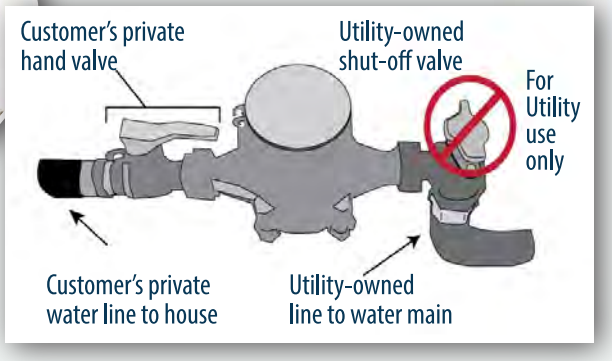
'Serve in jug' new mantra to save water

More than 5 TMC feet water in dams

2 PUNE WEDNESDAY JULY 25, 2012

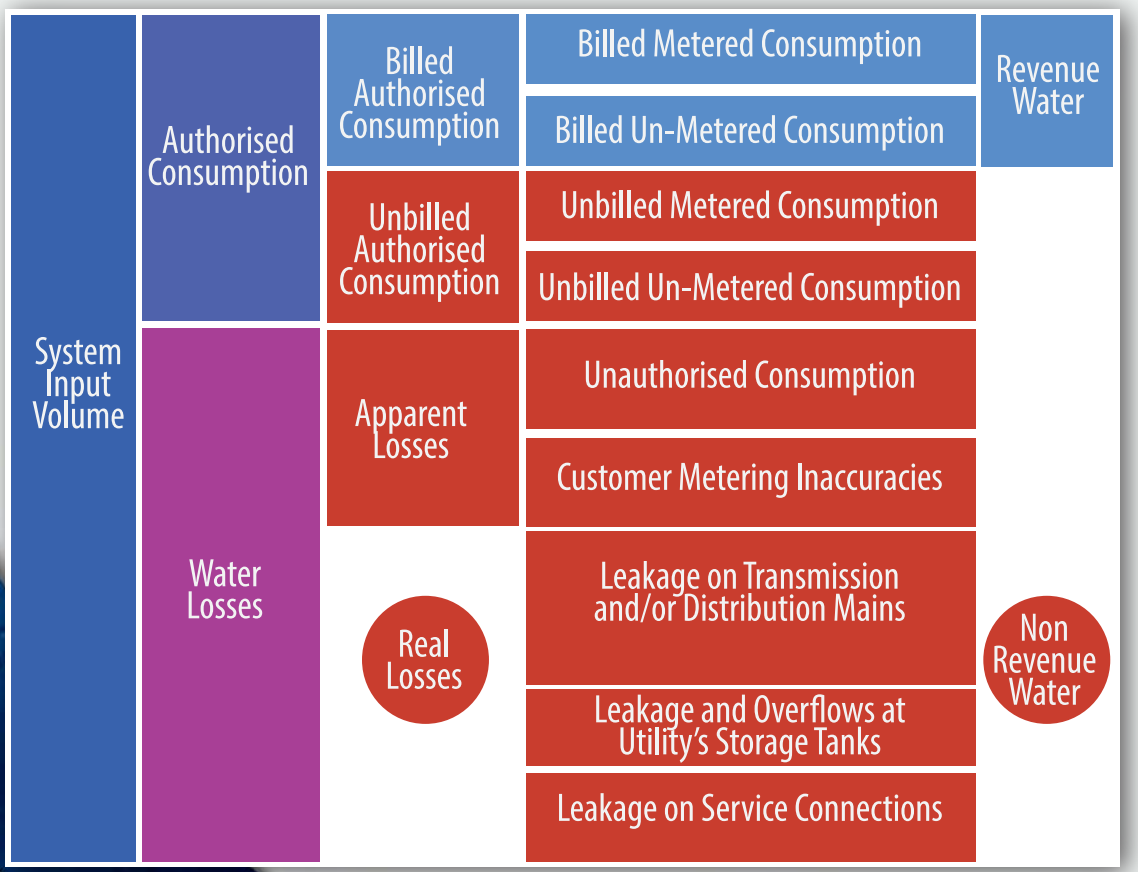
DNA DAILY NEWS AND ANALYSIS

PILOT SMART METERING



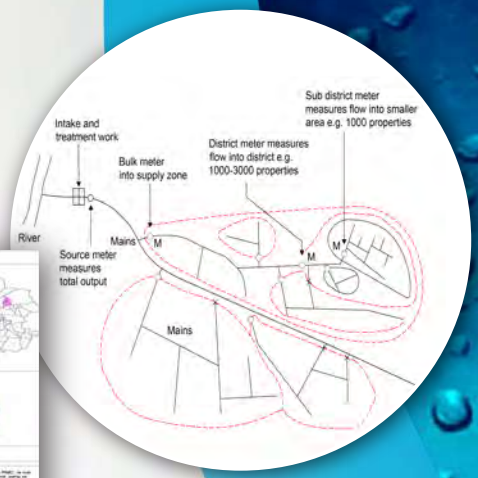
LEAKAGE DETECTION AND NRW MANAGEMENT

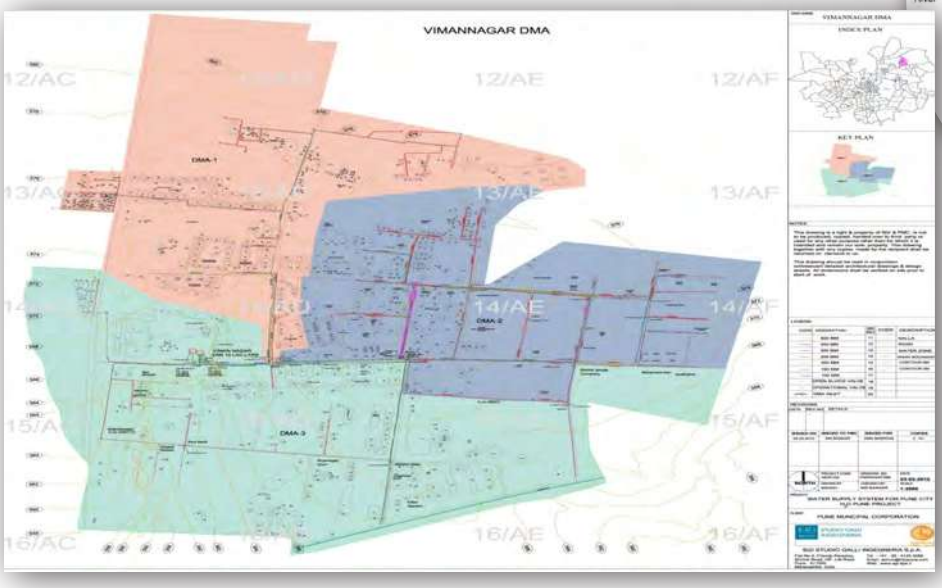
- Survey of bulk system to pinpoint visible leaks
- Plug visible leaks
- Estimation of losses by means of simultaneous inflow-outflow measurements
- Ranking of pipelines according to (Losses/Length)
- Sounding of valves and contact points
- Acoustic correlation to pinpoint leaks
- Use of ground microphone to confirm leak positions



DMA FORMATION

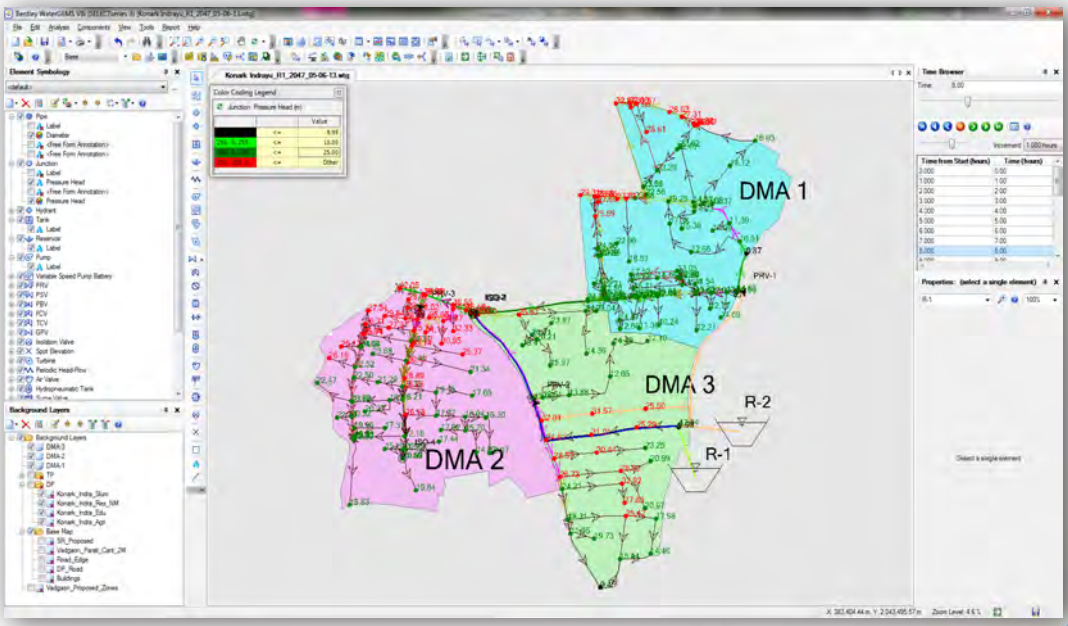
- Number of connections - 1000 to 2500
- Number of closed valves to isolate the DMA - Minimum
- Number of meters to measure inflow to and outflow from the DMA – Fewer (Ideally one)
- Full utilization of storage capacity of existing service reservoirs
- Ground level variation within the DMA – Minimum
- Pressure variation within DMA - Minimum
- Boundaries of DMA - Rivers, Drainage channels, Railways, Highways etc.





HYDRAULIC MODELING

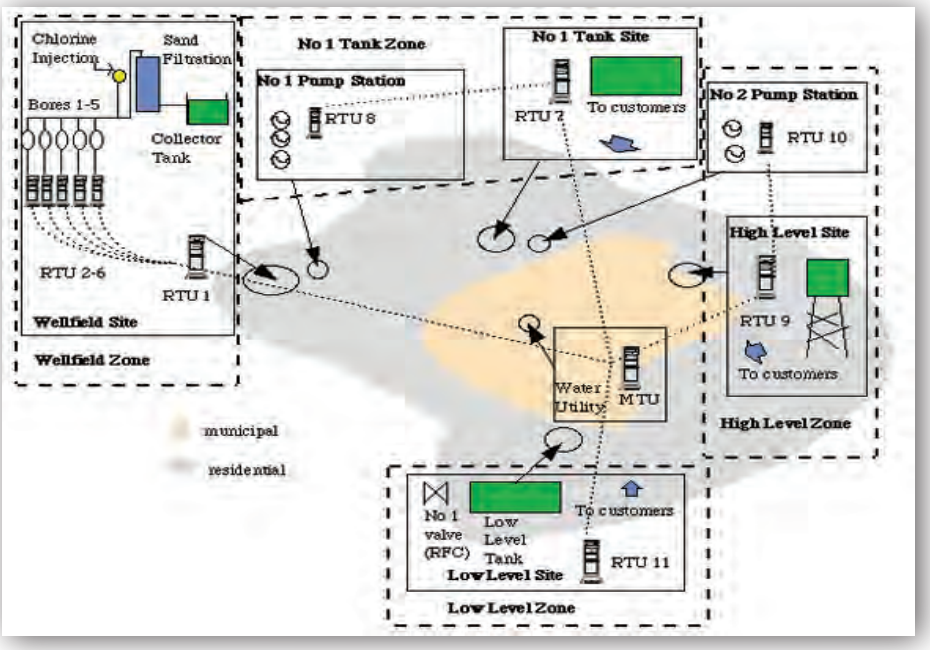
- Simulate existing network
- Use hydraulic modeling tools
- Model the existing network
- Find out the problems in the system
- Find out corrective measures
- Minimize Uneven Water Distribution
- Proper Planning of Distribution Network



SMART INTERVENTION FOR WTP, SR'S, TRANSMISSION & DISTRIBUTION SYSTEM

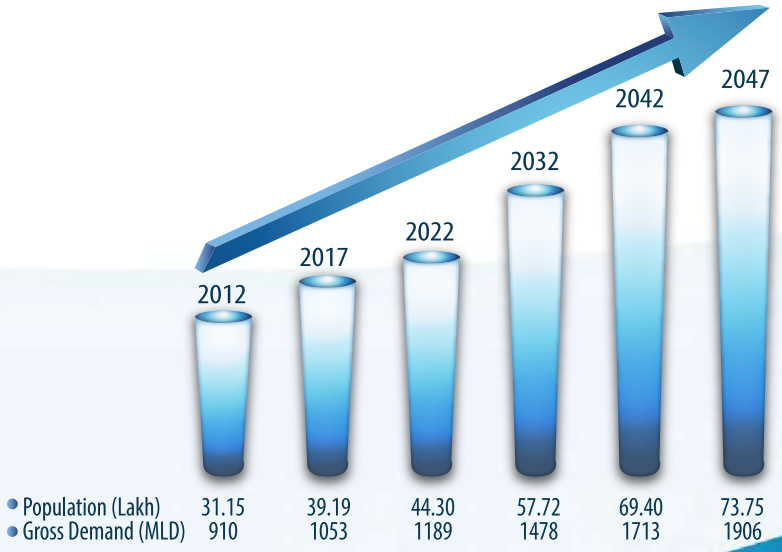
- Preliminary collection of information
- Field survey on the various WTPs included in the Diagnostic Preparation of a specific report for each plant, containing the findings obtained from the activities of Step 1 and 2, and the relevant technical comments
- Results of the acquisition of sensible data on water quality
- Issue of recommendations for the improvement of the consistency and performance of the WTPs included in the Diagnostic

SCADA AND SYSTEM OPERATIONS CONTROL



POPULATION AND WATER DEMAND

Population projections were elaborated based on the past Census results & adopting various statistical methods. The following values, were finally adopted for population and demand in Pune.



Population for 2047	Gross Demand for 2047 (MLD)
73,75,348	1906.26

EXISTING & PLANNED WATER TREATMENT PLANT

In the proposed project with upgradation in all the existing WTPs as well as proposed and under constructions WTPs are considered as follows:

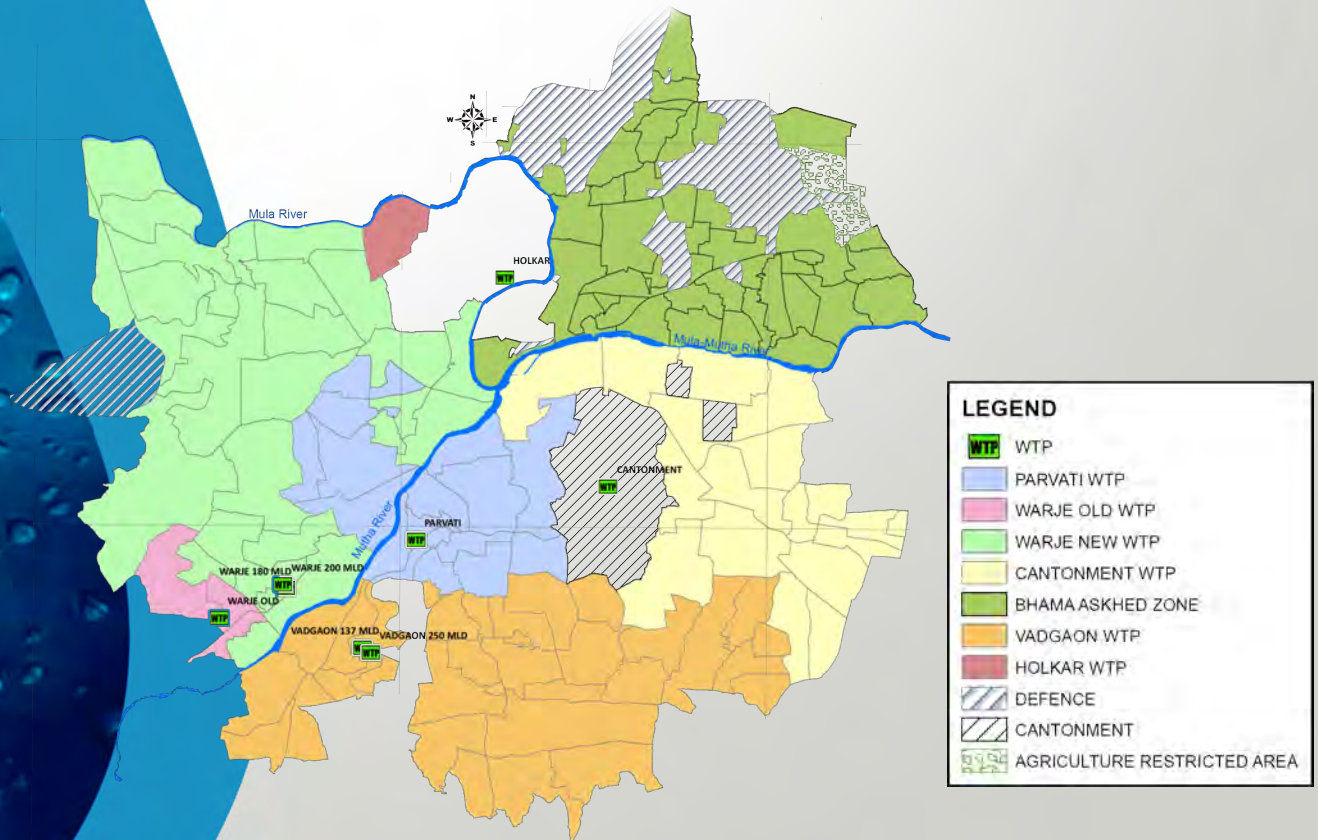
- Existing 9 Treatments Plants having a total treatment capacity of 1489 MLD
- Total additional WTP planned & under construction are of total treatment capacity of 1125 MLD
- In the proposed project the rationalization of the number of pumping stations has been achieved
- The effort is made to use the existing pump and transmission mains capacity to an advantage
- The new pumping systems are planned at 12 locations

EXISTING AND PROPOSED NEW SERVICE RESERVOIRS

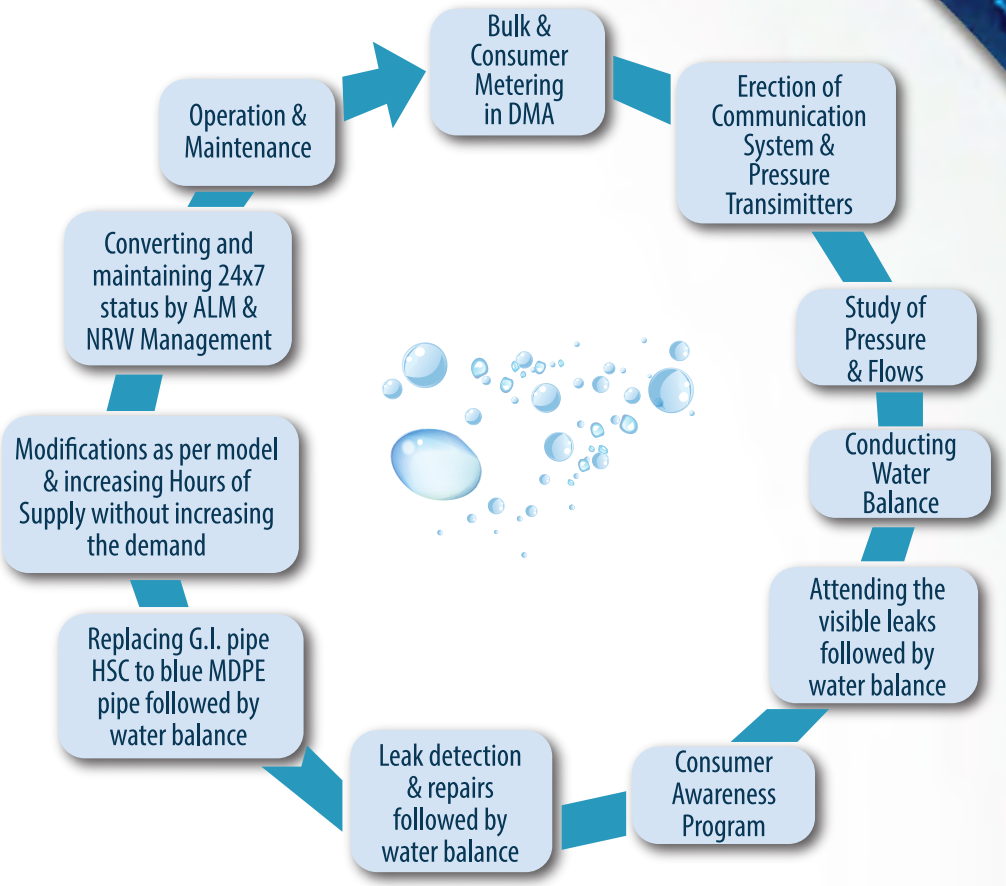
The following table depicts the distribution of existing and new reservoirs within the considered WTP supply areas of the PMC.

Served population in 2047	Demand in 2047 (MLD)	No. Existing SRs (retained)	Existing Storage Capacity (ML)	No. Proposed new SRs	Additional Storage Capacity (ML)
7375348	1877	58	245	103	389.00

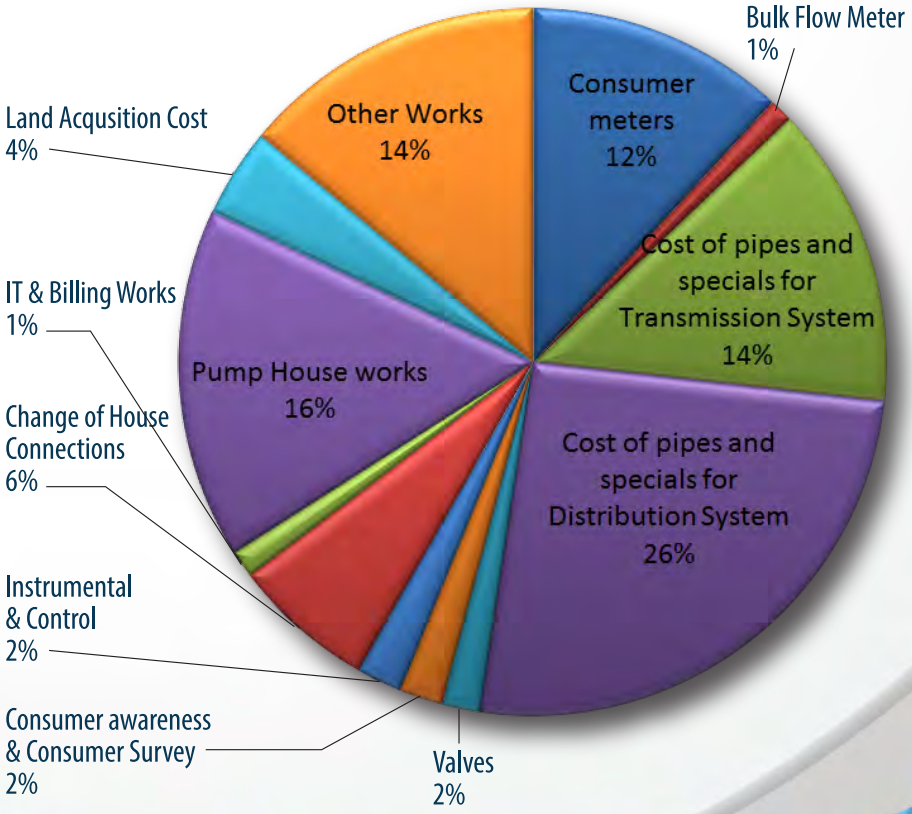
PROPOSED WATER SUPPLY ZONE PUNE



INTERMITTENT TO 24X7 WATER SUPPLY



GROSS PROJECT COST



FINANCING OF PROJECT	
DESCRIPTION	TOTAL AMOUNT (INR Crore)
OUTFLOWS	
Capex	3043
IDC	470
Total Outflow (A)	3513
INFLOWS	
Government Grants	
Under SMART City	299
AMRUT	200
PMC Contribution	
Stand alone Contribution	650
Under SMART City	100
Sub. Total	750
Loan Amount	2264
Total Inflow (B)	3513

City Digitalisation strategy leveraging the new utilities creation

REQUIREMENT OF THE FIBRE CABLE

Internet data is growing exponentially across the world with having a high speed internet becoming more of a necessity. With growing internet penetration and as the applications become richer and video oriented, the need for data is likely to increase significantly. Studies suggest that Fibre is the only technology to meet projected high traffic requirement for a city supported by wireless technologies like LTE/5G for the end connectivity.

Further, creation of a reliable fibre network with strong data connection also supports businesses especially smaller Internet and data companies e.g., within one year of Google Fiber being introduced in Kansas, ratings agency, Fitch, upgraded the city's bond ratings from "negative" to "stable." Why? The city's growing gigabit offerings had "already attracted a number of smaller Internet and data companies," bringing in new businesses, creating jobs and boosting the economy.

Lastly, with city government's also embarking on a smart city journey, cities itself will have a huge data requirement especially for some of the bandwidth hungry initatives like Safety and Surveillance , City WiFi, Connected transport, Smart Lighting, Traffic management etc. which again can be provided through laying of the fibre network.

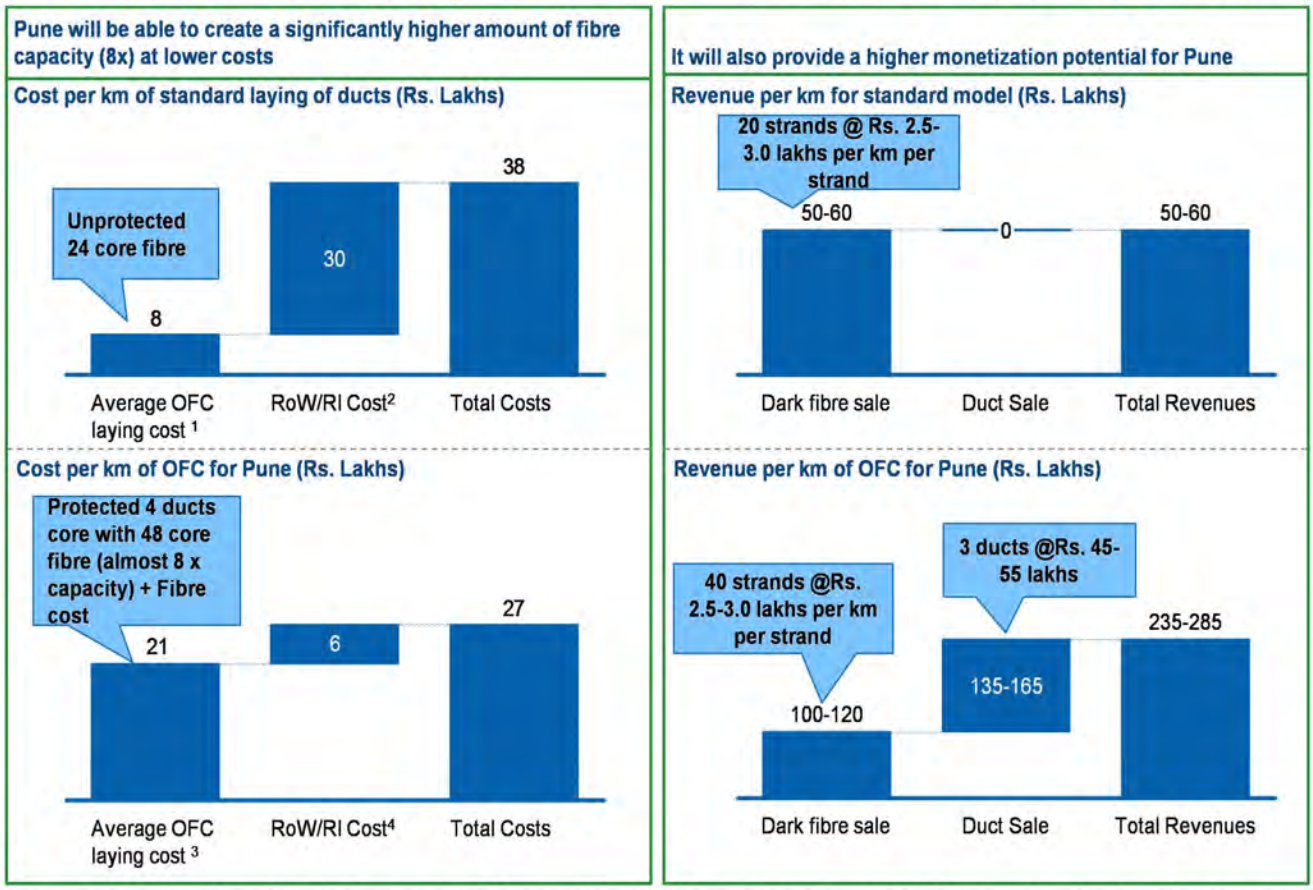
ADVANTAGES OF LAYING FIBRE WITH WATER PIPELINE

1. Reduces the cost to the city - Given that it is being combined along with the digging for the city of Pune, it will lead to significant cost saving (upto 70-80% of the cost for OFC is re-instatement cost)
2. Reducing public inconvenience – Multiple agencies have need for fibre and each one of them separately dig the road for laying of optical fibre. By laying out 4 ducts at once it helps reduce the digging within the city
3. Reduced time to roll out – The project will significantly reduce the time to roll out services for the data providers as there would be a ready infrastructure available which can be leveraged

FINANCING OF THE DUCTS

Laying of a 4 core duct along with utility will become self-financing itself. It creates an option for the city to sell the additional ducts as well as lease out fibre strands which will pay for the cost and generate incremental revenue for the city.

OFC infrastructure project- Standard situation v/s current situation



1 Average cost of Incremental Trenching @ Rs. 8 lakhs per kms; 2 Cost to re-instate the road (at ~50% of RoW/RI cost) @Rs. 30 lakhs based on rates charged to govt. department
3 4 No OFC duct with 2000 kms without trenching @Rs 12.5 lakhs per kms ; remaining 500 kms with trenching @Rs. 12.5 lakhs per kms
4 Cost while waived off would have been spent by the city to re-instate the road (at ~50% of RoW/RI cost) for 500 kms out of 2500 kms; Average cost Rs. 30 lakhs per kms
SOURCE : Pune Municipal Corporation

Municipal Bonds for financing Water for Pune's Future

"You are all aware of the huge capital requirements for improving urban infrastructure. This government has launched an ambitious Smart Cities programme. In this context, I am disappointed that even now, we do not have a municipal bond market.

There will be problems and difficulties in creating such a market. But the true test of an expert innovation is when it solves a complex problem. Can SEBI and the Department of Economic Affairs ensure that at least 10 cities in India issue municipal bonds within one year?"

- Shri Narendra Modi, Hon'ble Prime Minister of India

December 24th, 2016

National Institute of Securities Markets, Navi Mumbai, India

Supporting Agencies / Organizations:

- Government of Maharashtra (GoM),
- Union Ministry of Finance (MoF),
- Ministry of Urban Development (MoUD),
- Securities Exchange Board of India (SEBI)
- US Department of Treasury's Office of Technical Assistance (OTA) – Advisory Capacity
- SBI Capital Markets Ltd. (SBI Caps) – Merchant Bankers

Salient Features of PMC Municipal Bonds:

- **PMC's Municipal Bonds provide an attractive opportunity to investors to invest in Smart-Cities :**
  - 'IND AA+/Stable Outlook' awarded by India Ratings to PMC for the Year 2016
  - 'CARE Ratings' has provided PMC with a 'CARE AA+ Stable' rating
  - Telescopic Water Tariff has been adopted by PMC to ensure financial viability of the project

- **PMC has completed an exhaustive financial analysis :**
  - Debt Capacity Analysis
  - Debt Management Policy
  - Adherence to double-entry accounting system and National Municipal Accounting Manual (NMAM) since 2006-2007
  - First ULB in India to have prepared audited accrual based financial balance sheets

- **PMC's ambition to become the first ULB in India to issue Municipal Bonds is in consonance with Prime Minister Modi's vision of creating a vibrant market for Municipal Bonds in India to support the the Smart Cities' Mission**

Interest Subsidy for Municipal Bonds:

- Union Government has decided to give an interest subsidy of Rs.400 crore this year to make Municipal Bonds more attractive to investors
- Pune and Ahmedabad would be the first municipalities to float bonds
- The urban development ministry expects 12 other municipalities to follow with bonds worth Rs. 3,000 crore being floated in the current financial year
- Ministry of Urban Development would tap into the incentive funds under Atal Mission for Rejuvenation and Urban Transformation (AMRUT) in order to provide this subsidy

Reference: http://economictimes.indiatimes.com/news/politics-and- nation/interest-subsidy- of-rs- 400-crore- clears-way-for-municipal- bonds/articleshow/58674998.cms

Cashflow Statement

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Grant Inflow	58	110	119	117	95	0	0	0	0	0	0	0	0	0	0
Bond Inflow	261	498	530	528	447	0	0	0	0	0	0	0	0	0	0
PMC Equity Funding Inflow	146	176	173	140	115	0	0	0	0	0	0	0	0	0	0
Total Inflow	465	784	822	785	657	0	0	0	0	0	0	0	0	0	0
Capex Outflow	459	738	730	645	471	0	0	0	0	0	0	0	0	0	0
Interest Servicing during Construction Outflow	6	46	92	140	186	0	0	0	0	0	0	0	0	0	0
Total outflow during Construction	465	784	822	785	657	0	0	0	0	0	0	0	0	0	0
Operational Cash	-6	22	55	96	145	272	181	239	299	367	441	523	617	718	830
Interest Servicing after Construction	0	0	0	0	0	202	202	202	202	202	190	156	109	62	19
Debt Repayment	0	0	0	0	0	0	0	0	0	0	261	498	530	528	424
PMC Support	438 Crore during Construction					Project Self Sustainable				Project Self Sustainable generating net cash					
	152	154	118	44	-30	70	-21	37	97	165	-10	-131	-22	128	387

Loan / Bond Amount (INR 2264 Cr.)	**Total Cost INR 3513 Cr.**	Smart City / AMRUT (INR 299 Cr.) / (INR 200 Cr.)
PMC Contribution (INR 750 Cr.)		Interest During Construction (INR 470 Cr.)

SGI Certifications

PUNE MUNICIPAL CORPORATION

Pune, the Oxford of the East is a historical city in India with a glorious past, an innovative present and a promising future. Since 1950, the Pune Municipal Corporation is administrating the city and serving citizens. Pune Municipal Corporation has taken an initiative for implementing e-Governance. Success of e-governance depends on use of Information Technology in mobilization of Government resources and utilization of these scarce resources with an aim of providing a better service

Pune is the ninth-most populous city in India and the second largest in the state of Maharashtra after the state capital city of Mumbai. Pune is also the 101st largest city in the world, by population. Pune is considered the cultural capital of Maharashtra. Pune is also one of the fastest growing cities in the Asia-Pacific region. The 'Mercer 2015 Quality of Living rankings' evaluated local living conditions in more than 440 cities around the world where Pune ranked at 145, second in India after Hyderabad (138). It also highlights Pune among evolving business centers and emerging 9 cities around the world with citation "Hosts IT and automotive companies". Pune has also emerged as a new startup hub in India with tech startups like Pubmatic, Firstcry.com, Storypick.com, TastyKhana.com and Swipe setting up base in Pune.

SGI

SGI Studio Galli Ingegneria S.r.l, Italy & fully owned subsidiary SGI Studio Galli Ingegneria India Pvt. Ltd. has been assigned consultancy job for major rehabilitation and upgrading of existing intermittent water supply system to 24 x 7 water supply system for Pune City.

SGI is a multinational engineering consultancy company specialized in the sectors of water, environment, civil engineering, transportation, landscape management and energy. Established in 1920, having employed over 200+ engineering staff. In order to support its major projects in Africa, Eastern Europe, Middle and Far East, SGI set up joint ventures an offices in Mauritius, Senegal, Uganda, Tanzania, Ethiopia, Botswana, Iraq, Qatar, China and India. We are also one of the founders of DESIGN ALLIANCE 250+ (http://www.da250plus.com), a joint venture of International firms built to provide professional architecture and engineering services around the world.

Actively involved in projects funded by International and Governmental Institutions (EC, WB, EBRD, UNEP, UNESCO, the Italian Ministries for the Environment and Foreign Affairs, USACE), SGI is conducting assignments in more than 30 countries.

CONTACT DETAILS

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