

# 24x7 Water Supplies for PMC Area

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**ABSTRACT:** One of the problems for water supply systems with intermittent supply is the peak flow produced at some hours of the day, which is usually much larger than that in a system with continuous supply. The main consequence is the reduction of pressure and flow at the ends or highest points of the system network. This in turn generates in equity in water supply and complaints from users. To reduce the peak flow, some sectors of the system must be assigned a different supply schedule. As a result, the supply curve is modified and the peak flow is reduced. This reorganization seeks some optimal allocation schedule and must be based on various quantitative and qualitative technical criteria. Irregular timing of Garbage collector van is also big issues in metropolitan city. to reduce this kinds of problems proper scheduling is required. In order to achieve the above mentioned objectives and solve the structural and operational problems listed above, PMC has decided to undertake a radical and comprehensive approach which clearly defined the main concepts to be developed in the present project this solution does not seek perpetuating intermittent water supply. On the contrary, this methodology can be a useful tool in gradual transition processes from intermittent to continuous supply.

**KEYWORDS:** Water supply schedule, Optimization.

## I. INTRODUCTION

The Pune water supply system is affected by many problems which are due to the fast and chaotic development of Pune and by the consequent need-based development of the water distribution network for keeping the pace of the water demand growth in various parts of the town. This irregular development determined the progressive accumulation of the following problems and deficiencies of the water supply service:

- The marginal parts of the town receive water in insufficient quantity and pressure and distributed over few hours per day. On the contrary some central parts of Pune are benefited by large availability and adequate pressure.
- The water resources have been exploited up to their maximum potential and it will be more difficult to find additional water sources able to meet the water demand if growing with the current level of consumption.
- The system is presently affected by a high level of Non-Revenue Water and water losses largely exceeding the government established target of 15%.
- Over 70% of the consumer connections are not metered and many illegal or unregistered connections are present. The water charges of the un-metered connections are collected through a specific quota paid with the property taxes. This system does not encourage efficient and rational usage of water which is progressively becoming a scarce resource.

### A. Proposed System

We propose a system for monitoring the water supply provided in the city. The application is handle by the municipal corporation and it is usable for people who daily surviving peak flow problem. The proposed systems overcome the problems of household women or peoples who don't know the information about today's water supply and Also the information about garbage collector. The proposed system also consists of android module which provides option for user to directly complaint to the municipal officer or the corporate of the local area. The proposed system also consists of many application features for daily information about corporation updates. The overall architecture of water supply management and garbage collector management is shown in following diagram



**B. Objectives**

The main objectives of the project are:

- To ensure safe and 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.
- The goal of this project is to produce an Social Awareness About water saving Activity and Municipal Corporation application for the Android marketplace. . This application will be serve information one of which is open source, the rest custom made.

**II. PROJECT WATER DEMAND**

**A. Domestic Water Demand**

The domestic water demand for various stages of the design period is calculated based on the following considerations

- Water allowance: The domestic water allowance of 150 lpcd has been considered as per the provisions of the CPHEEO manual.
- System losses: The present system losses are of the order of 35%, and will be reduced to 15% by the year 2027

Table 1 Domestic water demand in Pune Municipal Corporation area

Design Year	Population	Net Water demand in MLD	System losses	Gross water demand in MLD
2012	3115433	467.31	35	718.95
2017	3918763	587.81	30	839.73
2022	4430320	664.55	20	830.69
2032	5771754	865.75	15	1018.54
2042	6939529	1040.93	15	1224.62
2047	7375348	1106.30	15	1301.53

Table 2 - Domestic water demand in Pune Cantonment area

Design Year	Population	Net Water demand in MLD	Gross water demand in MLD
2012	79,965	11.99	18.45
2017	79,965	11.99	17.14
2022	79,965	11.99	14.99
2032	79,965	11.99	14.11
2042	79,965	11.99	14.11
2047	79,965	11.99	14.11

Table 3- Domestic water demand in Khadki Cantonment area

Design Year	Population	Net Water demand in MLD	Gross water demand in MLD
2012	78,046	11.71	18.01
2017	78,046	11.71	16.72
2022	78,046	11.71	14.63
2032	78,046	11.71	13.77
2042	78,046	11.71	13.77
2047	78,046	11.71	13.77

**B. Non Domestic water demand**

Pune is a metropolitan city and provides water supply to the large number of non-domestic consumers. These primarily include the following-

- Government and Non-Government establishments
- Educational institutions



- Commercial and industrial units
- Healthcare institutes, such as Hospitals, clinics and Laboratories
- Cultural centres, Theatres, concert halls
- Transportation terminals for Road, rail and Air traffic

The Approach and methodology of computing the Non domestic water demand for each of the three local bodies is discussed in the following sections.

Table 4 Summary of Non Domestic demand for the design year 2047

Sr No	Category	Net demand in MLD	Gross demand in MLD
1	Commercial	19.66	23.13
2	Industrial	32.56	38.31
3	Public and Semi Public	33.93	39.92
4	Educational Institutes	69.21	81.42
5	Hospitals	11.66	13.72
6	Traffic terminuses-Bus stands, Railway stations and Air ports	17.71	20.84
7	Commercial demand in designated Residential land use	213.29	250.93
8	Miscellaneous	92.11	108.36
<b>TOTAL</b>		<b>490.13</b>	<b>575.8</b>

Table 5 Total Project demand

Year	Gross Demand (MLD)					
	Pune Municipal Corporation			Pune Cantonment	Khadki Cantonment	Total
	Domestic	Non Domestic	Total	Total	Total	
2012	718.95	153.11	872.06	19.28	18.55	909.89
2017	839.73	178.31	1018.04	17.91	17.23	1053.17
2022	830.69	327.88	1158.57	15.67	15.07	1189.31
2032	1018.5	430.51	1449.05	14.75	14.19	1477.99
2042	1224.6	459.3	1683.93	14.75	14.19	1712.86
2047	1301.5	575.8	1877.33	14.75	14.19	1906.26

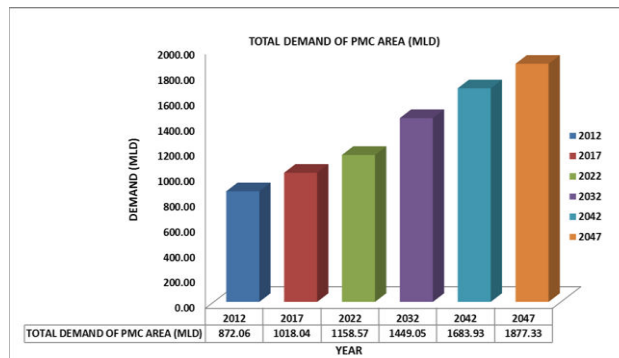


Fig 1 Projected Water Demand of PMC Area

### III. PROPOSED WATER DISTRIBUTION SYSTEM

The existing distribution system is divided in to 67 water supply zones, each to be supplied from one or more reservoirs. The network of pipes from each of the Primary service reservoirs provides supply in a specific geographic

area. However at many places interconnections have been made between the distribution mains from two service reservoirs.

**A. Proposed Water Supply Projects**

- **Conduit from Khadakwasla Dam to Cantonment WTP**

The Irrigation department has asked PMC to discontinue use of Irrigation canal to draw water at Parvati and at Pune Cantonment water works. Therefore PMC has prepared a separate project, not included in the present DPR, to pump 800MLD of raw water from Khadakwasla to Parvati water works.

- **Warje Stage 3 WTP (200 MLD)**

A new water treatment plant of 200 MLD capacities is under construction in Warje water works. The raw water pumping station (Jackwell no.2) and the pipe line is being implemented through a separate project to supply to this new plant

- **Vadgaon Stage 2 WTP (250 MLD)**

A new WTP has been planned and designed to increase the supply of treated water to the South western section of Pune, which is interested by a fast urban development. This new plant will be built aside the existing Vadgaon WTP. This project will also include the upgrading and rehabilitation of the existing WTP increasing its production capacity to 137 MLD and improving the process of this plant.

- **New Parvati 500 MLDWTP**

A new 500 MLDWTP has been planned by PMC to be built at Parvati site, adjacent to the existing New WTP. This new WTP has been designed by TATA Consulting Engineers Ltd. This WTP has been designed for a net drinking water output of 500 MLD.

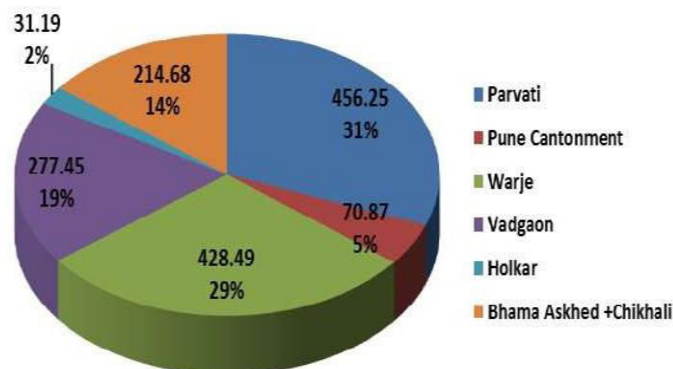


Fig 2 Zone Wise Distribution of Water Demand 2032

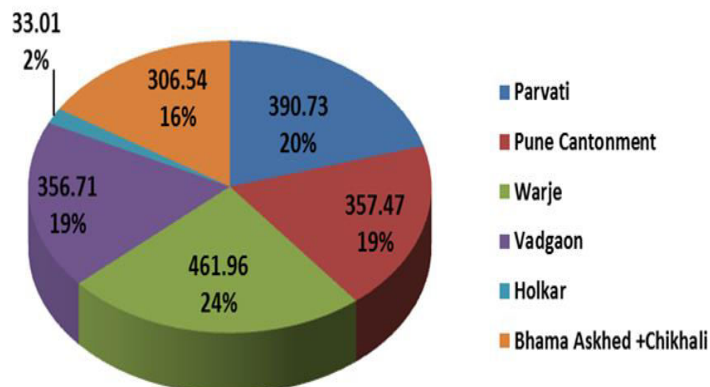


Fig 3 Zone Wise Distribution of Water Demand 2047

**B. Proposed Water Pump Stations**

- **Parvati water treatment plant**

The PMC has planned to decommission both the existing water treatment plants at Parvati. These plants are more than 40 years old, and are facing many problems. Therefore the pump stations of these plants will also be taken out of service. A pumping station is planned at Parvati as a part of proposed water treatment plant of 500 MLD. The pump station consists of clear water sump of 18 ML capacity and a pump house.



• **Pune Cantonment water treatment plant**

The PMC has planned to decommission the existing water treatment plant of 240 MLD capacities at Pune Cantonment. This plant is more than 60 years old, and is facing many problems. Therefore the pump stations of this plant will also be taken out of service. It is proposed to construct a new pump station to receive the clear water from Parvati WTP, and has been planned at the location of the existing settling tanks, which are very old and leaking at many locations.

• **Warje water treatment plant**

There are three water treatment plants in Warje area, two existing and one is under construction. Each of the three plants have its own clear water pump station. The details of these are described in the following sections. The existing sump at old Warje WTP of 9 Mld has capacity of 2.60 ML, with 2 compartments of 1.30 ML each. One compartment will be used as service reservoir for Atulnagar and WarjeMalwadi water supply zones. The other compartment will be used as BPT for proposed ESR at AhireGaon.

• **Vadgaon water treatment plant**

The Vadgaon WTP will be augmented by 250 MLD, in two stages of 125 MLD. The 2032 demand is planned from the first stage augmentation.

• **Holkar water treatment plant**

There is an existing water treatment plant of 45 MLD and a clear water pump station of the same capacity. At present, this pump station is used for supplying to Vidyanagar and Tingarenagar pump stations. In the proposed planning, this pumping station will be used to supply to the following zones

- Khadki Cantonment –Bulk supply
- Bopodi zone

**C. Gross Project Cost**

Sr No	DESCRIPTION OF COMPONENT	COST (INR LAKHS)
A	Land Acquisition	4062
B	Pilot DMA	1612
C	Consumer Survey	555
D	Physical Infrastructure	
1	Construction of reservoirs (5 Lots)	29310
2	Rehabilitation of Reservoirs (3 Lots)	2373
3	Rehabilitation of Water Treatment Plants	566
4	Pumping Stations	14213
5	Transmission, Distribution and Metering (Zone-wise)	217734
	Sub Total-D	264196
	<b>Total cost of water supply components (A to D)</b>	<b>270425</b>
E	Shifting of utilities	531
F	Statutory compliances	50
	<b>Total Net cost</b>	<b>271006</b>
	Add Cost of consultancy services at 1%	2710
	Add Contingencies at 3%	8130
	<b>Total Gross cost</b>	<b>281846</b>

**IV. CONCLUSION**

A few decades ago Pune city had experience of 24 hours water supply due to large capacity of water source and moderate level of demand. As the demand for water increased due to large scale urbanization, water supply gradually had to be restricted to a limited time and quantum. The duration and volume of water supply is usually affected by demands and priorities of different type consumers like industrial, commercial, agricultural, domestic and supply to poor strata of society. Moreover there are many factors viz. technical, financial, institutional, managerial, social and political which affect the water supply scenario of the Municipal Corporations. An ideal condition for the citizens is to

have 24 hours uninterrupted water supply of good quality and in adequate quantity. The price of water, reliability of supply also matter most to the consumers. It has been proved that 24 hours water supply is not only beneficial to the consumers but also to the service providers/water utilities in many ways.

#### A. Health and Economic Benefits

The main advantage of 24x7 supply is that the entire distribution systems remains continuously pressurized, which prevents contamination by dirty water and /or waste water surrounding the pipelines. As a result of this, incidences of water contamination will be reduced drastically. There will be considerable reduction in water borne diseases because incidences of raw sewage entering in to water supply pipe lines will be prevented. This is significant health benefit to the consumers. This has multiple collateral benefits such as savings in likely loss of working man-days, reduced healthcare bills, higher productivity and possible lower dependence on household water treatment appliances.

#### B. Social Benefits

The 24x7 water supply will also be beneficial to urban poor families living in slums. Due to lack of space available in their houses, urban poor have limited storage capacity. They will not be required to store water and thus save space used for water storage and use for some other purpose. The poor families cannot afford in-house water treatment facilities and thus they are more prone to water borne diseases. With good quality water supply, the incidences of water borne diseases will be reduced thus saving their expenditure on medical treatment and loss of working hours resulting due to illness.

Individual House connections or common connections near houses can be provided in slums. This will save time of residents of slum for fetching water from stand posts and utilize for economic activities like earning livelihood. The 24x7 water supply project intends to cover entire Pune city. The areas which are not getting potable and reliable water supply including areas coming under the extended city limit can also be covered under this project.

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