Detailed Project Report

Pimpri-Chinchwad Continuous Pressurized Water Supply Project under AMRUT Program, 60% Area-Phase I, 2 and 3

Volume I: General Report

Project	**Pimpri-Chinchwad Water Supply Project**
Client	Pimpri-Chinchwad Municipal Corporation
Work Order	WS/06/874/2016, Dt: 02/06/2016

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ABBREVIATIONS AND UNITS OF MEASURE

Abbreviations

AC	Asbestos Cement
PCMC	Pimpri-Chinchwad Municipal Corporation
CI	Cast iron
DI	Ductile iron
DMA	District metering area
DPR	Detailed project report
ESR	Elevated service reservoir
GIS	Geographic Information system
GoM	Government of Maharashtra
GoI	Government of India
HGL	Hydraulic grade line
MBR	Master balancing reservoir
MJP	Maharashtra Jeevan Pradhikaran
MS	Mild steel
NRW	Non-revenue water
PVC	Polyvinyl Chloride
WTP	Water treatment plant
GSR	Ground service reservoir

Units of Measure

Km	Kilo meter
LPCD	Liters per capita per day
m	Meter
m^2	Square meter
m^3	Cubic meters
MLD	Million liters per day

Executive Summary

The purpose of this document is to create a detailed project report (DPR) with advance techniques of GIS and simulation Hydraulic Model for the 60% area of the Pimpri-Chinchwad city and recommend a strategy, which would help Pimpri-Chinchwad Municipal Council (PCMC) to design the pipe network of the distribution system of the city. This combined document includes the Phase1, Phase2 and Phase3 of the 60% area. Ultimate objective is to allow PCMC to achieve continuous (24/7) pressurized water supply to all its customers including the poor. The project is designed to cover about 11 lakh population (about 60 % of the city) having diverse socio-economic and demographic structure.

With a aim of increasing drinking water availability to the city and improving service level, PCMC has planned a comprehensive water supply project. The Project focuses on- (i) Reducing non-revenue water by leakage management and commercial losses through identification and regularization of illegal connections, metering and improvement in billing and collection systems; (ii) Refurbishment and expansion of transmission and distribution network (iii) reforms to address revenue improvement, expenditure rationalization (water and energy audit), customer relations and redressal systems and enablement of water management for efficiency improvement and (iv) organizational strengthening and capacity building. To achieve these objectives, PCMC has planned this project.

The project is expected to bring significant improvement in service delivery (as per the SLB indicators), reduction of coping costs for citizens, financial sustainability for PCMC and most importantly public health improvement. The project is designed to avoid hindrances (Ex. land acquisition etc) and hence would be completed as per the indicated time.

The Pimpri-Chinchwad city is located (Figure A) in the Pune district of the state of Maharashtra. The population of the city in the year 2011 was 17,30,133.

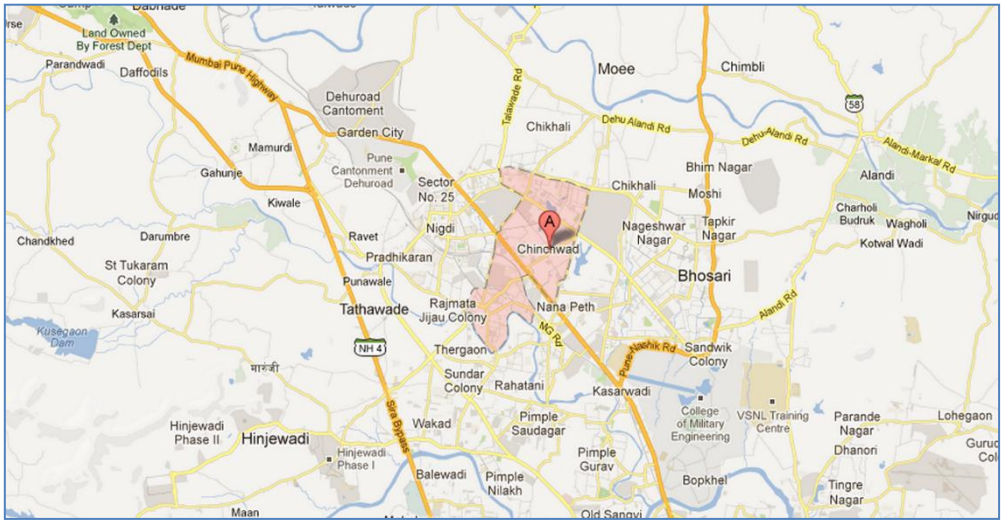


Figure A: Location of Pimpri-Chinchwad town

Background

Present water supply situation in the Pimpri-Chinchwad city is challenging. Presently a number of ESR/GSR are supplying water to the distribution system. Due to lack of investment and disarrayed distribution system, the current practice is to maintain water supply on intermittent mode. The Non-Revenue Water is more than 50% and therefore, the residents of the city get water just three hours in a day.

The cities in urban India are facing the similar situations, as a result, the coverage is less, per capita share is on lower side, the level of NRW is quite high and there is no consumer satisfaction. To overcome this and ameliorate the present status, Government of India (GoI) has introduced its ambitious program of Atal Mission for Rejuvenation and Urban Transformation (AMRUT) for the cities that have low coverage, low per capita share and high values of non- revenue water. Pimpri-Chinchwad city administration is taking advantage of this scheme. Under AMRUT project the city got funds phase wise, i.e., Phase1 and Phase2. As there is limitations of funds under AMRUT project, it is expected that PCMC shall provide from its own sources the funds for the Phase3. Hence, this document is prepared for all the three phases.

Summary

Presently water is pumped from the head works at the Rawet on Pavana river to the Water Treatment Plant (WTP) at sector 23 through the three mild steel (MS) pipelines of diameters 1100 mm for 228 MLD, 1200 mm for 100 MLD and 1400 mm 100 MLD laid in the years 1989, 1999, 2006 and 2010. From pure water sumps of the WTP, treated water is pumped to the existing ESRs and then supplied to the respective water districts of the distribution systems. The plight of the distribution system is in disarrayed form. Existing ESRs are not in a state to supply water on 24/7 system. The city is not divided into operational zones. The design of the operational zone is not proper. Hence, distribution of water is in a haphazard way. Besides this, there is unequal distribution of water too.

Advanced and powerful techniques of GIS mapping and the hydraulic modeling have been used in the present study. Using these techniques, a GIS based hydraulic model simulating the water supply system, right from the source to the consumers in distribution system has been prepared.

Population forecast and the demand projection is carried out. The demands of water in the water districts have been computed for immediate stage of the year 2030 and the pipe network of the distribution system has been designed for ultimate stage of year 2045. The demand allocation to the 17,624 nodes has been made using advanced feature of the WaterGems.

The base scenario, simulating water supply of the entire city, has been prepared as a first step. Child scenarios of the system for the various water zones have been created. The zoning is

made considering the capacity and serviceability of the existing ESRs. Using the model, the sizes of the pipes are worked out.

Scope

Figure B shows 40% (shown in green color) and 60% are shown in blue color. There are 29 operational zones considered in 40% area and are shown in Table A. Work is in progress for 40% area which is out of scope of this DPR. There are 65 operational zones zones in 60%area of PCMC as shown in Figure B. Apart from 65 operational zones there are two point demand loads- Bhalewadi Stadium and Chest Hospital in 60% area. Present distribution pipe network is therefore proposed to be divided into 65 zones. The district metering areas are also designed and the location of the bulk meters is fixed.

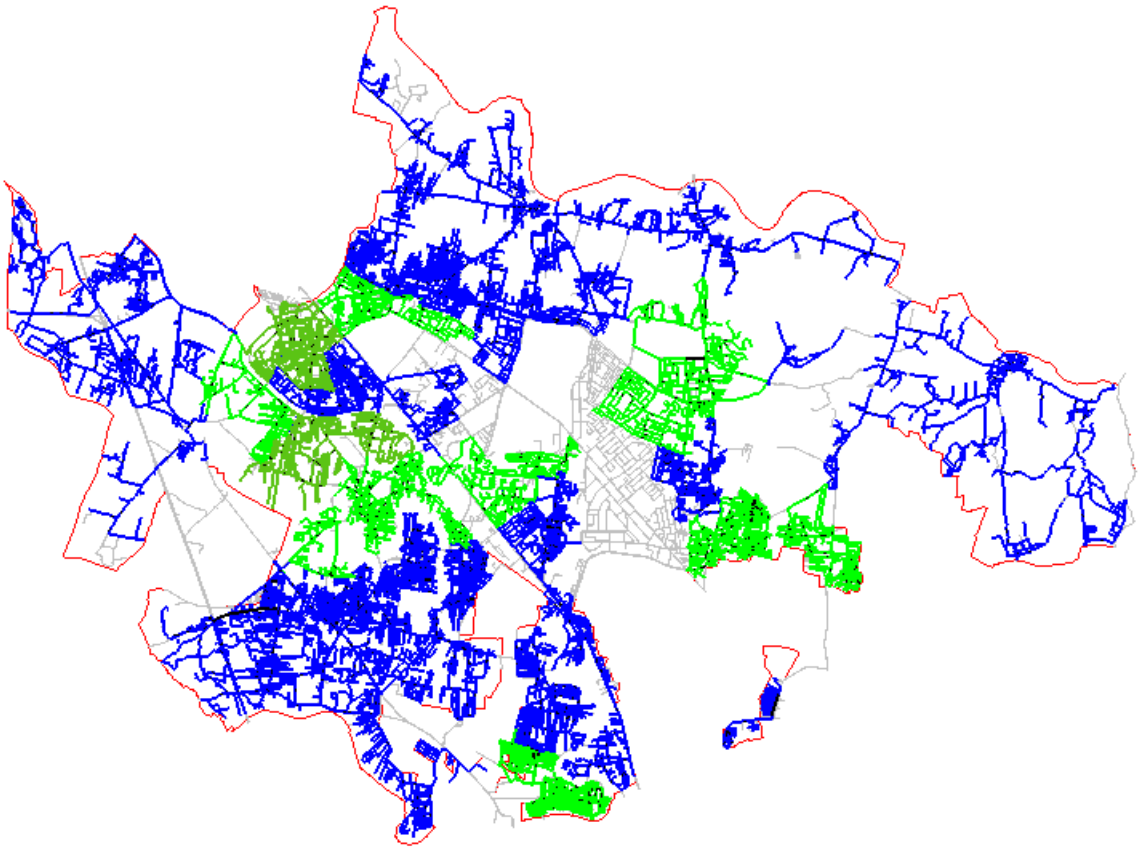


Figure B: Areas selected in Phase I of 60% area of Pimpri-Chinchwad town

Table A: Operational zones considered in 40% area

SN	Operational Zone
1	Ajmera-1
2	Ajmera-2
3	Annasaheb_Magar
4	Bhosari Gaothan
5	Dighi
6	Dighi Gaothan
7	Elpro a
8	Elpro b
9	Elpro New ESR
10	Gaothan New (Old Sangavi)_b
11	New sangvi police Station
12	PWD Sector 84
13	Sant Tukaram
14	Sant Tukaram New
15	Sector 29a
16	Sector 29b
17	Sector7_10_a
18	Sector7_10_b
19	Thergaon Gaothan1
20	Triveni Nagar1
21	Triveni Nagar2
22	WD4 a
23	WD4 b
24	WD4 c
25	Bijli Nagar a*
26	Bijli Nagar b*
27	Bijli Nagar c*
28	Pradhikaran*
29	Premlok Park*

* Recently directed to include in 40%

Table B: Operational zones considered in Phase 1, 2 and 3 of 60% area

Phase1			Phase2			Phase3	
SN	Operational Zones		SN	Operational Zones		SN	Operational Zones
1	Ashok Cinema		1	Morewasti Chikhli		1	Charholi c
2	Ashram Shala		2	Nav Maha		2	Dudulgaon
3	B4_Mamurdi		3	Naydu		3	Gairan
4	Bopkhel		4	Nehru Nagar1		4	Kudalwadi New1
5	Dapodi1		5	Nehru Nagar2		5	Kudalwadi New2
6	Dapodi2		6	New Panjarpol		6	Kudalwadi New3
7	Dighi_Magzine		7	New Pimple Gurav Garden 20 Lakhs		7	Kudalwadi New4
8	Indrayaninagar a		8	New_Punavale		8	Moshi b
9	Kala Khadak		9	Panjarpol		9	New_Charoli
10	Kala Khadak New1		10	Pimple Gurao1		10	New_Moshi b
11	Kala Khadak New2		11	Pimple Gurao2		11	New_Wadmukhwadi b
12	Kasarwadi1		12	Pimple Gurao3		12	Wadmukhwadi b
13	Kasarwadi2		13	Pimple Gurav Garden		13	NewJadhavwadi2
14	Kaveri Nagar		14	Pimple Nilakh			
15	Khandoba-1		15	Pimple Saudagar a			
16	Khandoba-2		16	Pimple Saudagar b New			
17	Lakshman Nagar		17	Pimpri Delux a			
18	Lakshman Nagar 2		18	Pimpri Delux b			
19	Mahendra & Mahendra		19	Proposed Naydu			
20	NewJadhavwadi1		20	Punavale			
21	Thergaon Gaothan2		21	Rahatni1			
			22	Rahatni2			
			23	Rahatni3			
			24	Rupi Nagar			
			25	Sachin1			
			26	Sachin2			
			27	Sector 28 New ESR			
			28	Sector 96			
			29	Sector 96 New Esr			
			30	Sector 96 Part 2			
			31	Shahu Nagar			

Critical Recommendations

(1) New Elevated Service Reservoirs (ESR)

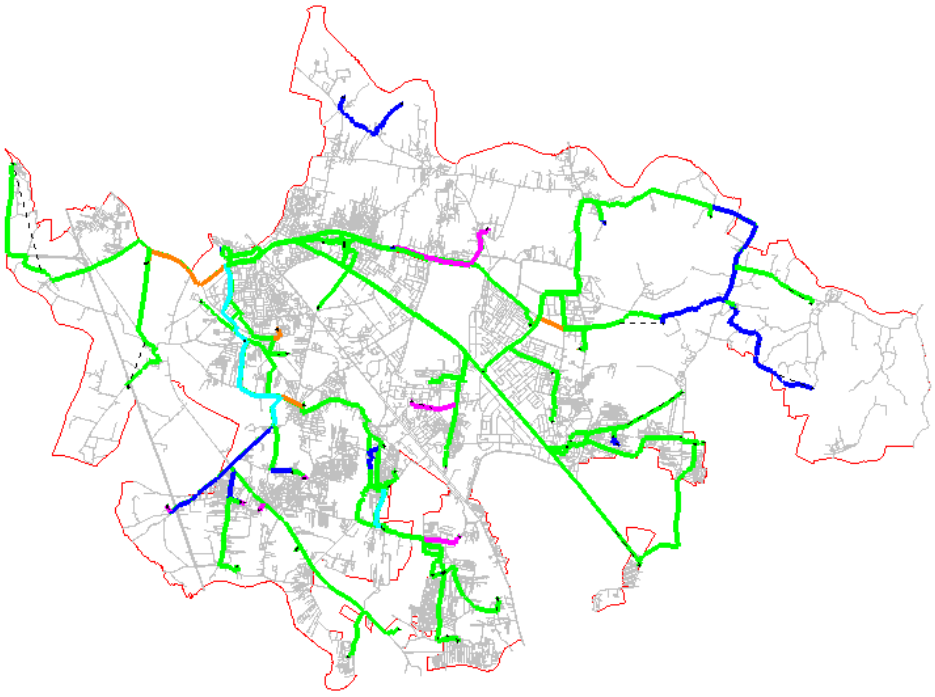
New tanks are suggested as shown in Table C.

Table C: New tanks

SN	Phase	Area (%)	Label	Elevation (Minimum) (m)	Elevation (Maximum) (m)	Diameter (m)	Capacity (M3)	Elevation (m)	St_Ht
1	Phase3	60	Kudalwadi New1	602	607	22.5	1988	582	20
2	Phase0	40	Elpro New ESR	593.5	598.5	22.5	1988	568.5	25
3	Phase0	40	Gaothan New (Old Sangavi)_b	575	580	22.7	2024	555	20
4	Phase1	60	Kala Khadak New2	603.5	608.5	28	3079	581.5	22
5	Phase1	60	NewJadhavwadi1	615.94	620.94	25.23	2500	598.7	17.24
6	Phase2	60	New_Punavale	591.97	596.97	22.5	1988	571.97	20
7	Phase2	60	Pimple Saudagar b New	580	585	22.5	1988	560	20
8	Phase3	60	Gairan	615	620	22.5	1988	591	24
9	Phase3	60	Kudalwadi New2	602	607	22.5	1988	582	20
10	Phase3	60	Kudalwadi New3	610	615	22.5	1988	590	20
11	Phase3	60	Kudalwadi New4	610	615	22.5	1988	598	12
12	Phase3	60	New_Charoli	604	609	22.5	1988	584	20
13	Phase3	60	New_Moshi b	600.1	605.1	22.2	1935	580.1	20
14	Phase3	60	New_Wadmukhwadi b	604	609	22.5	1988	584	20
15	Phase3	60	NewJadhavwadi2	615.94	620.94	20	1571	598.7	17.24

(2) Strengthening of the Transmission pipelines

New transmission pipelines shown shall be laid as shown in Figure C. In Phase 1, lines shown in pink colours are proposed, orange for Phase 2 and Blue for Phase 3. The pipes considered are shown in Table D.



D

Figure C: New pipelines (pink colour)

Table D: Details of new transmission mains

Diameter (mm)	40% area	60% area			Grand Total
		Phase1	Phase2	Phase3	
300			462		462
400		3301			3301
450			72		72
500	1146	2669	3152	12339	19306
600		316	31	1590	1937
700		193		4859	5052
750				254	254
900			423	394	817
1000	5606		1030		6636
Grand Total	6752	6479	5170	19436	37837

Isolation Valves: Isolation valves (Butter fly) required in the transmission system are shown in Table E.

Table E: Number of isolation valves

Diameter (mm)	Count
200	1
300	9
350	2
400	13
450	7
500	60
600	13
700	2
750	1
800	1
1000	1
Grand Total	110

Flow Controlling Valves in Transmission Mains:

Throttling valves required in the transmission system are shown in Table F.

Table F: Number of Flow controlling valves in 60% area

Diameter (mm)	Number			Total
	Phase 1	Phase 2	Phase 3	
300	1	11		12
350		4		4
400	2	12		14
450	1	6		7
500	17	16	31	64
600			1	1
600			12	12
700			1	1
750			1	1
800			1	1
900			1	1
1000			1	1
1200			2	2
Grand Total	21	49	51	121

Bulk Meters in Transmission Mains:

Bulk meters required in the transmission system are shown in Table G.

Table G: Number of bulk meters

Diameter (mm)	Count
200	1
300	8
350	2
400	13
450	7
500	60
600	13
700	2
750	1
800	1
1000	1
Grand Total	109

Summary of pumps:

Summary of pumps is shown in Table H

Table H: Summary of pumps for the year 2030

Label	Flow (Design) (ML/day)	Head (Design) (m)
PMP-WTP_Phase3P	32	13
PMP-WTP_Phase3	32.2	13
PMP-WD4a,b,c	23.32	38
PMP-WTP_Sector10	84.56	10
PMP-Bopkhel	5.43	30
PMP-Sector 28 New	3.16	35
PMP-Dighi_Magzine	2.25	60
PMP-Sector7_10_b	3.04	40
PMP-Pimple Gurav Garden	2.98	35
PMP-Sachin1	3.65	30
PMP-Dighi Gaothan	3.71	65
PMP-Bhosari	4.23	40
PMP-Dapodi1	5.14	26
PMP-Sachin2	4.53	30
PMP-Dapodi2	2.95	26
PMP-Pimple Saudagar a	4.62	25
PMP-WTP_Ph3	41.04	16
PMP-WTP_Ph3	41.04	16
PMP-WTP_Ph3	41.04	16
PMP-Sector7_10_a	5.14	40
PMP_Mamurdi	5.21	55
PMP-PWD Sector 84	5.29	30
PMP-Punavale	7.81	40
PMP-Rahatni3	6.55	35
PMP-WTP_Phase3	6.8	35
PMP-Sector 96	6.88	35
PMP-Kala Khadak	7.23	40
PMP-Rahatni1	7.37	30
PMP-Shahu Nagar	7.38	30
PMP-Sector 96 Part 2	7.47	35
PMP-New Pimple Gurav Garden	7.53	35
PMP-Kaveri Nagar	7.58	35
PMP-New sangvi police Station	7.42	30
PMP-New_Punavale	5.85	45
PMP-Lakshman Nagar 2	8.47	30
PMP-Ashram	8.57	50
PMP-Rahatni2	8.77	35
PMP-Morewasti Chikhli	9.21	30
PMP-Pimple Saudagar b New	10.32	35

PMP-Kala Khadak New1	11.12	40
PMP-Rupi Nagar	11.13	30
PMP-Sector 96 New	11.26	35
PMP-Pradhikaran	12.12	30
PMP-Kala Khadak New 2	12.31	40
PMP-Pimple Gurao	13.02	30
PMP-Dighi	10.36	65
PMP-Lakshman Nagar	14.11	30
PMP-Kudalwadi2	14.57	45
PMP-Kudalwadi1	15.71	40
PMP-Triveni Nagar	15.9	25
PMP-Sant Tukaram	16.65	50
PMP-Jadhvwadi	20.32	60
PMP-GM_WD4	20.11	84.25
PMP-NewMBR	35.7	30

(3) Pipes in Distribution System

New

New pipes are proposed to increase coverage to 100%. Summary is shown in Tables I and J.

Table I: New pipes in the distribution system

Diameter (mm)	New_60			Old_40			Old_40_A*			Grand Total
Row Labels	DI	HDPE	Total	DI	HDPE	Total	DI	HDPE	Total	
99.3		252908	252908		84323	84323		16806	16806	354037
144.4	11	86904	86915		12292	12292		3655	3655	102862
150	916	7	923	229		229	7		7	1159
180.6		66020	66020		14465	14465		5852	5852	86337
250	111		111							111
300	89400		89400	24769		24769	6933		6933	121102
350	6167		6167	475		475	777		777	7419
400	38791		38791	13041		13041	3784		3784	55616
450	3163		3163	167		167				3330
500	14744		14744	5283		5283	2850		2850	22877
600	6744		6744	2500		2500	319		319	9563
700	3552		3552	493		493	31		31	4076
800	1419		1419							1419
1000							131		131	131
Grand Total	165018	405839	570857	46957	111080	158037	14832	26313	41145	770039

* PCMC directed to include operational zones of Bijli Nagar a, Bijli Nagar b, Bijli Nagar c, Pradhikaran and Premlok Park in 40% area. Hence pipes in this area is denoted as Old_40_A

Phase wise break up of these new pipes in 60% area is shown in Table J.

Table J: Phase wise break up of the new pipes in 60% area

Diamter (mm)	60_P1			60_P2			60_P3			Grand Total
	DI	HDPE	Total	DI	HDPE	Total	DI	HDPE	Total	
99.3		106066	106066		109229	109229		37613	37613	252908
144.4	11	22034	22045		32915	32915		31955	31955	86915
150	479		479	287	4	291	150	3	153	923
180.6		30290	30290		17209	17209		18521	18521	66020
250				111		111				111
300	38335		38335	29375		29375	21690		21690	89400
350	2262		2262	3121		3121	784		784	6167
400	15729		15729	17525		17525	5537		5537	38791
450	723		723	2290		2290	150		150	3163
500	3721		3721	5392		5392	5631		5631	14744
600	1876		1876	2781		2781	2087		2087	6744
700	187		187	1938		1938	1427		1427	3552
800	1411		1411	8		8				1419
Grand Total	64734	158390	223124	62828	159357	222185	37456	88092	125548	570857

(4) District Metering Areas

Total 127 DMAs are proposed in 65 zones (Figure D) of the 60% area. A care shall be taken to isolate the DMAs.

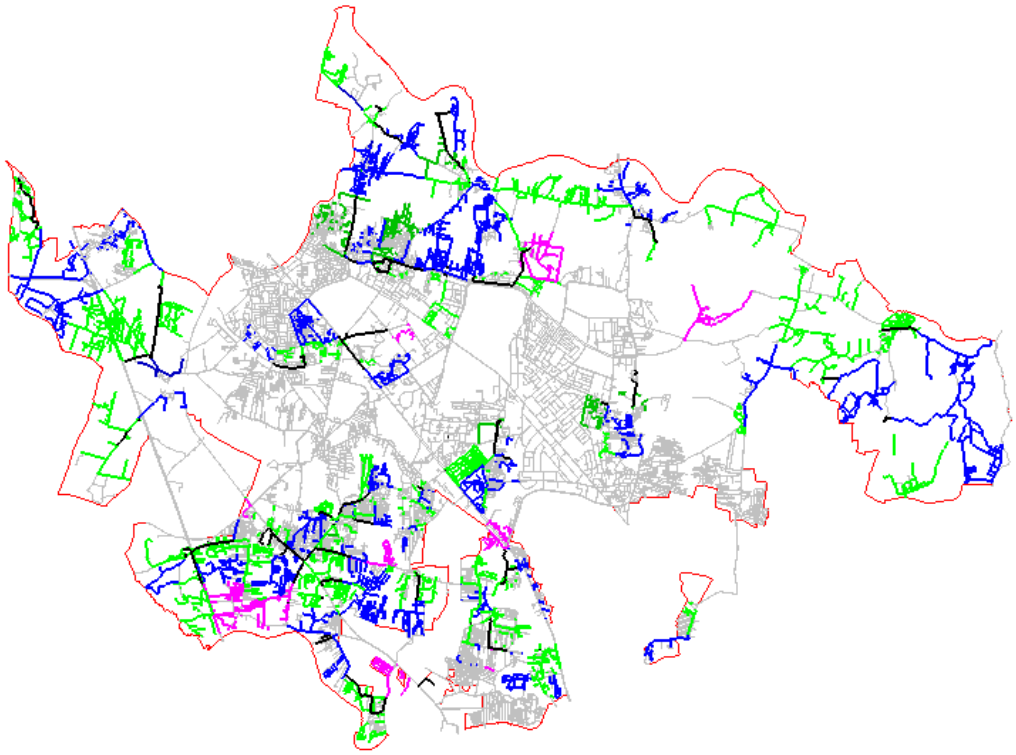


Figure D: 48 DMA in selected area

Total number of DMAs in PCMC are shown in Table K.

Table K: DMAs in PCMC

40%	60%			Total
	Phase1	Phase2	Phase3	
59	47	58	22	186

(5) Bulk Meters

The bulk meters, at the outlet of each tank and at the entry point of each DMA, have suggested. These meters will be useful in measuring NRW in the system. The details of the bulk meters in Phase1 have been given in Table L.

Table L: Abstract of bulk meters

Diameter (mm)	Phase1	Phase2	Phase3	Total
80	8	6		14
100	130	134	37	301
150	129	144	56	329
200	99	81	33	213
250	20	13	5	38
300	81	88	45	214
350	8	6		14
400	47	33	20	100
450	11	18	1	30
500	8	19	13	40
600	11	15	6	32
700			1	1
800	2	1		3
Grand Total	554	558	217	1329

(6) Flow Control Valves(FCV)

FCVs are essential to control the flows to the respective DMAs. They help to make equitable distribution of water. Abstract of FCV is given in Table M,

Table M: Abstract FCV required in 60% area

Diameter (mm)	Number of FCV			Total
	Phase 1	Phase 2	Phase 3	
300	12	22	6	40
350	2	3		5
400	31	17	7	55
450	2	2		4
500		8	5	13
600	1	4	1	6
Total	48	56	19	123

(7) Scour Valves

Abstract of scour valves is shown in Table N.

Table N: Abstract Scour valves

Diameter (mm)	Phase1	Phase2	Phase3	Total
100	33	29	10	72
150	11	10	5	26
200	3	6	2	11
250		1	1	2
350	1	1	1	3
400	1	2	1	4
450	1	2		3
500	1	4		5
Grand Total	51	55	20	126

Suggestions for 24x7 Water Supply

(1) Zero pressure test shall be conducted to ensure that the DMAs are perfectly hydraulically discrete.

(2) Water audit is a continuous process and hence shall be conducted time to time to compute the values of non-revenue water (NRW) of all the DMAs.

(3) Knowing the NRW values, a vigorous leak detection program shall be undertaken and leaks shall be repaired to decrease the NRW values.

(4) House service connection, potential leakage points, will be suitably replaced with MDPE pipe with strap saddle.

(5) PCMC is proposed to rationalize tariff structure for promoting water conservation through demand management. Strengthening billing and collection system is equally important for financial sustainability.

(6) PCMC should undertake strategy communication & IEC campaigns for ensuring support and collaboration of stakeholders.

7) Customer satisfaction is primordial for sustainability of continuous water supply project. PCMC shall introduce customer facilitation centers and a robust grievance redressal system.

The approach in this study shall help city administration to transform its current intermittent supply to 24/7 continuous water system. The comprehensive approach adopted is depicted in Figure E.

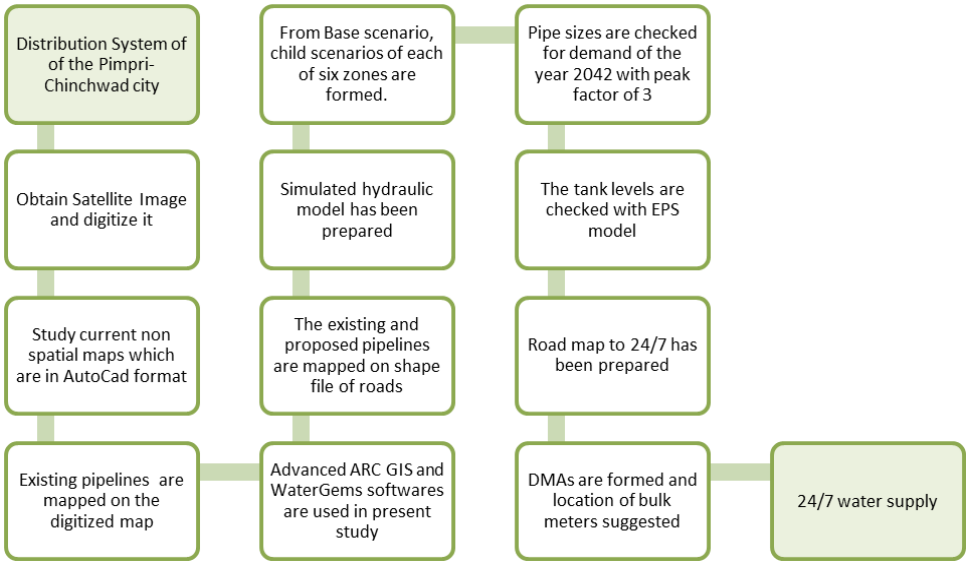


Figure E: Approach adopted

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Chapter 1
Introduction

1.1 Introduction

Pimpri-Chinchwad is a city (Figure 1.1) in the Pune district of Maharashtra. The city comprises of the twin towns of Pimpri and Chinchwad which are governed by a common municipal body (the Pimpri-Chinchwad Municipal Corporation or PCMC).

Figure 1.1: Location of Pimpri-Chinchwad city

1.2 History

Pimpri-chinchwad has main areas- Chinchwad, Pimpri, Nigdi, Akurdi, kalewadi and Bhosari. Chinchwad is famous for Saint Morya Gosavi's Shrine, which is one of the lord Ganesha's shaktipeeth (Figure 1.2) in Maharashtra state. This temple gets submerged in the river water due to the flooding of the river Pavana every year (Figure 1.3). Local people consider it as

bathing of lord Ganesha. Chinchwad is also the birthplace of the Chapekar brothers. Pimpri-Chinchwad is home to the historic town of Bhosari, originally known as Bhojapuri.

The original name of Bhosari is Bhojapur, which was the capital of King Bhoj, a legendary king who ruled central parts of India two thousand years ago. During the period of Mahabharata this city was known as Bhojakata, the capital of the Bhoja-Yadava king Rukmi.

Figure 1.2: Shaktipeeth

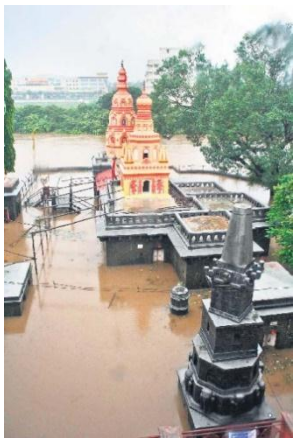

Figure 1.3: Ganesh Temple

1.3 Demographics

As of 2011 India census, Pimpri-Chinchwad had a population of 17,29,320. Male population (9.45 lakh) and female population (7.83 lakh). Pimpri-Chinchwad has an average literacy rate of 87.19 which is higher than the national average of 74.04%. In Pimpri Chinchwad, 14% of the population is under 6 years of age.

1.4 Geography

Pimpri-Chinchwad city spans between the geographic co-ordinates of latitude N 18° 37' 07" and longitude E 73° 48' 13.43". The township is situated at a height of 530 m above the sea level. It is blessed with pleasant climate for entire year. Three rivers Pavana, Mula and Indrayani flow through this area. Pimpri-chinchwad sources its water from the Pavana river but release of domestic and industrial effluents, dumping of debris and domestic pollution has severely affected the quality of the Pavana water though recently efforts have been taken to improve the quality of water, which have been successful in some places along the riverside.

1.5 Topography

The city has a large area with undulations (Figure 1.4). It fall in Upper Bhima sub basin (Figure 1.5).

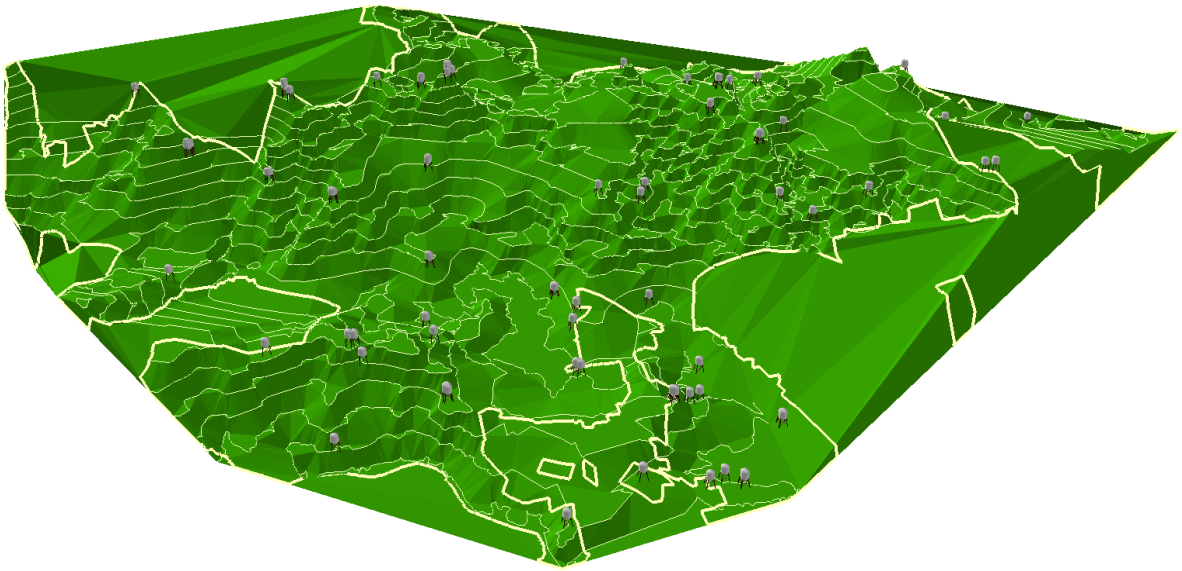

Figure 1.4: Terrain of the city

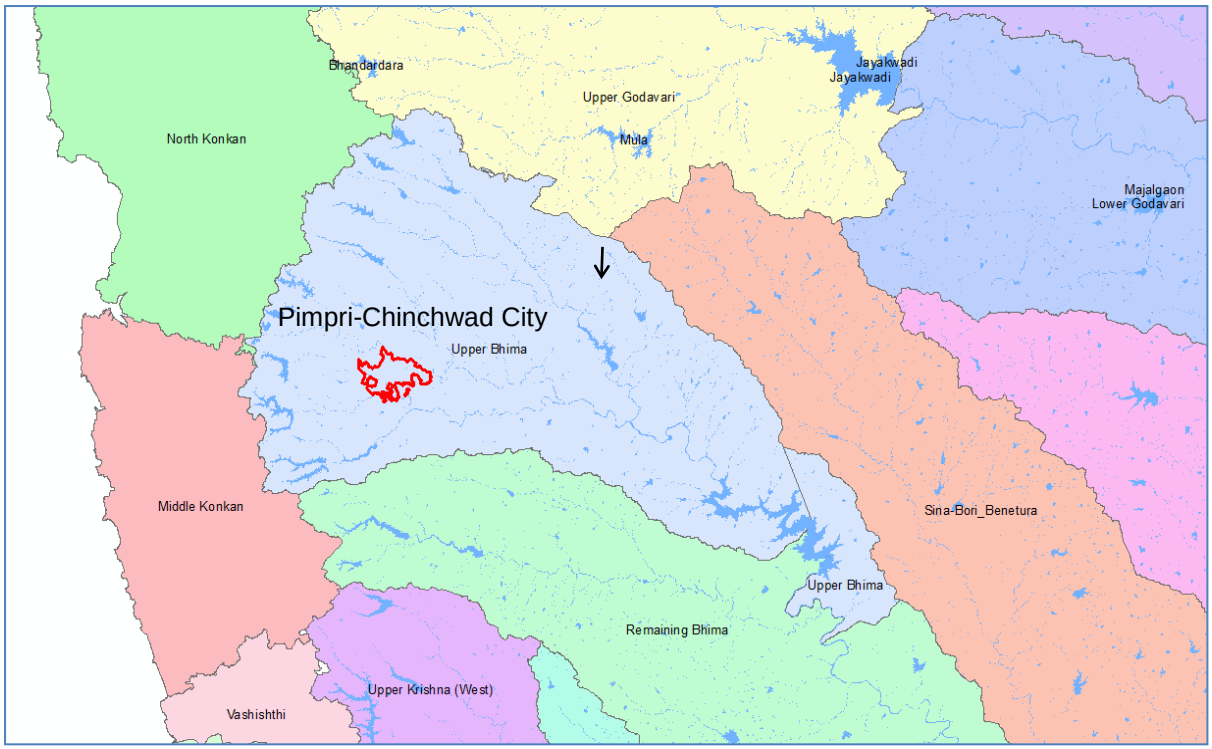

Figure 1.5: Location of Pimpri-Chinchwad city in sub basins

Drain lines of the city are shown in Figure 1.6.

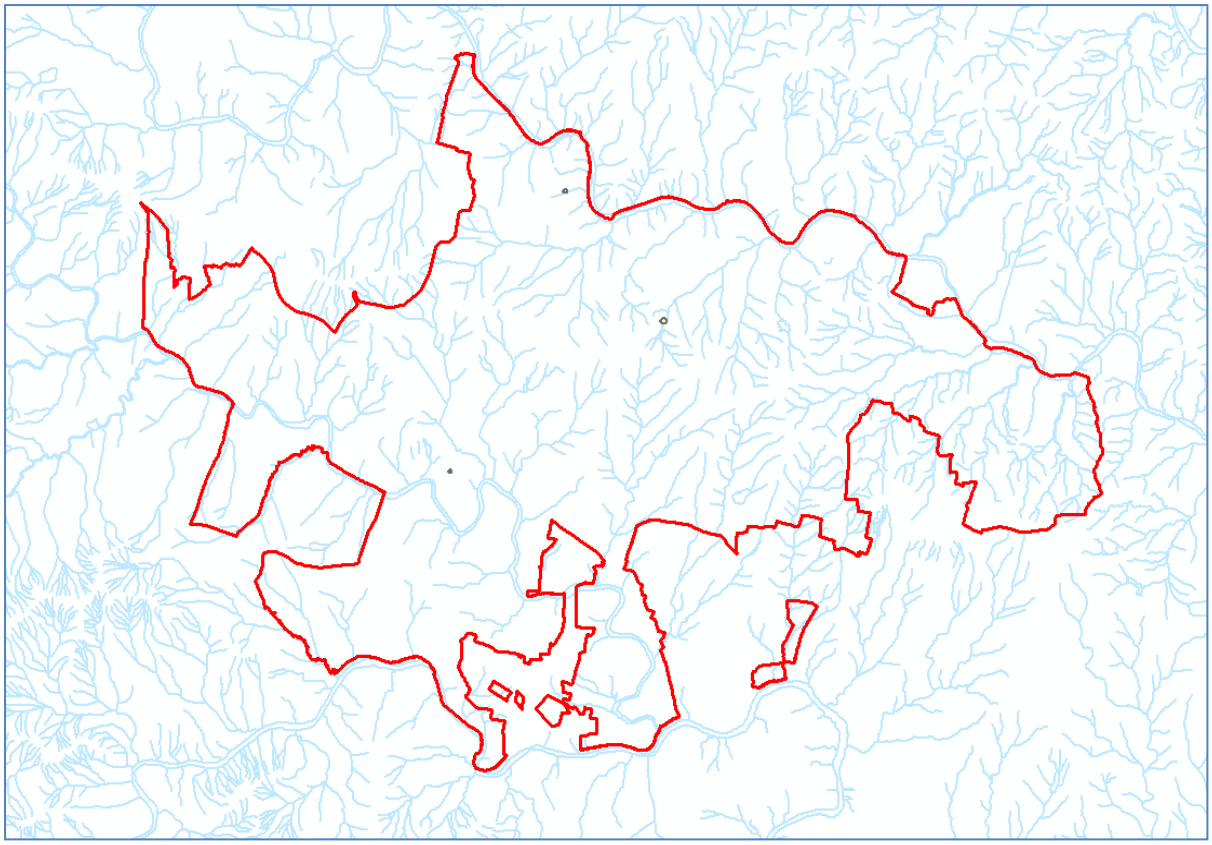

Figure 1.6: Drain lines of the city

1.6 Local administration

Pimpri-Chinchwad Municipal Corporation (PMC) is the local civil body. PMC is administratively divided into four zones as shown in Figure 1.7.

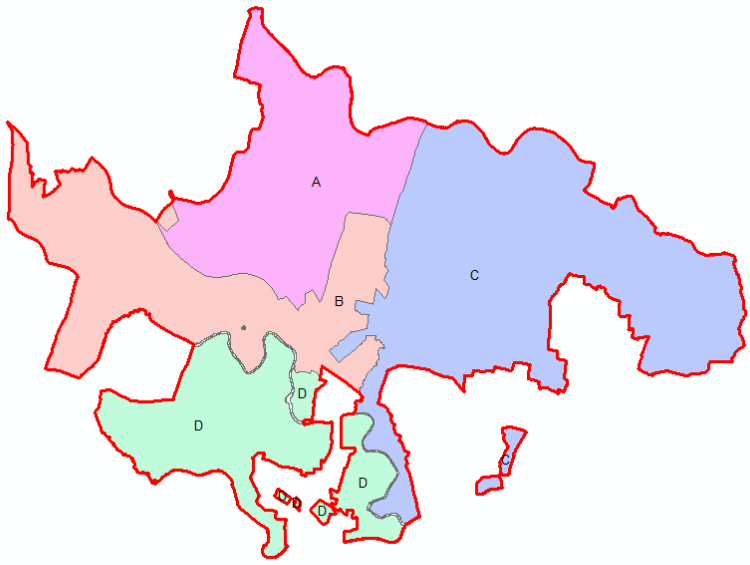

Figure 1.7: Administrative zones of Pimpri-Chinchwad

The city is divided in 47 water districts which are shown in Figure 1.8. Later on demand is computed using these districts.

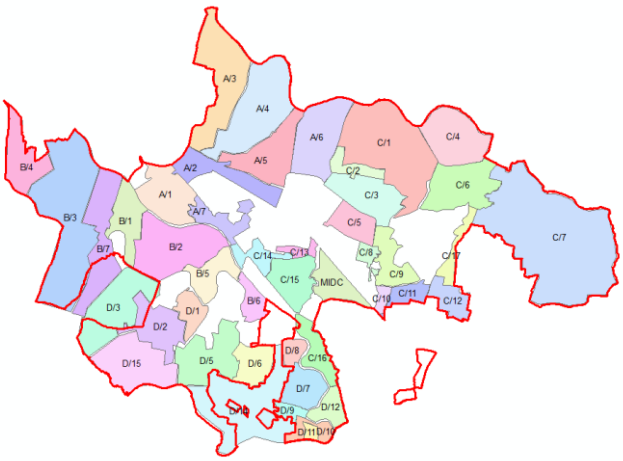

Figure 1.8: Water districts of the Pimpri-Chinchwad city

1.7 Industies

Pimpri-Chinchwad is a major industrial hub. It hosts one of the biggest industrial zones in Asia. Industrialization started way back in 1954 when Hindustan Antibiotics Limited was established. The city is home to the Indian operations of major automobile companies like Premier Limited, Mahindra Navistar, Bajaj Auto, BEL Optronic Devices Limited, TATA Motors (formerly TELCO), Kinetic Engineering, Force Motors (formerly Bajaj Tempo) DaimlerChrysler, Thermax and Autoline Industries. Apart from this the city contains several heavy industries such as Forbes-Marshall, ThyssenKrupp and Alfa Laval & Sandvik Asia. There are many manufacturing units in the city and also the German company KSB Pumps, Swedish bearing company SKF. There is a Rajiv Gandhi Infotech Park which hosts several Software and Information Technology majors like Accenture, IBM India, KPIT Cummins, Tata Technologies, Infosys, Wipro etc.

1.8 Transport

Pimpri-Chinchwad is well connected by road, rail and air. It has a nearest airport at Pune. Maharashtra government plans to set up a new airport near Chakan. Pune - Lonavla suburban local trains run through this area. Old Pune–Mumbai Highway has been widened to four lanes, which has improved connectivity to Pune and reduced travel time to less than 30 minutes. It has a State Transport Bus stand at Vallabhnagar. The main railway stations for this area are Chinchwad Railway Station and Pimpri Railway Station.

1.9 Service Levels

The GoI standard performance indicators of water supply, benchmarks achieved so far and the expected goal of benchmarks are summarized in Table 1.1.

Table 1.1: GoI performance indicators and achievement

SN	Indicator	Standard Benchmark	Pimpri-Chinchwad	After implementation of the proposed project
1	Coverage (percentage of households connected)	100%	77%	100%
2	Per capita supply of water (litres per day)	150	170	150 lpcd
3	Extent of metering (%)	100	78%	100%
4	Extent of non-revenue water (%)	20%	50%	20%
5	Continuity of water supply (hours per day)	24	3 hours	24 Hours
6	Quality of water supplied (%)	100%	99%	100%
7	Efficiency in addressing customer complaints (%)	80%	60%	80%
8	Cost recovery in water supply services (%)	100%	85%	100% as per CPHEEO norms
9	Efficiency in collection of water supply-related charges (%)	90%	42%	90%

Source: PMC SLB

1.10 Problems of the Existing Water Supply

The city administration, including the water supply department, faces a very difficult task of supply of drinking water supply. Important problems of the water supply system are enumerated as below:

(1) Uneven Terrain: The city terrain has a number of undulating surfaces. The contours are shown in Figure 1.9. The terrain has a level difference is in the range of 540 m to 620 m. The system is lacking a pressure management, as a result there are uneven pressures in the different parts of the city.

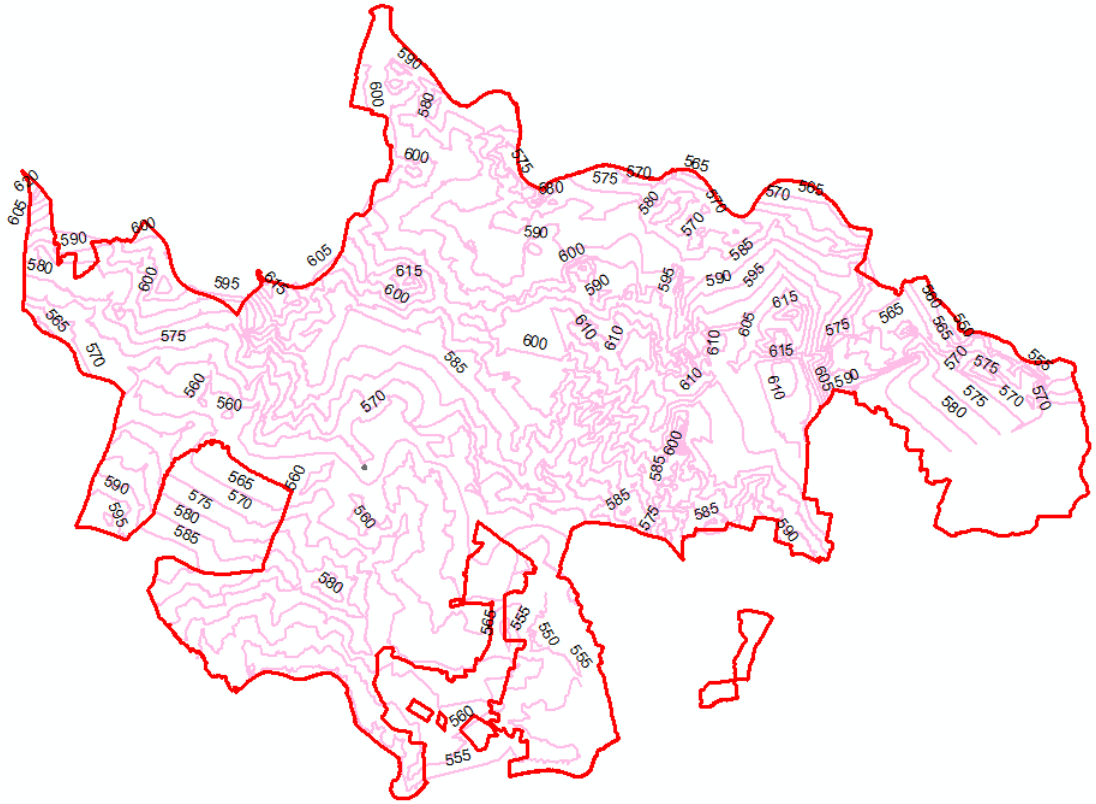

Figure 1.9: Uneven terrain

(2) High NRW: The current NRW is high about 50%.

(3) Contamination due to Intermittent Supply: One of the important drawback of the current intermittent water supply is that the water is contaminated in non-supply hours due to the outside contaminants, which find entry in pipeline due to vacuum in pipeline and through the leaking joints.

(4) Supply Hours: Main problem of the city's water supply is that the residents get water supply for just 3 hours daily. The supply hours are not regular. People have to remain awake in night hours as well as in the early hours as the timing of the supply are erratic and not regular. Due to this hardship some of the taps of the household connections and public taps are kept open resulting into the loss of precious water resource.

(5) Large number of Valves: Due to intermittent water supply, zoning system for daily operation has to be practiced by the city water supply maintenance engineers. The total number of the valves in the distribution system are shown in Table 1.2. The special location of these vales is shown in Figure 1.10.

Table 1.2: Number of valves

Water Prabhag	No. of Valves
A	754
B	841
C	1178
D	800
Total	3573

Thus operation of zones require a large number of the staff for mere operation of the valves.

(6) Improper Operation Zones:

Serving area/ zone served by each elevated service reservoir (ESR) was not designed as per their capacity. Despite disarrayed service area, existing pipelines have been found laid in haphazard manner. Thus the residents get water with less pressure.

The operational zones are created with multiple tanks. There is common inlet and outlet for tanks. But as diameter of the tanks vary, there will be fluctuations when transformation to 24/7 system occurs.

Main problems with the distribution system network (DSN) of the citys' water supply system is as follows:

- Capacity of ESR is not enough to cater the demand of its earmarked service area (operational zone),
- ESR remains empty or found overflowing,

(7) Huge Coping Costs: Coping costs is a money which is required to cope up with the poor service. Pimpri-Chinchwad residents have to expend Rs 5640 per annum to buy the plastic overhead tanks, booster pumps, tankers and small purification devices.

1.11 Need for Project

The city is expanding leaps and bound. It is one of the fastest growing metropolitan cities in India. Hence, the coverage needs improvement. The NRW of the city is high (50%). The plight of distribution network is poor as the water districts have not been designed properly. The pipelines have been laid haphazardly. Therefore there is no control on the distribution of drinking water. Due to disarrayed distribution system, the water is not being distributed equitably and with equal pressure.

The supply times are odd due to zoning method. Therefore, the taps are found open. The residents have to expend on the coping costs due to poor delivery of water. In Transmission main the hydraulic carrying is found insufficient, especially in the area of Chinchwad.

The city needs reduction of non-revenue water by leakage management and commercial losses through identification and regularization of illegal connections, metering and improvement in billing and collection systems. For strengthening the performance of the distribution, refurbishment and expansion of transmission and distribution network is needed. Hence, the project is required.

1.12 Objectives of the Consultancy

The objective of the present consultancy work is to prepare a DPR and create the GIS based hydraulic model of the entire Pimpri-Chinchwad city, which shall simulate the system's behavior. The study shall present the measures to be taken up by the Pimpri-Chinchwad water utility to reduce the NRW and finally convert its existing intermittent water supply to 24/7 continuous water system and then make it sustainable. It shall also provide the measures for making infrastructure to tackle present as well as future requirements of the city. A detailed project report for converting present water supply into 24/7 system is the outcome of this study. The study will not only solve the problem of inequitable flow, low pressures but shall suggest a road map to 24/7 continuous water supply.

1.13 Strategy to Reduce NRW

A strategy has been formulated for reduction of NRW for which necessary steps are taken/ shall be taken for computation and reduction of NRW from its base line existing today.

i. Setting up correct zones for each ESR/ GSR: Operational zones are demarcated with respect to ESR/ GSR’s capacity and serviceability

ii. Setting up District Metering Areas (DMA): District Metering Areas are set up for each correct operational zone for the number of customers between 500 to 2000. These DMAs must be made hydraulically discrete (isolated) by carrying out zero pressure tests,

iii. Out of 344 kms of selected area of distribution pipe network, 54.8 km pipeline will have to be replaced, so after replacement, NRW can be brought down considerably as the pipes will be new with good joint system

iv. House service connections: All house service connections shall be made by using MDPE pipe,

v. Bulk and consumer metering: Bulk meters shall be installed with a provision of creating a graph of minimum net night flow Vs. hours by sending SMS to the control room.

vi. Leak identification: Identify the leakage areas by conducting step tests and gathering data from the data loggers. Exact location of leak spots shall be then fixed using leakage identification instruments such as injection of helium gas, sounding rods, noise-corelator etc.,

vii. NRW reduction: Once the commercial and physical losses are known, measures shall be taken up to bring them in accepted limit,

ix. Water Balance: Components of water balance such as- authorized billed meter consumption, authorized billed unmetered consumption, unauthorized consumption due to thefts, metering inaccuracies, leakage in transmission mains, distribution house service connection shall be computed and water audit shall be carried out,

x. NRW reduction: Once the commercial and physical losses are known, measures shall be taken up to bring them in accepted limit.

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CHAPTER 2
Criteria for System Planning

2.1 General

This Chapter describes consideration of the design parameters that are used in the design of distribution system and steps to be adopted for conversion of the existing system into 24/7 continuous water supply system.

2.2 Systems of Water Supply

The water may be supplied to the consumers by either- (1) continuous system or (2) intermittent system. In the continuous system, the water will be available to the consumers for all 24 hours a day. Whereas, the intermittent system will supply water only during peak water demand period fixed hours in the morning and evening. The exact period of supply of water to the consumers will depend on the availability of water from the source/ water treatment plant, pumping rate, available storage of water, availability of electric power supply during the day, water demand, seasons etc.

The intermittent system creates problems like contamination of water in the pipes during non-supply hours, unhygienic as well as insanitation problems due to inadequate use of water by certain group of people by utilizing minimum quantity of water. Besides, at majority of places, the intermittent supplies may not provide much savings of water because of the following reasons:

- In intermittent supply system, water is generally stored by the consumers in tanks, drums, and utensils etc. for use during non-supply hours. They, if unutilized, as soon as the fresh supply is restored, usually throw this stored water away. This increases the wastage and losses of water considerably.
- The consumers have a general tendency to keep the water taps open during non-supply hours; so that they may come to know the restoration of the supply. However, in majority of cases, water goes on flowing to waste, unattended even after the supply is restored, thus resulting into wastage of precious treated and potable water.

Besides, this intermittent supply system causes great inconvenience to consumers, keeping them on their toes for receiving and collecting water as soon as the supply is restored.

Further, in this system, when the supply of water stops and the water from the pipe is withdrawn off, a partial vacuum may be created in the pipeline. This induces suction through leaky joints and if dirt or parts of sullage or even sewage and other waste waters on the ground surround the pipes, the same may get entries into the pipes. This contaminates the

existing water available in pipes as well as incoming water in the pipelines, when the supply is restored.

Number of sluice valves and control valves are required to be installed in the network of water distribution system. All these valves are operated many times daily, while starting or closing supply. This requires additional operating staff along with high operating and maintenance cost.

Intermittent system should not be continued on long term policy due to the following disadvantages-

1. The consumers have to store water for use during non-supply hours; which is likely to be contaminated. Some consumers may not have sufficient storage facilities; which may lead to insanitary conditions ultimately.
2. It has been observed that the consumers leave their water taps open every time; which causes much wastage of water.
3. If more storage of water is kept for the use during non-supply hours, it is thrown away, causing wastage of water.
4. If any incidents of fire-fighting occur during non-supply hours, no water is available; which may subsequently cause huge damages before the supply could be turned on.

In spite of all these limitations / disadvantages, the intermittent supply system is being mostly adopted in our towns and cities. For improving the pressures in intermittent system, the entire city area is divided into number of zones and different zones are supplied with water during different hours of the day, thus obtaining pressures. Most of network of pipe distribution system of water supply of towns and cities are usually designed as continuous supply system", but after implementation operated as an “intermittent" one.

In view of above, the water is to be supplied through continuous system. This is the best system and the water is supplied for all the 24 hours a day. In this system, ample water is always available for firefighting, or any break-down or emergencies, even by closing the supply of certain localities. Besides, due to continuous circulation, water always remains fresh, in the pipelines.

Considering these, continuous supply of water around 24 hours a day is proposed for the project area under this DPR.

2.3 Design Period

Design period for this work has been adopted as shown below:

(i) Immediate stage 2015
(ii) Intermediate stage 2030
(iii) Ultimate stage 2045

2.4 Population

Population figures are used by standard methods specified CPHEEO manual.

2.5 Water Demand

Water demand projections are worked out with 150 liters per capita per day (LPCD) at consumer end. The losses are computed upward for gross demand projections as per CPHEEO manual. Values of the zone/ward wise demand for the Pimpri-Chinchwad city have been considered.

Water demand to the nodes of the distribution system is computed using the water districts data provided by the PCMC.

2.6 Water Distribution Network

The water distribution system for public water supply is a network of pipes within the network of streets and roads of the project area. The purpose of the water distribution network is to convey wholesome (treated) drinking water to the consumers at an adequate residual pressure in sufficient quantity at convenient points. Water distribution system usually accounts for 40 to 70% of the capital cost of the water supply system, depending upon the lengths of streets and roads to be covered in the project area. As such, proper design and layout of the network is of great importance.

The street plan, topography and location of service reservoirs etc. govern the type of distribution network. Proper layout of the pipelines, correct locations of various types of valves and specials are necessary for proper and efficient operation and maintenance of the system. Sufficient residual pressure at peak demand period is the prime hydraulic consideration of the distribution system.

(a) Service Storage: Storage in the service reservoirs is provided considering balancing of inflows and outflows and emergency including water for firefighting. The service storage in the immediate stage year 2030 is computed presuming 23 hour pumping.

With inflow rate of 23 hours and the outflow rate (supply hours) of 24 hours, the capacity of ESRs have been checked as per the methodology mentioned in CPHEEO manual.

(b) Hazen-Williams C-Value: So far cast iron pipes (CI) have been used in the distribution pipe network of the city. C-values of CI, DI and other materials of pipes are shown in Table 2.2.

Table 2.2: Hazen William C -Values for pipes.

Material	HWC-Value
	Proposed
CI	85
Ductile iron (DI)	135
Mild steel (mortar lined)	120
HDPE	140

(c) Residual Pressures: CPHEEO "Manual on water supply and treatment" - third edition (1999) has been adopted in fixing residual pressure. Presently the houses in the Pimpri-Chinchwad Municipal Council area are single storied. Therefore, sizes of pipelines and tank storages of the system are checked for minimum residual pressure of 7 m at nodal points. Multi- storied buildings needing higher pressure, will be providing their individual underground storage tanks; from where, the water will be pumped to elevated storage tanks on such buildings for supply of water to their consumers.

(d) Minimum Diameter of Pipes: As per recommendations in CPHEEO Manual, the minimum proposed diameter of pipes considered in the analysis is 100 mm and no service connections would be given from a pipe more than 100 mm dia. Wherever there is single pipeline on a road of size above 100 mm, a parallel line of 100 mm is proposed for giving consumer connections.

(e) Leading Mains: The inlet mains to service reservoirs and trunk mains will carry water for 23 hours.

(f) Peak Factor:

As per CPHEEO manual, a peak factor of 2 is adopted for distribution system in the Hydraulic modeling.

2.7 ROAD MAP to 24/7 SYSTEM

(a) Bulk Flow Meters: After a careful study of the system's requirements, bulk flow meters shall be proposed at key strategic points in the system such as water treatment plants, service reservoirs and pumping stations to monitor the quantum of water being handled at these places.
Following bulk meters are recommended:

Diameter of pipe Type of Bulk meter

- ≤ 300 mm Mechanical

- > 300 mm Ultra sonic or Magnetic type full-bore flow meters whichever is economical

(b) Pressure Gauges: For calibration of the hydraulic model and monitoring of the water supply system pressures at key locations will have to be monitored. In every zone/DMA about 5 points are anticipated.

(c) Flow Controlling Valves: For operation and maintenance of any intermittent supply system a minimum number of valves are necessary. In a continuous supply system every DMA should have isolation valve to make it hydraulically discrete.

2.8 Software Used

For GIS maps, ESRI's ARC-VIEW software has been used. The analysis of the leading mains and the distribution system is made using Bentley WaterGEMS software, Select-6 version.

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Chapter-3

Existing Pimpri-Chinchwad Water Supply

3.1 History

History of Pimpri-Chinchwad water supply is shown in Figure 3.1.

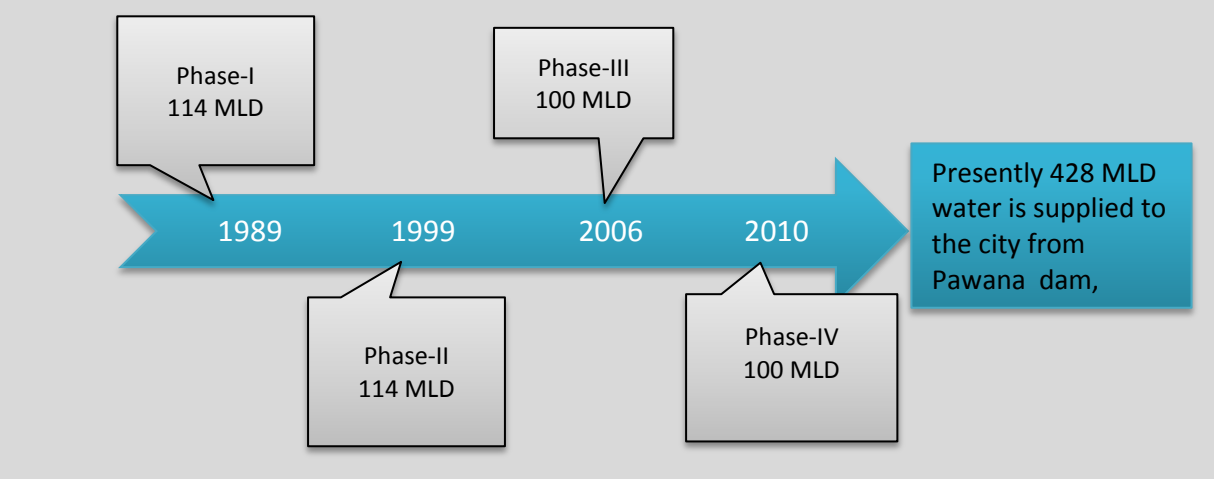


Figure 3.1: History of Pimpri-Chinchwad water supply

3.2 Existing Water Supply System

Existing water supply scheme is shown in Figure 3.2. The existing water supply to the Pimpri-Chinchwad city is managed by Pimpri-Chinchwad Municipal Council (PMC). The City Engineer of the city and his team of executive engineers and staff are responsible for ensuring protected drinking water supply in the city.

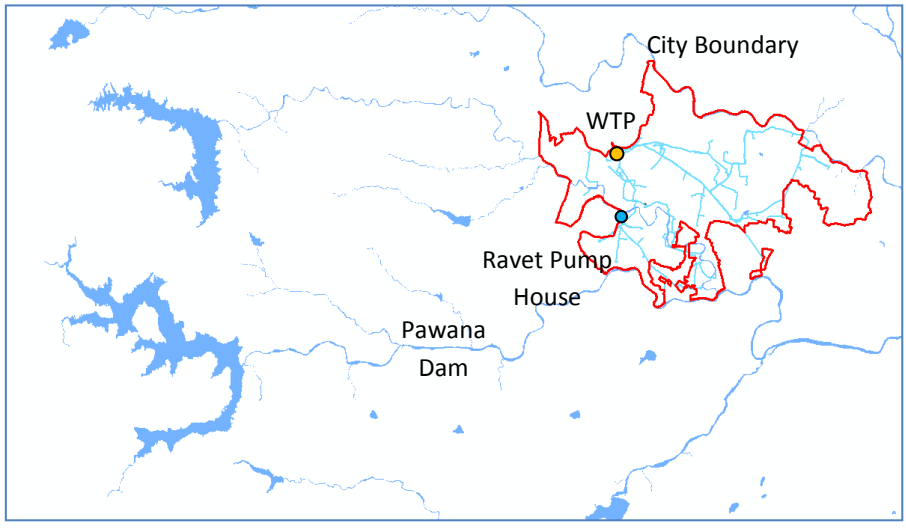
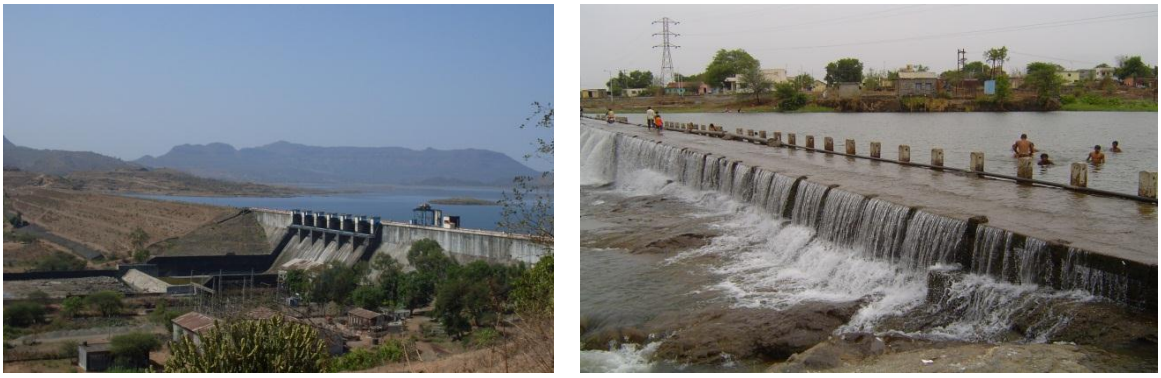


Figure 3.2: Existing main water supply scheme

3.2.1 Sources

Main source of the Pimpri-Chinchwad water supply system is Pawana dam which is shown in Figure 3.2 and 3.3(a). There is a pick up weir (Ravet-Punavale) on downstream side of the dam (Figure 3.2 and 3.3b).



(a): Pawana dam **(b):** Rawet-Punavale weir

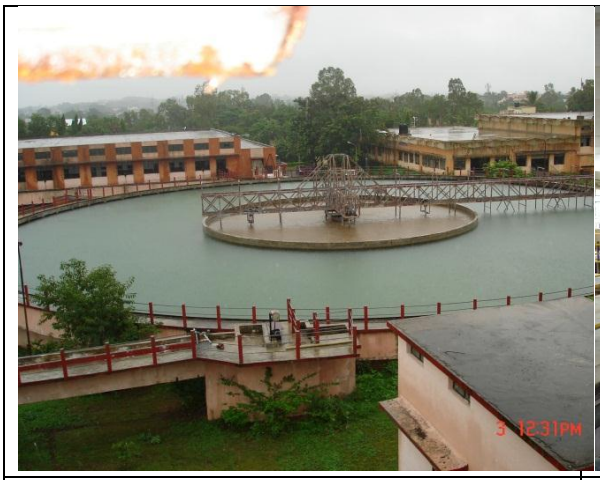
Figure 3.3: Sources of the Pimpri-Chinchwad city

Water is pumped from the pickup weir at Ravet-Punavale dam and conveyed to water treatment plant by three mild steel (MS) pipe pumping mains (1100 mm for 228 MLD, 1200 mm for 100 MLD and 1400 mm 100 MLD). Treated water is pumped to Master Balancing Reservoirs (MBR) at WTP site and then transmitted by pumping/gravity to 85 Elevated Service Reservoirs (ESR)s in the city.

Water Treatment Plants (WTP)

Figure 3.4: Aerial view of Water Treatment Plant

The water treatment plants (WTP) for phase I, II, III and IV are situated in the same premises as shown in Figure 3.4. Clari-flocculator and filter plants are shown in Figure 3.5.



(a)100 MLD - Clariflocculator

(b): 100 MLD – Filter beds

Figure 3.5: Water Treatment Plant

Pure Water Transmission Main

Pure water transmission mains are shown in Figure 3.6 and its details are shown in Table 3.1.

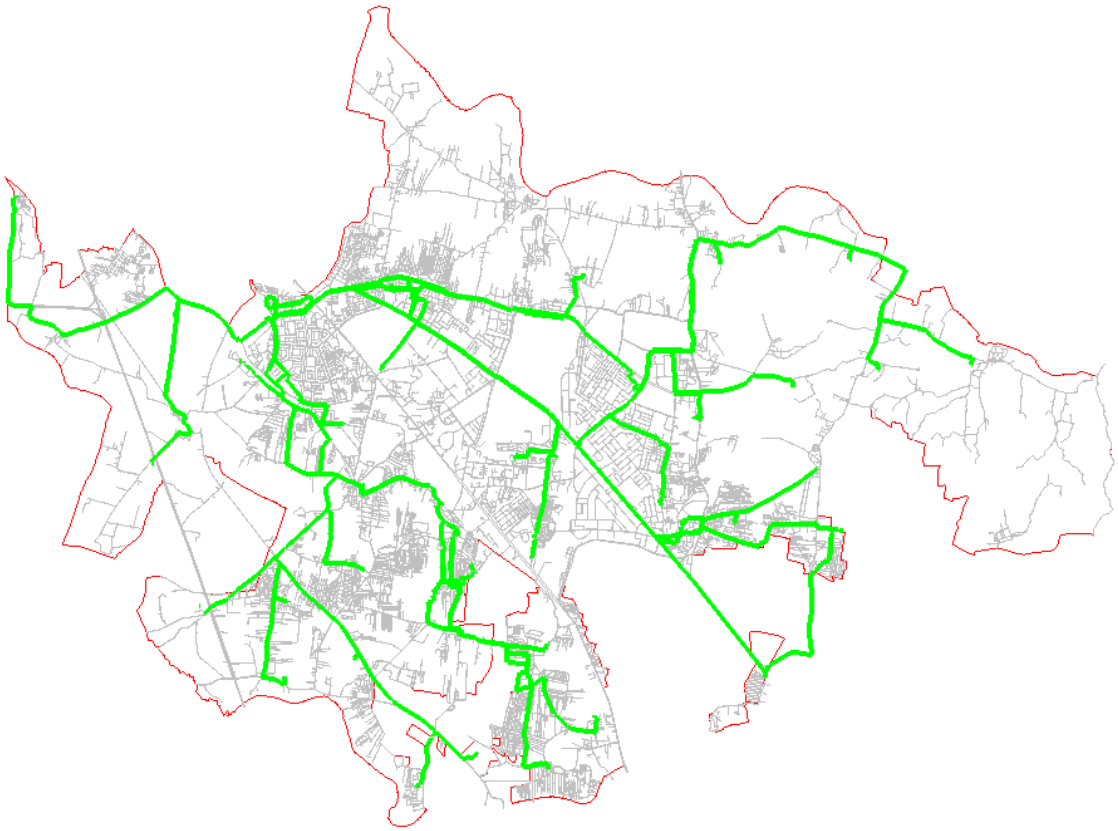


Figure 3.6: Pure water transmission mains

Table 3.1: Details of the pure water transmission mains

Diameter (mm)	CI	DI-K7	MS	Grand Total
200		2404		2404
250			3163	3163
300	91	7829	865	8785
350		2563		2563
400	11	25834	3886	29731
450		12431		12431
500	23	7450	7262	14735
550			2746	2746
600		15661	12863	28524
700		4911	6575	11486
750		29	8511	8540
800			2483	2483
900		17817	479	18296
1000		3844	14065	17909
1035			2822	2822
1100			4878	4878
1200		41	13993	14034
1400			91	91
Grand Total	125	100814	84682	185621

Present Service Reservoirs

There are 85 ESRs which are marked and shown in Figure 3.6. A typical ESR is shown in Figure 3.7. Details of the existing ESRs/ GSRs are shown in Table 3.2; ongoing in Table 3.3 and New tanks are shown in Table 3.4.

Figure 3.7: ESR

Table 3.2: Details of the existing storage tanks

SN	Phase	Area (%)	Code	WD	Label	Elevation (Minimum) (m)	Elevation (Maximum) (m)	Diameter (m)	Capacity (M3)	Elevation (m)	St. Ht. (m)
1	Phase0	40	854	C14	Ajmera-1	598.79	603.79	19.5	1500	589	9.79
2	Phase0	40	853	C14	Ajmera-2	598.92	603.92	20	1500	589	9.92
3	Phase0	40	848	C13	Annasaheb_Magar	599.9	604.9	20.5	1650	587.5	12.4
4	Phase0	40	804	C10	Bhosari Gaothan	602.4	607.4	18.7	1500	585.5	16.9
5	Phase0	40	774	C12	Dighi	625.5	630.5	22.6	2000	602.8	22.7
6	Phase0	40	771	C12	Dighi Gaothan	626.4	631.4	14.3	800	603.7	22.7
7	Phase0	40	194	B5	Elpro a	587.8	592.8	22.6	2000	568.5	19.3
8	Phase0	40	193	B5	Elpro b	588.1	593.1	25.2	2500	568.8	19.3
9	Phase0	40	302	D10	PWD Sector 84	568	573	21.5	2000	555	13
10	Phase0	40	294	D9	New sangvi police Station	570.9	575.9	22.6	2000	555	15.9
11	Phase0	40	857	C11	Sant Tukaram	606.4	611.4	20.8	1500	594	12.4
12	Phase0	40	173	B1	Sector 29a	599.1	604.1	23.8	1780	584	15.1
13	Phase0	60	174	B1	Sector 29b	599.4	604.4	25	2200	584.5	14.9
14	Phase0	40	664	C5	Sector7_10_a	623.2	628.2	15.1	900	606.5	16.7
15	Phase0	40	665	C5	Sector7_10_b	623.2	628.2	15.1	900	606.5	16.7
16	Phase0	40	229	D1	Thergaon Gaothan1	584.39	589.39	22.57	2000	568.3	16.09
17	Phase0	40	437	A2	Triveni Nagar1	622.1	627.1	25.2	2500	609	13.1
18	Phase0	40	438	A2	Triveni Nagar2	621.3	626.3	25.2	2500	608	13.3
19	Phase0	40	347	C3	WD4 a	627.4	632.4	16.7	1200	609	18.4
20	Phase0	40	350	C3	WD4 b	628.7	633.7	23.7	2200	609	19.7
21	Phase0	40	704	C3	WD4 c	628.7	633.7	23.7	2200	609	19.7
22	Phase0	40	182	B2	Bijli Nagar a	597.24	602.24	21.11	1750	584.8	12.44
23	Phase0	40	183	B2	Bijli Nagar b	597.07	602.07	21.11	1750	584.8	12.27
24	Phase0	40	184	B2	Bijli Nagar c	597.28	602.28	23.67	2200	584.8	12.48
25	Phase0	40	A1	A1	Pradhikaran	626.8	631.8	34	4540	616.8	10
26	Phase0	40		B9	Premlok Park	596.5	601.5	22.5	2500	574	22.5
27	Phase1	60	145	B8	Ashok Cinema	579.61	584.61	22.57	2000	565.3	14.31
28	Phase1	60	450	C8a	Ashram Shala	605.93	610.93	22.56	2000	589.1	16.83

29	Phase1	60		B4	B4_Mamurdi	629	634	20	1256.64	619	10
30	Phase1	60	473		Bopkhel	594.33	598.33	19.95	1250.36465	577.15	17.18
31	Phase1	60	139	D12	Dapodi1	568.18	573.18	20.28	1131	556.4	11.78
32	Phase1	60	140	D12	Dapodi2	568.01	573.01	20.28	1131	556.4	11.61
33	Phase1	60	454	C17	Dighi_Magzine	625.36	630.36	19.54	1499	609.1	16.26
34	Phase1	60	627	C8	Indrayaninagar a	618.24	623.24	25.23	2500	604.2	14.04
35	Phase1	60	236	D3	Kala Khadak	606.56	611.56	19.54	1499	581.5	25.06
36	Phase1	60			Kasarwadi1	581.07	586.07	22.57	2000	561.07	20
37	Phase1	60	872	C16	Kasarwadi2	576.58	581.58	22.57	2000	555.3	21.28
38	Phase1	60	861	A7	Khandoba-1	600.29	605.29	26.25	2500	584.2	16.09
39	Phase1	60	860	A7	Khandoba-2	602.84	607.84	22.61	1999	584.2	18.64
40	Phase1	60	250	D2	Lakshman Nagar	596.16	601.16	25.23	2500	579.3	16.86
41	Phase1	60	251	D13	Lakshman Nagar 2	595.6	600.6	22.6	2000	579	16.6
42	Phase1	60	220	D4	Thergaon Gaothan2	584.17	589.17	20.82	1600	568.8	15.37
43	Phase2	60	389	A4	Morewasti Chikhli	631.16	636.16	25.23	2500	614.2	16.96
44	Phase2	60	149	B8a	Nav Maha	582.44	587.44	12.62	500	563.4	19.04
45	Phase2	60	219	D4	Naydu	583.14	588.14	15.96	1000	568.5	14.64
46	Phase2	60	424	C15	Nehru Nagar1	599.14	604.14	21.11	1750	584.7	14.44
47	Phase2	60	425	C15	Nehru Nagar2	599.12	604.12	21.11	1750	584.3	14.82
48	Phase2	60	624	C9	Panjarpol	614.9	619.9	26.46	2200	601	13.9
49	Phase2	60	129	D7	Pimple Gurao1	577.43	582.43	18.55	1000	564.1	13.33
50	Phase2	60	130	D7	Pimple Gurao2	577.43	582.43	16.46	1000	564.1	13.33
51	Phase2	60	131	D7	Pimple Gurao3	577.63	582.63	15.96	1000	564.1	13.53
52	Phase2	60	119	D8	Pimple Gurav Garden	576.85	581.85	19.54	1499	560	16.85
53	Phase2	60	91	D14	Pimple Nilakh	575.25	580.25	22.57	2000	559.4	15.85
54	Phase2	60	285	D6	Pimple Saudagar a	572	577	19.54	1499	560	12
55	Phase2	60	201	B6	Pimpri Delux a	582.72	587.72	22.57	2000	561.8	20.92
56	Phase2	60	202	B6	Pimpri Delux b	582.81	587.81	22.57	2000	562.2	20.61
57	Phase2	60			Punavale	597	602	19.54	1500	572	25
58	Phase2	60	165	D5	Rahatni1	586.98	591.98	22.57	2000	569.2	17.78
59	Phase2	60	166	D5	Rahatni2	588.61	593.61	28.21	2500	569.2	19.41
60	Phase2	60	167	D5	Rahatni3	590	595	25.23	2000	570.7	19.3
61	Phase2	60	387	A3	Rupi Nagar	630.99	635.99	25.23	2500	614.3	16.69
62	Phase2	60	462	A5	Sachin1	627.86	632.86	18.83	1100	614.2	13.66
63	Phase2	60	463	A5	Sachin2	628.05	633.05	18.83	1100	614.92	13.13

64	Phase2	60	212	B3	Sector 96	610.17	615.17	19.7	1250	591.5	18.67
65	Phase2	60	209	B7	Sector 96 Part 2	609.97	614.97	19.7	1250	591.3	18.67
66	Phase2	60	388	A5	Shahu Nagar	631.5	636.5	25.23	2500	613.5	18
67	Phase3	60	406	C7	Charholi c	581.8	586.8	19.54	1500	566.8	15
68	Phase3	60	640	C4	Dudulgaon	594.94	599.94	15.96	1000	574.7	20.24
69	Phase3	60	635	C1	Moshi b	595.2	600.2	19.5459442	1500	580.2	15
70	Phase3	60	645	C6	Wadmukhwadi b	589.7	594.7	22.57	2000	574.7	15

Table 3.3: Details of the ongoing storage tanks

SN	Phase	Area (%)	Code	WD	Label	Elevation (Minimum) (m)	Elevation (Maximum) (m)	Diameter (m)	Capacity (M3)	Elevation (m)	St. Ht. (m)
1	Phase0	40			Sant Tukaram New	613.5	618.5	25	2454	591.5	22
2	Phase1	60			Kala Khadak New1	603.5	608.5	27	2863	581.5	22
3	Phase1	60			Kaveri Nagar	600.8	605.8	28	3079	578.8	22
4	Phase1	60			Mahendra & Mahendra	599.5	604.5	22	1901	579.5	20
5	Phase2	60			New Panjarpol	616	621	22.57	2000	601	15
6	Phase2	60			New Pimple Gurav Garden 20 Lakhs	582.5	587.5	22	1901	561.5	21
7	Phase2	60			Proposed Naydu	583.6	588.6	22.5	1988	568.6	15
8	Phase2	60			Sector 28 New ESR	604.8	609.8	22.56759	2000	584.8	20
9	Phase2	60			Sector 96 New Esr	611.55	616.55	22.5	1988	591.55	20
								Total	20174		

Table 3.4: Details of the New storage tanks

SN	Phase	Area (%)	Code	WD	Label	Elevation (Minimum) (m)	Elevation (Maximum) (m)	Diameter (m)	Capacity (M3)	Elevation (m)	St. Ht. (m)
1	Phase3	60			Kudalwadi New1	602	607	22.5	1988	582	20
2	Phase0	40		B5	Elpro New ESR	593.5	598.5	22.5	1988	568.5	25
3	Phase0	40			Gaothan New (Old Sangavi)_b	575	580	22.7	2024	555	20
4	Phase1	60			Kala Khadak New2	603.5	608.5	28	3079	581.5	22
5	Phase1	60		A6	NewJadhavwadi1	615.94	620.94	25.23	2500	598.7	17.24
6	Phase2	60			New_Punavale	591.97	596.97	22.5	1988	571.97	20
7	Phase2	60	286	D6	Pimple Saudagar b New	580	585	22.5	1988	560	20
8	Phase3	60			Gairan	615	620	22.5	1988	591	24
9	Phase3	60			Kudalwadi New2	602	607	22.5	1988	582	20
10	Phase3	60			Kudalwadi New3	610	615	22.5	1988	590	20
11	Phase3	60			Kudalwadi New4	610	615	22.5	1988	598	12
12	Phase3	60			New_Charoli	604	609	22.5	1988	584	20
13	Phase3	60			New_Moshi b	600.1	605.1	22.2	1935	580.1	20
14	Phase3	60			New_Wadmukhwadi b	604	609	22.5	1988	584	20
15	Phase3	60		A6	NewJadhavwadi2	615.94	620.94	20	1571	598.7	17.24
								Total	30989		

Details of inlet and outlet pipes are shon in Table 3.5.

Table 3.5: Details of inlet and outlet pipes of all storage tanks

SN	Phase	Area (%)	Status	WD	Label	Demand (2045) (ML)	Q m3/s	Inlet Dia as per Tr_Main (mm)	Inlet Dia required(mm) (Assuming v=1)	Inlet Dia rounded and recommended (mm)	Outlet Dia as per HM(mm)
0	No_Zone	No_Zone			Bhalewadi Stadium	0.88	0.0153	200	140	200	NA
0	No_Zone	No_Zone		D14	Chest Hospital	0.94	0.0164	400	144	400	400
1	Phase0	40		C14	Ajmera-1	7.74	0.1345	450	414	450	500
2	Phase0	40		C14	Ajmera-2	7.07	0.1227	400	395	400	700
3	Phase0	40		C13	Annasaheb_Magar	4.70	0.0816	700	322	700	400
4	Phase0	40		C10	Bhosari Gaothan	4.96	0.0861	500	331	500	500
5	Phase0	40		C12	Dighi	12.16	0.2111	400	518	500	500
6	Phase0	40		C12	Dighi Gaothan	4.36	0.0757	300	311	300	500
7	Phase0	40		B5	Elpro a	8.63	0.1498	300	437	450	700
8	Phase0	40		B5	Elpro b	5.54	0.0962	300	350	350	600
9	Phase0	40	N	B5	Elpro New ESR	5.70	0.0989	500	355	500	500
10	Phase0	40	N		Gaothan New (Old Sangavi)_b	7.98	0.1386	600	420	600	500
11	Phase0	40		D9	New sangvi police Station	9.08	0.1576	500	448	500	700
12	Phase0	40		D10	PWD Sector 84	6.22	0.1080	500	371	500	500
13	Phase0	40		C11	Sant Tukaram	5.00	0.0869	500	333	500	400
14	Phase0	40	OG		Sant Tukaram New	14.54	0.2524	500	567	500	600
15	Phase0	40		B1	Sector 29a	9.83	0.1706	500	466	500	600
16	Phase0	40		B1	Sector 29b	5.74	0.0996	500	356	500	600
17	Phase0	40		C5	Sector7_10_a	6.04	0.1048	300	365	400	600
18	Phase0	40		C5	Sector7_10_b	3.56	0.0618	300	281	300	600
19	Phase0	40		D1	Thergaon Gaothan1	11.66	0.2025	400	508	500	600
20	Phase0	40		A2	Triveni Nagar1	8.27	0.1437	500	428	500	600
21	Phase0	40		A2	Triveni Nagar2	10.39	0.1805	500	479	500	700
22	Phase0	40		C3	WD4 a	5.02	0.0872	550	333	550	500
23	Phase0	40		C3	WD4 b	10.98	0.1906	550	493	550	600
24	Phase0	40		C3	WD4 c	11.37	0.1974	550	501	550	600
25	Phase0	60		B2	Bijli Nagar a	10.12	0.1757	500	473	500	600
26	Phase0	60		B2	Bijli Nagar b	4.77	0.0828	500	325	500	600
27	Phase0	60		B2	Bijli Nagar c	6.75	0.1171	500	386	500	700
28	Phase0	60		A1	Pradhikaran	14.25	0.2474	600	561	600	1000
29	Phase0	60		B9	Premlok Park	6.10	0.1060	450	367	450	500
1	Phase1	60		B8	Ashok Cinema	8.93	0.1550	400	444	450	500
2	Phase1	60		C8a	Ashram Shala	4.16	0.0722	400	303	400	500
3	Phase1	60		B4	B4_Mamurdi	6.11	0.1062	400	368	400	500

4	Phase1	60			Bopkhel	6.54	0.1136	500	380	500	600
5	Phase1	60		D12	Dapodi1	5.02	0.0872	500	333	500	500
6	Phase1	60		D12	Dapodi2	5.37	0.0933	500	345	500	450
7	Phase1	60		C17	Dighi_Magzine	2.64	0.0458	500	241	500	400
8	Phase1	60		C8	Indrayaninagar a	5.90	0.1024	300	361	400	400
9	Phase1	60		D3	Kala Khadak	8.49	0.1474	600	433	600	500
10	Phase1	60	OG		Kala Khadak New1	13.06	0.2267	500	537	550	800
11	Phase1	60	N		Kala Khadak New2	14.46	0.2510	500	565	500	500
12	Phase1	60			Kasarwadi1	2.26	0.0392	600	223	600	400
13	Phase1	60		C16	Kasarwadi2	10.84	0.1881	500	489	500	600
14	Phase1	60	OG		Kaveri Nagar	8.89	0.1544	600	443	600	700
15	Phase1	60		A7	Khandoba-1	8.22	0.1427	500	426	500	600
16	Phase1	60		A7	Khandoba-2	9.48	0.1646	500	458	500	600
17	Phase1	60		D2	Lakshman Nagar	16.56	0.2874	500	605	600	800
18	Phase1	60		D13	Lakshman Nagar 2	9.96	0.1729	500	469	500	600
19	Phase1	60	OG		Mahendra & Mahendra	6.20	0.1077	500	370	500	500
20	Phase1	60	N	A6	NewJadhavwadi1	7.41	0.1286	600	405	600	600
21	Phase1	60		D4	Thergaon Gaothan2	7.57	0.1314	400	409	400	600
1	Phase2	60		A4	Morewasti Chikhli	10.82	0.1879	500	489	500	500
2	Phase2	60		B8a	Nav Maha	1.29	0.0224	500	169	500	350
3	Phase2	60		D4	Naydu	7.38	0.1281	500	404	500	600
4	Phase2	60		C15	Nehru Nagar1	4.04	0.0701	500	299	500	400
5	Phase2	60		C15	Nehru Nagar2	3.46	0.0601	500	277	500	500
6	Phase2	60	OG		New Panjarpol	1.22	0.0212	450	164	450	400
7	Phase2	60	OG		New Pimple Gurav Garden 20 Lakhs	8.84	0.1534	500	442	500	600
8	Phase2	60	N		New_Punavale	9.16	0.1591	500	450	500	600
9	Phase2	60		C9	Panjarpol	5.58	0.0970	450	351	450	450
10	Phase2	60		D7	Pimple Gurao1	4.56	0.0792	500	318	500	500
11	Phase2	60		D7	Pimple Gurao2	5.14	0.0893	500	337	500	500
12	Phase2	60		D7	Pimple Gurao3	5.57	0.0967	500	351	500	600
13	Phase2	60		D8	Pimple Gurav Garden	3.65	0.0634	400	284	400	500
14	Phase2	60		D14	Pimple Nilakh	12.96	0.2251	400	535	400	700
15	Phase2	60		D6	Pimple Saudagar a	5.42	0.0942	500	346	500	600
16	Phase2	60	N	D6	Pimple Saudagar b New	12.12	0.2104	500	518	500	800
17	Phase2	60		B6	Pimpri Delux a	7.70	0.1337	500	413	500	600
18	Phase2	60		B6	Pimpri Delux b	5.01	0.0870	500	333	500	600
19	Phase2	60	OG		Proposed Naydu	4.37	0.0758	500	311	500	400
20	Phase2	60			Punavale	6.87	0.1193	500	390	500	600
21	Phase2	60		D5	Rahatni1	8.64	0.1500	500	437	500	600
22	Phase2	60		D5	Rahatni2	10.29	0.1786	500	477	500	600

23	Phase2	60		D5	Rahatni3	7.69	0.1334	500	412	500	600
24	Phase2	60		A3	Rupi Nagar	13.07	0.2268	500	537	500	500
25	Phase2	60		A5	Sachin1	4.29	0.0745	600	308	600	400
26	Phase2	60		A5	Sachin2	5.33	0.0925	450	343	450	400
27	Phase2	60	OG		Sector 28 New ESR	3.98	0.0691	300	297	300	600
28	Phase2	60		B3	Sector 96	8.08	0.1403	500	423	500	500
29	Phase2	60	OG		Sector 96 New Esr	13.23	0.2296	500	541	550	700
30	Phase2	60		B7	Sector 96 Part 2	8.77	0.1522	500	440	500	500
31	Phase2	60		A5	Shahu Nagar	8.66	0.1504	600	438	600	600
1	Phase3	60		C7	Charholi c	2.13	0.0370	600	217	600	500
2	Phase3	60		C4	Dudulgaon	4.79	0.0832	350	326	350	500
3	Phase3	60	N		Gairan	8.00	0.1388	500	420	500	600
4	Phase3	60	N		Kudalwadi New1	9.08	0.1576	500	448	500	700
5	Phase3	60	N		Kudalwadi New2	9.37	0.1626	500	455	500	600
6	Phase3	60	N		Kudalwadi New3	9.09	0.1579	500	448	500	600
7	Phase3	60	N		Kudalwadi New4	7.23	0.1255	500	400	500	500
8	Phase3	60		C1	Moshi b	6.32	0.1097	500	374	500	500
9	Phase3	60	N		New_Charoli	5.38	0.0934	500	345	500	500
10	Phase3	60	N		New_Moshi b	10.86	0.1885	500	490	500	600
11	Phase3	60	N		New_Wadmukhwadi b	2.74	0.0476	500	246	500	600
12	Phase3	60		C6	Wadmukhwadi b	2.87	0.0499	600	252	600	500
13	Phase3	60	N	A6	NewJadhavwadi2	0.14	600	419	600	600	600

Distribution System

The existing pipelines laid in the distribution network of the Pimpri-Chinchwad city are shown in Figure 3.8.

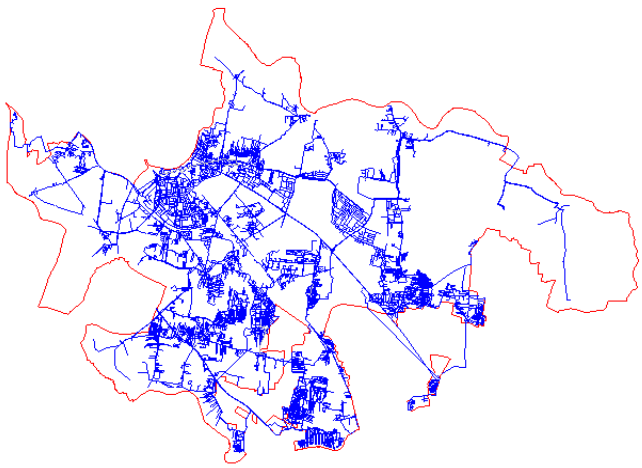


Figure 3.8: Existing pipelines in the distribution network

The total length of the existing distribution network in both 40% and 60% of the Pimpri-Chinchwad Corporation is around 1065.1 km. Length of different pipes in the distribution system is shown in Table 3.6 and 3.7.

Table 3.6: Length of pipes in selected (60%) of distribution system

Diameter (mm)	CI	DI	HDPE	MS	Grand Total
75	140				140
80	18686				18686
99.3			632		632
100	427174	17664		1619	446457
144.4	67		745		812
150	240425	28714		511	269650
175	1532				1532
180.6	149		82		231
200	90232	6960		4642	101834
250	45165	762			45927
300	70759	8436		10781	89976
350	8061				8061
400	17762	3977		4878	26617
450	15147	2117		6830	24094
500	4162	2801		2899	9862
600	10413	3463		6507	20383
700		121			121
750		167			167
Grand Total	949874	75182	1459	38667	1065182

Table 3.7: Length of existing pipes in both 40% and 60% area

Diameter (mm)	New_60					Old_40					Old_40_A*				Grand Total
	CI	DI	HDPE	MS	Total	CI	DI	HDPE	MS	Total	CI	DI	MS	Total	
75	140				140										140
80	11109				11109	6607				6607	970			970	18686
99.3								632		632					632
100	266266	15310		108	281684	120064	2354		1511	123929	40844			40844	446457
144.4			745		745						67			67	812
150	130419	16228		198	146845	88915	12486		313	101714	21091			21091	269650
175	411				411	1121				1121					1532
180.6	149		82		231										231
200	61666	4173		4642	70481	21638	2787			24425	6928			6928	101834
250	29431	320			29751	14443	442			14885	1291			1291	45927
300	38170	2770		8069	49009	23806	5666		2712	32184	8783			8783	89976
350	4896				4896	1357				1357	1808			1808	8061
400	10611	2354		2554	15519	7113	1623		2324	11060	38			38	26617
450	5063	574		5230	10867	8605	1543		1600	11748	1479			1479	24094
500	4152	1280		2618	8050	10	1521		281	1812					9862
600	6255	885		2170	9310	3572	2578		3891	10041	586		446	1032	20383
700												121		121	121
750		167			167										167
Grand Total	568738	44061	827	25589	639215	297251	31000	632	12632	341515	83885	121	446	84452	1065182

* PCMC directed to include Operational zones of Bijli Nagar a, Bijli Nagar b, Bijli Nagar c, Pradhikaran and Premlok Park in 40% area which is shown as Old_40_A in Table 3.4.

3.3 Environmental Compliance and Protection

An initial environmental preliminary review of the project has been carried out and is provided below. This project includes the rehabilitation of distribution system, providing and laying of gravity main and installing various sizes of water meters etc

Potential Environmental Impacts and Mitigation Measures:
The proposed project would influence the environment in two stages, i.e. Construction Stage and Operation Stage. The potential impacts and associated mitigation measures are described below. It has been broadly understood that the impacts during the construction stage which would be temporary and short term in nature and that the operation stage could have long term effects. The positive impacts of this project action are also described in subsequent sections.

Pollution
There will be no pollution due to offensive odors of Chlorine as filtered water is supplied to the newly merged area and it is located at 7 km from the water treatment plant. As such there will be no significant offensive odors reaching the residential areas.

No downstream water utilization is hampered by little outflows of soil from open ground created in the construction of the facility. Compensatory plantation will be taken up as per environment management plan if necessary. As a mitigation measure, exposed surface will be resurfaced and stabilized as soon as possible and trenches will have adequate backfill consolidation to prevent subsequent street settlement.
Upon completion of backfill, the surface shall be restored fully to the level existed prior to the construction of the pipe line. Construction surfaces during dry/windy periods resulting in fugitive dust generation will be suppressed by spraying of water or other suitable means and workers working in dust prone areas will be provided with masks and goggles. Excavated material transported by trucks will be covered and /or wetted to prevent dust nuisance.

Noise from Construction
All construction vehicles will be properly maintained and will have valid "Pollution under Control Certificate" and noisy construction activities will be carried out only during normal working hours and local residents will be advised of any unusual or unavoidable areas particularly carrying out works of distribution line. Pipe jacking operations take place below ground level and are generally have low sound intensities.

Natural Environment Issues
Effect of Construction on the Ecology Major construction like laying of Gravity main, chambers and, distribution mains etc shall be done outside designated natural conservation areas such as city parks and green areas established in accordance with the local laws and will not have any significant impacts on Conservation area. During the construction phase there

might be some impacts on air, noise and management of solid waste in vicinity with habitations. The effect of project pipelines and access roads on valuable habitat for flora and fauna is anticipated as minimal. Prevention of water logging/flooding shall be made as dewatering during trenching and excavation and water testing of new lines will be done in a manner so that it does not lead to water logging of the nearby area.

Effect on Landscape

There would be temporary social impact with respect to landscape disturbances during construction and operation phase of the project in terms of traffic congestion and disturbances while laying of transmission system, no other impact is envisaged. Protection of trees shall be done by routing of pipe lines to avoid impacting trees to the extent feasible. Prior approval will be obtained where trees have to be felled for laying the pipes etc.

Human Environment Issues

Heritage: Places of historical and heritage importance does not fall in vicinity with any proposed construction work.

Effect of Construction of the Facility on the Historical and Cultural Heritage: There are no places of cultural and historical importance in vicinity with any proposed construction work.

Effect on Existing Infrastructure: Preliminarily study reveals, no significant structures found to be affected. In the narrow sections of road construction, activities may cause traffic disruption while lying of pipe lines. Traffic diversion, lack of access to buildings and air and noise pollution caused by construction activities could have some adverse impact on trade and commerce in the service area.

Road Safety and Traffic Management during Construction

By taking measure to prevent traffic congestion like provision of temporary safe access to buildings, and/or separation of motor vehicle traffic from non-motorized and pedestrian where necessary and measures to be taken to ensure safety of pedestrian, traffic passing through the construction area including signs, marking flags, lights and flagmen as may be required.

Effect on Downstream Water Users

In context of work zones for this Project, this impact is not applicable and not relevant.

Involuntary Resettlement

Social and environmental impacts study reveals that during construction and operation phase there will be no small or large-scale involuntary displacement of persons; hence preparation of Resettlement Action Plan would not be required at a later stage. Net work of distribution system is to be carried out on road where human habitation is minimal.

Living and Livelihood

Living and livelihood forms an important component to be addressed within the social framework. Social impact assessment undertaken in study reveal that no long-term visible negative social impact during the construction and operation phase is envisaged. Field study

reveals that there is possibility of generation of more employment activities during the construction phase, wherein local laborers would be engaged in excavation for trenches and laying of gravity main, distribution lines.

Ethnic Minorities and Indigenous Peoples

Study area is mostly under urban extent and field observation found that there are no indigenous groups getting affected.

Others

Effect on the Environment during Construction Stage

The location of installations and equipment, work methods, and the work period shall be arranged so that the execution of the project work will cause the least possible inconvenience in the area.

Environmental health and safety consideration at construction campsites and construction work-sites shall be taken as camps / compounds will be located so that they do not interfere with the existing drainage system, construction work-site will be properly barricaded and have adequate provision of drinking water, toilets and dispensing of first aid. Appropriate control measures will be taken to prevent insect/vector diseases especially malaria by measures such as preventing creation of stagnant pool of water.

Effect on the Environment during Operation Stage

During the operation stage the environmental impacts are likely to be mostly positive, a part of several health benefits; WTP will make the supply of treated water where shortage of water is felt and thus people will get quality water. However, there could be some adverse impacts due to inadequate operation and maintenance or control such as inappropriate dumping of excavated stuff retrieved from the Excavation of trenches Mitigation measures include setting of performance requirements to be achieved by the O&M agencies in their contract, and effective monitoring and supervision of the achievements of these requirements.

Positive Impacts of the Project

Improvement in service level of water supply in this area as a result of this project would ensure better improved water quality.

A significant population of the service area would benefit the most from the proposed project as they suffer the most when there is shortage of water which is based on ground water source

Other benefits of the project would include:

People will be satisfied with water supply and people will pay water taxes, Skilled and unskilled employment generation during construction stage,

Employment generation during O&M phase.

Institutional Requirements and Environmental Monitoring Plan

It is recommended that the successful Contractors executing the construction of the various components in this project shall carry out appropriate monitoring plans during the construction phase of the project. Those items have also been identified whose impact is not great to justify modification of the project but which are considered to require monitoring. The construction of the project will be executed by the successful Contractors under the Management and supervision of PCMC or his authorized consultant of Project Management Consultancy who will carry out the monitoring activities during construction during the Operations and Maintenance phase of the project, PCMC shall be responsible to carry out monitoring activities who may be aided by other governmental agencies such as Irrigation Department for reserving water in dam, MSEDCL for supplying continuous electrical supply Effective implementation of the mitigation measures will require the project to undertake a comprehensive monitoring program. The objective of the monitoring program is to insure that the construction activities are carried out in an environmentally sensitive and responsible manner.

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Chapter-4
Population Forecast and Demand Estimation

4.1 Population Forecast

The population of the Pimpri-Chinchwad as per 2011 census is 17,30,133. The present Pimpri-Chinchwad Municipal Corporation has area of 170.51 square kilometers. The decadal population growth of the Pimpri-Chinchwad city is shown in Table 4.1. The projected population is shown in Table 4.2.

Table 4.1: Decadal population growth of the Pimpri-Chinchwad city.

Sr. No.	Year	Population	Increase in decade	Incremental increase in decade.	Rate of growth per decade
1	1971	98572			
			153197		1.554
2	1981	251769		115673	
			268870		1.068
3	1991	520639		216908	
			485778		0.933
4	2001	1006417		237938	
			723716		0.719
5	2011	1730133			
	Total	3607530	1631561	570519	
	AVERAGE	721506	407890	190173	1.027

Table 4.2: The projected population of the Pimpri-Chinchwad city.

Sr. No.	Year	Arithmetic method	Incremental increase method	Geometric progression method	Average of Incremental increase method and Geometric progression method.
1	2015	1893289	1946538	2295296	2120917

2	2030	2505124	3029053	6625003	4827028
3	2045	3116959	3815740	19122005	11468873

Population forecast, made by the average of Incremental increase method and Geometric progression method, is on very high side. Hence, the forecast as made by the Incremental increase method are adopted which is shown in Table 4.3.

Table 4.3: Finally accepted projected population

S.No	Year	Population
1.	2015	1946538
2.	2030	3029053
3.	2045	3815740

4.2 Demand Projection

4.2.1 Losses

CPHEEO manual restricted total losses to 15% (Ref p11 of CPHEEO manual). Hence, it is assumed that there will be 10% losses (Figure 4.1) in distribution system, 3% in treatment plant (2% is recovered by recirculation) and 2% (1% in raw water transmission and 1% in pure water transmission) in the transmission system.

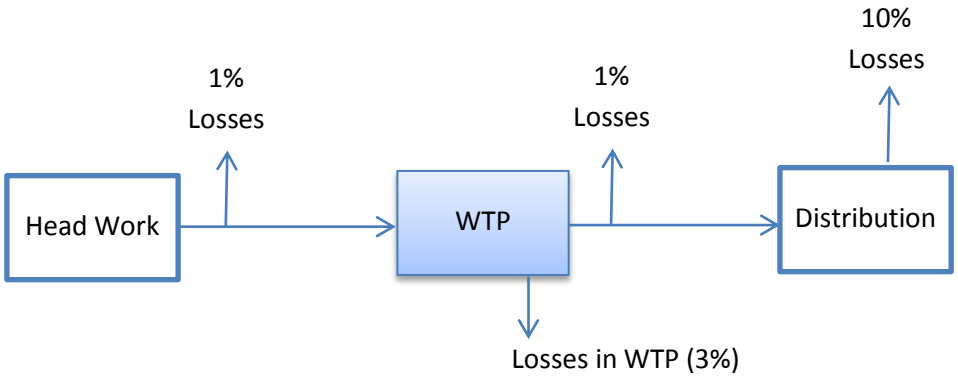


Figure 4.1: Demand of en-route connections and losses in WTP

Rate of supply is considered as 150 LPCD as the PMC has population more than 1 million. The forecast of the demands for the present, intermediate and the ultimate stages are shown in Table 4.4.

Table 4.4: Population forecast and demand of the Pimpri-Chinchwad city.

Demand at	SN	Details	Base Year	Intermediate Stage	Ultimate stage
			Year: 2015	2030	2045
Primary demand	1	Population (Souls)	1946538	3029053	3815740
	2	Rate of WS (LPCD)	150	150	150
	3	Daily Demand (Lits)	291980700	454357950	572361000
	4	Floating Popuation (@ 5%)*	97327	151453	190787
	5	Rate of WS (LPCD)	20	20	20
	6	Floating Demand	19,46,538	30,29,053	38,15,740
	8	Total Demand (MLD)	293.9	457.4	576.2
	9	Fire Demand	4.41	5.50	6.18
	(a)	Total Demand	298.34	462.89	582.35
Demand of Distribution	(b)	Institutional (3%)*	8.95	13.89	17.47
	(c)	Public- semi public (5%)*	14.92	23.14	29.12
	(d)	Commercial (1.5%)*	4.48	6.94	8.74
	(e)	Industrial(0.5%)*	1.49	2.31	2.91
		Total (a+b+c+d+e)	328.17	509.18	640.59
		Demand with 10% losses in Distribution System	364.64	565.76	711.77
	10	Total	365	566	712
At WTP		Demand with 1% losses in PW RM at outlet of WTP	2.98	4.63	5.82
		Demand with 3% losses in WTP at inlet of WTP	8.95	13.89	17.47
	11	**Total**	**377**	**584**	**735**
At Head Work		Add 1% for losses in RW transmission system	2.98	4.63	5.82
	12	Total	380	589	741

* Discussion with PCMC planners

The distribution system operational zones, tanks etc are designed for 566 MLD and the pipe sizes are designed for 712 MLD.

**

Chapter-5

Hydraulic Model of Transmission Main of Pimpri-Chinchwad

5.1 Simulation Model

Modeling of the water supply system is a critical part of designing and operating water networks for 24/7 continuous supply. It helps the distribution system to serve community reliably, safely and efficiently in daily operations. Hydraulic models give commanding knowledge of the water infrastructure, and help to take informed decisions. Modeling (Haested Methods, 2003) is *defined as a mathematical description of a real-world system*.

5.2 The Modeling Process

Main objective of any water utility is to deliver safe and potable water to its customers uninterruptedly. The first step in preparation of the model for water supply project is a creation of maps and records.

5.2.1 Maps and Records

System Maps: System maps of the Pimpri-Chinchwad city in the form of the GIS format have been collected from the computer section of the Pimpri-Chinchwad Municipal Corporation (PMC). These maps helped to make understanding of the water distribution networks of the city. The maps illustrate wide range of system characteristics of the Pimpri-Chinchwad city such as pipeline alignment, elevations of nodes, location of tanks and reservoirs and valves etc.

A vast data, describing real-world network system has been used to build a model. Fortunately the city water supply department has a set of drawings pertaining to the water supply of the Pimpri-Chinchwad city. The information available with the PMC has been tested for accuracy and was validated in consultation with the engineers of PMC.

The Transmission main(transmission main from WTP to the various service tanks) is obtained from the PMC, which was prepared in EPANET. This EPANET file is used to prepare the hydrauiic model in WaterGEMS. Water transmission pipelines were are shown and the positions of water treatment plants, water districts (WD) and the elevated service

reservoirs in the city were used in WaterGEMS. The shape files of roads and the buildings are used as a backdrop of the WaterGEMS software.

5.3 System Simulation

While making hydraulic model for 24/7 continuous water supply system, various components of the network such as reservoir, tanks, pipelines and valves etc. are required to be simulated. The term simulation (Haested Methods, 2003) refers to the process of imitating the behavior of one system through functions of another. In the present approach, the term simulation represents behavior of real system (model) mathematically. Network simulation is a tool used when it is not possible to make experimentation to the actual system or to predict the behavior of the system before it is actually built. The objectives of the simulation are as follows-

- Replicate the dynamics of an existing and the proposed water supply system,
- Performed when it is not practical for the real system to be directly subjected to experimentation,
- Evaluating a system before it is actually built.

5.3.1 Simulation of 24/7 Continuous Water Supply System

The road map to 24/7 continuous water supply for the Pimpri-Chinchwad has been shown in Figure 5.1.

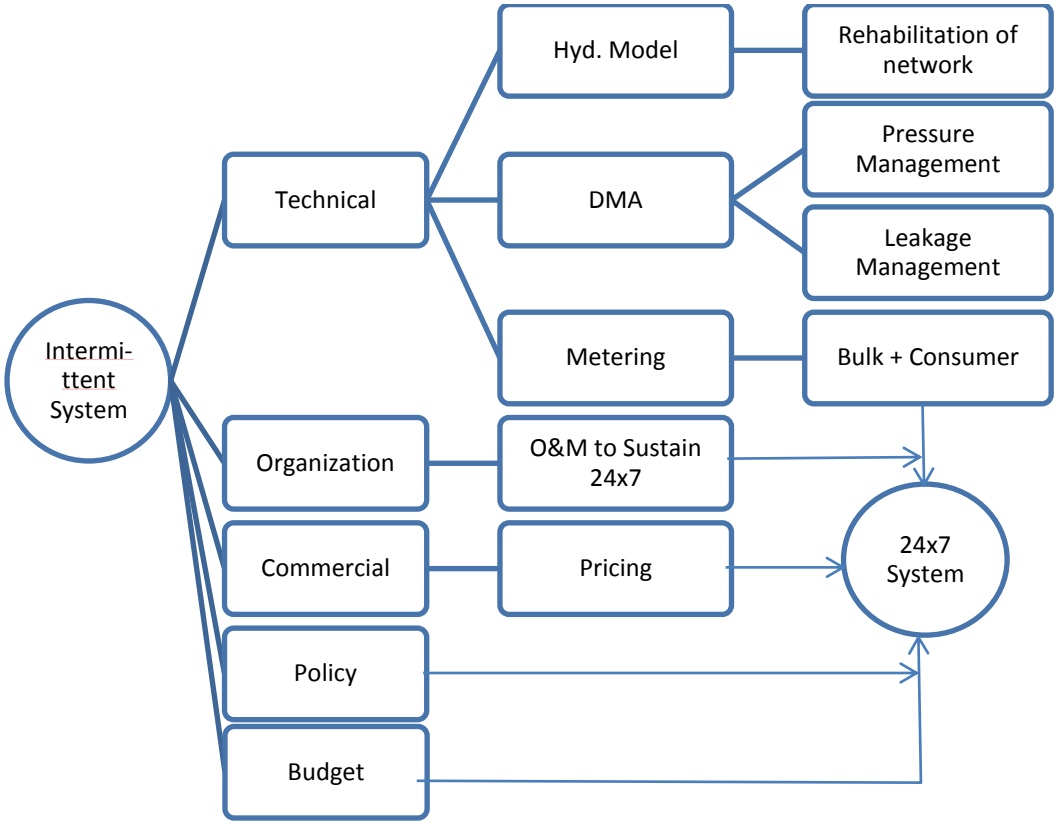
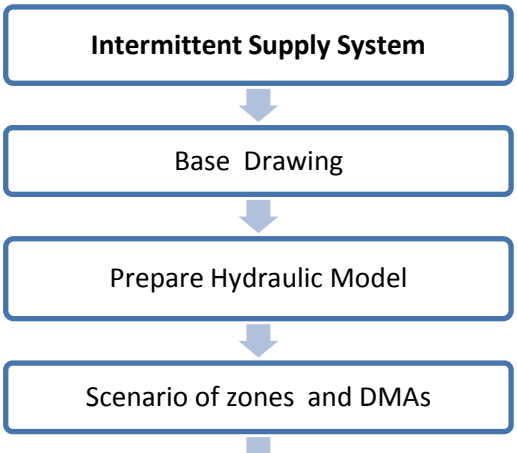


Figure 5.1: Road map of 24/7 continuous water supply

All the parameters, as shown in Figure 5.1, are equally important and are inextricably linked. If anyone of them is not achieved, then it is not possible to convert the existing intermittent supply into 24/7 continuous water supply. For example, if technical parameters such as creation of hydraulic model, using DMA methodology and metering activities are carried out, but if proper tariff is not adopted, then there will be rise in the consumption rather than expected decrease in the supply rate and there will be shortage of water.

Implementation Steps of 24/7 Water Supply: Detailed implementation steps are shown in Figure 5.2.

Basic principle: The basic principle is to save water by plugging of leaks in distribution pipe network. And the saved water is then used to increase the supply hours to 24 hours daily. This process must be a continuous one to constantly reduce NRW.



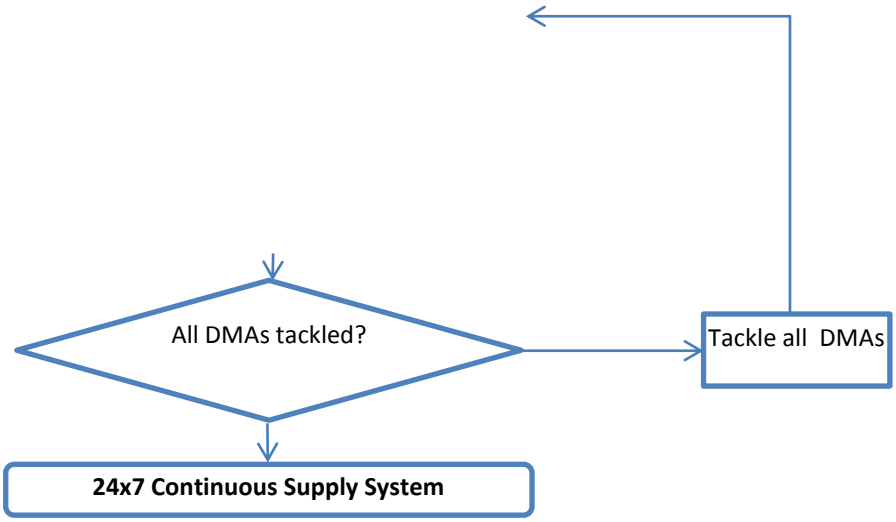


Figure 5.2: Implementation stages of 24/7 continuous water supply

5.3.2 Model Scenario

Scenario represents a set of models that describe traits of hydraulic networks of different water works. A typical model scenario requires analysis of a number of alternatives. Analysis of each alternative requires separate set of input data. In the situation of large number of model runs, it is not possible to edit input data accurately. Working either with many data files or editing frequently with single data file (Haested Methods, 2003) is confusing, inefficient and susceptible to the errors. Hence, to solve this problem alternative data sets are kept with single model data file. The alternatives can be assigned to the scenario and then the batch run of the particular scenario is performed to evaluate the results.

Alternatives: Basically three types of alternatives are used in this study. They are namely- (a) active topology, (b) demand and (c) operational.

(a) Active Topology: System drawings of all water networks showing locations of tanks, intermediate nodes, demand nodes and pipeline alignment of the Pimpri-Chinchwad city are taken from the earlier EPANET file which were prepared by actually visiting the site and plotted using the available drawings. In GIS maps the co-ordinate system of WGS-1984 UTM 43° N has been used. A satellite image of the city along with vector image (shape files) is shown in Figure 5.3.

Figure 5.3: A satellite image of a part of Pimpri-Chinchwad along with vector images of roads and buildings

All elements of model are then suitably named and the corresponding data is fed to the computer software. The base scenario is then separated into various child scenario by making inactive elements of other zones and making active elements of the zones that is considered as a separate child scenario as shown in Figure 5.4.. Thus all child scenario of active topology.

(b) Demand: Demand for all the nodes for the years 2015, 2030 and 2045 are allocated.

(c) Operational: Valve operations are important in the model of pipe network. Flow control valves are used to regulate the flow into each zone.

5.3.3 Base Scenario

Base scenario of pipe network of entire city is the first task in preparation of the hydraulic model.

Back Drop Drawing

A satellite raster image of the Pimpri-Chinchwad city has been made available by the PMC, which has been used in this study. This image is limited to the extent of the city. This raster satellite image was digitized and the shape files of the features such as road edge boundaries, buildings, water bodies were created. The satellite image and the shape files are geo-referenced (spatial)

Attaching Alternatives

Alternatives of active topology, demand and the operational are created in WaterGEMS and are attached to the base scenario as shown in Figure 5.4.

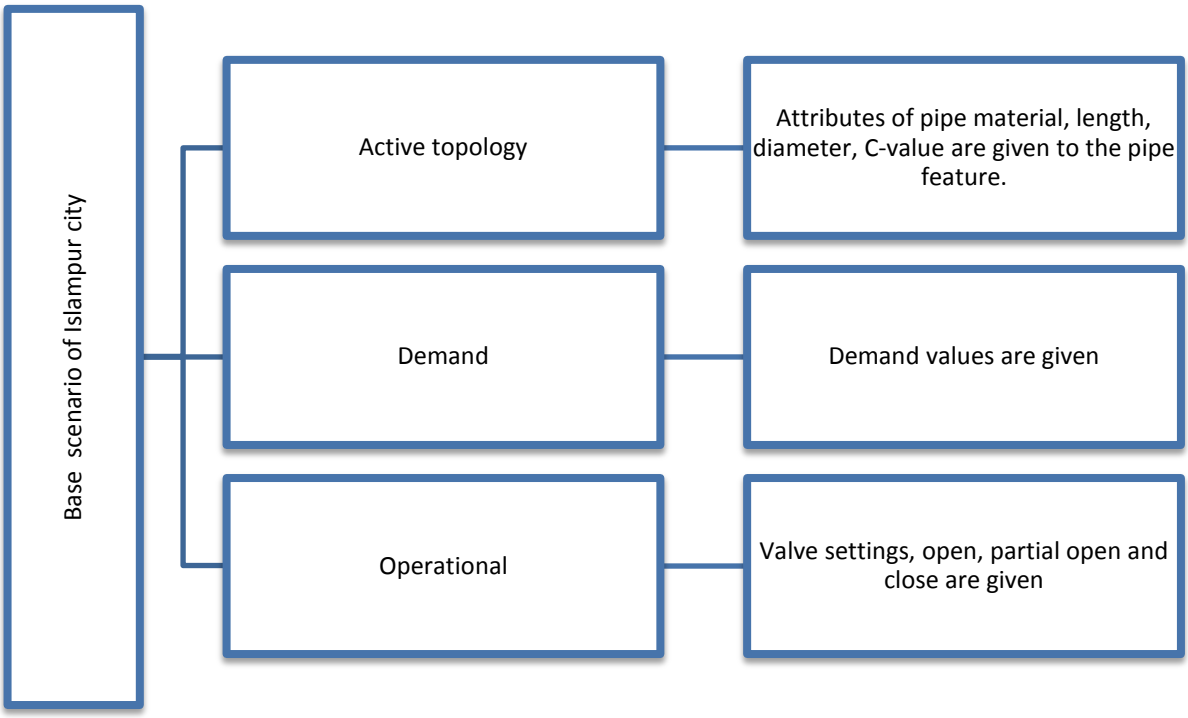


Figure 5.4: Alternative attached to the base scenario

5.3.3 Active Topology of Entire City

The shape files of the roads and buildings are exported to WaterGEMS and are used as the background layers. Various components of the pipe network such as reservoir, pipe, junctions, valves and tanks etc. are drawn on the background layer and are shown in Figure 5.5.

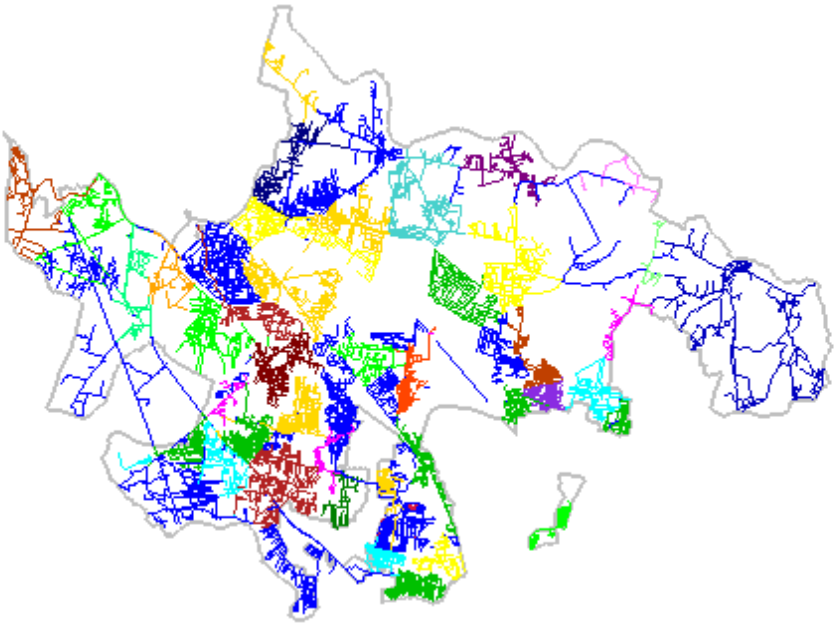


Figure 5.5: Pipe network of Pimpri-Chinchwad

5.4 Water Demand

The water districts of the Pimpri-Chinchwad city are shown in Figure 5.6. Demand of the water districts is computed by using the land pattern data given by the PMC.

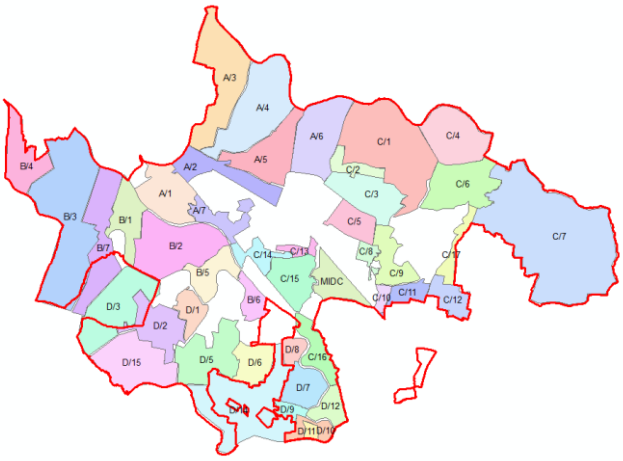


Figure 5.6: Water districts of the Pimpri-Chinchwad city

Population of all the 46 water districts, its area and population density, under study area, is shown in Table 5.1. A GIS layer with population densities as attribute table has been created.

Table 5.1: Population of the water districts under study area

SN	Water Zone No.	Water Zone Name	Area (km^2)	Population (2011)	Population Density (P/km^2)

1	A1	Pradhikaran (E1)	3653171	65289	17872
2	A2	Triveni Nagar	2893995	86184	29780
3	A3	Rupi Nagar	5923341	36680	6192
4	A4	Chikhli	6593275	87935	13337
5	A5	Krishna Nagar	3969321	51081	12869
6	A6	Kudalwadi & Jadhavwadi	4730182	32528	6877
7	A7	Akurdi	1775531	48460	27293
8	B1	Sector 29	2550570	22854	8960
9	B2	Bijli Nagar	2556691	79790	31208
10	B3	Sector 96 Part 1	11073858	32980	2978
11	B4	Mamurdi Direct	3000458	4999	1666
12	B5	Elpro	2103509	59034	28065
13	B6	Pimpri Camp	1208700	58362	48285
14	B7	Sector 96 Part 2	4727993	17738	3752
15	B8	Nav Maharashra	781756	12360	15810
16	C1	Moshi	9277030	31455	3391
17	C2	Boradewadi	1131161	12613	11150
18	C3	WD4	3536615	24074	6807
19	C4	Dudulgaon	45917	3509	76426
20	C5	Sector 7 and 10	1891204	6040	3194
21	C6	Wadmukhwadi	4273259	2437	570
22	C7	Charholi	17411135	13306	764
23	C8	Indrayaninagar	628780	22266	35411
24	C9	Panjarpol	2213991	57787	26101
25	C10	Bhosari Gaothan	499918	19070	38146
26	C11	Sant Tukaram Nagar	1049013	48691	46416
27	C12	Dighi Gaothan	1576909	40598	25745
28	C13	Anna Saheb Magar Stadium	560074	11758	20993
29	C14	Ajmera Colony	1293794	29264	22619
30	C15	Nehru Nagar	2768757	66855	24146
31	C16	Kasarwadi	1917448	29279	15270
32	C17	Dighi Magzine	1132172	4153	3668
33	D1	Thergaon Gaothan	1399055	35210	25167
34	D2	Lakshman Nagar	3152663	77074	24447
35	D3	Kala Khadak	5629633	35216	6255
36	D4	Shreenagar	2635108	85137	32309
37	D5	Rahatni	4071683	70331	17273
38	D6	Pimple Saudagar	1974842	55497	28102
39	D7	Pimple Gurao	2149168	59284	27585
40	D8	Jawalkar Nagar	768790	20054	26085
41	D9	New Sangvi	599944	24898	41500
42	D10	PWD Sector 85	906487	20845	22995
43	D11	Old Sangvi	342635	20883	60948
44	D12	Dapodi	1313327	37404	28481
45	D13	Lakshman Nagar 2	1319225	13131	9954
46	D14	Pimple Nilakh	8264983	30596	3702
47	D15		4987049	25143	5042
		Total	148264118	1730133	20758

5.4.1 Observations on Demand Projection

The City Development Plan (CDP) recommends the growth of population according to the ward density pattern. Water district's density is a ratio of population of each water district to its spread area. Based on the population pattern, the water district are categorized as low dense, medium dense, high dense, very high dense and saturated. Population projection factor was considered in accordance with the growth rate of the city and with discussions with the city planners. It is also considered as per the, expected new layouts, vertical growth, urban poor, slums, land use pattern, residential and commercial properties and industries, etc. in the each 46 water districts. A maximum growth factor of 3 has been given to the low dense water districts, followed by the projection factors as shown in Table 5.3.

Table 5.2: Population density pattern

SN	Water district: Density Pattern	Persons/ sq km	No. of Water districts	Projection Factor
1	Low	0 - 10000	16	3
2	Medium	10000 - 20000	7	2.7
3	High	20000-30000	15	2.5
4	Very High	30000-45000	5	2
5	Saturated	>45000	4	1.2
		Total	47	

Numbers of water districts with different density type are shown in Figure 5.7. Distribution of population density in various water districts is shown in Figure 5.8 and Table 5.3.

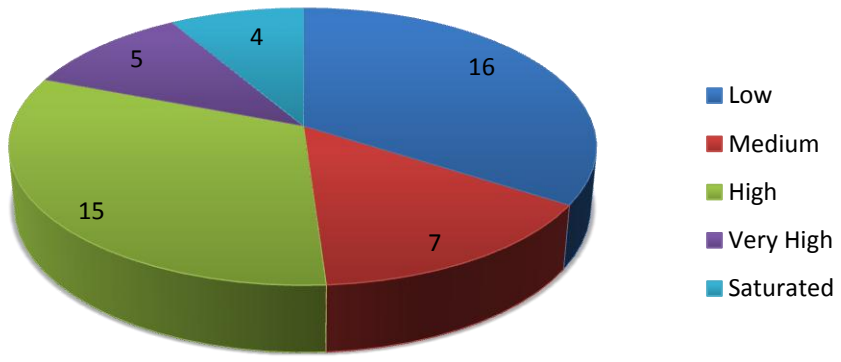


Figure 5.7: Density pattern of water districts in Pimpri-Chinchwad

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Table 5.3: Distribution of population density in various wards

Water District No.	Water District Name	Area_sqm	A_sqkm	Population (2011)	Population Density (P/sqkm)	Density	Projection factor	Population			Population density (p/m2)		
								2015	2030	2045	2015	2030	2045
C6	Wadmukhwadi	4273259	4.273259	2437	570	Low	3.0	2742	5041	6522	0.000642	0.00118	0.001526
C7	Charholi	17411135	17.41114	13306	764	Low	3.0	14970	27523	35607	0.00086	0.001581	0.002045
C4	Dudulgaon	4245917	4.245917	3509	826	Low	3.0	3948	7259	9391	0.00093	0.00171	0.002212
B4	Mamurdi Direct	3000458	3.000458	4999	1666	Low	3.0	5625	10341	13378	0.001875	0.003446	0.004459
B3	Sector 96 Part 1	11073858	11.07386	32980	2978	Low	3.0	37105	68218	88256	0.003351	0.00616	0.00797
C5	Sector 7 and 10	1891204	1.891204	6040	3194	Low	3.0	6795	12494	16163	0.003593	0.006606	0.008547
C1	Moshi	9277030	9.27703	31455	3391	Low	3.0	35390	65065	84176	0.003815	0.007014	0.009074
C17	Dighi Magzine	1132172	1.132172	4153	3668	Low	3.0	4672	8590	11113	0.004127	0.007587	0.009816
D14	Pimple Nilakh	8264983	8.264983	30596	3702	Low	3.0	34423	63287	81876	0.004165	0.007657	0.009906
B7	Sector 96 Part 2	4727993	4.727993	17738	3752	Low	3.0	19957	36692	47469	0.004221	0.007761	0.01004
D15	D15	4987049	4.987049	25143	5042	Low	3.0	28288	52008	67284	0.005672	0.010429	0.013492
A3	Rupi Nagar	5923341	5.923341	36680	6192	Low	3.0	41268	75873	98158	0.006967	0.012809	0.016571
C3	WD4	3536615	3.536615	24074	6807	Low	3.0	27085	49797	64424	0.007658	0.01408	0.018216
A6	Kudalwadi & Jadhavwadi	4730182	4.730182	32528	6877	Low	3.0	36597	67285	87048	0.007737	0.014225	0.018403
D3	Kala Khadak	5063502	5.063502	35216	6955	Low	3.0	39620	72844	94239	0.007825	0.014386	0.018612
B1	Sector 29	2556691	2.556691	22854	8939	Low	3.0	25713	47273	61159	0.010057	0.01849	0.023921
D13	Lakshman Nagar 2	1319225	1.319225	13131	9954	Low	3.0	14774	27162	35140	0.011199	0.02059	0.026637
C2	Boradewadi	1131161	1.131161	12613	11150	Medium	2.7	14191	23481	30378	0.012545	0.020758	0.026855
A5	Krishna Nagar	3969321	3.969321	51081	12869	Medium	2.7	57470	95094	123026	0.014479	0.023957	0.030994
A4	Chikhli	6593275	6.593275	87935	13337	Medium	2.7	98934	163705	211788	0.015005	0.024829	0.032122
B2	Bijli Nagar	5950587	5.950587	79790	13409	Very High	2.0	89771	110031	142349	0.015086	0.018491	0.023922
C16	Kasarwadi	1917448	1.917448	29279	15270	Medium	2.7	32941	54508	70518	0.01718	0.028427	0.036777
B8	Nav Maharashra	781756.4	0.781756	12360	15810	Medium	2.7	13906	23009	29768	0.017788	0.029433	0.038078
D5	Rahatni	4071683	4.071683	70331	17273	Medium	2.7	79128	130931	169389	0.019434	0.032157	0.041602
A1	Pradhikaran (E1)	3653171	3.653171	65289	17872	Medium	2.7	73456	121546	157246	0.020107	0.033271	0.043044
C13	Anna Saheb Magar Stadium	560074.1	0.560074	11758	20993	High	2.5	13228	20267	26220	0.023619	0.036187	0.046815
C14	Ajmera Colony	1293794	1.293794	29264	22619	High	2.5	32925	50445	65261	0.025448	0.03899	0.050442
D10	PWD Sector 85	906487.2	0.906487	20845	22995	High	2.5	23452	35931	46485	0.025871	0.039637	0.05128
C15	Nehru Nagar	2768757	2.768757	66855	24146	High	2.5	75217	115241	149090	0.027166	0.041622	0.053847
D2	Lakshman Nagar	3152663	3.152663	77074	24447	High	2.5	86715	132857	171880	0.027505	0.042141	0.054519
D1	Thergaon Gaothan	1399055	1.399055	35210	25167	High	2.5	39614	60693	78520	0.028315	0.043381	0.056123

C12	Dighi Gaothan	1576909	1.576909	40598	25745	High	2.5	45676	69981	90536	0.028966	0.044379	0.057414
D8	Jawalkar Nagar	768789.9	0.76879	20054	26085	High	2.5	22563	34569	44722	0.029348	0.044965	0.058172
C9	Panjarpol	2213991	2.213991	57787	26101	High	2.5	65015	99610	128868	0.029365	0.044991	0.058206
A7	Akurdi	1775531	1.775531	48460	27293	High	2.5	54522	83534	108069	0.030707	0.047047	0.060866
D7	Pimple Gurao	2149168	2.149168	59284	27585	High	2.5	66699	102190	132206	0.031035	0.047549	0.061515
B5	Elpro	2103509	2.103509	59034	28065	High	2.5	66418	101761	131650	0.031575	0.048377	0.062586
D6	Pimple Saudagar	1974842	1.974842	55497	28102	High	2.5	62438	95662	123760	0.031617	0.04844	0.062669
D12	Dapodi	1313327	1.313327	37404	28481	High	2.5	42083	64476	83414	0.032043	0.049093	0.063513
A2	Triveni Nagar	2893995	2.893995	86184	29780	High	2.5	96964	148560	192195	0.033505	0.051334	0.066412
D4	Shreenagar	2635108	2.635108	85137	32309	Very High	2.0	99146	144732	151887	0.037625	0.054925	0.05764
C8	Indrayaninagar	628780.4	0.62878	22266	35411	Very High	2.0	28412	37852	39723	0.045185	0.060198	0.063174
C10	Bhosari Gaothan	499917.6	0.499918	19070	38146	Very High	2.0	24816	32419	34021	0.04964	0.064848	0.068054
D9	New Sangvi	599944.2	0.599944	24898	41500	Very High	2.0	31373	42326	44419	0.052293	0.07055	0.074038
C11	Sant Tukaram Nagar	1049013	1.049013	48691	46416	Saturated	1.2	49665	52099	52120	0.047344	0.049665	0.049685
B6	Pimpri Camp	1208700	1.2087	58362	48285	Saturated	1.2	59530	62448	62473	0.049251	0.051665	0.051686
D11	Old Sangvi	342635.1	0.342635	20883	60948	Saturated	1.2	21301	22345	22354	0.062167	0.065215	0.065241
			Total	1730133				1946538	3029053	3815740			

Using load builder of WaterGEMS, the demand is given as per the population density (Figure 5.8).

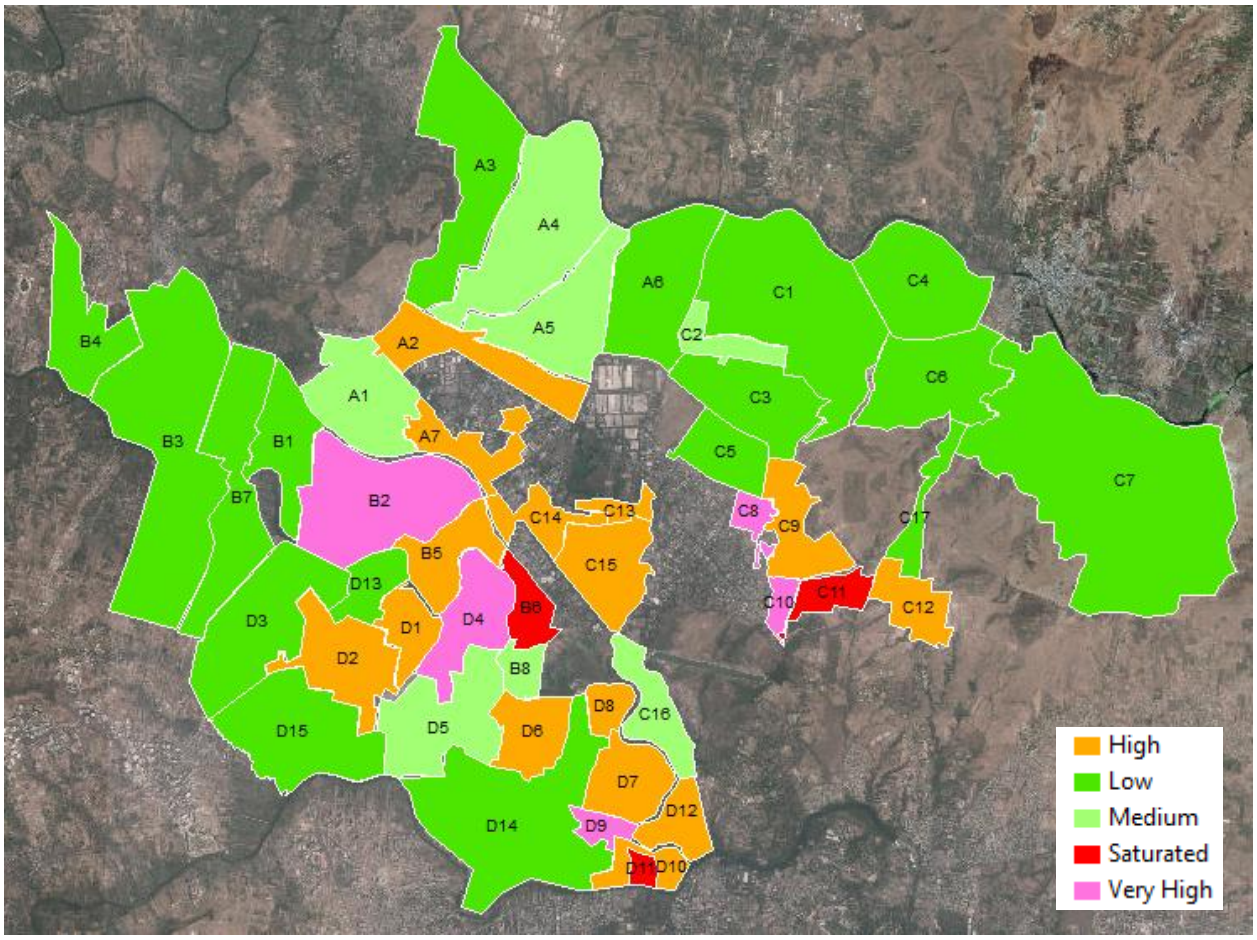

Figure 5.8: Population density of Pimpri-Chinchwad

Population of different water districts are shown in Figures 5.9, 5.10 and 5.11.

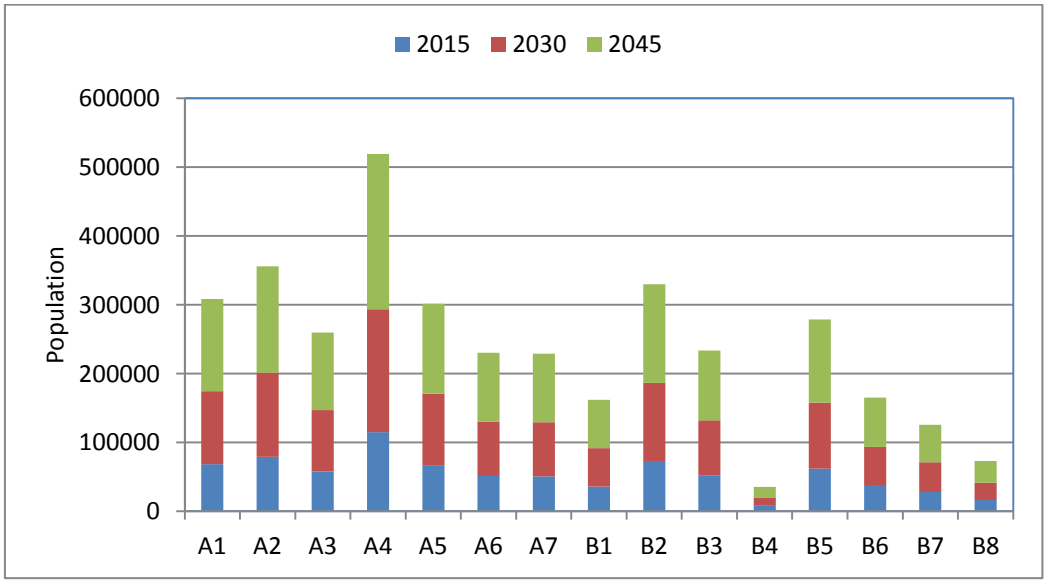

Figure 5.9: Water districts wise population projection of Pimpri-Chinchwad

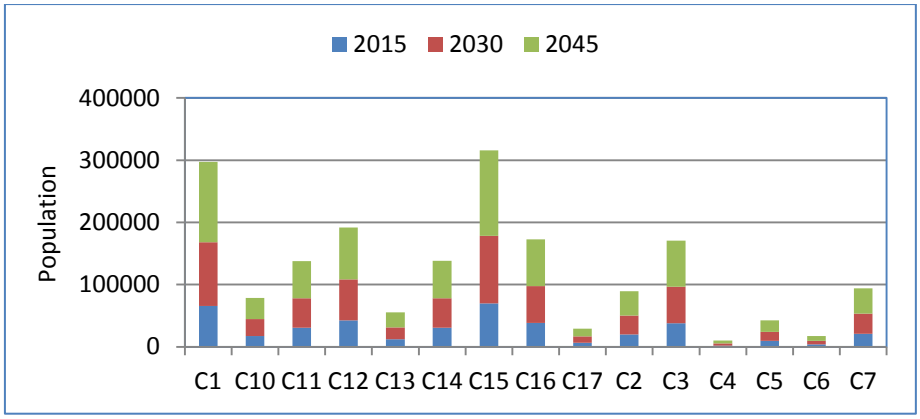

Figure 5.10: Demand of water districts

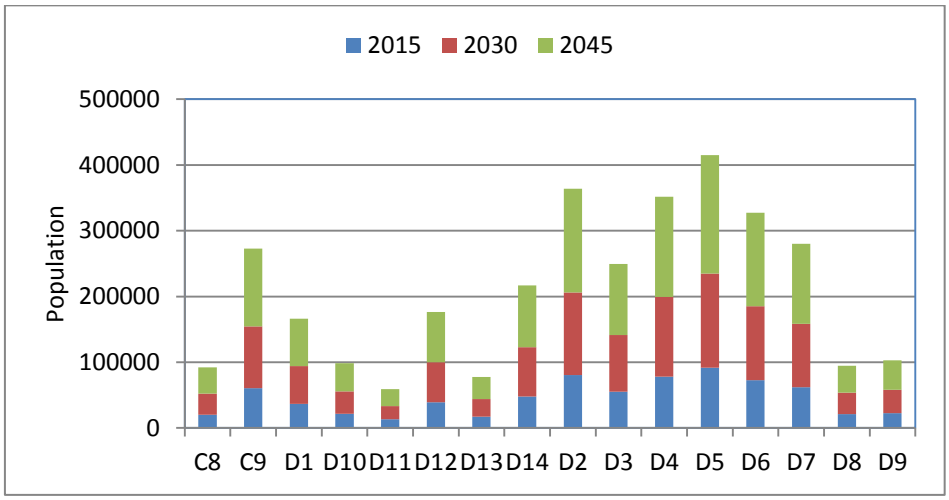

Figure 5.11: Demand of water districts

Base Scenario

Base scenario of the Transmission mainof the Pimpri-Chinchwad city has been prepared with the alternatives: (i) active topology, demand and the operational as shown in Figure 5.16.

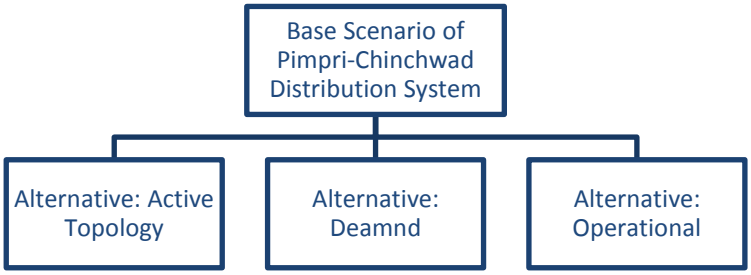

Figure 5.16: Base scenario with alternatives of active topology, demand and operational

Thus the basic hydraulic model of the distribution system has been created for further analysis and design of the entire project.

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Chapter-6
Design of Transmission System

6.1 Transmission System

Existing (E) ongoing (OG) and new (N) tanks proposed in this design are shown in Figure 6.1.

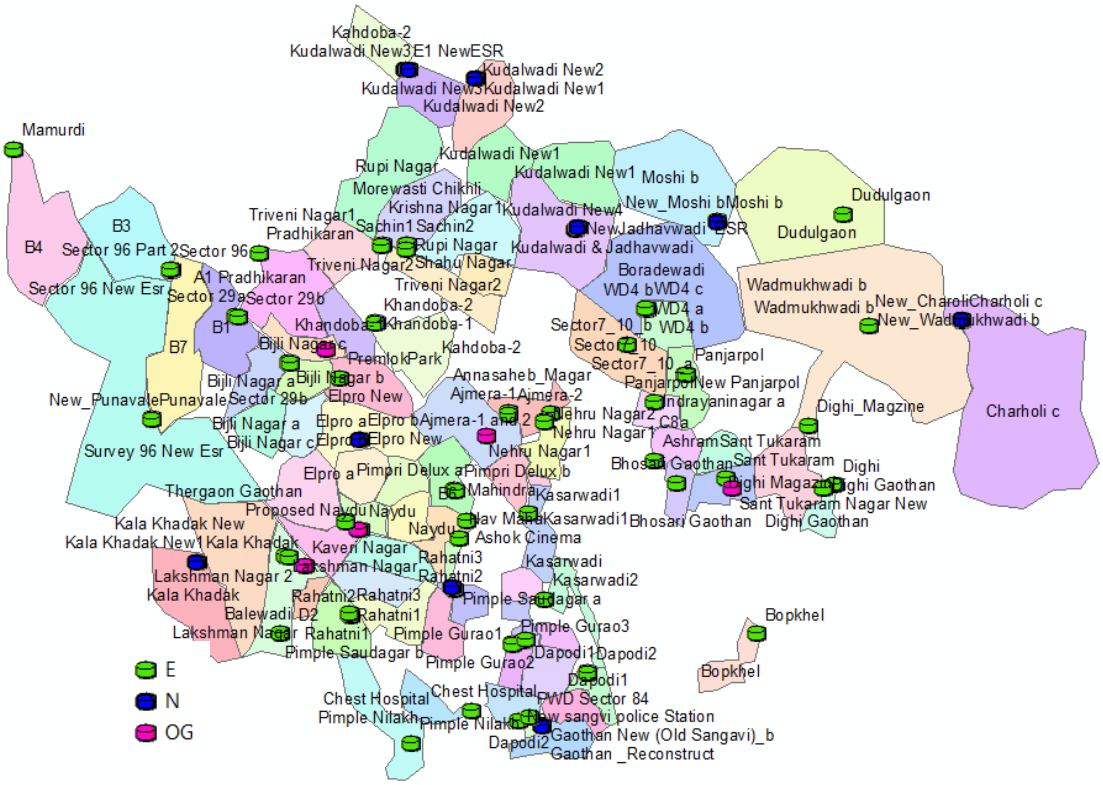

Figure 6.1: Existing (E) ongoing (OG) and new (N) tanks proposed

New Transmission Main

A new MS feeder main of 1400 mm is proposed to be laid in the CIDCO area along with the existing 1400 mm and 1118 mm mains.

Demands of the ESRs for the year 2026 and 2041 is shown in Table 6.1.

Table 6.1: Demands of the ESRs for the year 2026 and 2041

Tank_ID	Area (%)	Status	Label	Demand of 2030 (ML/day)	Demand of 2045 (MLD)
1	40	E*	Ajmera-1	6.33	7.96
2	40	E	Ajmera-2	5.77	7.26
3	40	E	Annasaheb_Magar	3.83	4.82
4	40	E	Bhosari Gaothan	4.05	5.10
5	40	E	Dighi	9.93	12.49
6	40	E	Dighi Gaothan	3.56	4.48
7	40	E	Elpro a	7.05	8.87
8	40	E	Elpro b	4.53	5.70
9	40	N	Elpro New	4.65	5.85
10	40	N	Gaothan New (Old Sangavi)_b	6.52	8.20
11	40	E	New sangvi police Station	7.42	9.33
12	40	E	PWD Sector 84	5.07	6.38
13	40	E	Sant Tukaram	4.09	5.15
14	40	OG	Sant Tukaram Nagar New	11.87	14.93
15	40	E	Sector 29a	8.02	10.09
16	40	E	Sector 29b	4.68	5.89
17	40	E	Sector7_10_a	4.93	6.20
18	40	E	Sector7_10_b	2.91	3.66
19	40	E	Thergaon Gaothan1	9.52	11.98
20	40	E	Triveni Nagar1	6.76	8.50
21	40	E	Triveni Nagar2	8.48	10.67
22	40	E	WD4 a	4.1	5.16
23	40	E	WD4 b	8.97	11.28
24	40	E	WD4 c	9.28	11.67
25	40	E	Bijli Nagar a	8.27	10.40
26	40	E	Bijli Nagar b	3.89	4.89
27	40	E	Bijli Nagar c	5.51	6.93
28	40	E	Pradhikaran	11.64	14.64
29	40	E	PremlokPark	4.98	6.27
30	60	E	Ashok Cinema	7.29	9.17
31	60	E	Ashram	3.39	4.26
32	60	E	Mamurdi	4.99	6.28
33	60	E	Bopkhel	0	0.00
34	60	E	Dapodi1	4.1	5.16
35	60	E	Dapodi2	4.39	5.52
36	60	E	Dighi_Magzine	2.16	2.72
37	60	E	Indrayaninagar a	4.82	6.06
38	60	E	Kala Khadak	6.93	8.72
39	60	OG	Kala Khadak New1	10.66	13.41
40	60	N	Kala Khadak New 2	11.8	14.85
41	60	E	Kasarwadi1	1.84	2.31
42	60	E	Kasarwadi2	8.84	11.12
43	60	OG	Kaveri Nagar	7.26	9.13
44	60	E	Khandoba-1	6.71	8.44
45	60	E	Khandoba-2	7.74	9.74
46	60	E	Lakshman Nagar	13.52	17.01
47	60	E	Lakshman Nagar 2	8.12	10.22
48	60	OG	Mahendra & Mahendra	5.06	6.37
49	60	N	NewJadhavwadi ESR	14.23	17.90

50	60	E	Thergaon Gaothan2	6.18	7.77
51	60	E	Morewasti Chikhli	8.83	11.11
52	60	E	Nav Maha	1.06	1.33
53	60	E	Naydu	6.02	7.57
54	60	E	Nehru Nagar1	3.3	4.15
55	60	E	Nehru Nagar2	2.82	3.55
56	60	OG	New Panjarpol	1	1.26
57	60	OG	New Pimple Gurav Garden	7.22	9.08
58	60	N	New_Punavale	7.48	9.41
59	60	E	Panjarpol	4.56	5.74
60	60	E	Pimple Gurao1	3.73	4.69
61	60	E	Pimple Gurao2	4.2	5.28
62	60	E	Pimple Gurao3	4.55	5.72
63	60	E	Pimple Gurav Garden	2.98	3.75
64	60	E	Pimple Nilakh	10.58	13.31
65	60	E	Pimple Saudagar a	4.43	5.57
66	60	N	Pimple Saudagar b New	9.89	12.44
67	60	E	Pimpri Delux a	6.29	7.91
68	60	E	Pimpri Delux b	4.09	5.15
69	60	OG	Proposed Naydu	3.56	4.48
70	60	E	Punavale	5.61	7.06
71	60	E	Rahatni1	7.06	8.88
72	60	E	Rahatni2	8.4	10.57
73	60	E	Rahatni3	6.28	7.90
74	60	E	Rupi Nagar	10.67	13.42
75	60	E	Sachin1	3.5	4.40
76	60	E	Sachin2	4.34	5.46
77	60	OG	Sector 28 New	0	0.00
78	60	E	Sector 96	6.59	8.29
79	60	OG	Sector 96 New	10.79	13.57
80	60	E	Sector 96 Part 2	7.16	9.01
81	60	E	Shahu Nagar	7.07	8.89
82	60	E	Charholi c	1.75	2.20
83	60	E	Dudulgaon	3.91	4.92
84	60	N	Gairan	6.53	8.22
85	60	N	Kudalwadi New1	7.41	9.32
86	60	N	Kudalwadi New2	7.65	9.62
87	60	N	Kudalwadi New3	7.43	9.35
88	60	N	Kudalwadi New4	5.91	7.44
89	60	E	Moshi b	5.16	6.49
90	60	N	New_Charoli	4.4	5.54
91	60	N	New_Moshi b	8.86	11.15
92	60	N	New_Wadmukhwadi b	2.24	2.82
93	60	E	Wadmukhwadi b	2.34	2.94
94	No Zone	E	Balewadi	0.72	0.91
95	No Zone	E	Chest Hospital	0.77	0.97
				565.78	711.80

* E: Existing; OG: Ongoing; N= New

6.2 Existing Pumping Stations in Distribution System

Presently, there are 21 pumping stations in the system as shown in Table 6.2.

Table 6.2: Pumping stations in the distribution system

Sr. No.	Name of Pump house	Connected Pumps			Hp	Discharge (m^3/h)	Head	Working Hrs.
		Running	Standby	Total		In M^3/Hr.	MTR	HR.
1	Rawet S.No. 96	3	2	5	100	600	32	18
		1	1	2	180	400	90	5
2	Thergoan s.No.15	2	2	3	75	600	25	13
3	Punawale	2	1	3	120	600	38	0
4	Rahatni S.No. 20	2	2	4	60	600	20	18
5	Pimpale Gurav S.No.72	2	1	3	75	600	25	18
6	Thergoan Gavthan	1	1	2	50	500	18	16
7	Thergoan S.No. 9	1	2	3	75	600	25	16
8	Kalakhadak Waked	2	1	3	120	600	34	5
9	Tathawade	1	1	2	10	50	18	6
10	Kalakhadak Booster	1	1	2	20	50	26	3
11	Sangvi Gavthan	1	1	2	50	400	20	7
12	Sangvi S.No. 84	1	1	2	60	600	18	12
13	Sangvi PWD	1	1	2	60	600	18	12
14	Gawalimatha	2	1	3	335	838	84.29	22
		1	1	2	75	250	60.36	22
15	Landewadi,bhosari gaon	1	1	2	120	500	45.56	18
	Alandi Road	1	1	2	150	600	63	16
	digji road	2	1	3	150	200	95	21
	dighi magazine	1	1	2	120	320	60	9
	dighi ESR	1	1	2	75	189	71.2	12
16	Bopkhel	2	2	4	20	118	32	15
17	Krishnanagar(old)	1	1	2	180	1283	26.1	16
		1	1	2	120	975	26.38	16
	Krishnanagar(new)	2	1	3	120			
18	Jadhavwadi	1	1	2	40			12
19	Patilnagar	1	1	2	20			22
20	Sec22	2	1	3	20	118	32	10
21	Sec 10(FOR SEC 10)	2	1	3	150	800	33	12
	(FOR SEC 12)	4	4	8	20	118	32	18
	TOTAL	46	37	83				

Source: PCMC Mech./ Ele. Department

6.3 Design of Transmission System

6.3.1 ESRs on the sump of Sector10 pumping station

ESRs, on the sump at Sector10 pumping station, are shown in Figure 6.2 and Table 6.3. Water from WTP at sector 23 reaches the sump at Sector-10 by gravity. From sump water is

pumped to the ESRs Sector7_10_a, Sector7_10_b, WD4 a, WD4 b and WD4 c. From ESRs WD4 b and WD4 c, water reaches to the distribution networks of these respective operational zones and downstream EERs at Moshi, Wadmukhwadi and Chiroli by gravity.

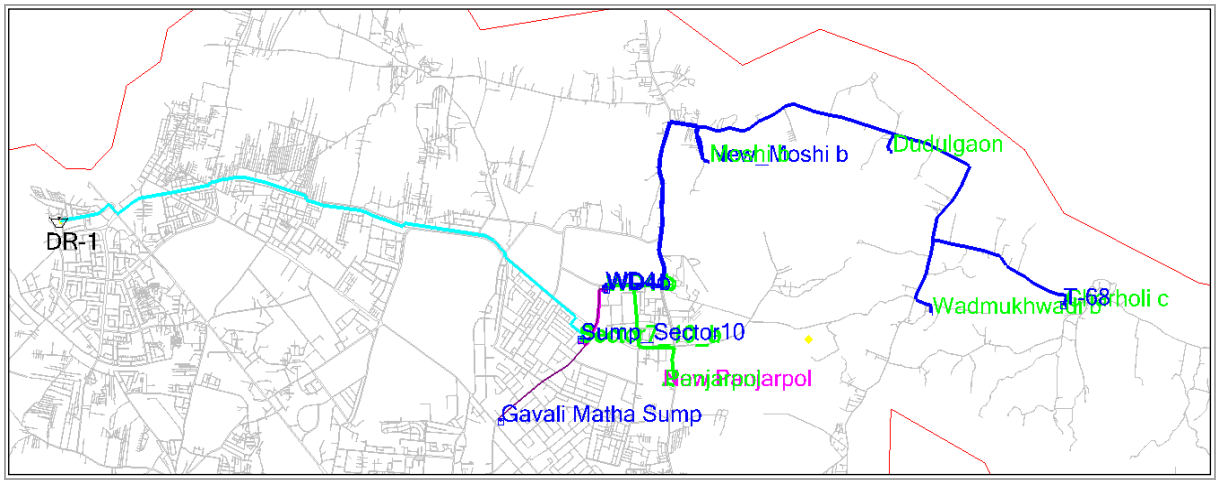

Figure 6.2: ESRs on the sump of Sector10 pumping station

Table 6.3: ESRs on the sump of Sector10 pumping station

SN	Label	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)
1	Sector7_10_a	4.93	5.14	6.20	6.47
2	Sector7_10_b	2.91	3.04	3.66	3.82
3	WD4 a	4.1	4.28	5.16	5.38
4	WD4 b	8.97	9.36	11.28	11.78
5	WD4 c	9.28	9.68	11.67	12.18
6	New Panjarpol	1	1.04	1.26	1.31
7	Panjarpol	4.56	4.76	5.74	5.99
8	Charholi c	1.75	1.83	2.20	2.30
9	Dudulgaon	3.91	4.08	4.92	5.13
10	Moshi b	5.16	5.38	6.49	6.77
11	New_Charoli	4.4	4.59	5.54	5.78
12	New_Moshi b	8.86	9.25	11.15	11.63
13	New_Wadmukhwadi b	2.24	2.34	2.82	2.94
14	Wadmukhwadi b	2.34	2.44	2.94	3.07
	Total	64.41	67.21	81.03	84.56

However, it is observed that capacities of the ESRs WD4 b and WD4 c are not enough and they would be emptying. Hence, it is proposed that water from the sump at sector 10 will be pumped to the ESRs WD4 a, WD4 b and WD4 c separately and there should be separate arrangement for the transmission of water to the ESRs at Moshi, New_Moshi b,

Wadmukhwadi, New_Wadmukhwadi b, Chiroli and New_Charoli. The new arrangement is shown in Figure 6.3 and 6.4.

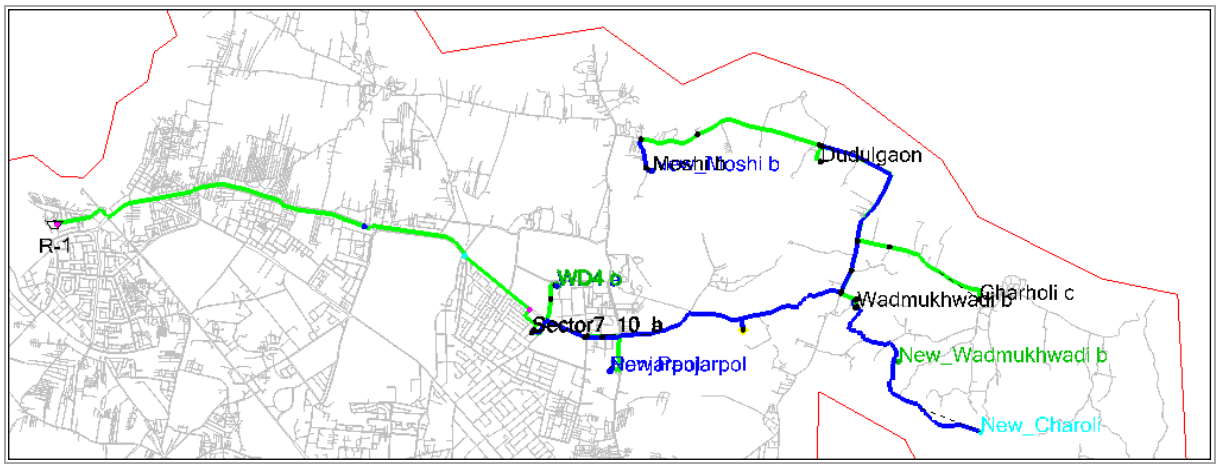

Figure 6.3: Proposed new arrangement

Check for adequacy of Gravity main from WTP (S1) to Sump at sector 10

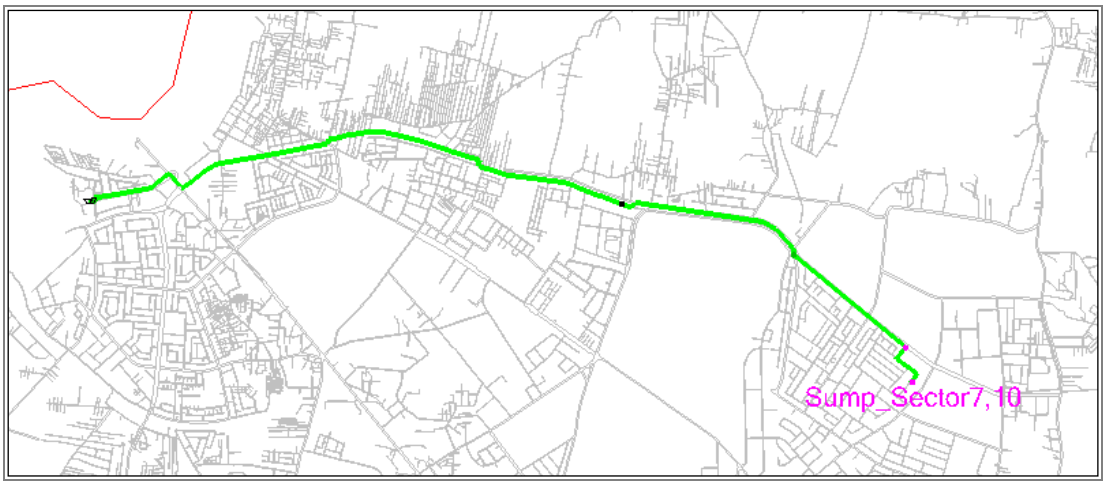

Figure 6.4: Transmission main S1 to Sump at Sector 7, 10

Check for flow of year 2030

A demand of year 2030 as shown in Table 6.3 is given to the node of sump at Sector 10 and model rum is taken. It is observed that water will not reach sump at Sector 10. Hence, a pumping will have to carry out.

Design of Pump: The levels and demand is shown in Table 6.4. A demand of 65.43 MLD and a head of 10 m is given to the pump and model run is taken.

Table 6.4: Levels and demand at Sump at Sector 10.

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	New Sector10	613.3	610	3.3	64.41	67.21	81.03	84.56	82.31

The pipe and junction results are shown in Table 6.5 and 6.6 respectively.

Table 6.5: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	Headloss Gradient (m/km)	P_EN
P-701	J-311	Sump_Sector7,10	MS	120	479	900	67.21	1.223	1.579	E
P-700	J-226	J-311	MS	120	1,364	1,000.00	67.21	0.99	0.945	E
P-699	J-264	J-226	MS	120	1,800	1,200.00	67.21	0.688	0.389	E
P-753	S1	PMP-72	MS	120	13	1,200.00	67.21	0.688	0.389	E
P-754	PMP-72	J-264	MS	120	5,409	1,200.00	67.21	0.688	0.389	E

Table 6.6: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
J-226	604.88	0	14.59
J-264	590.6	0	29.54
J-311	609	0	9.19
Sump_Sector7,10	607.05	67.21	10.38

From Tables 6.4 and 6.5 it is observed that velocity is less than 1.8 m/s and minimum residual pressure is more than 8 m, hence OK.

Check for flow of year 2045

A demand of year 2045, 84.56 MLD (Table 6.3) is given to the node of sump at Sector 10. This demand and a head of 10 m is given to the pump and model run is taken. The pipe and junction results are shown in Tables 6.7 and 6.8 respectively.

Table 6.7: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	Headloss Gradient (m/km)	P_EN
P-701	J-311	Sump_Sector7,10	MS	120	479	900	84.56	1.538	2.415	E
P-700	J-226	J-311	MS	120	1,364	1,000.00	84.56	1.246	1.446	E
P-699	J-264	J-226	MS	120	1,800	1,200.00	84.56	0.865	0.595	E
P-753	S1	PMP-72	MS	120	13	1,200.00	84.56	0.865	0.595	E
P-754	PMP-72	J-264	MS	120	5,409	1,200.00	84.56	0.865	0.595	E

Table 6.8: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
J-226	604.88	0	13.1
J-264	590.6	0	28.43
J-311	609	0	7.02
Sump_Sector7,10	607.05	84.56	7.81

From Tables 6.7 and 6.8 it is observed that velocity is Ok and residual pressure is more than 6.3 m, hence OK.

Design of Rising Main

This rising main is proposed from the sump at Sector 10 to New MBR. A connection is made en-route to provide water to the ESRs at Panjarpol and New Panjarpol (Figure 6.6).

Economic Size: Economic size is computed as shown in Appendix 1. Outer diameter of the MS pipe is 1067 mm. Considering 10 mm thick and 6 mm mortar lining, ID is 1035 mm. The thickness and water hammer pressure is checked in Appendix 1.

Rising mains from Sump sector 10

Pumps to be installed are shown in Figure 6.5 and various rising mains from sump at Sector 7 are shown in Figure 6.6.

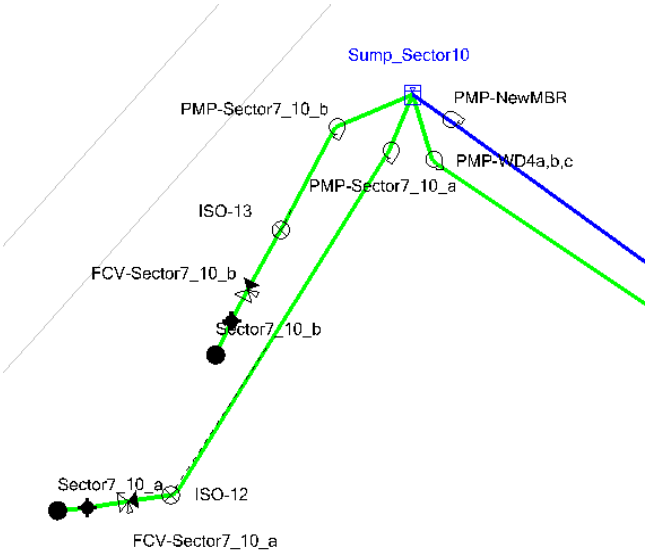

Figure 6.5: Details of pumps at sump at Sector 7,10

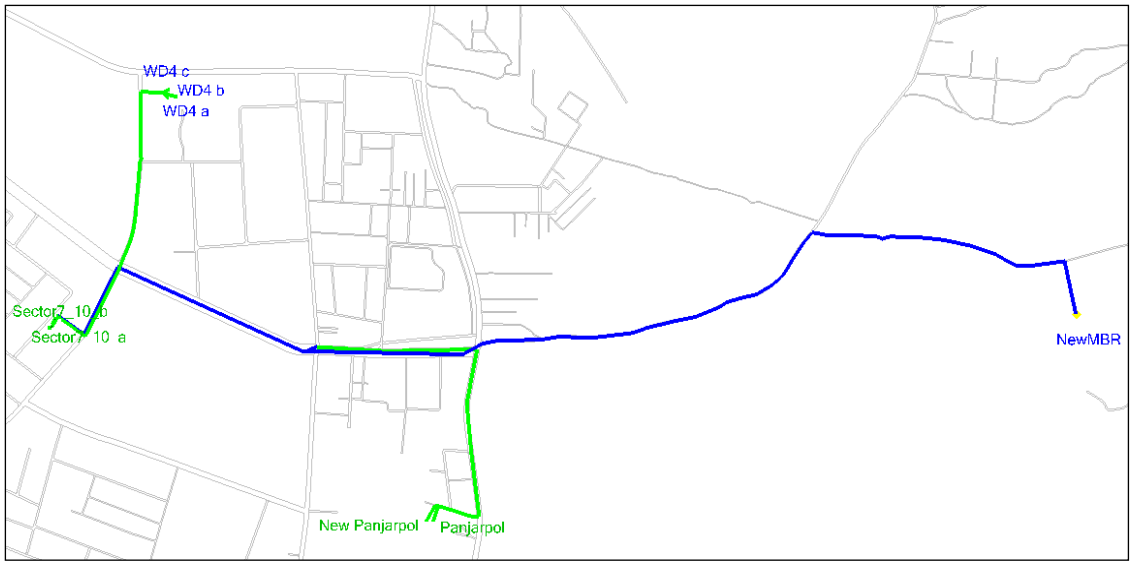

Figure 6.6: Rising mains from Sump at Sector 7,10

Values of demands of nodes and pump design head and discharge are shown in Table 6.7

Table 6.7: Demands of nodes and pump design head and discharge at sump

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head for 2030 (m)	Design Head for 2045 (m)
1	PMP-Sector7_10_a	628.2	602.94	25.26	4.93	5.14	6.20	6.47	40	40
2	PMP-Sector7_10_b	628.2	602.94	25.26	2.91	3.04	3.66	3.82	40	40
3	PMP-WD4a,b,c	633.7	602.94	30.76	22.35	23.32174	28.11811	29.34063	38	38
4	PMP-NewMBR*	634	602.94	31.06	34.22	35.70783	43.05153	44.92333	30	30

*includes demands of Panjarpol and New Panjarpol

Check for flow of year 2045

A demand of 2045 with multiplying factor of 24/23 as shown in Table 6.7 is given to the various nodes the head for pump is taken as shown in Table 6.7 and model rum is taken. The pipe and junction results are respectively shown in Tables 6.8 and 6.9.

Table 6.8: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	Headloss Gradient (m/km)	P_EN
P-89	Sump_Sector10	PMP-Sector7_10_a	DI	135	6	300	6.47	1.06	3.51	E
P-90	PMP-Sector7_10_a	FCV-Sector7_10_a	DI	135	45	300	6.47	1.06	3.51	E
P-91	H-8	Sector7_10_a	DI	135	4	300	6.47	1.06	3.514	E
P-92	FCV-Sector7_10_a	H-8	DI	135	4	300	6.47	1.06	3.504	E

P-562	J-327	FCV-WD4 c	DI	135	14	500	12.19	0.718	0.977	E
P-563	FCV-WD4 c	WD4 c	DI	135	13	500	12.19	0.718	0.977	E
P-615	J-327	FCV-WD4 b	DI	135	39	500	11.77	0.694	0.977	E
P-616	FCV-WD4 b	WD4 b	DI	135	13	500	11.77	0.694	0.977	E
P-64	Sump_Sector10	PMP-NewMBR	DI-K9	120	5	1,000.00	44.92	0.662	0.446	N
P-65	PMP-NewMBR	J-318	DI-K9	120	1,025	1,000.00	44.92	0.662	0.448	N
P-249	Sump_Sector10	PMP-Sector7_10_b	DI	135	8	300	3.82	0.625	1.32	E
P-250	PMP-Sector7_10_b	FCV-Sector7_10_b	DI	135	18	300	3.82	0.625	1.32	E
P-251	H-9	Sector7_10_b	DI	135	4	300	3.82	0.625	1.317	E
P-252	FCV-Sector7_10_b	H-9	DI	135	3	300	3.82	0.625	1.318	E
P-580	J-19	J-327	DI	135	302	900	29.34	0.534	0.273	E
P-581	Sump_Sector10	PMP-WD4a,b,c	DI	135	6	900	29.34	0.534	0.275	E
P-582	PMP-WD4a,b,c	J-19	DI	135	708	900	29.34	0.534	0.273	E
P-322	J-319	J-312	DI	135	1,225	450	7.29	0.531	0.608	E
P-13623	FCV-NewMBR	Sumpnode_NewMBR	MS	120	5	1,035.00	37.62	0.518	0.273	N
P-13624	J-318	H-109	MS	120	2,814	1,035.00	37.62	0.518	0.273	N
P-13625	H-109	FCV-NewMBR	MS	120	3	1,035.00	37.62	0.518	0.266	N
P-735	J-312	FCV-Panjarpol	DI	135	32	450	5.99	0.436	0.42	E
P-738	FCV-Panjarpol	H-103	DI	135	10	450	5.99	0.436	0.425	E
P-739	H-103	Panjarpol	DI	135	12	450	5.99	0.436	0.419	E
P-565	J-327	FCV-WD4 a	DI	135	20	500	5.38	0.317	0.244	E
P-566	FCV-WD4 a	WD4 a	DI	135	9	500	5.38	0.317	0.244	E
P-5	J-318	J-319	DI-K9	135	31	600	7.29	0.299	0.149	N
P-734	FCV-New Panjarpol	J-312	DI-K7	135	43	450	1.31	0.095	0.024	N
P-736	New Panjarpol	H-102	DI-K7	135	19	450	1.31	0.095	0.028	N
P-737	H-102	FCV-New Panjarpol	DI-K7	135	10	450	1.31	0.095	0.023	N

Table 6.9: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
WD4 c	633.7	12.19	7.01
WD4 b	633.7	11.77	7.01
WD4 a	632.4	5.38	8.3
New Panjarpol	621	1.31	10.77
Panjarpol	619.9	5.99	11.84
Sector7_10_a	628.2	6.47	14.56

Sector7_10_b	628.2	3.82	14.76
Sumpnode_NewMBR	614	37.62	17.74
J-319	609.35	0	23.14
J-318	609.27	0	23.22
J-312	603.34	0	28.39
J-327	609	0	31.66
J-19	609	0	31.74

It is observed that the velocities are less than 1.8 m/s and the pressures are more than 10m, hence the sizing of the pipes is ok.

Check for flow of year 2030

A demand of 2030 with multiplying factor of 24/23 as shown in Table 6.7 is given to the various nodes the head for pump is taken as shown in Table 6.7. and model rum is taken. The pipe and junction results are respectively shown in Tables 6.10 and 6.11.

Table 6.10: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	Headloss Gradient (m/km)	P_EN
P-89	Sump_Sector10	PMP-Sector7_10_a	DI	135	6	300	5.14	0.842	2.295	E
P-90	PMP-Sector7_10_a	FCV-Sector7_10_a	DI	135	45	300	5.14	0.842	2.293	E
P-91	H-8	Sector7_10_a	DI	135	4	300	5.14	0.842	2.286	E
P-92	FCV-Sector7_10_a	H-8	DI	135	4	300	5.14	0.842	2.306	E
P-562	J-327	FCV-WD4 c	DI	135	14	500	9.69	0.571	0.488	E
P-563	FCV-WD4 c	WD4 c	DI	135	13	500	9.69	0.571	0.732	E
P-615	J-327	FCV-WD4 b	DI	135	39	500	9.36	0.552	0.488	E
P-616	FCV-WD4 b	WD4 b	DI	135	13	500	9.36	0.552	0.732	E
P-64	Sump_Sector10	PMP-NewMBR	DI-K9	120	5	1,000.00	35.7	0.526	0.294	N
P-65	PMP-NewMBR	J-318	DI-K9	120	1,025	1,000.00	35.7	0.526	0.293	N
P-249	Sump_Sector10	PMP-Sector7_10_b	DI	135	8	300	3.03	0.497	0.862	E
P-250	PMP-Sector7_10_b	FCV-Sector7_10_b	DI	135	18	300	3.03	0.497	0.859	E
P-251	H-9	Sector7_10_b	DI	135	4	300	3.03	0.497	0.851	E
P-252	FCV-Sector7_10_b	H-9	DI	135	3	300	3.03	0.497	0.872	E
P-580	J-19	J-327	DI	135	302	900	23.32	0.424	0.179	E
P-581	Sump_Sector10	PMP-WD4a,b,c	DI	135	6	900	23.32	0.424	0.179	E
P-582	PMP-WD4a,b,c	J-19	DI	135	708	900	23.32	0.424	0.179	E
P-322	J-319	J-312	DI	135	1,225	450	5.8	0.422	0.397	E

P-13623	FCV-NewMBR	Sumpnode_NewMBR	MS	120	5	1,035.00	29.91	0.411	0.178	N
P-13624	J-318	H-109	MS	120	2,814	1,035.00	29.91	0.411	0.178	N
P-13625	H-109	FCV-NewMBR	MS	120	3	1,035.00	29.91	0.411	0.186	N
P-735	J-312	FCV-Panjarpol	DI	135	32	450	4.76	0.346	0.275	E
P-738	FCV-Panjarpol	H-103	DI	135	10	450	4.76	0.346	0.278	E
P-739	H-103	Panjarpol	DI	135	12	450	4.76	0.346	0.271	E
P-565	J-327	FCV-WD4 a	DI	135	20	500	4.28	0.252	0	E
P-566	FCV-WD4 a	WD4 a	DI	135	9	500	4.28	0.252	0	E
P-5	J-318	J-319	DI-K9	135	31	600	5.8	0.237	0.099	N
P-734	FCV-New Panjarpol	J-312	DI-K7	135	43	450	1.04	0.076	0.016	N
P-736	New Panjarpol	H-102	DI-K7	135	19	450	1.04	0.076	0.016	N
P-737	H-102	FCV-New Panjarpol	DI-K7	135	10	450	1.04	0.076	0.023	N

Table 6.11: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
WD4 b	633.7	9.36	7.1
WD4 c	633.7	9.69	7.1
WD4 a	632.4	4.28	8.4
New Panjarpol	621	1.04	11.18
Panjarpol	619.9	4.76	12.27
Sector7_10_a	628.2	5.14	14.61
Sector7_10_b	628.2	3.03	14.8
Sumpnode_NewMBR	614	29.91	18.16
J-319	609.35	0	23.29
J-318	609.27	0	23.38
J-312	603.34	0	28.81
J-327	609	0	31.75
J-19	609	0	31.81

It is observed that velocity in pipes is less than 1.8 m/s and the residual pressures at ESRs are more than 10m, hence OK. Residual pressures are the flow at ESRs are controlled by the FCVs with level controls.

Profile of pressure from the sump to the new MBR is shown in Figure 6.7.

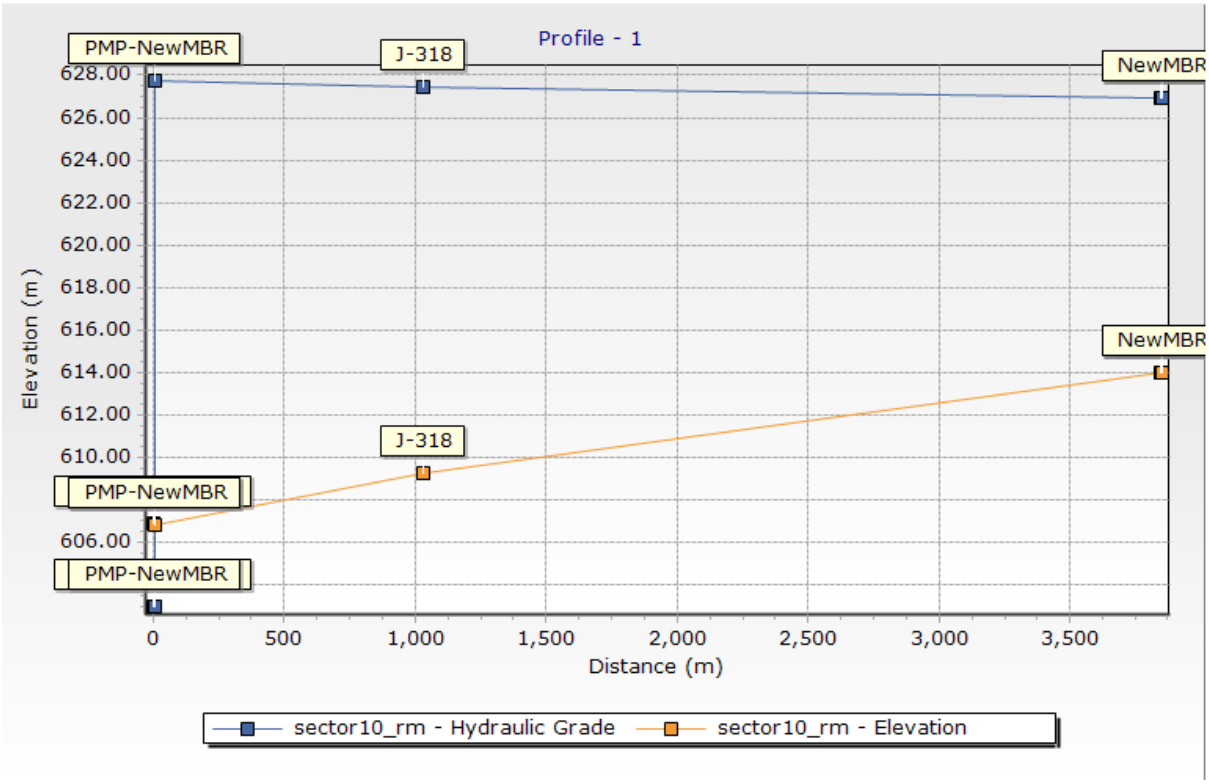

Figure 6.7: Profile of pressure from the sump to the new MBR

Design of Gravity Main from NewMBR

Gravity mains from the proposed New MBR are shown in Figure 6.8. The existing pipes are shown in green colour and that of the new are shown in blue colour. Demands are shown in Table 6.12.

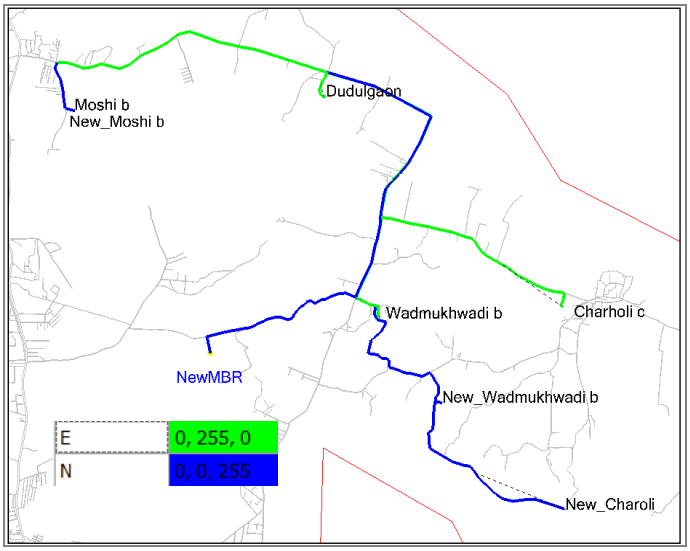

Figure 6.8: Gravity mains from NewMBR

Table 6.12: Demand details

SN	Label	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)
1	Charholi c	1.75	1.83	2.20	2.30
2	Dudulgaon	3.91	4.08	4.92	5.13
3	Moshi b	5.16	5.38	6.49	6.77
4	New_Charoli	4.4	4.59	5.54	5.78
5	New_Moshi b	8.86	9.25	11.15	11.63
6	New_Wadmukhwadi b	2.24	2.34	2.82	2.94
7	Wadmukhwadi b	2.34	2.44	2.94	3.07
	Total	28.66	29.91	36.06	37.62

Design of New MBR

Total demand is 36.63 say 37 MLD. So per hour flow is 1567.5 m^3/h. Provide 20 m diameter tank with water depth of 5 m, so volume is 1570.8 m3. So retention = 60 minutes
Ground elevation is 614 m. staging height is 20 m.

(a) Design for year 2045:

Demand of year 2045 with multiplying factor of 24/23 (Table 6.12) has been given to the nodes and the model run is taken. The pipe results are shown in Table 6.13 and junction results are shown in Table 6.14.

Table 6.13: Pipe results of rising mains for year 2045

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	Headloss Gradient (m/km)	P_EN
P-13630	NewMBR	H-111	DI-K7	135	5	700	29.9	0.899	0.966	N
P-13631	H-111	J-315	DI-K7	135	1,933	700	29.9	0.899	0.963	N
P-93	J-284	J-4	DI-K7	135	109	500	14.63	0.862	1.278	N
P-94	J-283	J-284	DI-K7	135	483	500	14.63	0.862	1.32	N
P-130	J-315	J-316	DI-K7	135	28	600	16.66	0.682	0.69	N
P-158	J-238	J-272	DI	135	494	600	14.22	0.582	0.515	E
P-159	J-272	J-316	DI	135	372	600	14.22	0.582	0.515	E
P-199	J-4	FCV-New_Moshi b	DI-K7	135	16	500	9.25	0.545	0.569	N
P-201	FCV-New_Moshi b	H-5	DI-K7	135	3	500	9.25	0.545	0.556	N
P-202	H-5	New_Moshi b	DI-K7	135	4	500	9.25	0.545	0.568	N
P-258	J-237	FCV-Dudulgaon	DI	135	306	350	4.08	0.491	0.706	E
P-259	FCV-Dudulgaon	H-4	DI	135	6	350	4.08	0.491	0.696	E
P-260	H-4	Dudulgao	DI	135	8	350	4.08	0.491	0.707	E

		n								
P-38	J-313	J-314	DI-K7	135	1,641	500	6.92	0.408	0.33	N
P-370	J-237	J-238	DI	135	2,453	700	12.4	0.373	0.189	E
P-355	J-315	J-317	DI-K7	135	889	500	6.31	0.372	0.278	N
P-356	J-317	J-237	DI-K7	135	2,445	500	6.31	0.372	0.278	N
P-396	J-4	FCV-Moshi b	DI-K7	135	18	500	5.38	0.317	0.244	N
P-397	FCV-Moshi b	H-6	DI-K7	135	2	500	5.38	0.317	0.55	N
P-398	H-6	Moshi b	DI-K7	135	3	500	5.38	0.317	0	N
P-127	J-314	FCV-New_Charoli	DI-K7	135	2,185	500	4.59	0.27	0.154	N
P-128	FCV-New_Charoli	H-1	DI-K7	135	3	500	4.59	0.27	0.142	N
P-129	H-1	New_Charoli	DI-K7	135	3	500	4.59	0.27	0.162	N
P-467	J-275	J-276	DI	135	2,082	900	14.63	0.266	0.075	E
P-468	J-276	J-237	DI	135	33	900	14.63	0.266	0.076	E
P-469	J-283	J-275	DI	135	971	900	14.63	0.266	0.075	E
P-172	J-314	FCV-New_Wadmukhwadi b	DI-K7	135	54	500	2.34	0.138	0.044	N
P-173	H-2	New_Wadmukhwadi b	DI-K7	135	8	500	2.34	0.138	0.046	N
P-174	FCV-New_Wadmukhwadi b	H-2	DI-K7	135	12	500	2.34	0.138	0.045	N
P-327	J-315	J-313	DI-K7	135	394	900	6.92	0.126	0.019	N
P-575	J-270	FCV-Wadmukh	DI	135	110	600	2.44	0.1	0.02	E
P-576	J-271	J-270	DI	135	19	600	2.44	0.1	0.02	E
P-577	J-316	J-271	DI	135	300	600	2.44	0.1	0.02	E
P-578	FCV-Wadmukh	H-7	DI	135	2	600	2.44	0.1	0.032	E
P-579	H-7	Wadmukhwadi b	DI	135	4	600	2.44	0.1	0.019	E
P-571	J-273	FCV-Charholi c	DI	135	1,824	600	1.82	0.075	0.011	E
P-572	J-238	J-273	DI	135	524	600	1.82	0.075	0.012	E
P-574	H-3	Charholi c	DI	135	4	600	1.82	0.075	0	E
P-573	FCV-Charholi c	H-3	DI	135	4	600	1.82	0.075	0	E

Table 6.14: Junction results of rising mains for year 2045

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
New_Moshi b	609	9.25	21.78
Moshi b	609	5.38	21.79
New_Charoli	605.1	4.59	26.59
Dudulgaon	599.94	4.08	31.48
New_Wadmukhwadi b	594.7	2.34	37.3
Charholi c	586.8	1.82	45.25
J-314	584.51	0	47.48
J-4	580.09	0	50.65

J-284	579.77	0	50.96
J-283	574.97	0	56.39
J-275	574.26	0	57.17
J-313	574.6	0	57.91
Wadmukhwadi b	574.56	2.44	57.92
J-270	574.24	0	58.25
J-271	574.19	0	58.3
J-238	572.69	0	59.36
J-317	572.69	0	59.58
J-315	572.89	0	59.62
J-276	571.62	0	59.96
J-316	572.13	0	60.36
J-272	571.65	0	60.65
J-237	570.79	0	60.79
J-273	568.56	0	63.47

It is observed that velocity in pipelines is not exceeding 1.8 m/s and the minimum residual pressure is about 10 m. Hence the sizes of the pipelines proposed are OK. The higher nodal pressures at tanks can be adjusted to desired value by adjusting Flow Controlling Valves (FCV) provided before the demand nodes (ESRs).

(a) Design for Pumps for year 2030:

Demand of year 2030 (Table 6.12) has been given to the nodes and the model run is taken. The pipe results are shown in Table 6.15 and junction results are shown in Table 6.16.

Table 6.15: Pipe results of rising mains for year 2030

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	Headloss Gradient (m/km)	P_EN
P-13630	NewMBR	H-111	DI-K7	135	5	700	29.9	0.899	0.966	N
P-13631	H-111	J-315	DI-K7	135	1,933	700	29.9	0.899	0.963	N
P-93	J-284	J-4	DI-K7	135	109	500	14.63	0.862	1.278	N
P-94	J-283	J-284	DI-K7	135	483	500	14.63	0.862	1.32	N
P-130	J-315	J-316	DI-K7	135	28	600	16.66	0.682	0.69	N
P-158	J-238	J-272	DI	135	494	600	14.22	0.582	0.515	E
P-159	J-272	J-316	DI	135	372	600	14.22	0.582	0.515	E
P-199	J-4	FCV-New_Moshi b	DI-K7	135	16	500	9.25	0.545	0.569	N
P-201	FCV-New_Moshi b	H-5	DI-K7	135	3	500	9.25	0.545	0.556	N
P-202	H-5	New_Moshi b	DI-K7	135	4	500	9.25	0.545	0.568	N
P-258	J-237	FCV-Dudulgaon	DI	135	306	350	4.08	0.491	0.706	E
P-259	FCV-Dudulgaon	H-4	DI	135	6	350	4.08	0.491	0.696	E
P-260	H-4	Dudulgaon	DI	135	8	350	4.08	0.491	0.707	E
P-38	J-313	J-314	DI-K7	135	1,641	500	6.92	0.408	0.33	N
P-370	J-237	J-238	DI	135	2,453	700	12.4	0.373	0.189	E
P-355	J-315	J-317	DI-K7	135	889	500	6.31	0.372	0.278	N
P-356	J-317	J-237	DI-K7	135	2,445	500	6.31	0.372	0.278	N
P-396	J-4	FCV-Moshi b	DI-K7	135	18	500	5.38	0.317	0.244	N
P-397	FCV-	H-6	DI-K7	135	2	500	5.38	0.317	0.55	N

	Moshi b									
P-398	H-6	Moshi b	DI-K7	135	3	500	5.38	0.317	0	N
P-127	J-314	FCV-New_Charoli	DI-K7	135	2,185	500	4.59	0.27	0.154	N
P-128	FCV-New_Charoli	H-1	DI-K7	135	3	500	4.59	0.27	0.142	N
P-129	H-1	New_Charoli	DI-K7	135	3	500	4.59	0.27	0.162	N
P-467	J-275	J-276	DI	135	2,082	900	14.63	0.266	0.075	E
P-468	J-276	J-237	DI	135	33	900	14.63	0.266	0.076	E
P-469	J-283	J-275	DI	135	971	900	14.63	0.266	0.075	E
P-172	J-314	FCV-New_Wadmukhwadi b	DI-K7	135	54	500	2.34	0.138	0.044	N
P-173	H-2	New_Wadmukhwadi b	DI-K7	135	8	500	2.34	0.138	0.046	N
P-174	FCV-New_Wadmukhwadi b	H-2	DI-K7	135	12	500	2.34	0.138	0.045	N
P-327	J-315	J-313	DI-K7	135	394	900	6.92	0.126	0.019	N
P-575	J-270	FCV-Wadmukh	DI	135	110	600	2.44	0.1	0.02	E
P-576	J-271	J-270	DI	135	19	600	2.44	0.1	0.02	E
P-577	J-316	J-271	DI	135	300	600	2.44	0.1	0.02	E
P-578	FCV-Wadmukh	H-7	DI	135	2	600	2.44	0.1	0.032	E
P-579	H-7	Wadmukhwadi b	DI	135	4	600	2.44	0.1	0.019	E
P-571	J-273	FCV-Charholic	DI	135	1,824	600	1.82	0.075	0.011	E
P-572	J-238	J-273	DI	135	524	600	1.82	0.075	0.012	E
P-574	H-3	Charholic	DI	135	4	600	1.82	0.075	0	E
P-573	FCV-Charholic	H-3	DI	135	4	600	1.82	0.075	0	E

Table 6.16: Junction results of rising mains for year 2030

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
New_Moshi b	609	9.25	21.78
Moshi b	609	5.38	21.79
New_Charoli	605.1	4.59	26.59
Dudulgaon	599.94	4.08	31.48
New_Wadmukhwadi b	594.7	2.34	37.3
Charholi c	586.8	1.82	45.25
J-314	584.51	0	47.48
J-4	580.09	0	50.65
J-284	579.77	0	50.96
J-283	574.97	0	56.39
J-275	574.26	0	57.17
J-313	574.6	0	57.91
Wadmukhwadi b	574.56	2.44	57.92
J-270	574.24	0	58.25
J-271	574.19	0	58.3
J-238	572.69	0	59.36
J-317	572.69	0	59.58
J-315	572.89	0	59.62

J-276	571.62	0	59.96
J-316	572.13	0	60.36
J-272	571.65	0	60.65
J-237	570.79	0	60.79
J-273	568.56	0	63.47

It is observed that the velocity in pipelines is not exceeding 1.8 m/s and the pressures at ERSs are more than 10 m. Hence the pipe sizes are OK. The residual pressures at ERS can be adjusted by FCV.

Redundant Line: Line shown in red (Figure 6.9) becomes redundant line, it can be de-laid.

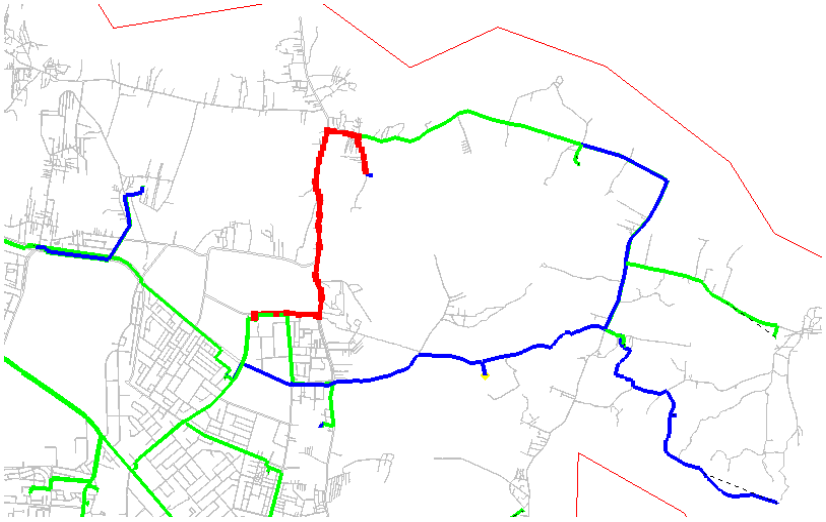

Figure 6.9: Redundant line

6.3.2 ESRs on Chinchwad Line

ESRs on the Chinchwad line are shown in Figure 6.10 and Table 6.17.

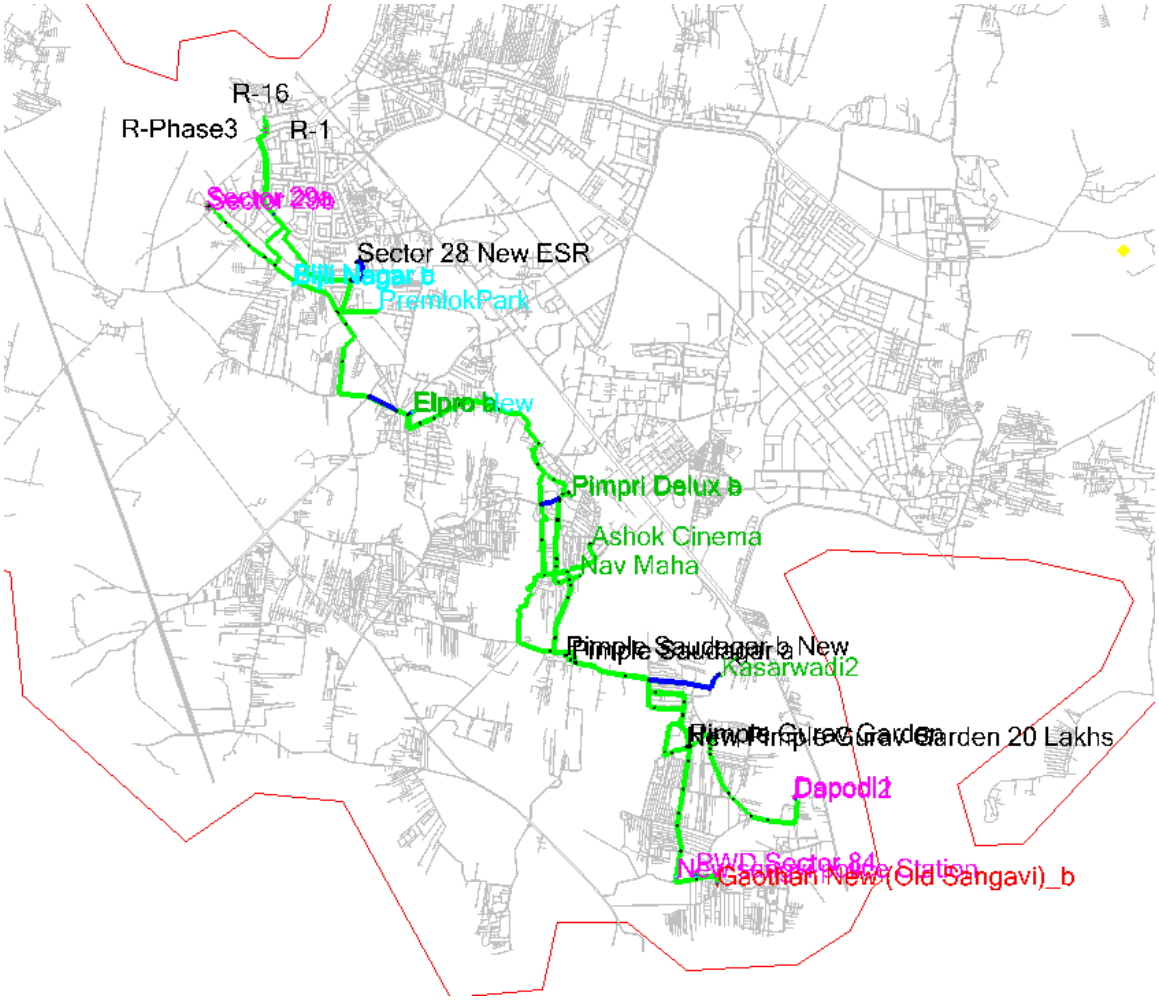

Figure 6.8: ESRs on the Chinchwad line

Table 6.17: ESRs on the Chinchwad Line

SN	Label	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)
1	Elpro a	7.05	7.36	8.87	9.26
2	Elpro b	4.53	4.73	5.70	5.95
3	Elpro New	4.65	4.85	5.85	6.10
4	Gaothan New (Old Sangavi)_b	6.52	6.80	8.20	8.56
5	New sangvi police Station	7.42	7.74	9.33	9.74
6	PWD Sector 84	5.07	5.29	6.38	6.66
7	Sector 29a	8.02	8.37	10.09	10.53
8	Sector 29b	4.68	4.88	5.89	6.14
9	Bijli Nagar a	8.27	8.63	10.40	10.86
10	Bijli Nagar b	3.89	4.06	4.89	5.11
11	Bijli Nagar c	5.51	5.75	6.93	7.23
12	PremlokPark	4.98	5.20	6.27	6.54

13	Ashok Cinema	7.29	7.61	9.17	9.57
14	Dapodi1	4.93	5.14	6.20	6.47
15	Dapodi2	2.83	2.95	3.56	3.72
16	Kasarwadi2	8.84	9.22	11.12	11.60
17	Nav Maha	1.06	1.11	1.33	1.39
18	New Pimple Gurav Garden	7.22	7.53	9.08	9.48
19	Pimple Gurao1	3.73	3.89	4.69	4.90
20	Pimple Gurao2	4.2	4.38	5.28	5.51
21	Pimple Gurao3	4.55	4.75	5.72	5.97
22	Pimple Gurav Garden	2.98	3.11	3.75	3.91
23	Pimple Saudagar a	4.43	4.62	5.57	5.82
24	Pimple Saudagar b New	9.89	10.32	12.44	12.98
25	Pimpri Delux a	6.29	6.56	7.91	8.26
26	Pimpri Delux b	4.09	4.27	5.15	5.37
27	Sector 28 New	3.16	3.30	3.98	4.15
	Total	146.08	152.43	183.78	191.77

ESRs on Pumping

Following ESRs are on pumping.
(a)With Sumps:

(1) Dapodi 1 and 2
(2) Gaothan New (Old Sangavi)_b
(3) PWD Sector 84
(4) New sangvi police Station
(5) Sector 28 New

(b)With Online boosters:

(1) Pimple Gurao1,2,3
(2) Pimple Gurav Garden
(3) New Pimple Gurav Garden
(4) Pimple Saudagar a
(5) Pimple Saudagar b New

(a)With Sumps:
(1)Dapodi 1 and 2

Pipeline network is shown in Figure 6.9. Levels and demands are shown in Table 6.18.

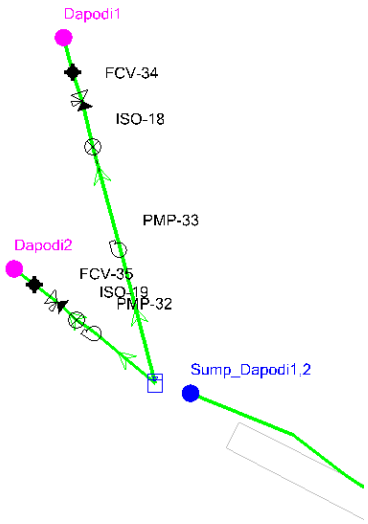

Figure 6.9: Dapodi ESRs represented by a node

Table 6.18: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Design Discharge: Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Dapodi1	573.18	552.48	20.7	4.93	5.14	6.20	6.47	26
2	Dapodi2	573.01	552.48	20.53	2.83	2.95	3.56	3.72	26

Data as shown in Table 6.18 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.21: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	Headloss Gradient (m/km)	P_EN
P-476	Sump_Dapodi1,2	PMP-Dapodi1	DI	135	15	500	5.14	0.303	0.178	E
P-477	PMP-Dapodi1	FCV-Dapodi1	DI	135	16	500	5.14	0.303	0	E
P-478	FCV-Dapodi1	H-14	DI	135	3	500	5.14	0.303	0.267	E
P-479	H-14	Dapodi1	DI	135	4	500	5.14	0.303	0.225	E
P-463	Sump_Dapodi1,2	PMP-Dapodi2	DI	135	9	500	2.95	0.174	0	E
P-464	PMP-Dapodi2	FCV-Dapodi2	DI	135	5	500	2.95	0.174	0	E
P-465	FCV-Dapodi2	H-15	DI	135	3	500	2.95	0.174	0.233	E
P-466	H-15	Dapodi2	DI	135	3	500	2.95	0.174	0	E

Table 6.22: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
Dapodi1	573.18	5.14	4.55
Dapodi2	573.01	2.95	4.71

(2)Gaothan New (Old Sangavi)_b

Pipeline network is shown in Figure 6.10. Levels and demands are shown in Table 6.23.

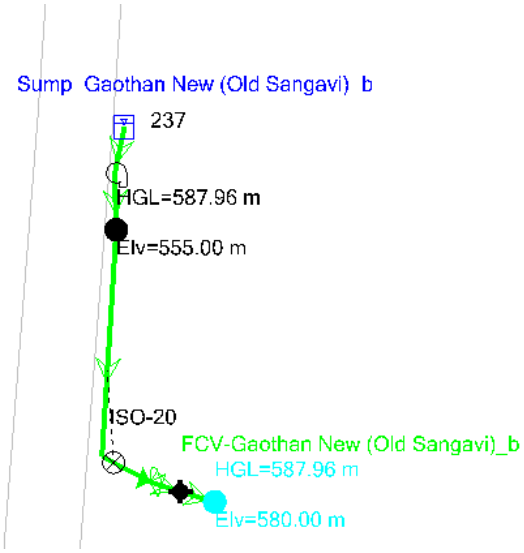

Figure 6.10: Pumping at Gaothan New (Old Sangavi)_b

Table 6.23: Demands and levels

S N	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Gaothan New (Old Sangavi)_b	580	551	29	6.52	6.80	8.20	8.56	35

Data as shown in Table 6.23 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.24: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-337	Sump_Gaothan New (Old Sangavi)_b	237	DI	135	4	500	6.8	0.401	E
P-437	J-151	FCV-Gaothan New (Old Sangavi)_b	DI	135	22	600	6.8	0.278	E
P-438	237	J-151	DI	135	4	600	6.8	0.278	E
P-439	FCV-Gaothan New (Old Sangavi)_b	H-16	DI	135	3	600	6.8	0.278	E
P-440	H-16	Gaothan New (Old Sangavi)_b	DI	135	3	600	6.8	0.278	E

Table 6.25: Junction results

J_Tank_ID	Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
0	J-151	555	0	31.94
10	Gaothan New (Old Sangavi)_b	580	6.8	7.15

(3)PWD Sector 84

Pipeline network is shown in Figure 6.11. Levels and demands are shown in Table 6.26.

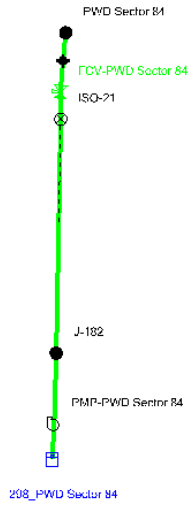

Figure 6.11: Pumping at ESR PWD Sector 84

Table 6.26: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	PWD Sector 84	573	551	22	5.07	5.29	6.38	6.66	30

Data as shown in Table 6.23 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.27: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-406	J-104	FCV-PWD Sector 84	DI	135	37	500	5.07	0.299	E
P-407	298_PWD Sector 84	PMP-PWD Sector 84	DI	135	5	500	5.07	0.299	E
P-408	PMP-PWD Sector 84	J-104	DI	135	10	500	5.07	0.299	E
P-409	FCV-PWD Sector 84	H-17	DI	135	4	500	5.07	0.299	E
P-410	H-17	PWD Sector 84	DI	135	4	500	5.07	0.299	E

Table 6.28: Junction results

J_Tank_ID	Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
12	PWD Sector 84	573	5.07	7.78
0	J-104	555	0	25.75

(4)New Sangvi police Station

Pipeline network is shown in Figure 6.12. Levels and demands are shown in Table 6.29.

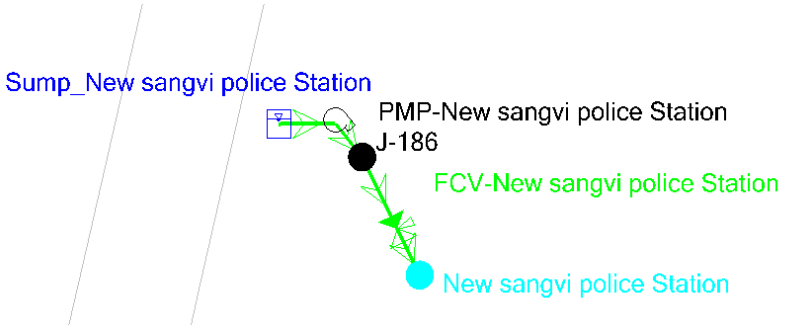

Figure 6.12: Pumping at ESR New sangvi police Station

Table 6.29: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	New sangvi police Station	575.9	551	24.9	7.42	7.74	9.33	9.74	30

Data as shown in Table 6.29 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.30: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-285	J-105	FCV-New sangvi police Station	DI	135	5	500	7.74	0.456	E
P-286	Sump_New sangvi police Station	PMP-New sangvi police Station	DI	135	4	500	7.74	0.456	E
P-287	PMP-New sangvi police Station	J-105	DI	135	3	500	7.74	0.456	E
P-288	FCV-New sangvi police Station	H-18	DI	135	2	500	7.74	0.456	E
P-289	H-18	New sangvi police Station	DI	135	2	500	7.74	0.456	E
P-406	J-104	FCV-PWD Sector 84	DI	135	37	500	5.07	0.299	E
P-407	298_PWD Sector 84	PMP-PWD Sector 84	DI	135	5	500	5.07	0.299	E
P-408	PMP-PWD Sector 84	J-104	DI	135	10	500	5.07	0.299	E
P-409	FCV-PWD Sector 84	H-17	DI	135	4	500	5.07	0.299	E
P-410	H-17	PWD Sector 84	DI	135	4	500	5.07	0.299	E

Table 6.31: Junction results

J_Tank_ID	Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
11	New sangvi police Station	575.9	7.74	7.21
12	PWD Sector 84	573	5.07	7.78
0	J-104	555	0	25.75
0	J-105	555	0	28.07

(5)Sector 28 New

Pipeline network is shown in Figure 6.13. Levels and demands are shown in Table 6.32.

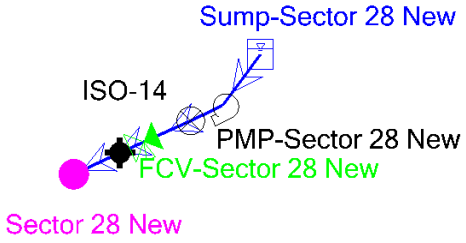

Figure 6.13: Pumping at ESR Sector 28 New

Table 6.32: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Sector 28 New	609.8	580.8	29	3.16	3.30	3.98	4.15	35

Data as shown in Table 6.32 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.33: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-642	Sump-Sector 28 New	PMP-Sector 28 New	DI-K9	135	4	300	3.3	0.54	N
P-695	PMP-Sector 28 New	FCV-Sector 28 New	DI-K9	135	5	300	3.3	0.54	N
P-684	FCV-Sector 28 New	H-10	DI-K9	135	2	300	3.3	0.54	N
P-683	H-10	Sector 28 New	DI-K9	135	3	300	3.3	0.54	N

Table 6.34: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
Sector 28 New	609.8	3.3	5.64

(b)With Online boosters:

(1)Pimple Gurao1,2,3

Pipeline network is shown in Figure 6.14. There is no sump as pumping is online. Levels and demands are shown in Table 6.35. It is proposed to construct a sump at node J-313 as shown in Figure 6.15.

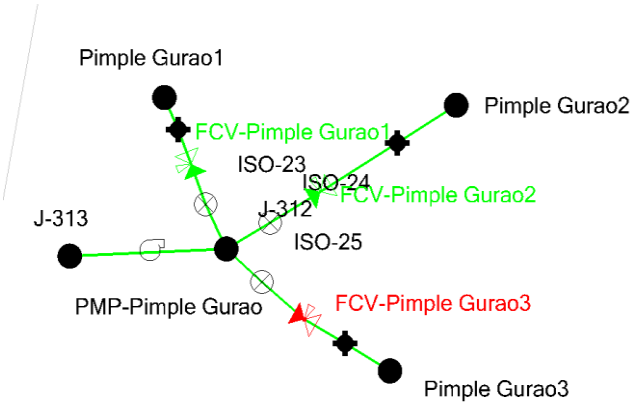

Figure 6.14: Pumping at ESR Sector 28 New

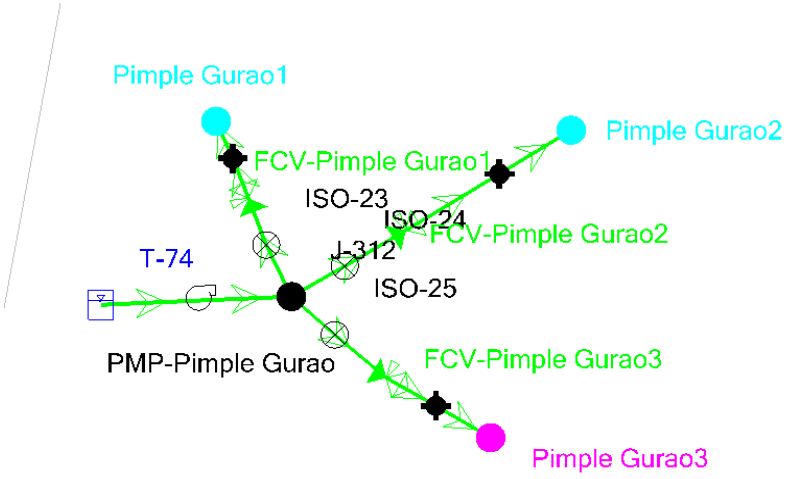

Figure 6.15: Pumping at ESR Sector 28 New with sump

Table 6.32: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Pimple Gurao1	582.43	559	23.43	3.73	3.89	4.69	4.90	30
2	Pimple Gurao2	582.43	559	23.43	4.2	4.38	5.28	5.51	
3	Pimple Gurao3	582.63	559	23.63	4.55	4.75	5.72	5.97	
				Total	12.48	13.02	15.69	16.38	

Data as shown in Table 6.32 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.33: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN

P-117	Sump_Pimple Gurao	PMP-Pimple Gurao	DI	135	6	500	13.02	0.768	E
P-118	PMP-Pimple Gurao	J-150	DI	135	6	500	13.02	0.768	E
P-434	J-150	FCV-Pimple Gurao3	DI	135	8	500	4.75	0.28	E
P-435	FCV-Pimple Gurao3	H-21	DI	135	4	500	4.75	0.28	E
P-436	H-21	Pimple Gurao3	DI	135	4	500	4.75	0.28	E
P-472	J-150	FCV-Pimple Gurao2	DI	135	8	500	4.38	0.258	E
P-473	FCV-Pimple Gurao2	H-20	DI	135	7	500	4.38	0.258	E
P-474	H-20	Pimple Gurao2	DI	135	5	500	4.38	0.258	E
P-499	J-150	FCV-Pimple Gurao1	DI	135	7	500	3.89	0.229	E
P-500	FCV-Pimple Gurao1	H-19	DI	135	3	500	3.89	0.229	E
P-501	H-19	Pimple Gurao1	DI	135	3	500	3.89	0.229	E

Table 6.34: Junction results

J_Tank_ID	Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
62	Pimple Gurao3	582.63	4.75	6.85
61	Pimple Gurao2	582.43	4.38	7.05
60	Pimple Gurao1	582.43	3.89	7.05
0	J-150	564	0	25.45

Design of Sump

With 2 hours of detention time, volume = 16.38*1000/12= 1365 m3. With 4m water depth, area = 341.25 m2. And diameter = (4*Area/3.14)^0.5 = 20.84 say 21 m. Volume provided is 1764 m3.

(2)Pimple Gurav Garden

Pipeline network is shown in Figure 6.16. There is no sump as pumping is online. It is proposed to construct a sump at node J-313 as shown in Figure 6.17. Levels and demands are shown in Table 6.35.

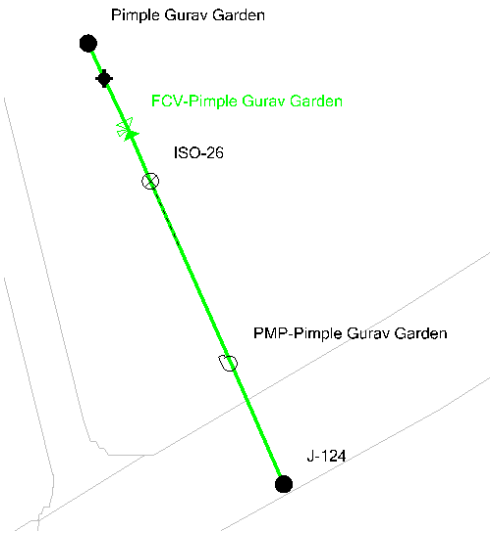

Figure 6.16: Pumping at ESR Sector 28 New

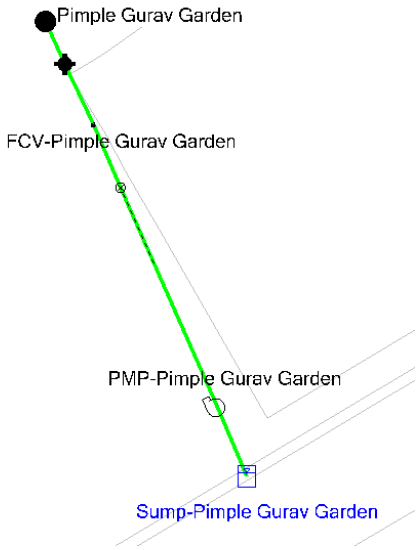

Figure 6.17: Pumping at ESR Sector 28 New with sump

Table 6.35: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Pimple Gurav Garden	581.85	556	25.85	2.98	3.11	3.75	3.91	35

Design for year 2030:

Data as shown in Table 6.32 is fed to the model and model run is obtained.

Table 6.36: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-426	PMP-Pimple Gurav Garden	FCV-Pimple Gurav Garden	MS	120	27	400	3.11	0.286	E
P-427	FCV-Pimple Gurav Garden	H-22	MS	120	6	400	3.11	0.286	E
P-428	H-22	Pimple Gurav Garden	MS	120	4	400	3.11	0.286	E
P-429	Sump-Pimple Gurav Garden	PMP-Pimple Gurav Garden	MS	120	7	400	3.11	0.286	E

Table 6.37: Junction results

J_Tank_ID	Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
63	Pimple Gurav Garden	581.85	3.11	8.61

Design of Sump

With 2hours of detention time, volume = 3.91*1000/12= 317.5 m3. With 4m water depth, area = 81.45 m2. And diameter = (4*Area/3.14)^0.5 = 10.18 say 11 m.

(3)New Pimple Gurav Garden

Pipeline network is shown in Figure 6.18. There is no sump as pumping is online. It is proposed to construct a sump near node J-7034 as shown in Figure 6.19. Levels and demands are shown in Table 6.38.

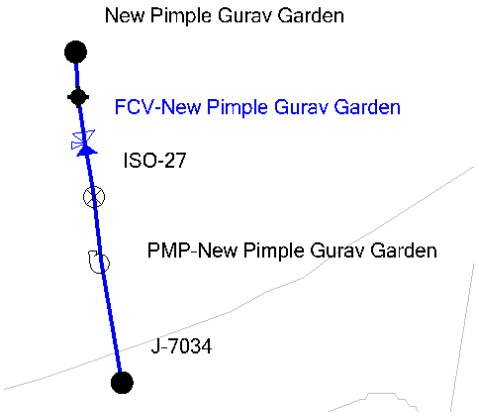

Figure 6.18: Online pumping at ESR New Pimple Gurav Garden

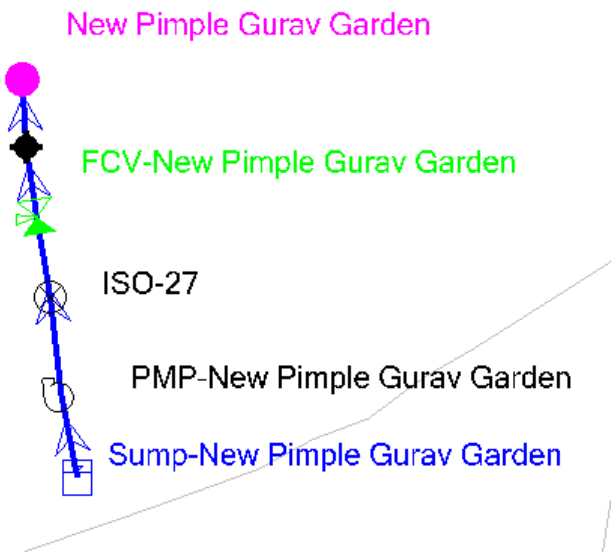

Figure 6.19: Pumping at ESR New Pimple Gurav Garden New with sump

Table 6.35: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	New Pimple Gurav Garden	587.5	557	30.5	7.22	7.53	9.08	9.48	35

Data as shown in Table 6.32 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.33: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-305	PMP-New Pimple Gurav Garden	FCV-New Pimple Gurav Garden	DI-K9	135	10	500	7.53	0.444	N
P-306	Sump-New Pimple Gurav Garden	PMP-New Pimple Gurav Garden	DI-K9	135	5	500	7.53	0.444	N
P-307	H-23	New Pimple Gurav Garden	DI-K9	135	4	500	7.53	0.444	N
P-308	FCV-New Pimple Gurav Garden	H-23	DI-K9	135	4	500	7.53	0.444	N

Table 6.34: Junction results

J_Tank_ID	Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
57	New Pimple Gurav Garden	587.5	7.53	5.37

Design of Sump

With 2hours of detention time, volume = 9.48*1000/12= 790 m3. With 4m water depth, area = 197.5 m2. And diameter = (4*Area/3.14)^0.5 = 15.86 say 16 m.

(4)Pimple Saudagar b New

Pipeline network is shown in Figure 6.20. There is no sump as pumping is online. It is proposed to construct a sump near node J-193 as shown in Figure 6.21. Levels and demands are shown in Table 6.35.

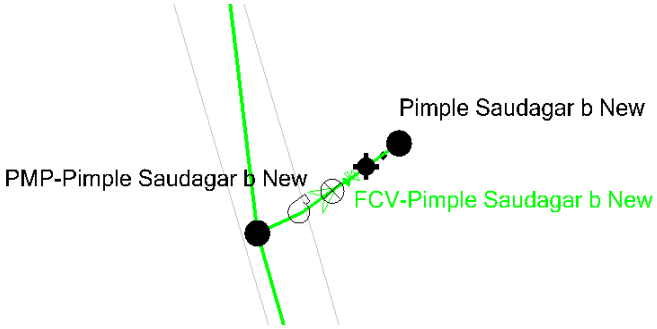

Figure 6.20: Online pumping at ESR New Pimple Gurav Garden

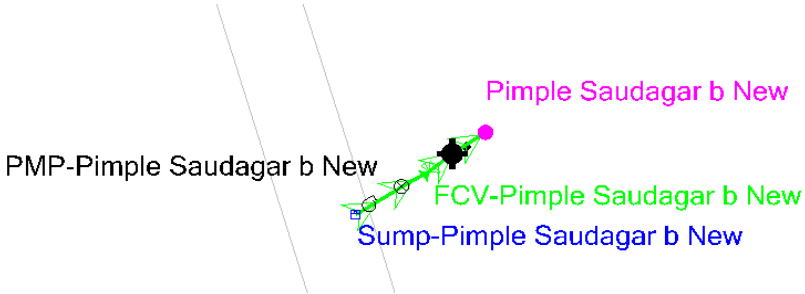

Figure 6.21: Pumping at ESR New Pimple Gurav Garden New with sump

Table 6.35: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Pimple Saudagar b New	577.5	560	17.5	9.89	10.32	12.44	12.98	35

Data as shown in Table 6.35 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.36: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-165	PMP-Pimple Saudagar b New	FCV-Pimple Saudagar b New	DI	135	4	500	10.32	0.608	E
P-166	FCV-Pimple Saudagar b New	H-33	DI	135	2	500	10.32	0.608	E
P-167	H-33	Pimple Saudagar b New	DI	135	2	500	10.32	0.608	E
P-168	Sump-Pimple Saudagar b New	PMP-Pimple Saudagar b New	DI	135	1	500	10.32	0.608	E

Table 6.37: Junction results

J_Tank_ID	Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
66	Pimple Saudagar b New	585	10.32	6.48

Design of Sump

With 2hours of detention time, volume = 12.98*1000/12= 1081.6 m3. With 4m water depth, area = 270.4 m2. And diameter = (4*Area/3.14)^0.5 = 18.56 say 19 m.

(5)Pimple Saudagar a

Pipeline network is shown in Figure 6.22. There is no sump as pumping is online. It is proposed to construct a sump near node J-193 as shown in Figure 6.23. Levels and demands are shown in Table 6.38.

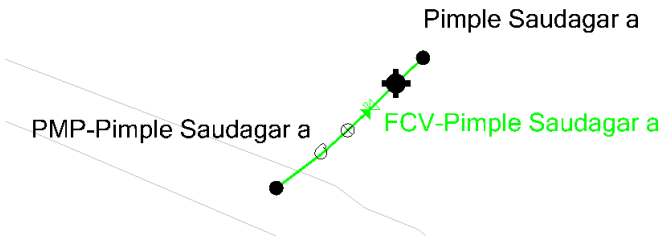

Figure 6.22: Online pumping at ESR New Pimple Gurav Garden

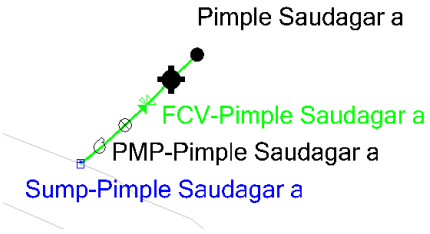

Figure 6.23: Pumping at ESR New Pimple Gurav Garden New with sump

Table 6.38: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Pimple Saudagar a	577	557	20	4.43	4.62	5.57	5.82	25

Data as shown in Table 6.38 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.39: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-457	PMP-Pimple Saudagar a	FCV-Pimple Saudagar a	DI	135	4	500	4.62	0.272	E
P-458	FCV-Pimple Saudagar a	H-34	DI	135	2	500	4.62	0.272	E
P-459	H-34	Pimple Saudagar a	DI	135	2	500	4.62	0.272	E
P-460	Sump-Pimple Saudagar a	PMP-Pimple Saudagar a	DI	135	2	500	4.62	0.272	E

Table 6.40: Junction results

J_Tank_ID	Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
65	Pimple Saudagar a	577	4.62	4.49

Design of Sump

With 2hours of detention time, volume = 5.82*1000/12= 485 m3. With 4m water depth, area = 121.2 m2. And diameter = (4*Area/3.14)^0.5 = 12.42 say 13 m.

Design of Gravity Main

Gravity main is simulated with following two cases:

Case 1: ESRs without sumps, or direct filling by gravity

Case 2: ESRs with sumps, or no direct filling by gravity but water comes by gravity upto the sump and then from the sump it is pumped to the ESR.

In Case 1: The demand of the zone is given to the representative nodes and the FSL of the tank is given as elevation to these nodes.

In Case2: Sumps of the ESRs are represented by a single node as shown in Figure 6.20. The combined demand of ESRs is given to the representative nodes, however, ground elevation of the sump is given as elevation to these nodes.

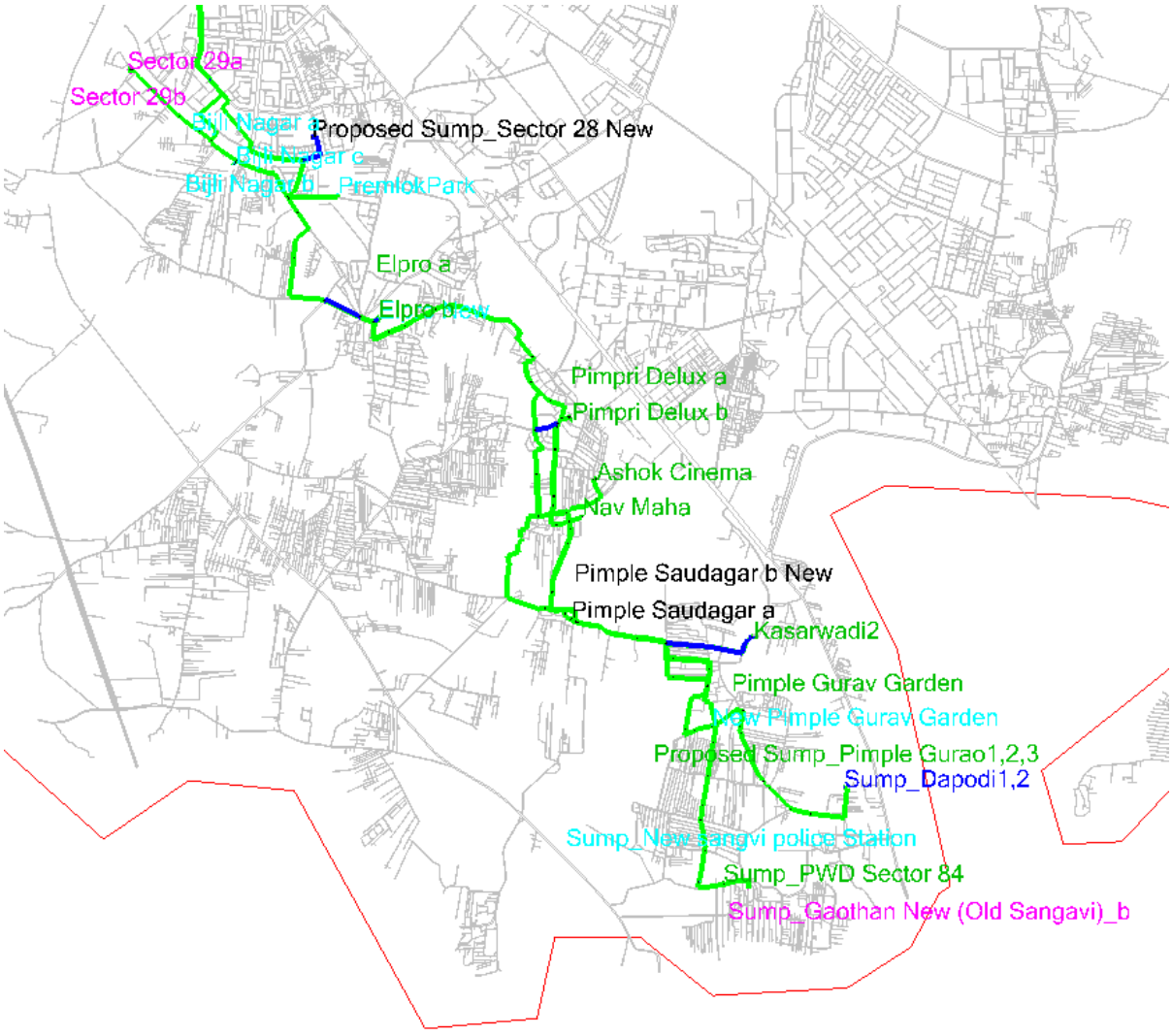

Figure 6.20: Nodes of Sumps and ESR

(a) Design for year 2041:

The gravity main is designed for year 2045. Demand of the year 2045 as shown in Table 6.17 has been given to the nodes and the model run is taken. It is observed that the velocity of flow is exceeding 1.8 m/s in the pipes shown as red in Figure 6.21. Hence a parallel

pipeline of 500 mm has been proposed. Again the model run is taken. Now the velocity is less than 1.8 m/s. The pipe results are shown in Table 6.41 and junction results are shown in Table 6.42.

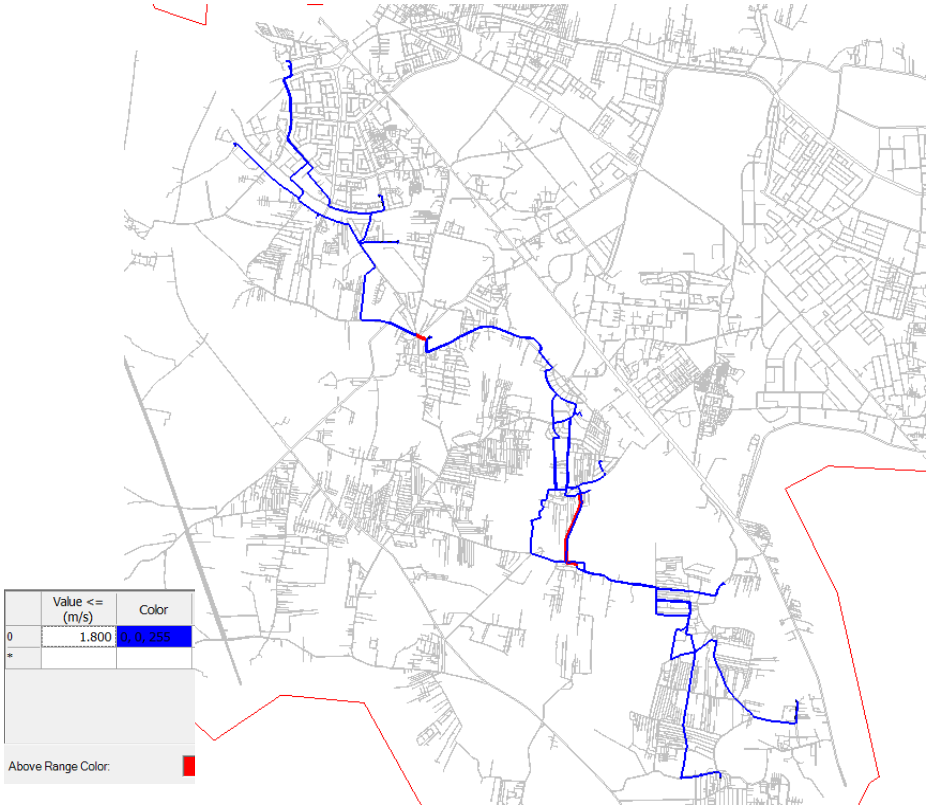

Figure 6.21: Velocity in gravity pipeline of Chinchwad

Table 6.41: Pipe results of rising mains for the year 2045

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)
P-179	J-320	J-321	MS	120	2	750	69.34	1.807
P-641	J-106	J-303	MS	120	94	500	30.6	1.804
P-181	J-190	J-184	MS	120	175	1,100.00	140.39	1.71
P-182	J-186	J-179	MS	120	785	1,100.00	140.39	1.71
P-183	J-184	J-186	MS	120	580	1,100.00	140.39	1.71
P-153	J-181	J-191	MS	120	452	600	39.26	1.607
P-360	J-163	J-157	MS	120	526	750	60.09	1.574
P-361	J-134	J-128	MS	120	293	750	60.09	1.574
P-362	J-128	J-177	MS	120	285	750	60.09	1.574
P-363	J-168	J-163	MS	120	557	750	60.09	1.574
P-364	J-157	J-288	MS	120	769	750	60.09	1.574
P-365	J-288	J-134	MS	120	351	750	60.09	1.574
P-366	J-321	J-168	MS	120	323	750	60.09	1.574
P-343	J-179	J-178	MS	120	191	750	59	1.546
P-344	J-178	J-169	MS	120	721	750	59	1.546
P-345	J-164	J-158	MS	120	522	750	59	1.546
P-346	J-169	J-289	MS	120	189	750	59	1.546
P-347	J-289	J-164	MS	120	371	750	59	1.546
P-348	J-158	J-291	MS	120	1,676	750	59	1.546
P-178	J-286	J-285	MS	120	149	750	58.62	1.536
P-56	J-321	FCV-Elpro a	DI	135	64	300	9.25	1.515
P-57	H-30	Elpro a	DI	135	12	300	9.25	1.515

P-58	FCV-Elpro a	H-30	DI	135	8	300	9.25	1.515
P-144	J-230	J-224	MS	120	898	1,200.00	147.54	1.51
P-681	J-79	FCV-Pimple Gurao1,2,3_ sump	MS	120	4	400	16.38	1.509
P-669	FCV-Pimple Gurao1,2,3_ sump	H-36	MS	120	2	400	16.38	1.509
P-657	H-36	Sump_Proposed_Pimple Gurao1,2,3	MS	120	2	400	16.38	1.509
P-216	J-191	J-190	MS	120	23	1,200.00	146.93	1.504
P-180	J-179	J-286	DI-K7	135	423	900	81.39	1.481
P-644	J-107	J-71	MS	120	339	500	24.79	1.461
P-650	J-68	J-61	MS	120	486	500	24.79	1.461
P-651	J-91	J-84	MS	120	741	500	24.79	1.461
P-652	J-84	J-68	MS	120	450	500	24.79	1.461
P-653	J-102	J-91	MS	120	674	500	24.79	1.461
P-646	J-65	J-72	MS	120	311	500	24.79	1.461
P-645	J-71	J-74	MS	120	324	500	24.79	1.461
P-643	J-74	J-72	MS	120	163	500	24.79	1.461
P-649	J-62	J-61	MS	120	175	500	24.79	1.461
P-648	J-62	J-65	MS	120	363	500	24.79	1.461
P-647	J-303	J-102	MS	120	69	500	24.79	1.461
P-276	J-285	J-320	MS	120	2	750	52.68	1.38
P-62	J-225	J-278	MS	120	22	500	23.19	1.367
P-46	S1	J-231	MS	120	1,412	1,000.00	92.33	1.361
P-638	J-292	J-106	DI-K7	135	1,146	500	22.99	1.355
P-229	J-286	J-320	DI-K7	135	156	500	22.77	1.342
P-194	J-224	J-225	MS	120	363	1,200.00	130.86	1.339
P-564	J-291	J-141	MS	120	576	750	50.8	1.331
P-584	J-177	J-290	MS	120	71	750	46.47	1.217
P-637	J-126	J-106	MS	120	349	500	20.59	1.214
P-636	J-116	J-126	MS	120	556	500	20.59	1.214
P-635	J-292	J-116	MS	120	233	500	20.59	1.214
P-654	J-141	J-294	MS	120	751	750	43.58	1.142
P-655	J-294	J-292	MS	120	146	750	43.58	1.142
P-378	J-225	J-191	MS	120	705	1,200.00	107.67	1.102
P-13634	J-291	J-7111	DI	135	578	500	18.32	1.08
P-511	J-129	J-109	DI	135	455	600	25.53	1.045
P-512	J-109	J-92	DI	135	656	600	25.53	1.045
P-513	J-92	J-112	DI	135	315	600	25.53	1.045
P-515	J-293	J-129	DI	135	1,602	600	25.53	1.045
P-13632	J-293	J-7111	DI	135	448	600	25.53	1.045
P-534	J-103	J-86	MS	120	979	600	25.4	1.04
P-535	J-127	J-103	MS	120	558	600	25.4	1.04
P-536	J-117	J-127	MS	120	543	600	25.4	1.04
P-537	J-123	J-125	MS	120	492	600	25.4	1.04
P-538	J-119	J-122	MS	120	229	600	25.4	1.04
P-539	J-122	J-123	MS	120	15	600	25.4	1.04
P-540	J-125	J-295	MS	120	520	600	25.4	1.04
P-541	J-295	J-117	MS	120	161	600	25.4	1.04
P-1	FCV-16	J-260	MS	120	46	1,200.00	98.62	1.009
P-10	R-16	FCV-17	MS	120	10	1,200.00	98.62	1.009
P-9	FCV-17	J-324	MS	120	64	1,200.00	98.62	1.009
P-2	J-324	FCV-16	MS	120	7	1,200.00	98.62	1.009
P-13635	J-260	J-7112	MS	120	3	1,200.00	98.62	1.009
P-13636	J-7112	J-230	MS	120	1,199	1,200.00	98.62	1.009
P-120	J-285	FCV-Elpro b	DI	135	57	300	5.95	0.974
P-121	H-28	Elpro b	DI	135	10	300	5.95	0.974
P-122	FCV-Elpro b	H-28	DI	135	7	300	5.95	0.974
P-379	J-290	J-119	MS	120	40	750	36.36	0.953
P-659	J-31	J-25	DI	135	216	400	10.19	0.938
P-667	J-50	J-40	DI	135	561	400	10.19	0.938

P-663	J-40	J-34	DI	135	93	400	10.19	0.938
P-665	J-34	J-31	DI	135	325	400	10.19	0.938
P-672	J-52	J-50	DI	135	66	400	10.19	0.938
P-668	J-25	FCV-Dapodi	DI	135	689	400	10.19	0.938
P-660	FCV-Dapodi	H-39	DI	135	3	400	10.19	0.938
P-671	H-39	Sump_Dapodi	DI	135	2	400	10.19	0.938
P-625	J-112	J-85	DI	135	700	600	22.65	0.927
P-626	J-70	J-108	DI	135	475	600	22.65	0.927
P-627	J-85	J-70	DI	135	178	600	22.65	0.927
P-670	J-107	Sump_New sangvi police Station	DI	135	5	400	9.74	0.897
P-661	J-107	J-58	MS	120	341	500	15.04	0.887
P-137	J-149	FCV-Ashok Cinema	MS	120	11	400	9.57	0.882
P-138	J-99	J-149	MS	120	27	400	9.57	0.882
P-139	J-99	J-114	MS	120	619	400	9.57	0.882
P-140	FCV-Ashok Cinema	H-31	MS	120	3	400	9.57	0.882
P-141	H-31	Ashok Cinema	MS	120	3	400	9.57	0.882
P-662	J-108	J-322	DI	135	26	500	13.99	0.825
P-746	J-106	FCV-Pimple Saudagar b New	DI	135	3	500	12.98	0.765
P-747	FCV-Pimple Saudagar b New	H-106	DI	135	1	500	12.98	0.765
P-748	H-106	sump-Pimple Saudagar b New	DI	135	2	500	12.98	0.765
P-673	J-322	J-48	DI	135	321	450	10.19	0.741
P-675	J-48	J-52	DI	135	173	450	10.19	0.741
P-72	J-230	J-231	DI	135	7	1,000.00	48.92	0.721
P-200	J-43	FCV-Kasarwadi2	DI-K7	135	22	500	11.61	0.684
P-203	FCV-Kasarwadi2	H-35	DI-K7	135	5	500	11.61	0.684
P-204	H-35	Kasarwadi2	DI-K7	135	4	500	11.61	0.684
P-628	J-86	J-83	MS	120	226	600	16.67	0.682
P-629	J-83	J-67	MS	120	644	600	16.67	0.682
P-630	J-67	J-79	MS	120	591	600	16.67	0.682
P-191	J-181	FCV-Sector 28 New	DI-K7	135	437	300	4.15	0.679
P-192	FCV-Sector 28 New	H-26	DI-K7	135	6	300	4.15	0.679
P-193	H-26	Sump_Sector 28 New	DI-K7	135	5	300	4.15	0.679
P-217	J-73	J-114	DI	135	274	500	10.96	0.646
P-218	J-121	J-120	MS	120	20	500	10.96	0.646
P-219	J-124	J-73	DI	135	101	500	10.96	0.646
P-220	J-121	J-119	MS	120	237	500	10.96	0.646
P-221	J-120	J-124	MS	120	486	500	10.96	0.646
P-226	J-278	FCV-Bijli Nagar a	DI	135	15	500	10.85	0.64
P-227	FCV-Bijli Nagar a	H-11	DI	135	3	500	10.85	0.64
P-228	H-11	Bijli Nagar a	DI	135	2	500	10.85	0.64
P-433	J-231	J-181	MS	120	1,561	1,000.00	43.41	0.64
P-253	J-211	FCV-Sector 29a	DI	135	23	500	10.53	0.621
P-254	FCV-Sector 29a	H-24	DI	135	7	500	10.53	0.621
P-255	H-24	Sector 29a	DI	135	5	500	10.53	0.621

P-658	J-58	TCV-96	MS	120	25	400	6.49	0.597
P-676	TCV-96	Sump_PWD Sector 84	MS	120	3	400	6.49	0.597
P-293	J-177	J-257	DI	135	80	600	13.62	0.557
P-294	J-257	J-115	DI	135	10	600	13.62	0.557
P-691	J-308	FCV-New Pimple Gurav Garden_Sump	DI-K7	135	7	500	8.94	0.527
P-682	H-37	Sump_New Pimple Gurav Garden	DI-K7	135	1	500	8.94	0.527
P-664	FCV-New Pimple Gurav Garden_Sump	H-37	DI-K7	135	2	500	8.94	0.527
P-116	J-86	J-43	DI-K7	135	1,024	500	8.73	0.515
P-336	J-100	J-113	DI	135	142	200	1.39	0.512
P-619	J-308	J-108	DI	135	37	500	8.66	0.51
P-677	J-58	FCV-Gaothan New (Old Sangavi)_b	MS	120	340	500	8.56	0.505
P-678	H-40	Sump_Gaothan New (Old Sangavi)_b	MS	120	3	500	8.56	0.505
P-692	FCV-Gaothan New (Old Sangavi)_b	H-40	MS	120	4	500	8.56	0.505
P-338	J-209	J-210	MS	120	419	700	16.68	0.502
P-339	J-206	J-209	MS	120	255	700	16.68	0.502
P-340	J-211	J-256	DI	135	17	700	16.68	0.502
P-341	J-256	J-210	MS	120	292	700	16.68	0.502
P-342	J-224	J-206	MS	120	161	700	16.68	0.502
P-349	J-140	FCV-Pimpri Delux a	CI	85	8	500	8.25	0.486
P-350	J-115	J-140	CI	85	6	500	8.25	0.486
P-749	FCV-Pimpri Delux a	H-107	CI	85	3	500	8.25	0.486
P-750	H-107	Pimpri Delux a	CI	85	6	500	8.25	0.486
P-357	FCV-PremlokPark	J-190	DI	135	538	450	6.54	0.476
P-358	PremlokPark	H-27	DI	135	5	450	6.54	0.476
P-359	H-27	FCV-PremlokPark	DI	135	7	450	6.54	0.476
P-119	J-112	J-43	DI	135	1,028	300	2.88	0.471
P-380	J-278	FCV-Bijli Nagar c	MS	120	10	500	7.23	0.426
P-381	FCV-Bijli Nagar c	H-13	DI	135	3	500	7.23	0.426
P-382	H-13	Bijli Nagar c	DI	135	3	500	7.23	0.426
P-461	FCV-Sector 29b	H-25	DI	135	4	500	6.15	0.362
P-462	H-25	Sector 29b	DI	135	5	500	6.15	0.362
P-430	J-320	FCV-Elpro New	DI-K7	135	53	500	6.11	0.36
P-431	H-29	Elpro New	DI-K7	135	8	500	6.11	0.36
P-432	FCV-Elpro New	H-29	DI-K7	135	6	500	6.11	0.36

P-685	J-322	FCV-Pimple Gurav Garden_sump	MS	120	3	400	3.81	0.351
P-656	H-38	Sump_Pimple Gurav Garden	MS	120	1	400	3.81	0.351
P-688	FCV-Pimple Gurav Garden_sump	H-38	MS	120	2	400	3.81	0.351
P-743	J-303	FCV-Pimple Saudagar a_Sump	DI	135	3	500	5.82	0.343
P-744	FCV-Pimple Saudagar a_Sump	H-105	DI	135	1	500	5.82	0.343
P-745	H-105	sump-Pimple Saudagar a	DI	135	2	500	5.82	0.343
P-470	J-139	FCV-Pimpri Delux b	MS	120	36	500	5.37	0.316
P-471	J-115	J-139	MS	120	8	500	5.37	0.316
P-751	FCV-Pimpri Delux b	H-108	MS	120	3	500	5.37	0.316
P-752	H-108	Pimpri Delux b	MS	120	4	500	5.37	0.316
P-495	J-278	FCV-Bijli Nagar b	DI	135	27	500	5.11	0.301
P-496	FCV-Bijli Nagar b	H-12	DI	135	6	500	5.11	0.301
P-497	H-12	Bijli Nagar b	DI	135	3	500	5.11	0.301
P-13633	J-7111	J-141	DI	135	12	600	7.21	0.295
P-475	J-290	J-291	DI-K7	135	254	750	10.11	0.265
P-533	J-211	FCV-Sector 29b	DI	135	23	600	6.15	0.252
P-600	J-100	FCV-Nav Maha	DI	135	10	500	1.39	0.082
P-601	J-114	J-113	DI	135	96	500	1.39	0.082
P-602	FCV-Nav Maha	H-32	DI	135	2	500	1.39	0.082
P-603	H-32	Nav Maha	DI	135	2	500	1.39	0.082
P-620	J-79	J-78	DI	135	172	500	0.28	0.017
P-621	J-78	J-308	DI	135	200	500	0.28	0.017

Table 6.42: Junction results of rising mains for the year 2045

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
J-324	609.98	0	1.47 (no demand, just near to sump at WTP)
J-260	609.66	0	1.74 (no demand, just near to sump at WTP)
J-7112	609.61	0	1.79 (no demand, just near to sump at WTP)
Kasarwadi2	581.58	11.61	4.04
Sector 29b	604.4	6.15	4.1
Nav Maha	587.44	1.39	4.2
Sector 29a	604.1	10.53	4.4
Elpro New	598.5	6.11	4.47
Pimpri Delux b	587.81	5.37	5.13
Pimpri Delux a	587.72	8.25	5.21
Ashok Cinema	584.61	9.57	5.89
Bijli Nagar c	602.28	7.23	6.19
Bijli Nagar a	602.24	10.85	6.23
PremlokPark	601.5	6.54	6.3

Bijli Nagar b	602.07	5.11	6.4
Sump_Sector 28 New	600.2	4.15	8.8
Elpro a	592.8	9.25	9.59
Elpro b	593.1	5.95	9.66
Sump_Gaothan New (Old Sangavi)_b	555	8.56	13.07
Sump_PWD Sector 84	555	6.49	13.23
J-58	555	0	13.23
Sump_New sangvi police Station	555	9.74	13.77
J-107	555	0	13.81
J-65	559.42	0	14.24
J-62	560.54	0	14.7
J-71	555	0	15.16
J-61	560.31	0	15.73
J-84	564	0	16.08
J-74	555.08	0	16.52
J-72	555.77	0	16.53
J-231	590.83	0	19.48
J-230	590.57	0	19.73
J-68	558.03	0	20.13
J-78	564	0	20.82
J-79	564	0	20.82
Sump_Proposed_Pimple Gurao1,2,3	563	16.38	21.81
J-83	564	0	21.92
J-86	564	0	22.13
J-112	564	0	22.47
J-91	560	0	23.29
Sump_New Pimple Gurav Garden	561.4	8.94	23.41
J-308	561.32	0	23.5
J-225	584.89	0	23.57
J-256	584.88	0	23.58
J-278	584.82	0	23.61
J-211	584.61	0	23.85
Sump_Dapodi	556.5	10.19	23.97
J-108	560.5	0	24.33
J-50	559.4	0	24.7
Sump_Pimple Gurav Garden	560.02	3.81	24.78
J-322	559.99	0	24.8
J-52	559.41	0	24.82
J-149	565.28	0	25.18
J-99	565.25	0	25.24
J-210	583.31	0	25.28
J-181	584.05	0	25.6
J-48	558.52	0	25.89
J-40	556.91	0	26.07
J-102	560	0	26.12
sump-Pimple Saudagar a	560	5.82	26.45
J-303	560	0	26.45
J-34	556.16	0	26.67
J-25	555	0	26.81
J-31	555	0	26.91
J-92	560	0	26.94
sump-Pimple Saudagar b New	560	12.98	27.11
J-106	560	0	27.11
J-70	558.1	0	27.3
J-67	558.02	0	27.34
J-103	560	0	27.92
J-109	560	0	27.93
J-184	579.27	0	28.09
J-190	579.6	0	28.16
J-100	563.41	0	28.18
J-191	579.61	0	28.19

J-126	560	0	28.23
J-295	561.83	0	28.51
J-292	562.05	0	28.56
J-129	560	0	28.63
J-85	557.04	0	28.89
J-127	560	0	29.03
J-116	560.7	0	29.18
J-117	560.72	0	29.31
J-114	562.29	0	29.5
J-113	562.1	0	29.69
J-224	579.18	0	29.74
J-206	578.94	0	29.92
J-294	560.81	0	29.96
J-43	555.16	0	30.43
J-293	560	0	30.77
J-125	560.5	0	30.85
J-73	561.06	0	30.93
J-209	577.42	0	31.33
J-140	561.46	0	31.42
J-139	561.35	0	31.54
J-115	561.33	0	31.56
J-7111	560	0	31.66
J-141	560	0	31.66
J-124	560.35	0	31.71
J-257	561.14	0	31.77
J-122	560.09	0	32.2
J-123	560.06	0	32.21
J-120	560	0	32.53
J-121	560	0	32.54
J-119	560	0	32.8
J-291	560	0	32.81
J-290	560	0	32.84
J-177	560	0	32.95
J-128	560	0	33.8
J-186	571.61	0	34.38
J-169	566.68	0	34.45
J-285	568.31	0	34.62
J-320	568.28	0	34.64
J-321	568.25	0	34.66
J-134	560	0	34.71
J-168	566.8	0	34.78
J-289	565.42	0	35.14
J-286	567.69	0	35.7
J-288	560	0	35.8
J-158	561.24	0	36.62
J-157	561.35	0	36.86
J-178	565.99	0	37.58
J-164	561.4	0	38.04
J-163	561.51	0	38.32
J-179	565.05	0	39.1

The higher nodal pressures at the demand nodes (ESRs) can be adjusted to desired value by adjusting Flow controlling valve (FCV) provided before the demand nodes (ESRs).
Hence the sizes of the pipelines proposed are OK.

(a) Design for Pumps for year 2030:

The demands of the year 2030 as shown in Table 6.17 is given to nodes and the model run is taken. The pipe results are shown in Table 6.42 and junction results are shown in Table 6.43.

Table 6.42: Pipe results of rising mains for the year 2030

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)
P-179	J-320	J-321	MS	120	2	750	55.11	1.444
P-641	J-106	J-303	MS	120	94	500	24.32	1.434
P-181	J-190	J-184	MS	120	175	1,100.00	111.59	1.359
P-182	J-186	J-179	MS	120	785	1,100.00	111.59	1.359
P-183	J-184	J-186	MS	120	580	1,100.00	111.59	1.359
P-153	J-181	J-191	MS	120	452	600	31.21	1.278
P-360	J-163	J-157	MS	120	526	750	47.76	1.251
P-361	J-134	J-128	MS	120	293	750	47.76	1.251
P-362	J-128	J-177	MS	120	285	750	47.76	1.251
P-363	J-168	J-163	MS	120	557	750	47.76	1.251
P-364	J-157	J-288	MS	120	769	750	47.76	1.251
P-365	J-288	J-134	MS	120	351	750	47.76	1.251
P-366	J-321	J-168	MS	120	323	750	47.76	1.251
P-343	J-179	J-178	MS	120	191	750	46.9	1.229
P-344	J-178	J-169	MS	120	721	750	46.9	1.229
P-345	J-164	J-158	MS	120	522	750	46.9	1.229
P-346	J-169	J-289	MS	120	189	750	46.9	1.229
P-347	J-289	J-164	MS	120	371	750	46.9	1.229
P-348	J-158	J-291	MS	120	1,676	750	46.9	1.229
P-178	J-286	J-285	MS	120	149	750	46.6	1.221
P-56	J-321	FCV-Elpro a	DI	135	64	300	7.35	1.204
P-57	H-30	Elpro a	DI	135	12	300	7.35	1.204
P-58	FCV-Elpro a	H-30	DI	135	8	300	7.35	1.204
P-144	J-230	J-224	MS	120	898	1,200.00	117.27	1.2
P-681	J-79	FCV-Pimple Gurao1,2,3_ sump	MS	120	4	400	13.02	1.199
P-669	FCV-Pimple Gurao1,2,3_ sump	H-36	MS	120	2	400	13.02	1.199
P-657	H-36	Sump_Proposed_Pimple Gurao1,2,3	MS	120	2	400	13.02	1.199
P-216	J-191	J-190	MS	120	23	1,200.00	116.79	1.195
P-180	J-179	J-286	DI-K7	135	423	900	64.69	1.177
P-46	S1	J-231	MS	120	1,412	1,000.00	78.82	1.161
P-644	J-107	J-71	MS	120	339	500	19.7	1.161
P-650	J-68	J-61	MS	120	486	500	19.7	1.161
P-651	J-91	J-84	MS	120	741	500	19.7	1.161
P-652	J-84	J-68	MS	120	450	500	19.7	1.161
P-653	J-102	J-91	MS	120	674	500	19.7	1.161
P-646	J-65	J-72	MS	120	311	500	19.7	1.161
P-645	J-71	J-74	MS	120	324	500	19.7	1.161
P-643	J-74	J-72	MS	120	163	500	19.7	1.161
P-649	J-62	J-61	MS	120	175	500	19.7	1.161
P-648	J-62	J-65	MS	120	363	500	19.7	1.161
P-647	J-303	J-102	MS	120	69	500	19.7	1.161
P-276	J-285	J-320	MS	120	2	750	41.87	1.097
P-62	J-225	J-278	MS	120	22	500	18.43	1.087
P-638	J-292	J-106	DI-K7	135	1,146	500	18.28	1.077
P-229	J-286	J-320	DI-K7	135	156	500	18.1	1.067
P-194	J-224	J-225	MS	120	363	1,200.00	104.01	1.064
P-564	J-291	J-141	MS	120	576	750	40.38	1.058
P-584	J-177	J-290	MS	120	71	750	36.94	0.968
P-637	J-126	J-106	MS	120	349	500	16.37	0.965
P-636	J-116	J-126	MS	120	556	500	16.37	0.965
P-635	J-292	J-116	MS	120	233	500	16.37	0.965

P-654	J-141	J-294	MS	120	751	750	34.64	0.908
P-655	J-294	J-292	MS	120	146	750	34.64	0.908
P-378	J-225	J-191	MS	120	705	1,200.00	85.58	0.876
P-13634	J-291	J-7111	DI	135	578	500	14.56	0.858
P-511	J-129	J-109	DI	135	455	600	20.29	0.831
P-512	J-109	J-92	DI	135	656	600	20.29	0.831
P-513	J-92	J-112	DI	135	315	600	20.29	0.831
P-515	J-293	J-129	DI	135	1,602	600	20.29	0.831
P-13632	J-293	J-7111	DI	135	448	600	20.29	0.831
P-534	J-103	J-86	MS	120	979	600	20.19	0.826
P-535	J-127	J-103	MS	120	558	600	20.19	0.826
P-536	J-117	J-127	MS	120	543	600	20.19	0.826
P-537	J-123	J-125	MS	120	492	600	20.19	0.826
P-538	J-119	J-122	MS	120	229	600	20.19	0.826
P-539	J-122	J-123	MS	120	15	600	20.19	0.826
P-540	J-125	J-295	MS	120	520	600	20.19	0.826
P-541	J-295	J-117	MS	120	161	600	20.19	0.826
P-120	J-285	FCV-Elpro b	DI	135	57	300	4.73	0.774
P-121	H-28	Elpro b	DI	135	10	300	4.73	0.774
P-122	FCV-Elpro b	H-28	DI	135	7	300	4.73	0.774
P-379	J-290	J-119	MS	120	40	750	28.9	0.757
P-10	R-16	FCV-17	MS	120	10	1,200.00	72.96	0.747
P-9	FCV-17	J-324	MS	120	64	1,200.00	72.96	0.747
P-2	J-324	FCV-16	MS	120	7	1,200.00	72.96	0.747
P-1	FCV-16	J-260	MS	120	46	1,200.00	72.96	0.747
P-13635	J-260	J-7112	MS	120	3	1,200.00	72.96	0.747
P-13636	J-7112	J-230	MS	120	1,199	1,200.00	72.96	0.747
P-659	J-31	J-25	DI	135	216	400	8.1	0.746
P-667	J-50	J-40	DI	135	561	400	8.1	0.746
P-663	J-40	J-34	DI	135	93	400	8.1	0.746
P-665	J-34	J-31	DI	135	325	400	8.1	0.746
P-672	J-52	J-50	DI	135	66	400	8.1	0.746
P-668	J-25	FCV-Dapodi	DI	135	689	400	8.1	0.746
P-660	FCV-Dapodi	H-39	DI	135	3	400	8.1	0.746
P-671	H-39	Sump_Dapodi	DI	135	2	400	8.1	0.746
P-625	J-112	J-85	DI	135	700	600	18.01	0.737
P-626	J-70	J-108	DI	135	475	600	18.01	0.737
P-627	J-85	J-70	DI	135	178	600	18.01	0.737
P-670	J-107	Sump_New sangvi police Station	DI	135	5	400	7.74	0.713
P-661	J-107	J-58	MS	120	341	500	11.96	0.705
P-137	J-149	FCV-Ashok Cinema	MS	120	11	400	7.61	0.701
P-138	J-99	J-149	MS	120	27	400	7.61	0.701
P-139	J-99	J-114	MS	120	619	400	7.61	0.701
P-140	FCV-Ashok Cinema	H-31	MS	120	3	400	7.61	0.701
P-141	H-31	Ashok Cinema	MS	120	3	400	7.61	0.701
P-662	J-108	J-322	DI	135	26	500	11.12	0.656
P-72	J-230	J-231	DI	135	7	1,000.00	44.31	0.653
P-746	J-106	FCV-Pimple Saudagar b New	DI	135	3	500	10.32	0.608
P-747	FCV-Pimple Saudagar b New	H-106	DI	135	1	500	10.32	0.608
P-748	H-106	sump-Pimple Saudagar b New	DI	135	2	500	10.32	0.608
P-673	J-322	J-48	DI	135	321	450	8.1	0.589
P-675	J-48	J-52	DI	135	173	450	8.1	0.589

P-200	J-43	FCV-Kasarwadi2	DI-K7	135	22	500	9.23	0.544
P-203	FCV-Kasarwadi2	H-35	DI-K7	135	5	500	9.23	0.544
P-204	H-35	Kasarwadi2	DI-K7	135	4	500	9.23	0.544
P-628	J-86	J-83	MS	120	226	600	13.25	0.542
P-629	J-83	J-67	MS	120	644	600	13.25	0.542
P-630	J-67	J-79	MS	120	591	600	13.25	0.542
P-191	J-181	FCV-Sector 28 New	DI-K7	135	437	300	3.3	0.54
P-192	FCV-Sector 28 New	H-26	DI-K7	135	6	300	3.3	0.54
P-193	H-26	Sump_Sector 28 New	DI-K7	135	5	300	3.3	0.54
P-217	J-73	J-114	DI	135	274	500	8.71	0.514
P-218	J-121	J-120	MS	120	20	500	8.71	0.514
P-219	J-124	J-73	DI	135	101	500	8.71	0.514
P-220	J-121	J-119	MS	120	237	500	8.71	0.514
P-221	J-120	J-124	MS	120	486	500	8.71	0.514
P-433	J-231	J-181	MS	120	1,561	1,000.00	34.51	0.509
P-226	J-278	FCV-Bijli Nagar a	DI	135	15	500	8.63	0.509
P-227	FCV-Bijli Nagar a	H-11	DI	135	3	500	8.63	0.509
P-228	H-11	Bijli Nagar a	DI	135	2	500	8.63	0.509
P-253	J-211	FCV-Sector 29a	DI	135	23	500	8.37	0.493
P-254	FCV-Sector 29a	H-24	DI	135	7	500	8.37	0.493
P-255	H-24	Sector 29a	DI	135	5	500	8.37	0.493
P-658	J-58	TCV-96	MS	120	25	400	5.15	0.475
P-676	TCV-96	Sump_PWD Sector 84	MS	120	3	400	5.15	0.475
P-293	J-177	J-257	DI	135	80	600	10.82	0.443
P-294	J-257	J-115	DI	135	10	600	10.82	0.443
P-691	J-308	FCV-New Pimple Gurav Garden_Sump	DI-K7	135	7	500	7.11	0.419
P-682	H-37	Sump_New Pimple Gurav Garden	DI-K7	135	1	500	7.11	0.419
P-664	FCV-New Pimple Gurav Garden_Sump	H-37	DI-K7	135	2	500	7.11	0.419
P-116	J-86	J-43	DI-K7	135	1,024	500	6.94	0.409
P-336	J-100	J-113	DI	135	142	200	1.1	0.407
P-619	J-308	J-108	DI	135	37	500	6.88	0.406
P-677	J-58	FCV-Gaothan New (Old Sangavi)_b	MS	120	340	500	6.8	0.401
P-678	H-40	Sump_Gaothan New (Old Sangavi)_b	MS	120	3	500	6.8	0.401
P-692	FCV-Gaothan New (Old Sangavi)_b	H-40	MS	120	4	500	6.8	0.401
P-338	J-209	J-210	MS	120	419	700	13.26	0.399
P-339	J-206	J-209	MS	120	255	700	13.26	0.399
P-340	J-211	J-256	DI	135	17	700	13.26	0.399
P-341	J-256	J-210	MS	120	292	700	13.26	0.399

P-342	J-224	J-206	MS	120	161	700	13.26	0.399
P-349	J-140	FCV-Pimpri Delux a	CI	85	8	500	6.56	0.387
P-350	J-115	J-140	CI	85	6	500	6.56	0.387
P-749	FCV-Pimpri Delux a	H-107	CI	85	3	500	6.56	0.387
P-750	H-107	Pimpri Delux a	CI	85	6	500	6.56	0.387
P-357	FCV-PremlokPark	J-190	DI	135	538	450	5.2	0.378
P-358	PremlokPark	H-27	DI	135	5	450	5.2	0.378
P-359	H-27	FCV-PremlokPark	DI	135	7	450	5.2	0.378
P-119	J-112	J-43	DI	135	1,028	300	2.29	0.374
P-380	J-278	FCV-Bijli Nagar c	MS	120	10	500	5.74	0.339
P-381	FCV-Bijli Nagar c	H-13	DI	135	3	500	5.74	0.339
P-382	H-13	Bijli Nagar c	DI	135	3	500	5.74	0.339
P-461	FCV-Sector 29b	H-25	DI	135	4	500	4.89	0.288
P-462	H-25	Sector 29b	DI	135	5	500	4.89	0.288
P-430	J-320	FCV-Elpro New	DI-K7	135	53	500	4.85	0.286
P-431	H-29	Elpro New	DI-K7	135	8	500	4.85	0.286
P-432	FCV-Elpro New	H-29	DI-K7	135	6	500	4.85	0.286
P-685	J-322	FCV-Pimple Gurav Garden_sump	MS	120	3	400	3.03	0.279
P-656	H-38	Sump_Pimple Gurav Garden	MS	120	1	400	3.03	0.279
P-688	FCV-Pimple Gurav Garden_sump	H-38	MS	120	2	400	3.03	0.279
P-743	J-303	FCV-Pimple Saudagar a_Sump	DI	135	3	500	4.62	0.272
P-744	FCV-Pimple Saudagar a_Sump	H-105	DI	135	1	500	4.62	0.272
P-745	H-105	sump-Pimple Saudagar a	DI	135	2	500	4.62	0.272
P-470	J-139	FCV-Pimpri Delux b	MS	120	36	500	4.27	0.251
P-471	J-115	J-139	MS	120	8	500	4.27	0.251
P-751	FCV-Pimpri Delux b	H-108	MS	120	3	500	4.27	0.251
P-752	H-108	Pimpri Delux b	MS	120	4	500	4.27	0.251
P-495	J-278	FCV-Bijli Nagar b	DI	135	27	500	4.06	0.239
P-496	FCV-Bijli Nagar b	H-12	DI	135	6	500	4.06	0.239
P-497	H-12	Bijli Nagar b	DI	135	3	500	4.06	0.239
P-13633	J-7111	J-141	DI	135	12	600	5.73	0.235
P-475	J-290	J-291	DI-K7	135	254	750	8.04	0.211
P-533	J-211	FCV-Sector 29b	DI	135	23	600	4.89	0.2
P-600	J-100	FCV-Nav Maha	DI	135	10	500	1.1	0.065
P-601	J-114	J-113	DI	135	96	500	1.1	0.065

P-602	FCV-Nav Maha	H-32	DI	135	2	500	1.1	0.065
P-603	H-32	Nav Maha	DI	135	2	500	1.1	0.065
P-620	J-79	J-78	DI	135	172	500	0.22	0.013
P-621	J-78	J-308	DI	135	200	500	0.22	0.013

Table 6.43: Junction results of rising mains for the year 2030

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
J-324	609.98	0	1.49 (Node is near sump, no demand)
J-260	609.66	0	1.79 (Node is near sump, no demand)
J-7112	609.61	0.00	1.84 (Node is near sump, no demand)
Sector 29b	604.4	4.89	5.23
Sector 29a	604.1	8.37	5.53
Bijli Nagar c	602.28	5.74	7.33
Bijli Nagar a	602.24	8.63	7.37
Elpro New	598.5	4.85	7.51
Bijli Nagar b	602.07	4.06	7.54
PremlokPark	601.5	5.2	7.68
Sump_Sector 28 New	600.2	3.3	9.75
Nav Maha	587.44	1.1	11.16
Pimpri Delux b	587.81	4.27	11.64
Pimpri Delux a	587.72	6.56	11.72
Elpro b	593.1	4.73	12.77
Elpro a	592.8	7.35	12.83
Kasarwadi2	581.58	9.23	13.08
Ashok Cinema	584.61	7.61	13.24
J-231	591	0	19.98
J-230	590.57	0	20.23
J-225	584.89	0	24.71
J-256	584.88	0	24.71
J-278	584.82	0	24.75
J-211	584.61	0.00	24.98
J-181	584.05	0	26.32
J-210	583.31	0	26.37
J-84	564	0	27.02
J-62	560.54	0.00	27.32
J-65	559.42	0	27.41
J-61	560.31	0	28.07
Sump_Gaothan New (Old Sangavi)_b	555	6.8	28.17
Sump_PWD Sector 84	555	5.15	28.28
J-58	555	0	28.28
Sump_New sangvi police Station	555	7.74	28.63
J-107	555	0	28.66
J-190	579.6	0	29.53
J-71	555	0	29.54
J-191	579.61	0	29.55
J-184	579.27	0	29.6
J-78	564	0	30.12
J-79	564	0	30.12
J-72	555.77	0	30.17
J-74	555	0.00	30.4
J-224	579	0	30.71
J-83	564	0	30.84
J-206	578.94	0.00	30.91
J-86	564	0	30.98
Sump_Proposed_Pimple Gurao1,2,3	563	13.02	31.12

J-112	564	0	31.21
J-68	558.03	0	31.74
J-209	577.42	0	32.35
J-149	565.28	0	32.53
J-99	565.25	0	32.58
Sump_New Pimple Gurav Garden	561.4	7.11	32.72
J-308	561.32	0	32.8
J-91	560	0	33.12
J-108	560.5	0	33.63
Sump_Pimple Gurav Garden	560.02	3.03	34.09
J-322	560	0	34.11
J-50	559.4	0	34.25
J-52	559.41	0	34.33
Sump_Dapodi	556.5	8.1	34.77
J-102	560	0	34.98
J-100	563.41	0	35.14
sump-Pimple Saudagar a	560	4.62	35.19
J-303	560	0	35.19
J-48	558.52	0	35.34
J-92	560	0	35.51
sump-Pimple Saudagar b New	560	10.32	35.62
J-106	560	0.00	35.62
J-292	562.05	0.00	35.86
J-295	561.83	0.00	35.9
J-40	556.91	0.00	36.01
J-103	560	0.00	36.15
J-109	560	0	36.15
J-126	560	0	36.35
J-186	571.61	0	36.36
J-114	562.29	0	36.39
J-70	558.1	0	36.4
J-67	558.02	0	36.45
J-113	562.1	0	36.58
J-129	560	0	36.61
J-34	556.16	0	36.66
J-116	560.7	0	36.73
J-117	560.72	0	36.81
J-127	560	0	36.87
J-25	555	0	37.15
J-294	560.81	0	37.2
J-31	555	0	37.22
J-285	568.31	0	37.66
J-320	568.28	0	37.68
J-321	568.25	0	37.7
J-73	561.06	0	37.75
J-85	557.04	0	37.81
J-125	560.5	0	37.89
J-140	561.46	0	37.93
J-293	560	0	38.01
J-139	561.35	0	38.05
J-115	561.33	0	38.07
J-169	566.68	0	38.11
J-257	561.14	0	38.27
J-168	566.8	0	38.28
J-124	560.35	0.00	38.51
J-286	567.69	0	38.57
J-7111	560	0	38.59
J-141	560	0	38.6
J-122	560.09	0	38.92
J-123	560.06	0	38.93
J-289	565.42	0	38.99
J-120	560	0	39.16
J-121	560	0	39.17
J-119	560	0	39.34

J-291	560	0	39.35
J-290	560	0	39.36
J-177	560	0	39.44
J-43	555.16	0	39.46
J-128	560	0	39.99
J-178	565.99	0	40.39
J-134	560	0	40.59
J-288	560	0	41.3
J-158	561	0.00	41.41
J-157	561.35	0	41.53
J-179	565.05	0	41.71
J-164	561.4	0	42.28
J-163	561.51	0	42.43

It is observed that the velocity in pipelines is not exceeding 1.8 m/s and the minimum pressure is 5 m. Hence the pipe sizes are OK.

6.3.3 ESRs on Thergaon Line

ESRs on the Thergaon line are shown in Figure 6.22 and Table 6.44.

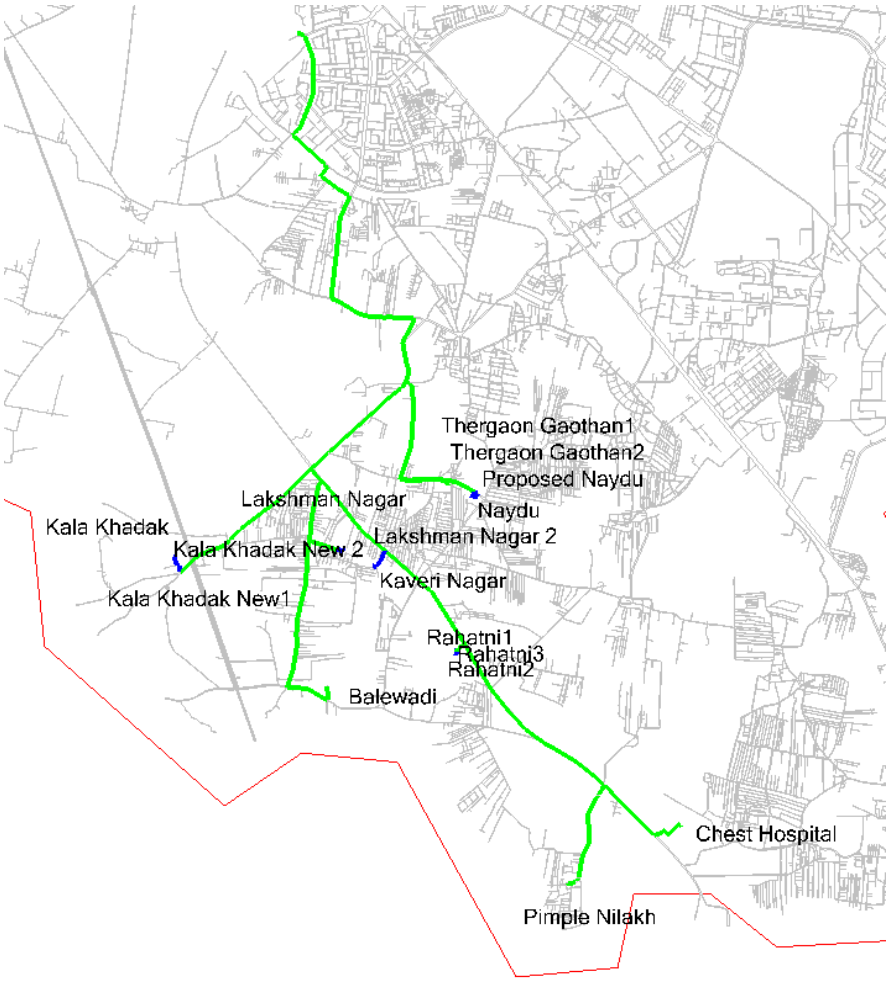

Figure 6.22: ESRs on the Thergaon line

Table 6.44: ESRs on the Thergaon Line

SN	Tank ID	Label	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)
1	19	Thergaon Gaothan1	9.52	9.93	11.98	12.50
2	38	Kala Khadak	6.93	7.23	8.72	9.10
3	39	Kala Khadak New1	10.66	11.12	13.41	13.99
4	40	Kala Khadak New 2	11.8	12.31	14.85	15.49
5	43	Kaveri Nagar	7.26	7.58	9.13	9.53
6	46	Lakshman Nagar	13.52	14.11	17.01	17.75
7	47	Lakshman Nagar 2	8.12	8.47	10.22	10.66
8	50	Thergaon Gaothan2	6.18	6.45	7.77	8.11
9	53	Naydu	6.02	6.28	7.57	7.90
10	64	Pimple Nilakh	10.58	11.04	13.31	13.89
11	69	Proposed Naydu	3.56	3.71	4.48	4.67
12	71	Rahatni1	7.06	7.37	8.88	9.27
13	72	Rahatni2	8.4	8.77	10.57	11.03
14	73	Rahatni3	6.28	6.55	7.90	8.24
15	94	Balewadi	0.72	0.75	0.91	0.95
16	95	Chest Hospital	0.77	0.80	0.97	1.01
		Total	117.38	122.48	147.67	154.09

ESRs on Pumping

Following ESRs are on pumping.

(a)With Sumps:

(1) Kala Khadak
(2) Kala Khadak New1
(3) Kala Khadak New 2

(b)With Online boosters:

(1) Lakshman Nagar
(2) Lakshman Nagar 2

(c)By Gravity:

(1) Kaveri Nagar
(2) Rahatni3
(3) Rahatni2
(4) Rahatni1
(5) Thergaon Gaothan1
(6) Thergaon Gaothan2

(7) Proposed Naydu
(8) Naydu
(9) Pimple Nilakh
(10) Chest Hospital
(11) Balewadi

Demand of 2045 is given to the nodes and model run is taken. The nodal pressures are shown in Figure 6.23. It is observed that water is not reaching by gravity to the ESRs at Kaveri Nagar, Rahatni1, Rahatni2 and Rahatni3. Hence, sumps are proposed at these ESRs and water is proposed to be pumped to these ESRs from the sumps.

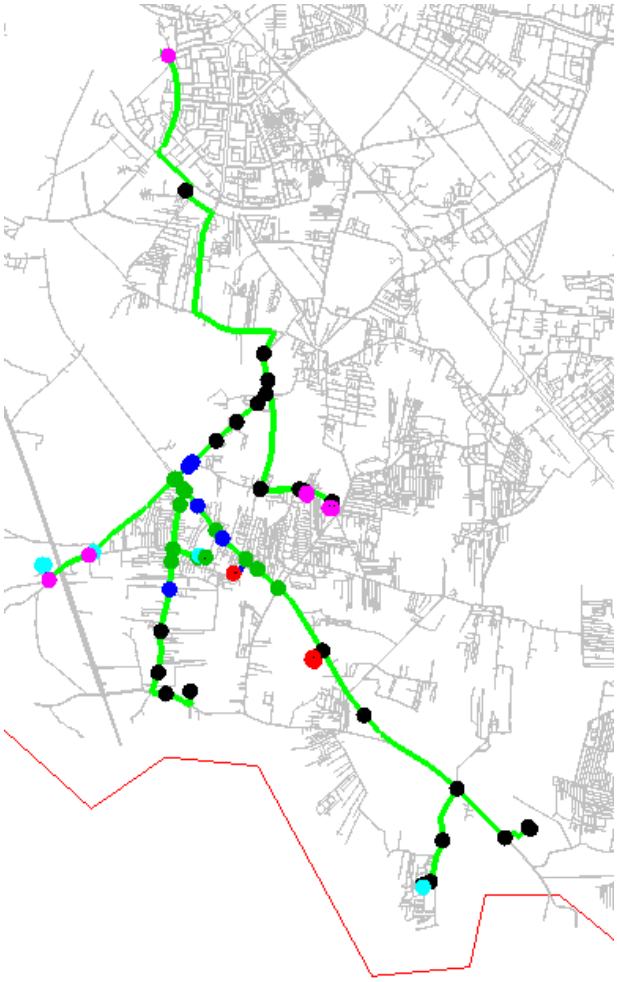

Figure 6.23: Nodal pressures

(a)With Sumps:

(1) Kala Khadak
(2) Kala Khadak New1
(3) Kala Khadak New 2

Pipeline network is shown in Figure 6.24. Levels and demands are shown in Table 6.45.

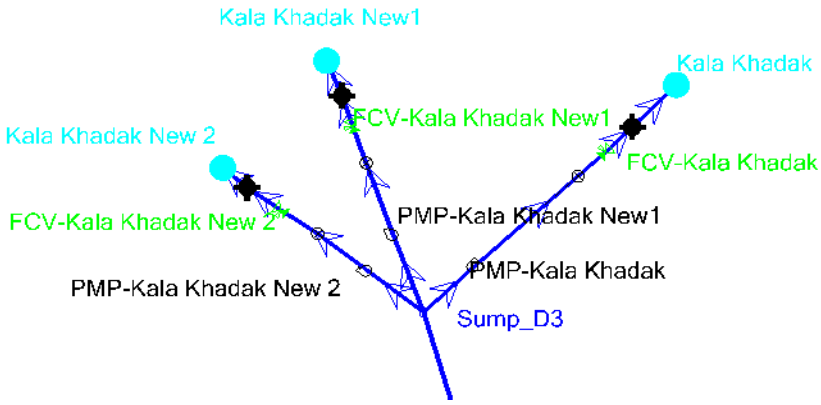

Figure 6.24: Network of Kala Khadak ESRs

Table 6.45: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Kala Khadak	611.56	581.29	30.27	6.93	7.23	8.72	9.10	40
2	Kala Khadak New1	608.5	581.29	27.21	10.66	11.12	13.41	13.99	40
3	Kala Khadak New 2	608.5	581.29	27.21	11.8	12.31	14.85	15.49	40
	Total				29.39	30.67	36.97	38.58	

Data as shown in Table 6.45 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.46: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)
P-205	PMP-Kala Khadak New 2	FCV-Kala Khadak New 2	DI	135	7	500	12.31	0.726
P-206	T-84	PMP-Kala Khadak New 2	DI-K9	135	7	500	12.31	0.726
P-207	FCV-Kala Khadak New 2	H-50	DI	135	3	500	12.31	0.726
P-208	H-50	Kala Khadak New 2	DI	135	2	500	12.31	0.726
P-100	PMP-Kala Khadak New1	FCV-Kala Khadak New1	DI	135	8	500	11.12	0.656
P-101	T-84	PMP-Kala Khadak	DI-K9	135	8	500	11.12	0.656

		New1						
P-102	FCV-Kala Khadak New1	H-51	DI	135	2	500	11.12	0.656
P-103	H-51	Kala Khadak New1	DI	135	3	500	11.12	0.656
P-418	PMP-Kala Khadak	FCV-Kala Khadak	DI	135	12	600	7.23	0.296
P-419	T-84	PMP-Kala Khadak	DI-K9	135	5	600	7.23	0.296
P-420	FCV-Kala Khadak	H-52	DI	135	3	600	7.23	0.296
P-421	H-52	Kala Khadak	DI	135	4	600	7.23	0.296

Table 6.47: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
Kala Khadak	611.56	7.23	6.12
Kala Khadak New1	608.5	11.12	9.16
Kala Khadak New 2	608.50	12.31	9.16

Design of Sump

With 2hours of detention time, volume = 38.58*1000/12= 3215.2 m3. With 4m water depth, area = 803.8 m2. And diameter = (4*Area/3.14)^0.5 = 31.99 say 32 m

(b)Kaveri:

Pipeline network is shown in Figure 6.25. Levels and demands are shown in Table 6.48.

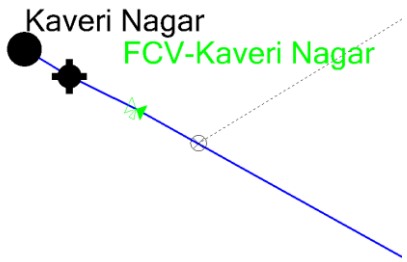

Figure 6.25: Network of Kaveri

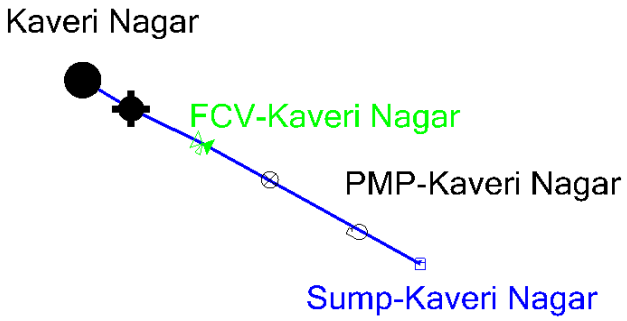

Figure 6.26: Network of Kaveri with sump

Table 6.48: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Kaveri Nagar	605.8	578.5	27.3	7.26	7.58	9.13	9.53	35

Data as shown in Table 6.48 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.49: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)
P-399	PMP-Kaveri Nagar	FCV-Kaveri Nagar	DI-K9	120	9	600	7.58	0.31
P-400	Sump-Kaveri Nagar	PMP-Kaveri Nagar	DI-K9	120	4	600	7.58	0.31
P-402	FCV-Kaveri Nagar	H-48	DI-K9	120	4	600	7.58	0.31
P-403	H-48	Kaveri Nagar	DI-K9	120	3	600	7.58	0.31

Table 6.50: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
Kaveri Nagar	605.8	7.58	4.2

Design of Sump

With 2hours of detention time, volume = 9.53*1000/12= 794.1 m3. With 4m water depth, area = 1598.5 m2. And diameter = (4*Area/3.14)^0.5 = 15.9 say 16 m

(b) Rahatni1, Rahatni2 and Rahatni3:

Pipeline network is shown in Figure 6.26. Levels and demands are shown in Table 6.51.

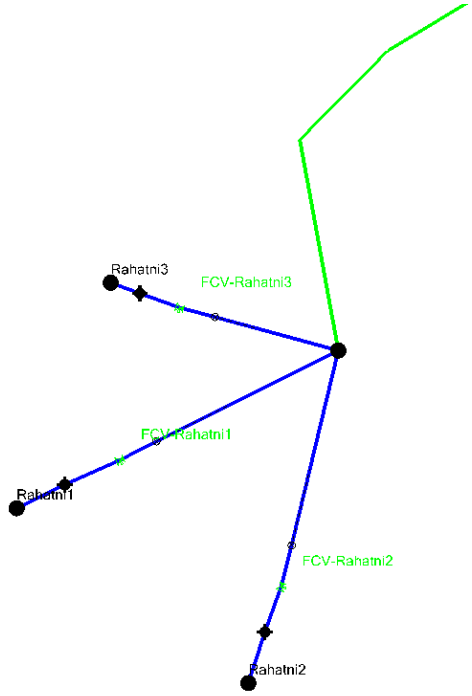

Figure 6.26: Network of Rahatni

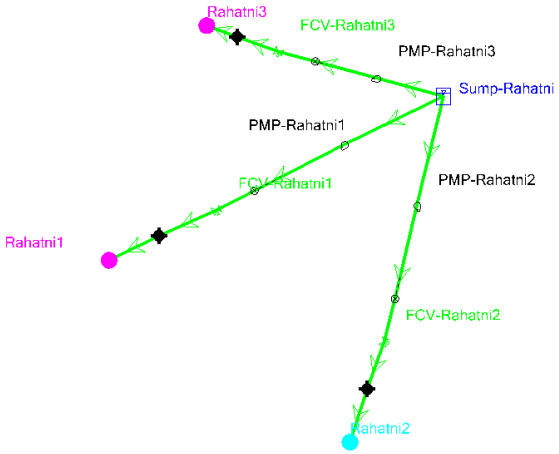

Figure 6.27: Network of Rahatni with sump

Table 6.48: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Rahatni1	591.98	569.12	22.86	7.06	7.37	8.88	9.27	30
2	Rahatni2	593.61	569.12	24.49	8.4	8.77	10.57	11.03	35
3	Rahatni3	595	569.12	25.88	6.28	6.55	7.90	8.24	35
	Total				21.74	22.69	27.35	28.54	

Data as shown in Table 6.48 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.49: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)
P-222	FCV-Rahatni2	H-47	DI	135	6	500	8.4	0.495
P-223	H-47	Rahatni2	DI	135	6	500	8.4	0.495
P-224	Sump-Rahatni	PMP-Rahatni2	DI	135	13	500	8.4	0.495
P-225	PMP-Rahatni2	FCV-Rahatni2	DI	135	16	500	8.4	0.495
P-301	FCV-Rahatni1	H-46	DI	135	7	500	7.06	0.416
P-302	H-46	Rahatni1	DI	135	6	500	7.06	0.416
P-303	Sump-Rahatni	PMP-Rahatni1	DI	135	13	500	7.06	0.416
P-304	PMP-Rahatni1	FCV-Rahatni1	DI	135	16	500	7.06	0.416
P-351	FCV-Rahatni3	H-45	DI	135	5	500	6.28	0.37
P-352	H-45	Rahatni3	DI	135	4	500	6.28	0.37
P-353	Sump-Rahatni	PMP-Rahatni3	DI	135	8	500	6.28	0.37
P-354	PMP-Rahatni3	FCV-Rahatni3	DI	135	11	500	6.28	0.37

Table 6.50: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
Rahatni1	591.98	7.06	4.46
Rahatni2	593.61	8.4	7.95
Rahatni3	595	6.28	6.56

Minimum velocity is less than 1.8 m/s and minimum residual pressure is 4.4 m. Hence, OK.

Design of Sump

With 2hours of detention time, volume = 28.54*1000/12= 2378.3 m3. With 4m water depth, area = 594.6 m2. And diameter = (4*Area/3.14)^0.5 = 27.52 m say 28 m

(c)Lakshman Nagar and Lakshman Nagar 2

Pipeline network is shown in Figure 6.28. Levels and demands are shown in Table 6.51.

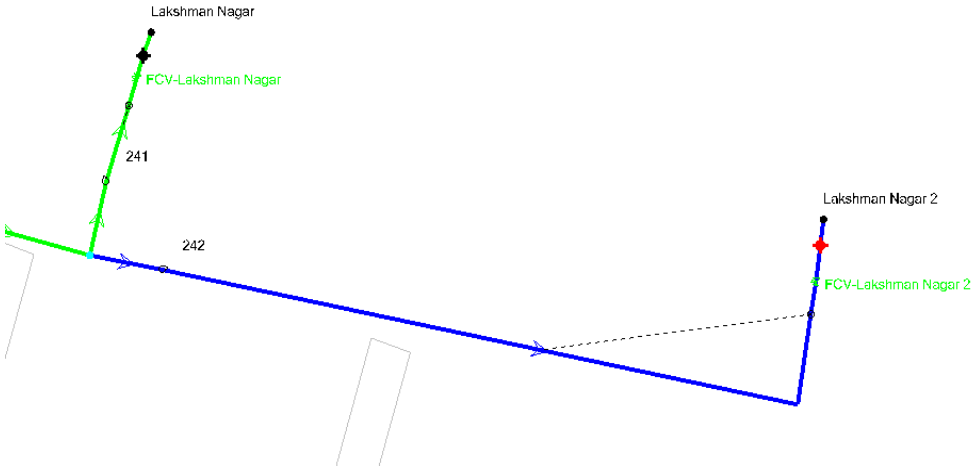

Figure 6.28: Network of Lakshman Nagar ESRs

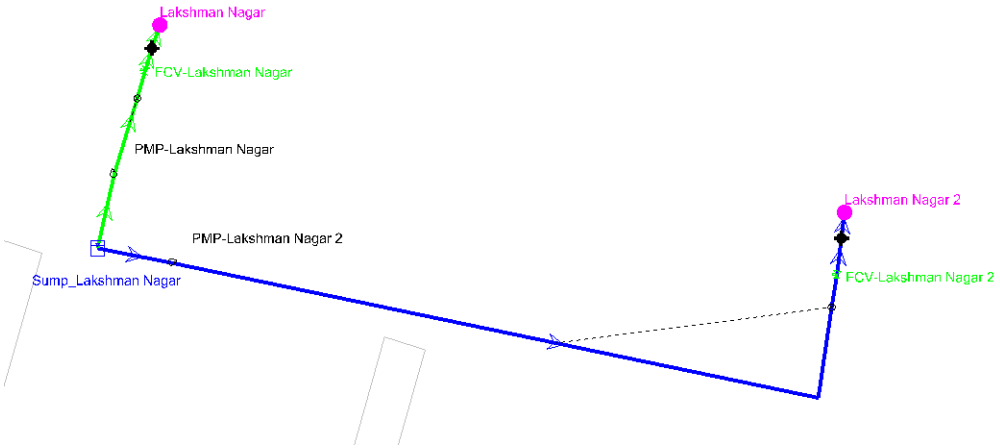

Figure 6.29: Pumping at ESR New Pimple Gurav Garden New with sump

Table 6.51: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Lakshman Nagar	601.16	578	23.16	13.52	14.11	17.01	17.75	30
2	Lakshman Nagar 2	600.6	578	22.6	8.12	8.47	10.22	10.66	30
				Total		22.08			

Data as shown in Table 6.18 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.52: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)
P-104	Sump_Lakshman Nagar	PMP-Lakshman Nagar	MS	120	9	500	13.52	0.797
P-105	PMP-Lakshman Nagar	FCV-Lakshman Nagar	MS	120	13	500	13.52	0.797
P-106	FCV-Lakshman Nagar	H-41	DI	135	3	500	13.52	0.797
P-107	H-41	Lakshman Nagar	DI	135	3	500	13.52	0.797
P-239	Sump_Lakshman Nagar	PMP-Lakshman Nagar 2	DI-K9	135	9	500	8.12	0.479
P-240	PMP-Lakshman Nagar 2	FCV-Lakshman Nagar 2	DI-K9	135	96	500	8.12	0.479
P-241	FCV-Lakshman Nagar 2	H-42	DI-K9	135	4	500	8.12	0.479
P-242	H-42	Lakshman Nagar 2	DI-K9	135	3	500	8.12	0.479

Table 6.53: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
Lakshman Nagar	601.16	13.52	4.15
Lakshman Nagar 2	600.6	8.12	4.69

Minimum velocity is less than 1.8 m/s and minimum residual pressure is 4.1 m. Hence, OK.

Design of Sump

With 2 hours of detention time, volume = 28.41*1000/12= 2367.5 m3. With 4m water depth, area = 591.8 m2. And diameter = (4*Area/3.14)^0.5 = 27.4 m

Design of Gravity Main from WTP to ESRs on Thergaon Line

Gravity main is simulated with following two cases:

Case 1: ESRs without sumps, or direct filling by gravity
Case 2: ESRs with sumps, or no direct filling by gravity but water comes by gravity up to the sump and then from the sump it is pumped to the ESR.

In Case 1: The demand of the zone is given to the representative nodes and the FSL of the tank is given as elevation to these nodes.

In Case2: Sumps of the ESRs are represented by a single node as shown in Figure 6.30. The combined demand of ESRs is given to the representative nodes, however, ground elevation of the sump is given as elevation to these nodes.

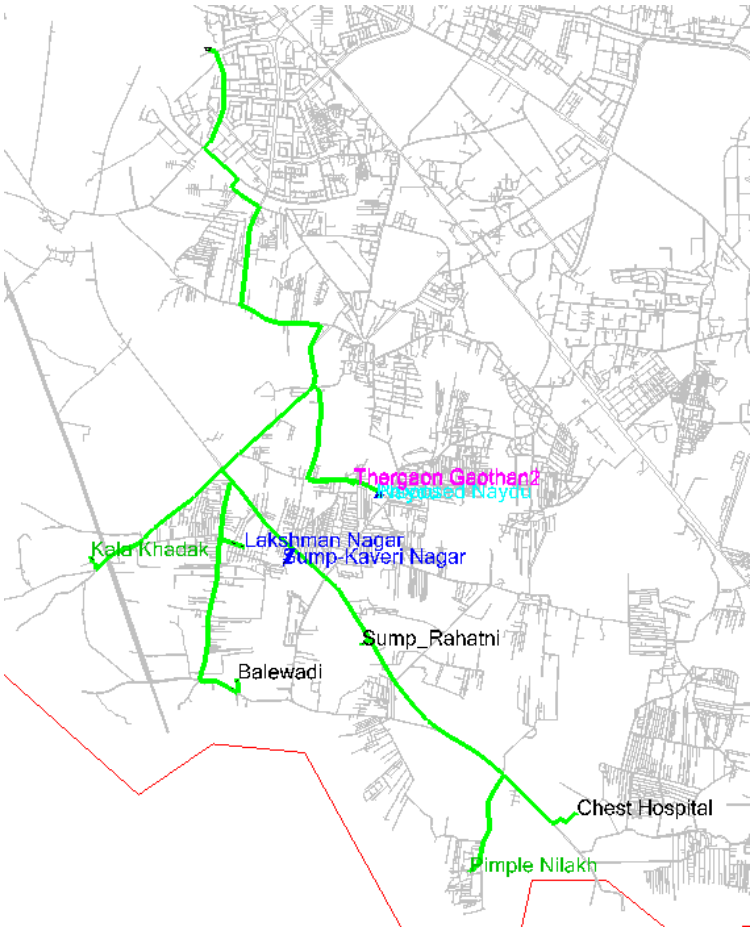

Figure 6.30: Nodes of Sumps and ESR

(a) Design for year 2045:
The gravity main is designed for year 2045. Demand of the year 2045 as shown in Table 6.44 has been given to the nodes and the model run is taken. The junction results are shown in Table 6.54

Table 6.55: Junction results of rising mains for the year 2045

J_Tank_ID	Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
94	Balewadi	559.91	0.72	23
95	Chest Hospital	559.44	0.77	24.7
69	Proposed Naydu	588.6	3.56	-2.56
53	Naydu	588.14	6.02	-2.09
50	Thergaon Gaothan2	589.17	6.18	-5.15
19	Thergaon Gaothan1	589.39	9.52	-5.34
106	Sump-Kaveri Nagar	578.7	9.53	6.11
64	Pimple Nilakh	580.25	10.58	0.57
108	Sump_Lakshman Nagar	579	28.41	4.92
107	Sump_Rahatni	569.41	28.54	14.93
109	Sump_Kala Khadak	581.34	35.58	-2.41

It is observed that there are negative pressures at ESRs as shown in Table 6.55. Even for the year 2030, residual pressure is just 1m. Moreover, velocities in pipes are more than 2m/s. Hence, it is proposed to add new parallel MS pipelines shown by blue line in Figure 6.31.

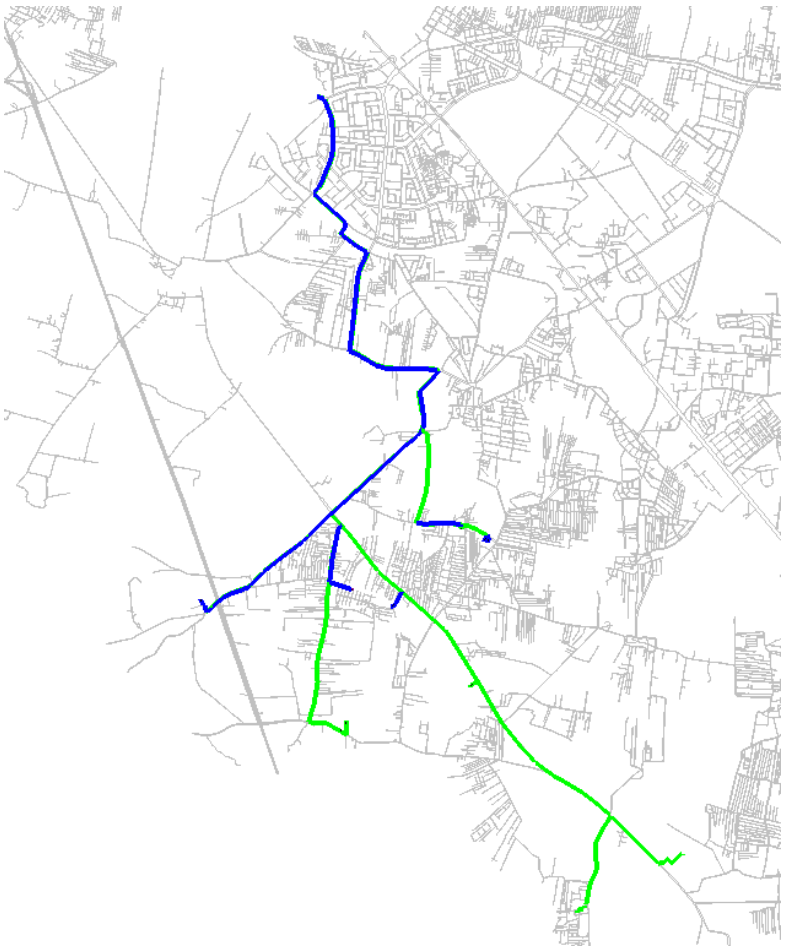

Figure 6.31: Nodes of Sumps and ESR

After adding new line, demand of the year 2045 as shown in Table 6.44 has been given to the nodes and the model run is taken. The pipe results are shown in Table 6.56 and junction results are shown in Table 6.57.

Table 6.56: Pipe results of rising mains for the year 2045

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-24	J-200	J-201	MS	120	15	1,000.00	116.03	1.71	E
P-25	J-199	J-200	MS	120	18	1,000.00	116.03	1.71	E
P-26	J-201	J-202	MS	120	21	1,000.00	116.03	1.71	E
P-27	J-193	J-187	MS	120	335	1,000.00	116.03	1.71	E
P-28	J-196	J-199	MS	120	384	1,000.00	116.03	1.71	E
P-29	J-193	J-196	MS	120	334	1,000.00	116.03	1.71	E
P-30	J-202	J-228	MS	120	20	1,000.00	116.03	1.71	E
P-31	J-228	J-174	MS	120	213	1,000.00	116.03	1.71	E
P-32	J-174	J-261	DI	135	14	1,000.00	116.03	1.71	E
P-33	J-187	J-296	MS	120	158	1,000.00	116.03	1.71	E
P-13661	J-7121	J-7117	MS	1,200.00	285	500	28.94	1.706	N
P-73	J-242	J-229	DI	135	143	1,000.00	103.12	1.52	E
P-74	J-261	J-242	DI	135	12	1,000.00	103.12	1.52	E
P-75	J-229	J-203	MS	120	37	1,000.00	103.12	1.52	E
P-13639	R-15	J-7114	DI-K7	135	5,596	1,000.00	97.06	1.43	N
P-43	J-215	FCV-Kala Khadak	DI-K7	135	184	700	46.71	1.405	N
P-44	H-61	Sump_Kala Khadak	DI-K7	135	4	700	46.71	1.405	N
P-45	FCV-Kala Khadak	H-61	DI-K7	135	5	700	46.71	1.405	N
P-13642	J-7114	J-7115	DI	135	1,504	600	33.8	1.384	N
P-13645	J-296	J-7116	MS	120	1,191	600	33.2	1.359	E
P-66	J-152	FCV-Pimple Nilakh	DI	135	21	400	13.89	1.279	E
P-67	J-143	J-142	MS	120	675	400	13.89	1.279	E
P-68	J-146	J-152	MS	120	107	400	13.89	1.279	E
P-69	J-143	J-146	MS	120	520	400	13.89	1.279	E
P-70	FCV-Pimple Nilakh	H-44	DI	135	3	400	13.89	1.279	E
P-71	H-44	Pimple Nilakh	DI	135	4	400	13.89	1.279	E
P-95	J-219	J-182	MS	120	3,155	1,000.00	85.96	1.267	E
P-96	J-182	J-180	MS	120	325	1,000.00	85.96	1.267	E
P-97	R-15	J-287	MS	120	104	1,000.00	85.96	1.267	E
P-98	J-287	J-219	MS	120	1,882	1,000.00	85.96	1.267	E
P-99	J-296	J-180	MS	120	167	1,000.00	85.96	1.267	E
P-13651	J-203	J-7118	MS	120	2	1,000.00	79.9	1.177	E
P-83	J-188	J-176	DI	135	470	400	12.58	1.159	E
P-84	J-176	J-138	DI	135	431	400	12.58	1.159	E
P-85	J-137	FCV-Thergaon Gaothan1	MS	120	13	400	12.5	1.151	E
P-86	FCV-Thergaon Gaothan1	H-56	MS	120	4	400	12.5	1.151	E
P-87	H-56	Thergaon Gaothan1	MS	120	4	400	12.5	1.151	E
P-40	J-261	J-223	MS	120	1,309	600	27.69	1.134	E
P-41	J-223	J-301	MS	120	70	600	27.69	1.134	E
P-42	J-301	J-215	MS	120	575	600	27.69	1.134	E
P-36	FCV-Lakshman Nagar	H-60	MS	120	3	700	37.3	1.122	R
P-37	H-60	Sump_Lakshman Nagar	MS	120	5	700	37.3	1.122	R
P-13649	J-7117	FCV-Lakshman	MS	120	10	700	37.3	1.122	R

		Nagar							
P-13644	J-7115	J-215	DI	135	1,978	500	19.01	1.121	N
P-13658	J-175	J-7121	MS	120	5	500	18.18	1.072	E
P-155	J-198	J-195	MS	120	368	1,000.00	64.88	0.956	E
P-156	J-195	J-280	MS	120	125	1,000.00	64.88	0.956	E
P-157	J-280	J-300	MS	120	378	1,000.00	64.88	0.956	E
P-13652	J-7118	J-198	MS	120	226	1,000.00	64.88	0.956	E
P-77	J-204	J-279	MS	120	534	600	23.22	0.951	E
P-13640	J-7114	J-296	DI-K7	135	10	1,000.00	63.26	0.932	N
P-13655	J-7118	J-7119	DI	135	712	500	15.02	0.885	N
P-213	J-170	FCV-Rahatni_sump	MS	120	117	800	37.47	0.863	E
P-214	FCV-Rahatni_sump	H-59	MS	120	5	800	37.47	0.863	E
P-215	H-59	Sump_Rahatni	MS	120	7	800	37.47	0.863	E
P-13647	J-7116	J-137	DI	135	573	500	13.78	0.813	N
P-13646	J-7116	J-297	MS	120	5	600	19.41	0.795	E
P-78	J-279	J-175	MS	120	4	600	19.12	0.783	E
P-230	J-172	J-170	MS	120	928	1,000.00	52.37	0.772	E
P-231	J-189	J-172	MS	120	339	1,000.00	52.37	0.772	E
P-232	J-300	J-189	MS	120	184	1,000.00	52.37	0.772	E
P-175	J-137	FCV-Thergaon Gaothan2	MS	120	20	400	8.12	0.748	E
P-176	FCV-Thergaon Gaothan2	H-55	MS	120	3	400	8.12	0.748	E
P-177	H-55	Thergaon Gaothan2	MS	120	4	400	8.12	0.748	E
P-142	J-203	J-204	MS	120	178	700	23.22	0.698	E
P-13660	J-7120	J-7121	DI	135	4	500	10.76	0.634	N
P-11	J-297	J-298	MS	120	540	400	6.83	0.629	E
P-12	J-298	J-137	MS	120	25	400	6.83	0.629	E
P-13643	J-7115	J-261	DI	135	18	600	14.78	0.605	N
P-13656	J-7119	J-7120	DI	135	2	700	19.12	0.575	N
P-331	J-297	J-188	MS	120	5	600	12.58	0.515	E
P-401	J-300	FCV-Kaveri Nagar	DI-K7	135	237	600	12.51	0.512	N
P-404	H-58	Sump-Kaveri Nagar	DI-K7	135	4	600	12.51	0.512	N
P-405	FCV-Kaveri Nagar	H-58	DI-K7	135	4	600	12.51	0.512	N
P-502	J-138	FCV-Naydu	DI-K7	135	96	500	7.9	0.466	N
P-503	FCV-Naydu	H-53	DI-K7	135	9	500	7.9	0.466	N
P-504	H-53	Naydu	DI-K7	135	5	500	7.9	0.466	N
P-443	J-207	J-208	DI	135	512	200	0.94	0.348	E
P-444	J-274	J-282	DI	135	422	200	0.94	0.348	E
P-445	J-208	J-274	DI	135	497	200	0.94	0.348	E
P-446	J-207	J-299	DI	135	332	200	0.94	0.348	E
P-447	J-282	FCV-Balewadi	DI	135	488	200	0.94	0.348	E
P-448	H-49	Balewadi	DI	135	5	200	0.94	0.348	E
P-449	FCV-Balewadi	H-49	DI	135	6	200	0.94	0.348	E
P-455	J-142	J-167	MS	120	1,435	800	14.9	0.343	E
P-456	J-170	J-167	MS	120	919	800	14.9	0.343	E
P-367	J-138	FCV-Proposed Naydu	DI-K7	135	67	500	4.68	0.276	N
P-368	FCV-Proposed	H-54	DI-K7	135	8	500	4.68	0.276	N

	Naydu								
P-369	H-54	Proposed Naydu	DI-K7	135	7	500	4.68	0.276	N
P-13657	J-7120	J-7117	DI	135	288	700	8.35	0.251	N
P-567	J-299	J-175	DI	135	149	300	0.94	0.155	E
P-13653	J-279	J-7119	DI	135	3	700	4.1	0.123	N
P-594	J-96	FCV-Chest Hospital	MS	120	28	400	1.01	0.093	E
P-595	J-111	J-96	MS	120	365	400	1.01	0.093	E
P-596	J-142	J-111	MS	120	824	400	1.01	0.093	E
P-597	FCV-Chest Hospital	H-43	MS	120	3	400	1.01	0.093	E
P-598	H-43	Chest Hospital	MS	120	3	400	1.01	0.093	E

Table 6.57: Junction results of rising mains for the year 2045

J_Tank_ID	Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
0	J-287	609.53	0	0.27 (Very near to sump at WTP and there is no demand)
69	Proposed Naydu	588.6	4.68	7.41
19	Thergaon Gaothan1	589.39	12.5	7.82
53	Naydu	588.14	7.9	7.88
50.00	Thergaon Gaothan2	589.17	8.12	8
64	Pimple Nilakh	580.25	13.89	9.44
109	Sump_Kala Khadak	581.34	46.71	12.12
0	J-215	579.59	0	13.86
0	J-301	579.24	0	15.33
0	J-223	579.26	0	15.46
0	J-172	579	0	17.06
0	J-189	579	0	17.27
108	Sump_Lakshman Nagar	579	37.3	17.33
0	J-7117	578.95	0	17.38
0	J-300	579	0	17.39
106	Sump-Kaveri Nagar	578.7	12.51	17.59
0	J-204	579	0	18.2
0	J-7120	577.54	0	18.81
0	J-7119	577.53	0	18.82
0	J-279	577.52	0	18.83
0	J-7121	577.49	0	18.86
0	J-175	577.46	0	18.89
0	J-203	577.41	0	19.93
0	J-7118	577.38	0	19.95
0	J-229	577.28	0	20.13
0	J-299	576.04	0	20.29
0	J-242	576.71	0	20.94
0	J-261	576.66	0	21.01
0	J-7115	576.52	0	21.17
0	J-174	576.49	0	21.22
0	J-195	575.36	0	21.44
0	J-280	575.02	0	21.76
0	J-198	575.19	0	21.94
0	J-228	574.36	0	23.83
0.00	J-202	574.31	0	23.93
0.00	J-201	574.26	0	24.03
0.00	J-200	574.23	0	24.08
0.00	J-199	574.15	0	24.17
0.00	J-207	571.33	0	24.75
0.00	J-170	569.57	0	26.12
107	Sump_Rahatni	569.41	37.47	26.13
0	J-208	569.27	0	26.44
0	J-219	579.24	0	27.42
0	J-188	569.68	0	28.16

0	J-297	569.66	0	28.18
0	J-7116	569.64	0	28.21
0	J-137	568.33	0	28.84
0.00	J-176	566.98	0	29.37
0	J-298	567.8	0	29.4
0	J-138	566.2	0	29.78
0	J-196	569.44	0	29.93
0	J-152	559.12	0	30.53
0	J-167	564.99	0	30.53
0	J-146	559.23	0	30.77
0	J-274	564.42	0	30.93
0	J-142	564	0	31.28
0	J-143	559.57	0	32.73
94	Balewadi	559.91	0.94	34.79
0	J-193	564.95	0	35.27
0	J-111	559.85	0	35.38
0	J-282	559.5	0	35.56
0	J-96	559.56	0	35.67
95	Chest Hospital	559.44	1.01	35.78
0	J-187	564.29	0	36.8
0	J-7114	564.08	0	37.42
0	J-296	564	0	37.5
0	J-180	561.63	0	40.12
0	J-182	560	0	42.22

It is observed that the velocity in pipelines is not exceeding 1.8 m/s and the minimum residual pressure at ESR is adequate. The higher nodal pressures at the demand nodes (ESRs) can be adjusted to desired value by adjusting Flow controlling valve (FCV) provided before the demand nodes (ESRs).
Hence the sizes of the pipelines proposed are OK.

(a) Design for year 2030:

The demands of the year 2030 as shown in Table 7.44 is given to nodes and the model run is taken. The pipe results are shown in Table 6.58 and junction results are shown in Table 6.59.

Table 6.58: Pipe results of rising mains for the year 2030

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-24	J-200	J-201	MS	120	15	1,000.00	92.22	1.359	E
P-25	J-199	J-200	MS	120	18	1,000.00	92.22	1.359	E
P-26	J-201	J-202	MS	120	21	1,000.00	92.22	1.359	E
P-27	J-193	J-187	MS	120	335	1,000.00	92.22	1.359	E
P-28	J-196	J-199	MS	120	384	1,000.00	92.22	1.359	E
P-29	J-193	J-196	MS	120	334	1,000.00	92.22	1.359	E
P-30	J-202	J-228	MS	120	20	1,000.00	92.22	1.359	E
P-31	J-228	J-174	MS	120	213	1,000.00	92.22	1.359	E
P-32	J-174	J-261	DI	135	14	1,000.00	92.22	1.359	E
P-33	J-187	J-296	MS	120	158	1,000.00	92.22	1.359	E
P-13661	J-7121	J-7117	MS	1,200.00	285	500	23.01	1.356	N
P-73	J-242	J-229	DI	135	143	1,000.00	81.96	1.208	E
P-74	J-261	J-242	DI	135	12	1,000.00	81.96	1.208	E
P-75	J-229	J-203	MS	120	37	1,000.00	81.96	1.208	E
P-13639	R-15	J-7114	DI-K7	135	5,596	1,000.00	77.15	1.137	N
P-43	J-215	FCV-Kala	DI-K7	135	184	700	37.13	1.117	N

		Khadak							
P-44	H-61	Sump_Kala Khadak	DI-K7	135	4	700	37.13	1.117	N
P-45	FCV-Kala Khadak	H-61	DI-K7	135	5	700	37.13	1.117	N
P-13642	J-7114	J-7115	DI	135	1,504	600	26.87	1.1	N
P-13645	J-296	J-7116	MS	120	1,191	600	26.39	1.08	E
P-66	J-152	FCV-Pimple Nilakh	DI	135	21	400	11.04	1.017	E
P-67	J-143	J-142	MS	120	675	400	11.04	1.017	E
P-68	J-146	J-152	MS	120	107	400	11.04	1.017	E
P-69	J-143	J-146	MS	120	520	400	11.04	1.017	E
P-70	FCV-Pimple Nilakh	H-44	DI	135	3	400	11.04	1.017	E
P-71	H-44	Pimple Nilakh	DI	135	4	400	11.04	1.017	E
P-95	J-219	J-182	MS	120	3,155	1,000.00	68.33	1.007	E
P-96	J-182	J-180	MS	120	325	1,000.00	68.33	1.007	E
P-97	R-15	J-287	MS	120	104	1,000.00	68.33	1.007	E
P-98	J-287	J-219	MS	120	1,882	1,000.00	68.33	1.007	E
P-99	J-296	J-180	MS	120	167	1,000.00	68.33	1.007	E
P-13651	J-203	J-7118	MS	120	2	1,000.00	63.51	0.936	E
P-83	J-188	J-176	DI	135	470	400	10	0.921	E
P-84	J-176	J-138	DI	135	431	400	10	0.921	E
P-85	J-137	FCV-Thergaon Gaothan1	MS	120	13	400	9.93	0.915	E
P-86	FCV-Thergaon Gaothan1	H-56	MS	120	4	400	9.93	0.915	E
P-87	H-56	Thergaon Gaothan1	MS	120	4	400	9.93	0.915	E
P-40	J-261	J-223	MS	120	1,309	600	22.01	0.901	E
P-41	J-223	J-301	MS	120	70	600	22.01	0.901	E
P-42	J-301	J-215	MS	120	575	600	22.01	0.901	E
P-36	FCV-Lakshman Nagar	H-60	MS	120	3	700	29.65	0.892	R
P-37	H-60	Sump_Lakshman Nagar	MS	120	5	700	29.65	0.892	R
P-13649	J-7117	FCV-Lakshman Nagar	MS	120	10	700	29.65	0.892	R
P-13644	J-7115	J-215	DI	135	1,978	500	15.11	0.891	N
P-13658	J-175	J-7121	MS	120	5	500	14.45	0.852	E
P-155	J-198	J-195	MS	120	368	1,000.00	51.57	0.76	E
P-156	J-195	J-280	MS	120	125	1,000.00	51.57	0.76	E
P-157	J-280	J-300	MS	120	378	1,000.00	51.57	0.76	E
P-13652	J-7118	J-198	MS	120	226	1,000.00	51.57	0.76	E
P-77	J-204	J-279	MS	120	534	600	18.46	0.756	E
P-13640	J-7114	J-296	DI-K7	135	10	1,000.00	50.29	0.741	N
P-13655	J-7118	J-7119	DI	135	712	500	11.94	0.704	N
P-213	J-170	FCV-Rahatni_sump	MS	120	117	800	29.78	0.686	E
P-214	FCV-Rahatni_sump	H-59	MS	120	5	800	29.78	0.686	E
P-215	H-59	Sump_Rahatni	MS	120	7	800	29.78	0.686	E
P-13647	J-7116	J-137	DI	135	573	500	10.96	0.646	N
P-13646	J-7116	J-297	MS	120	5	600	15.43	0.632	E
P-78	J-279	J-175	MS	120	4	600	15.2	0.622	E
P-230	J-172	J-170	MS	120	928	1,000.00	41.62	0.613	E

P-231	J-189	J-172	MS	120	339	1,000.00	41.62	0.613	E
P-232	J-300	J-189	MS	120	184	1,000.00	41.62	0.613	E
P-175	J-137	FCV-Thergaon Gaothan2	MS	120	20	400	6.45	0.594	E
P-176	FCV-Thergaon Gaothan2	H-55	MS	120	3	400	6.45	0.594	E
P-177	H-55	Thergaon Gaothan2	MS	120	4	400	6.45	0.594	E
P-142	J-203	J-204	MS	120	178	700	18.46	0.555	E
P-13660	J-7120	J-7121	DI	135	4	500	8.56	0.504	N
P-11	J-297	J-298	MS	120	540	400	5.43	0.5	E
P-12	J-298	J-137	MS	120	25	400	5.43	0.5	E
P-13643	J-7115	J-261	DI	135	18	600	11.75	0.481	N
P-13656	J-7119	J-7120	DI	135	2	700	15.19	0.457	N
P-331	J-297	J-188	MS	120	5	600	10	0.409	E
P-401	J-300	FCV-Kaveri Nagar	DI-K7	135	237	600	9.94	0.407	N
P-404	H-58	Sump-Kaveri Nagar	DI-K7	135	4	600	9.94	0.407	N
P-405	FCV-Kaveri Nagar	H-58	DI-K7	135	4	600	9.94	0.407	N
P-502	J-138	FCV-Naydu	DI-K7	135	96	500	6.28	0.37	N
P-503	FCV-Naydu	H-53	DI-K7	135	9	500	6.28	0.37	N
P-504	H-53	Naydu	DI-K7	135	5	500	6.28	0.37	N
P-443	J-207	J-208	DI	135	512	200	0.75	0.276	E
P-444	J-274	J-282	DI	135	422	200	0.75	0.276	E
P-445	J-208	J-274	DI	135	497	200	0.75	0.276	E
P-446	J-207	J-299	DI	135	332	200	0.75	0.276	E
P-447	J-282	FCV-Balewadi	DI	135	488	200	0.75	0.276	E
P-448	H-49	Balewadi	DI	135	5	200	0.75	0.276	E
P-449	FCV-Balewadi	H-49	DI	135	6	200	0.75	0.276	E
P-455	J-142	J-167	MS	120	1,435	800	11.84	0.273	E
P-456	J-170	J-167	MS	120	919	800	11.84	0.273	E
P-367	J-138	FCV-Proposed Naydu	DI-K7	135	67	500	3.72	0.219	N
P-368	FCV-Proposed Naydu	H-54	DI-K7	135	8	500	3.72	0.219	N
P-369	H-54	Proposed Naydu	DI-K7	135	7	500	3.72	0.219	N
P-13657	J-7120	J-7117	DI	135	288	700	6.64	0.2	N
P-567	J-299	J-175	DI	135	149	300	0.75	0.123	E
P-13653	J-279	J-7119	DI	135	3	700	3.26	0.098	N
P-594	J-96	FCV-Chest Hospital	MS	120	28	400	0.8	0.074	E
P-595	J-111	J-96	MS	120	365	400	0.8	0.074	E
P-596	J-142	J-111	MS	120	824	400	0.8	0.074	E
P-597	FCV-Chest Hospital	H-43	MS	120	3	400	0.8	0.074	E
P-598	H-43	Chest Hospital	MS	120	3	400	0.8	0.074	E

Table 6.59: Junction results of rising mains for the year 2030

J_Tank_ID	Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
0	J-287	609.53	0	0.33 (Very near to sump at WTP and there is no demand)
19	Thergaon Gaothan1	589.39	9.93	12.23
69	Proposed Naydu	588.6	3.72	12.23
50	Thergaon Gaothan2	589.17	6.45	12.42

53	Naydu	588.14	6.28	12.7
64	Pimple Nilakh	580.25	11.04	16.44
109	Sump_Kala Khadak	581.34	37.13	17.82
0	J-215	579.59	0	19.56
0	J-301	579.24	0	20.64
0	J-223	579.26	0	20.72
0	J-172	579	0	21.86
0	J-189	579	0	21.99
108	Sump_Lakshman Nagar	579	29.65	22.03
0	J-300	579	0	22.08
0	J-7117	578.95	0	22.08
106	Sump-Kaveri Nagar	578.7	9.94	22.31
0	J-204	579	0	22.6
0	J-7120	577.54	0	23.5
0	J-7119	577.53	0	23.52
0	J-279	577.52	0	23.53
0	J-7121	577.49	0	23.56
0	J-175	577.46	0	23.59
0	J-203	577.41	0	24.29
0	J-7118	577.38	0	24.31
0	J-229	577.28	0	24.46
0	J-299	576.04	0	25
0	J-242	576.71	0	25.19
0	J-261	576.66	0	25.25
0	J-7115	576.52	0	25.4
0	J-174	576.49	0	25.44
0	J-195	575.36	0	25.98
0	J-280	575.02	0	26.31
0	J-198	575.19	0	26.36
0	J-228	574.36	0	27.89
0	J-202	574.31	0	27.97
0	J-201	574.26	0	28.05
0	J-200	574.23	0	28.1
0	J-199	574.15	0	28.18
0	J-219	579.24	0	28.55
0	J-207	571.33	0	29.54
0	J-170	569.57	0	31.04
107	Sump_Rahatni	569.41	29.78	31.1
0	J-208	569.27	0	31.35
0	J-188	569.68	0	32.33
0	J-297	569.66	0	32.36
0	J-7116	569.64	0	32.38
0	J-137	568.33	0	33.25
0	J-196	569.44	0	33.58
0	J-298	567.8	0	33.79
0	J-176	566.98	0	34.06
0	J-138	566.2	0	34.6
0	J-167	564.99	0	35.51
0	J-274	564.42	0	35.96
0	J-142	564	0	36.34
0	J-152	559.12	0	37.53
0	J-146	559.23	0	37.65
0	J-193	564.95	0	38.62
0	J-143	559.57	0	38.81
0	J-187	564.29	0	39.84
94	Balewadi	559.91	0.75	40.04
0	J-7114	564.08	0	40.32
0	J-296	564	0	40.4
0	J-111	559.85	0	40.45
0	J-282	559.5	0	40.69
0	J-96	559.56	0	40.74
95	Chest Hospital	559.44	0.8	40.85
0	J-180	561.63	0	42.93
0	J-182	560	0	44.87

It is observed that the velocity in pipelines is not exceeding 1.8 m/s and the minimum pressure is 10 m. Hence the pipe sizes are OK.

6.3.4 ESRs on Mamurdi_Punavale

ESRs on the Mamurdi_Punavale line are shown in Figure 6.32 and Table 6.60.

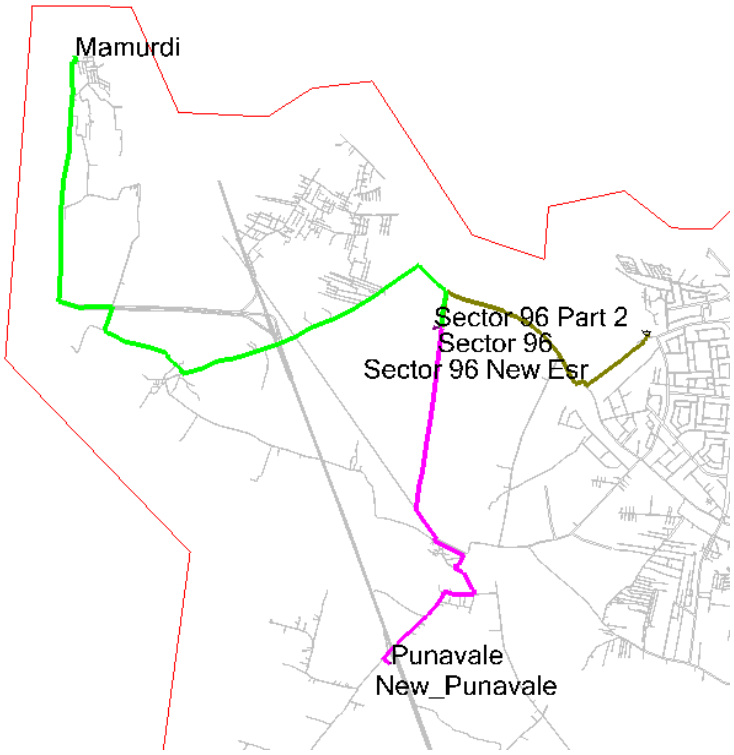

Figure 6.32: ESRs on the Mamurdi_Punavale line

Table 6.60: ESRs on the Mamurdi_Punavale Line

SN	Label	Demand (ML/day)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)
1	Mamurdi	4.99	5.21	6.28	6.55
2	New_Punavale	7.48	7.81	9.41	9.82
3	Punavale	5.61	5.85	7.06	7.36

4	Sector 96	6.59	6.88	8.29	8.65
5	Sector 96 New	10.79	11.26	13.57	14.16
6	Sector 96 Part 2	7.16	7.47	9.01	9.40
	Total	42.62	44.47	53.62	55.95

Adequacy of gravity main from WTP to Sump Sector 96

This gravity main is shown in Figure 6.33.

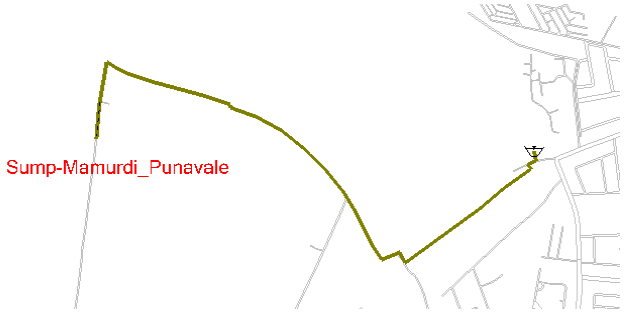

Figure 6.32: Gravity main from WTP to Sump Sector 96

With the demand of 2045 water will not reach sump at Sector 96. Hence a new line of 500 mm is proposed to be laid from WTP to this sump as shown in Figure 6.33.

Figure 6.33: Gravity main with extra line (blue) from WTP to Sump Sector 96

With extra pipeline, model is run for year 2045. Pipe results and junction results are shown in Table 6.61 and 6.62 respectively.

Table 6.61: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-15	R-15	Sump-	DI-K7	135	2,836	500	30.82	1.817	N

		Mamurdi_ Punavale							
P-16	J-212	J-213	MS	120	268	600	44.05	1.803	E
P-17	J-213	J-214	MS	120	387	600	44.05	1.803	E
P-18	J-214	J-216	MS	120	259	600	44.05	1.803	E
P-19	J-216	J-217	MS	120	579	600	44.05	1.803	E
P-20	R-15	J-212	MS	120	1,012	600	44.05	1.803	E
P-21	H-65	Sump-Mamurdi_ Punavale	MS	120	7	600	44.05	1.803	E
P-22	J-217	FCV-Sump-Mamurdi_ Punavale	MS	120	336	600	44.05	1.803	E
P-23	FCV-Sump-Mamurdi_ Punavale	H-65	MS	120	5	600	44.05	1.803	E

Table 6.62: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
J-217	594.65	0	2.11
Sump-Mamurdi_Punavale	590.56	74.87	4.53
J-216	591.24	0	8.25
J-214	588.84	0	11.95
J-213	584.19	0	18.59
J-212	585.09	0	19.09

(1)ESRs Sector 96, Sector 96 Part2 and Sector 96 New

Pipeline network is shown in Figure 6.34. Levels and demands are shown in Table 6.63.

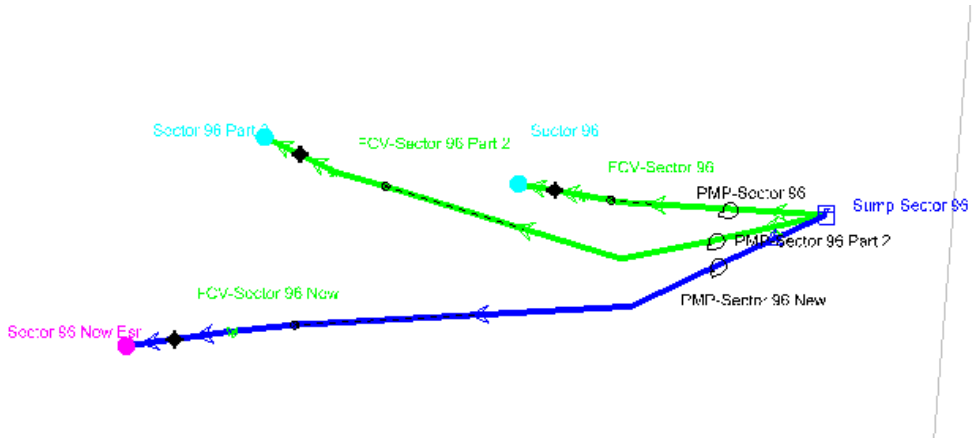

Figure 6.34: Pipe network

Table 6.63: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Sector 96	615.17	586	24.29	6.59	6.88	8.29	8.65	35
2	Sector 96 Part 2	616.55	586	25.67	7.16	7.47	9.01	9.40	35
2	Sector 96 New	616.55	586	25.67	10.79	11.26	13.57	14.16	35

Data as shown in Table 6.63 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.64: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-145	Sump-Sector 96	PMP-Sector 96 New	DI-K9	135	13	500	10.79	0.636	N
P-146	PMP-Sector 96 New	FCV-Sector 96 New	DI-K9	135	52	500	10.79	0.636	N
P-147	FCV-Sector 96 New	H-64	DI-K9	135	6	500	10.79	0.636	N
P-148	H-64	Sector 96 New	DI-K9	135	5	500	10.79	0.636	N
P-295	FCV-Sector 96 Part 2	H-62	DI	135	4	500	7.16	0.422	E
P-296	H-62	Sector 96 Part 2	DI	135	4	500	7.16	0.422	E
P-297	Sump-Sector 96	PMP-Sector 96 Part 2	DI	135	12	500	7.16	0.422	E
P-298	PMP-Sector 96 Part 2	FCV-Sector 96 Part 2	DI	135	42	500	7.16	0.422	E
P-323	FCV-Sector 96	H-63	DI	135	3	500	6.59	0.389	E
P-324	H-63	Sector 96	DI	135	4	500	6.59	0.389	E
P-325	Sump-Sector 96	PMP-Sector 96	DI	135	10	500	6.59	0.389	E
P-326	PMP-Sector 96	FCV-Sector 96	DI	135	15	500	6.59	0.389	E

Table 6.65: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
Sector 96 New	616.55	10.79	5.83
Sector 96	615.17	6.59	7.27
Sector 96 Part 2	614.97	7.16	7.47

(1)ESR Mamurdi

Pipeline network is shown in Figure 6.35. Levels and demands are shown in Table 6.66.

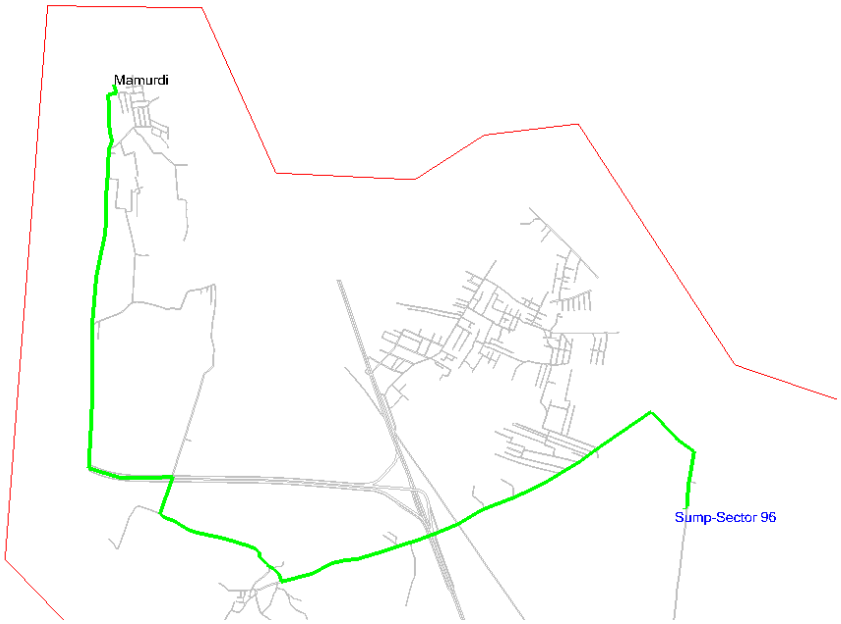

Figure 6.35: Pipe network

Table 6.66: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Mamurdi	634	586	48	4.99	5.21	6.28	6.55	55

Data as shown in Table 6.66 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.67: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-267	PMP_Mamurdi	Sump-Sector 96	DI	135	8	400	5.21	0.48	E
P-733	FCV-Mamurdi	PMP_Mamurdi	DI	135	7,140	400	5.21	0.48	E
P-731	Mamurdi	H-101	DI	135	5	400	5.21	0.48	E
P-732	H-101	FCV-Mamurdi	DI	135	5	400	5.21	0.48	E

Table 6.68: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
Mamurdi	634	5.21	3.37

Design of Sump: This sump is common for ESRs at Sector 96, Sector 96 Part2 and Sector 96 New and Mamurdi.

With 2hours of detention time, volume = 38.77*1000/12= 3230.8 m3. With 4m water depth, area = 807.7 m2. And diameter = (4*Area/3.14)^0.5 = 32 m.

(1)ESR Punavale and Punavale_New

Pipeline network is shown in Figure 6.35. Levels and demands are shown in Table 6.69.

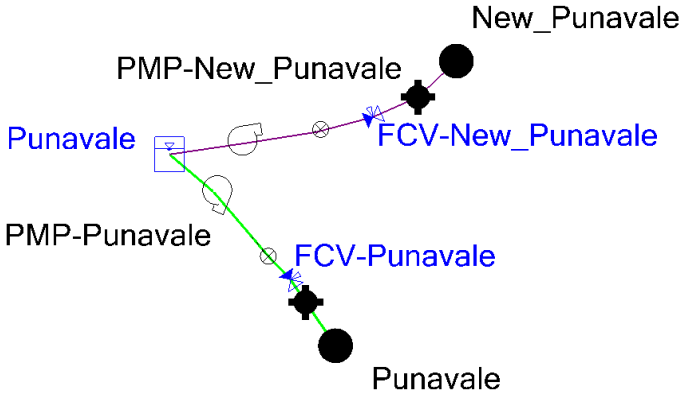

Figure 6.36: Pipe network

Table 6.69: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Punavale	602	568.5	33.5	7.48	7.81	9.41	9.82	40
2	New_Punavale	596.97	568.5	28.47	5.61	5.85	7.06	7.36	45
				Total	13.09	13.66	16.47	17.18	

Data as shown in Table 6.69 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.70: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-278	Punavale	PMP-New_Punavale	DI-K9	135	4	500	7.8	0.46	N
P-279	PMP-New_Punavale	FCV-New_Punavale	DI-K9	135	7	500	7.8	0.46	N
P-280	H-66	New_Punavale	DI-K9	135	3	500	7.8	0.46	N
P-281	FCV-New_Punavale	H-66	DI-K9	135	3	500	7.8	0.46	N

P-235	Punavale	PMP-Punavale	DI	135	3	500	5.85	0.345	E
P-236	PMP-Punavale	FCV-Punavale	DI	135	6	500	5.85	0.345	E
P-237	H-67	Punavale	DI	135	3	500	5.85	0.345	E
P-238	FCV-Punavale	H-67	DI	135	1	500	5.85	0.345	E

Table 6.71: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
New_Punavale	596.97	7.8	5.83
Punavale	602	5.85	13.32

Design of Sump:
With 2hours of detention time, volume = 17.18*1000/12= 1431.6 m3. With 4m water depth, area = 357.91 m2. And diameter = (4*Area/3.14)^0.5 = 21.35 m, say 22 m

Adequacy of gravity main from WTP to Sump Sector 96

This gravity main is shown in Figure 6.37.

Figure 6.37: Gravity main from WTP to Sump Sector 96

With the demand of 2045, model is run. Pipe results and junction results are shown in Table 6.72 and 6.73 respectively.

Table 6.72: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-740	Sump_Punavale	FCV-Punavale_Sump	DI	135	4,112	500	22.55	1.329	E
P-741	FCV-Punavale_Sump	H-104	DI	135	4	500	22.55	1.329	E
P-742	H-104	Sump-Punavale	DI	135	9	500	22.55	1.329	E

Table 6.73: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
Sump-Punavale	571.94	22.55	2.42

6.3.5 ESRs on Gavalimatha Line

ESRs on the Gavalimatha line are shown in Figure 6.38 and Table 6.74.

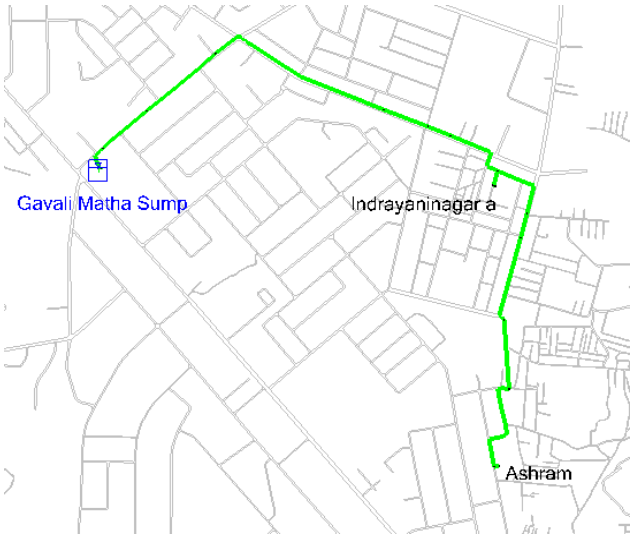

Figure 6.38: ESRs on the Gavalimatha line

Table 6.74: ESRs on the Gavalimatha Line

SN	Label	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)

1	Bhosari Gaothan	4.05	4.23	5.10	5.32
2	Dighi	9.93	10.36	12.49	13.04
3	Dighi Gaothan	3.56	3.71	4.48	4.67
4	Sant Tukaram	4.09	4.27	5.15	5.37
5	Sant Tukaram Nagar New	11.87	12.39	14.93	15.58
6	Ashram	3.39	3.54	4.26	4.45
7	Bopkhel	0	0.00	0.00	0.00
8	Dighi_Magzine	2.16	2.25	2.72	2.84
9	Indrayaninagar a	4.82	5.03	6.06	6.33
	Total	43.87	45.78	55.19	57.59

(1)ESRs Sant Tukaram and Sant Tukaram New

Pipeline network is shown in Figure 6.39. Levels and demands are shown in Table 6.75.

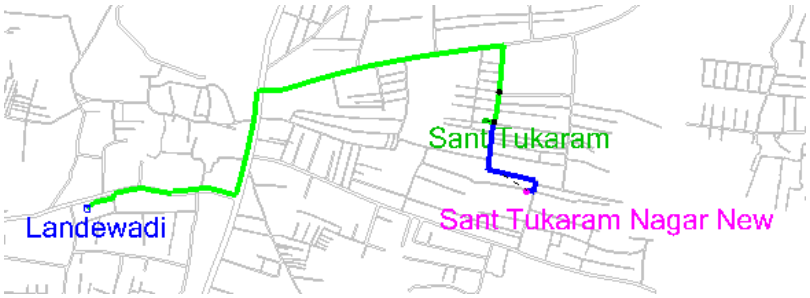

Figure 6.39: Pipe network

Table 6.75: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Sant Tukaram	611	576.9	34.1	4.09	4.27	5.15	5.37	50
2	Sant Tukaram Nagar New	618.5	576.9	41.6	11.87	12.39	14.93	15.58	50
				Total	15.96	16.65	20.08	20.95	

Data as shown in Table 6.75 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.76: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-53	J-220	J-3	DI	135	89	450	16.65	1.212	E
P-54	J-220	PMP-Sant	DI	135	1,627	450	16.65	1.212	E

		Tukaram							
P-55	PMP-Sant Tukaram	Landewadi	DI	135	12	450	16.65	1.212	E
P-124	J-3	FCV-Sant Tukaram Nagar New	DI-K9	135	337	500	12.39	0.73	N
P-125	FCV-Sant Tukaram Nagar New	H-73	DI-K9	135	2	500	12.39	0.73	N
P-126	H-73	Sant Tukaram Nagar New	DI-K9	135	2	500	12.39	0.73	N
P-480	J-3	FCV-Sant Tukaram	DI	135	20	500	4.27	0.251	E
P-481	FCV-Sant Tukaram	H-72	DI	135	4	500	4.27	0.251	E
P-482	H-72	Sant Tukaram	DI	135	4	500	4.27	0.251	E

Table 6.77: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
Sant Tukaram Nagar New	618.5	12.39	4.32
Sant Tukaram	611.4	4.27	11.73
J-220	594.6	0	28.82
J-3	594.24	0	28.86

(2)ESRs Indrayaninagar_a and Ashram

Pipeline network is shown in Figure 6.40. Levels and demands are shown in Table 6.78.

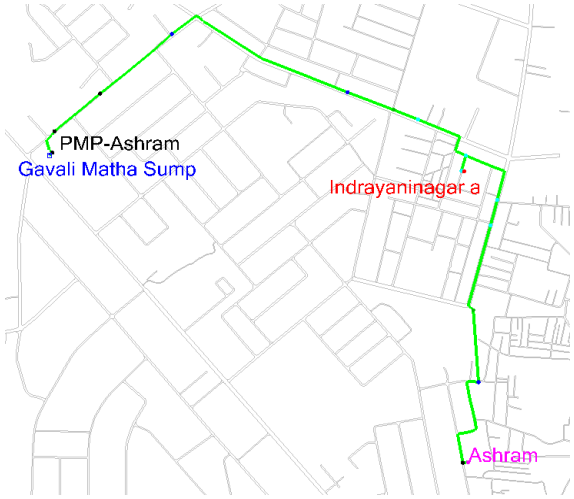

Figure 6.40: Pipe network

Table 6.78: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)

1	Indrayaninagar a	623.24	582.2	41.04	4.82	5.03	6.06	6.33	50
2	Ashram	610.93	582.2	28.73	3.39	3.54	4.26	4.45	50
				Total	8.21	8.57	10.33	10.78	

Data as shown in Table 6.78 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.79: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-108	J-15	FCV-Indrayaninagar a	DI	135	7	300	5.03	0.823	E
P-109	J-18	J-221	DI	135	301	400	8.56	0.789	E
P-110	J-22	J-21	DI	135	392	400	8.56	0.789	E
P-111	J-24	J-22	DI	135	249	400	8.56	0.789	E
P-112	J-26	J-24	DI	135	111	400	8.56	0.789	E
P-113	J-21	J-20	DI	135	841	400	8.56	0.789	E
P-114	J-236	J-18	DI	135	108	400	8.56	0.789	E
P-115	J-20	J-236	DI	135	206	400	8.56	0.789	E
P-233	Gavali Matha Sump	PMP-Ashram	DI	135	7	500	8.56	0.505	E
P-234	PMP-Ashram	J-26	DI	135	9	500	8.56	0.505	E
P-277	J-221	J-15	DI	135	67	400	5.03	0.463	E
P-387	J-12	J-14	DI	135	384	400	3.54	0.326	E
P-388	J-14	J-13	DI	135	307	400	3.54	0.326	E
P-389	J-221	J-249	DI	135	301	400	3.54	0.326	E
P-390	J-249	J-12	DI	135	111	400	3.54	0.326	E
P-391	FCV-Ashram	J-251	DI	135	14	400	3.54	0.326	E
P-392	J-251	J-13	DI	135	458	400	3.54	0.326	E
P-393	Ashram	H-70	DI	135	4	400	3.54	0.326	E
P-394	H-70	FCV-Ashram	DI	135	5	400	3.54	0.326	E
P-422	FCV-Indrayaninagar a	H-69	DI	135	2	500	5.03	0.296	E
P-423	H-69	Indrayaninagar a	DI	135	2	500	5.03	0.296	E

Table 6.80: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
Indrayaninagar a	623.24	5.03	7.05
Ashram	610.93	3.54	18.93
J-15	604	0	26.27

J-221	604	0	26.27
J-249	601	0	29.17
J-12	599.59	0	30.55
J-18	599.92	0	30.86
J-236	597.08	0	33.85
J-14	595.29	0	34.72
J-20	594.93	0	36.29
J-21	594.5	0	37.55
J-13	591.53	0	38.39
J-251	589.05	0	40.76
J-22	589.51	0	43.11
J-24	584.98	0	47.99
J-26	583.85	0	49.28

(3)ESRs Dighi_Magzine

Pipeline network is shown in Figure 6.41. Levels and demands are shown in Table 6.81.

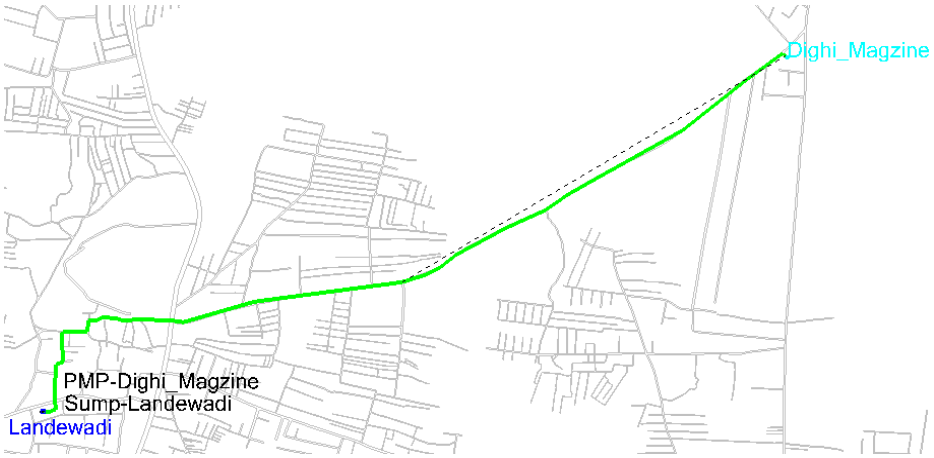

Figure 6.41: Pipe network

Table 6.81: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Dighi_Magzine	630.36	576.9	53.46	2.16	2.25	2.72	2.84	60

Data as shown in Table 6.81 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.82: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-544	Landewadi	PMP-Dighi_Mag	DI	135	8	450	2.25	0.164	E

		zine							
P-545	PMP-Dighi_Magzine	FCV-Dighi_Magzine	DI	135	3,537	450	2.25	0.164	E
P-560	FCV-Dighi_Magzine	H-68	DI	135	3	500	2.25	0.133	E
P-561	H-68	Dighi_Magzine	DI	135	4	500	2.25	0.133	E

Table 6.83: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
Dighi_Magzine	630.36	2.25	7.38

(4)ESRs Dighi

Pipeline network is shown in Figure 6.42. Levels and demands are shown in Table 6.84.

Figure 6.42: Pipe network

Table 6.84: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Dighi	630.5	576.9	53.6	9.93	10.36	12.49	13.04	65

Data as shown in Table 6.84 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.85: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-48	J-1	J-6	DI	135	1,546	400	9.93	0.915	E
P-49	J-2	J-1	DI	135	452	400	9.93	0.915	E
P-50	J-5	J-2	DI	135	843	400	9.93	0.915	E
P-47	J-6	J-252	DI	135	447	400	9.93	0.915	E

P-79	J-252	FCV-Dighi	DI	135	284	400	9.93	0.915	E
P-80	FCV-Dighi	H-74	DI	135	2	400	9.93	0.915	E
P-81	H-74	Dighi	DI	135	3	400	9.93	0.915	E
P-51	J-5	PMP-Dighi	DI	135	585	400	9.93	0.915	E
P-52	PMP-Dighi	Landewadi	DI	135	10	400	9.93	0.915	E

Table 6.86: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
Dighi	630.5	9.93	6.31
J-252	604	0	33.26
J-6	601.99	0	36.12
J-2	589.46	0	52.43
J-1	585.97	0	55.06
J-5	587.68	0	55.82

(5)ESR Dighi Gaothan

Pipeline network is shown in Figure 6.39. Levels and demands are shown in Table 6.87.

Figure 6.43: Pipe network

Table 6.87: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Dighi Gaothan	631.4	576.9	54.5	3.56	3.71	4.48	4.67	65

Data as shown in Table 6.87 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.88: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-162	J-239	FCV-Dighi Gaothan	DI	135	547	300	3.72	0.609	E
P-160	Landewadi	PMP-Dighi Gaothan	DI	135	14	300	3.72	0.609	E
P-161	PMP-Dighi	J-239	DI	135	3,413	300	3.72	0.609	E

	Gaothan								
P-163	FCV-Dighi Gaothan	H-75	DI	135	5	300	3.72	0.609	E
P-164	H-75	Dighi Gaothan	DI	135	4	300	3.72	0.609	E

Table 6.89: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
Dighi Gaothan	631.4	3.72	6.37
J-239	601.99	0	36.42

(6)ESR Bhosari Gaothan

Pipeline network is shown in Figure 6.44. Levels and demands are shown in Table 6.90.

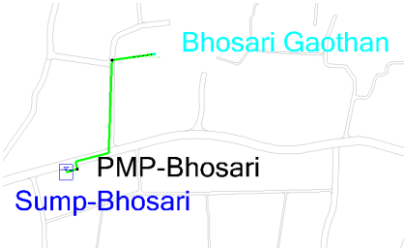

Figure 6.44: Pipe network

Table 6.90: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Bhosari Gaothan	607.4	573.68	33.72	4.05	4.23	5.10	5.32	40

Data as shown in Table 6.90 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.91: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-143	J-222	J-10	DI	135	166	300	4.22	0.691	E
P-487	J-222	FCV-Bhosari Gaothan	DI	135	45	500	4.22	0.249	E

P-488	FCV-Bhosari Gaothan	H-71	DI	135	3	500	4.22	0.249	E
P-489	H-71	Bhosari Gaothan	DI	135	4	500	4.22	0.249	E
P-490	Sump-Bhosari	PMP-Bhosari	DI	135	6	500	4.22	0.249	E
P-491	PMP-Bhosari	J-10	DI	135	8	500	4.22	0.249	E

Table 6.92: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
Bhosari Gaothan	607.4	4.22	6.97
J-222	582.6	0	31.72
J-10	578.68	0	35.97

(7)ESR Bopkhel

Pipeline network is shown in Figure 6.45. Levels and demands are shown in Table 6.93.

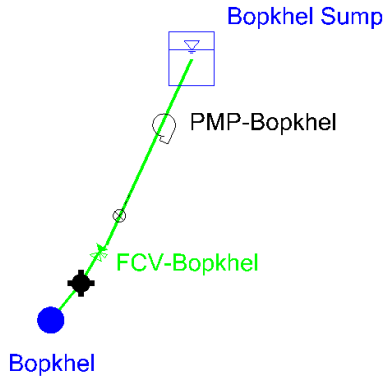

Figure 6.45: Pipe network

Table 6.93: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Bopkhel	594.33	573.15	21.18	5.2	5.43	6.54	6.83	30

Data as shown in Table 6.93 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.94: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams	Length (Scaled)	Diameter (mm)	Flow (Absolute)	Velocity (m/s)	P_EN

				C	(m)		(ML/day)		
P-680	PMP-Bopkhel	FCV-Bopkhel	DI	135	10	500	0	0	E
P-693	H-76	Bopkhel	DI	135	3	500	0	0	E
P-689	FCV-Bopkhel	H-76	DI	135	3	500	0	0	E
P-712	Bopkhel Sump	PMP-Bopkhel	DI	135	5	500	0	0	E

Table 6.95: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
Bopkhel	598.33	0	15.29

Design of Sump at Bhosari:
With 2hours of detention time, volume = 6.83*1000/12= 569.1 m3. With 4m water depth, area = 142.3 m2. And diameter = (4*Area/3.14)^0.5 = 13.4 say 14 m.

Design of Sump at Landewadi:
ESRs that are pumped are shown in Table 6.96

Table 6.96: ESRs on Landewadi sump

SN	ESR Label	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)
1	Sant Tukaram Nagar New	11.87	12.39	14.93	15.58
2	Sant Tukaram	4.09	4.27	5.15	5.37
3	Dighi_Magzine	2.16	2.25	2.72	2.84
4	Dighi Gaothan	3.56	3.71	4.48	4.67
5	Dighi	9.93	10.36	12.49	13.04
	Total	31.61	32.98	39.77	41.50

With 2hours of detention time, volume = 41.5*1000/12= 3458.3 m3. With 4m water depth, area = 864.6 m2. And diameter = (4*Area/3.14)^0.5 = 33.1 Say 33 m.

Design of Sump at Gavalimatha:
ESRs that are pumped are: Indrayaninagar a and Ashram

With 2 hours of detention time, volume = 10.78*1000/12= 898.3m3. With 4m water depth, area = 224.6 m2. And diameter = (4*Area/3.14)^0.5 = 16.91 Say 17 m.

Redundant Lines:

There are two pipelines- (1) from Gavalimatha sump to WD4 Esrs (Figure 6.46) and (2) From junction J-614 to Bhopkhel Sump (Figure 6.47). These lines are not in use and hence these lines are not considered in the design.

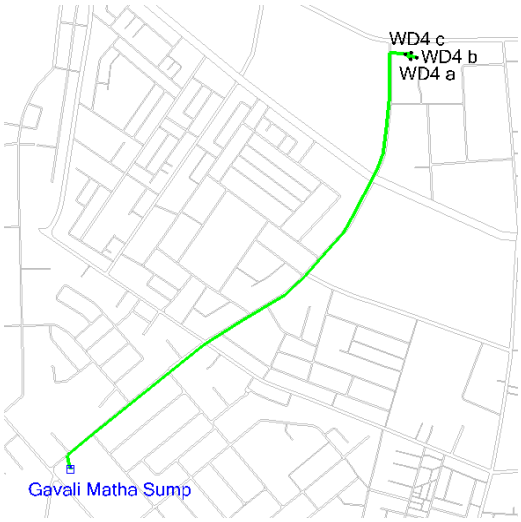

Figure 6.46: Pipe network

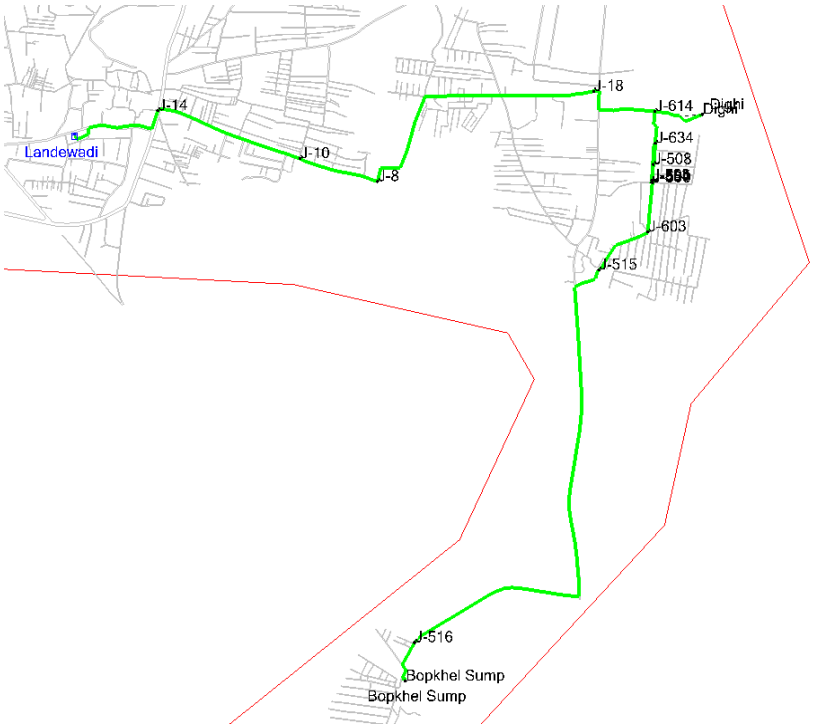

Figure 6.47: Pipe network

Adequacy of gravity main from WTP to Sumps up to Bhopkhel

This gravity main is shown in Figure 6.48.

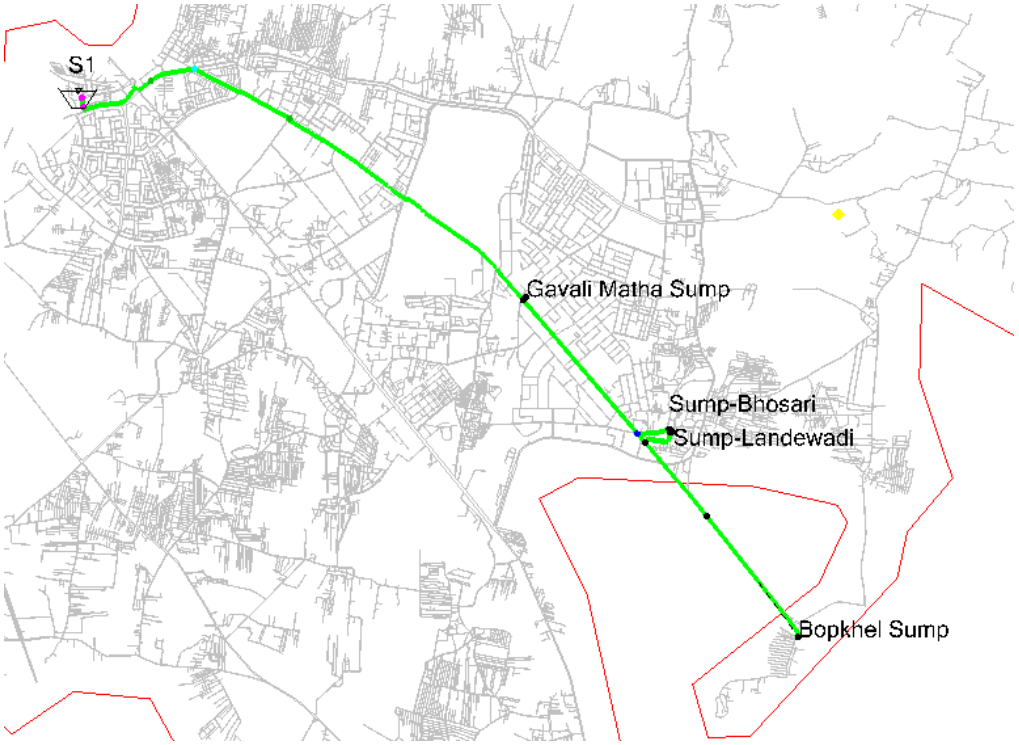

Figure 6.48: Gravity main from WTP to Sump Sector 96

Design for Year 2045:

With the demand of 2045, model is run. Pipe results and junction results are shown in Table 6.97 and 6.98 respectively.

Table 6.97: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-634	J-75	Sump_Gavali Matha	DI	135	16	500	0	0	E
P-633	J-27	Sump_Gavali Matha	DI	135	17	500	0	0	E
P-639	J-28	J-75	DI	135	21	600	0	0	E
P-640	J-28	J-27	DI	135	16	600	0	0	E
P-377	J-309	FCV-1Bopkhel Sump	DI	135	2,235	350	0	0	E
P-376	FCV-1Bopkhel Sump	H-77	DI	135	4	350	0	0	E
P-693	H-76	Bopkhel	DI	135	3	500	0	0	E
P-442	J-325	J-309	DI	135	1,397	400	0	0	E
P-583	J-30	J-325	DI	135	2,726	600	0	0	E
P-605	J-262	J-30	DI	135	6	900	0	0	E
P-606	J-153	J-262	DI	135	4,366	900	0	0	E
P-7	S1	J-263	DI	135	193	1,000.00	0	0	E
P-607	J-173	J-153	DI	135	1,572	1,000.00	0	0	E
P-609	J-263	J-185	DI	135	1,234	1,000.00	0	0	E
P-608	J-185	J-173	DI	135	669	1,000.00	0	0	E
P-680	PMP-Bopkhel	FCV-Bopkhel	DI	135	10	500	0	0	E

P-375	H-77	Sump_Bopkhel	DI	135	4	350	0	0	E
P-599	J-29	J-16	DI	135	2,556	450	0	0	E
P-631	J-30	J-29	DI	135	7	900	0	0	E
P-689	FCV-Bopkhel	H-76	DI	135	3	500	0	0	E
P-697	H-81	J-28	DI	135	4	750	0	0	E
P-694	J-262	FCV-Gavali Matha	DI	135	22	750	0	0	E
P-614	J-325	J-8	DI	135	532	600	0	0	E
P-686	FCV-Gavali Matha	H-81	DI	135	3	750	0	0	E
P-712	Bopkhel Sump	PMP-Bopkhel	DI	135	5	500	0	0	E

Table 6.98: Junction results

J_Tank_ID	Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
0	J-263	609.94	0	2.36
0	J-173	603.53	0	8.76
0	J-185	597.22	0	15.06
33	Bopkhel	598.33	0	15.29
0	J-153	594.71	0	17.56
113	Sump_Gavali Matha	583.54	0	28.71
0	J-27	583.47	0	28.77
0	J-75	583.37	0	28.88
0	J-28	583.32	0	28.93
0	J-262	583.2	0	29.05
0	J-30	583.1	0	29.14
0	J-29	583.02	0	29.22
0	J-16	582.9	0	29.35
0	J-309	579.86	0	32.38
0	J-325	579.38	0	32.86
0	J-8	578.1	0	34.14
119	Sump_Bopkhel	577.16	0	35.08

Design for Year 2030:

With the demand of 2030, model is run. Pipe results and junction results are shown in Table 6.99 and 6.100 respectively.

Table 6.99: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-634	J-75	Sump_Gavali Matha	DI	135	16	500	0	0	E
P-633	J-27	Sump_Gavali Matha	DI	135	17	500	0	0	E
P-639	J-28	J-75	DI	135	21	600	0	0	E

P-640	J-28	J-27	DI	135	16	600	0	0	E
P-377	J-309	FCV-1Bopkhel Sump	DI	135	2,235	350	0	0	E
P-376	FCV-1Bopkhel Sump	H-77	DI	135	4	350	0	0	E
P-693	H-76	Bopkhel	DI	135	3	500	0	0	E
P-442	J-325	J-309	DI	135	1,397	400	0	0	E
P-583	J-30	J-325	DI	135	2,726	600	0	0	E
P-605	J-262	J-30	DI	135	6	900	0	0	E
P-606	J-153	J-262	DI	135	4,366	900	0	0	E
P-7	S1	J-263	DI	135	193	#######	0	0	E
P-607	J-173	J-153	DI	135	1,572	#######	0	0	E
P-609	J-263	J-185	DI	135	1,234	#######	0	0	E
P-608	J-185	J-173	DI	135	669	#######	0	0	E
P-680	PMP-Bopkhel	FCV-Bopkhel	DI	135	10	500	0	0	E
P-375	H-77	Sump_Bopkhel	DI	135	4	350	0	0	E
P-599	J-29	J-16	DI	135	2,556	450	0	0	E
P-631	J-30	J-29	DI	135	7	900	0	0	E
P-689	FCV-Bopkhel	H-76	DI	135	3	500	0	0	E
P-697	H-81	J-28	DI	135	4	750	0	0	E
P-694	J-262	FCV-Gavali Matha	DI	135	22	750	0	0	E
P-614	J-325	J-8	DI	135	532	600	0	0	E
P-686	FCV-Gavali Matha	H-81	DI	135	3	750	0	0	E
P-712	Bopkhel Sump	PMP-Bopkhel	DI	135	5	500	0	0	E

Table 6.100: Junction results

Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
J-263	609.94	0	2.36
J-173	603.53	0	8.76
J-185	597.22	0	15.06
Bopkhel	598.33	0	15.29
J-153	594.71	0	17.56
Sump_Gavali Matha	583.54	0	28.71
J-27	583.47	0	28.77
J-75	583.37	0	28.88
J-28	583.32	0	28.93
J-262	583.2	0	29.05
J-30	583.1	0	29.14
J-29	583.02	0	29.22
J-16	582.9	0	29.35
J-309	579.86	0	32.38
J-325	579.38	0	32.86
J-8	578.1	0	34.14
Sump_Bopkhel	577.16	0	35.08

It is observed that velocity is not crossing 1.8 m/s and residual pressures are enough. Hence, sizing of pipeline is OK,

6.3.6 ESRs on Krishna Nagar Sump

ESRs on the KrishnaNagar line are shown in Figure 6.49 and Table 6.101.

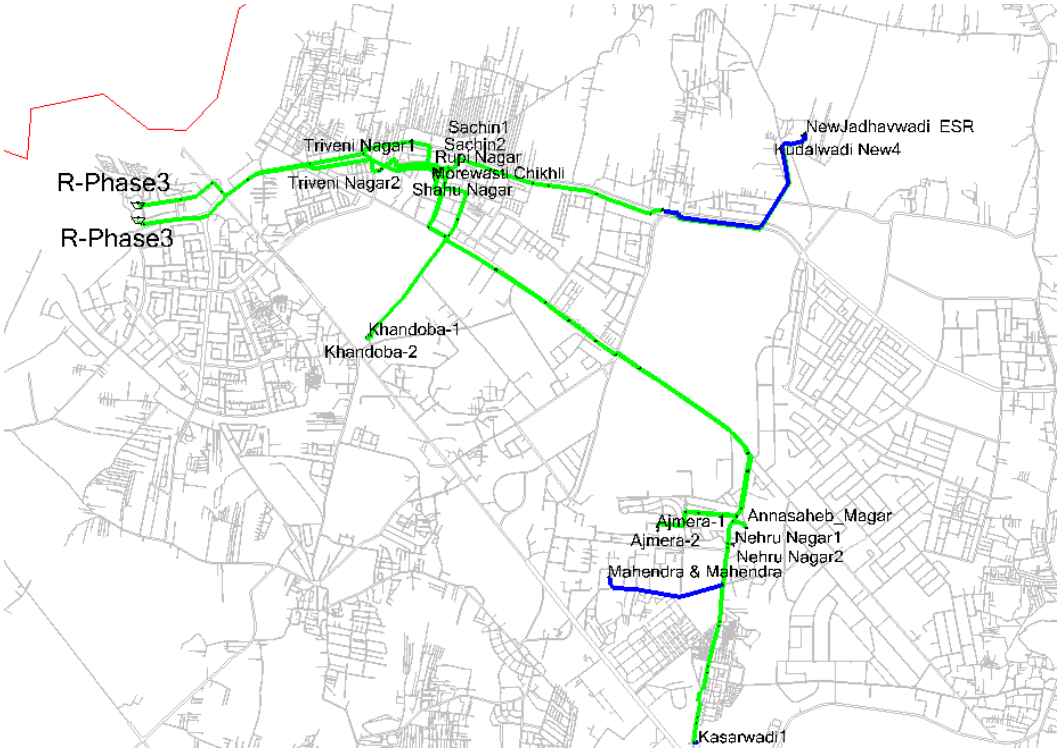

Figure 6.49: ESRs on the KrishnaNagar sump

Table 6.101: ESRs on the KrishnaNagar sump

SN	Label	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Remark
1	Ajmera-1	6.33	6.61	7.96	8.31	
2	Ajmera-2	5.77	6.02	7.26	7.57	
3	Annasaheb_Magar	3.83	4.00	4.82	5.03	
4	Triveni Nagar1	6.76	7.05	8.50	8.87	
5	Triveni Nagar2	8.48	8.85	10.67	11.13	
6	Kasarwadi1	1.84	1.92	2.31	2.42	
7	Khandoba-1	0	0.00	0.00	0.00	Direct from S1
8	Khandoba-2	0	0.00	0.00	0.00	Direct from S1
9	Mahendra & Mahendra	5.06	5.28	6.37	6.64	
10	NewJadhavwadi ESR	14.23	14.85	17.90	18.68	Direct from S1
11	Morewasti Chikhli	8.83	9.21	11.11	11.59	
12	Nehru Nagar1	3.3	3.44	4.15	4.33	
13	Nehru Nagar2	2.82	2.94	3.55	3.70	
14	Rupi Nagar	10.67	11.13	13.42	14.01	
15	Sachin1	3.5	3.65	4.40	4.59	
16	Sachin2	4.34	4.53	5.46	5.70	
17	Shahu Nagar	7.07	7.38	8.89	9.28	
18	Kudalwadi New4	5.91	6.17	7.44	7.76	Direct from S1
	Total	98.74	103.03	124.22	129.62	

(1)ESR on Krishna Nagar

Pipeline network is shown in Figure 6.50. Levels and demands are shown in Table 6.102.

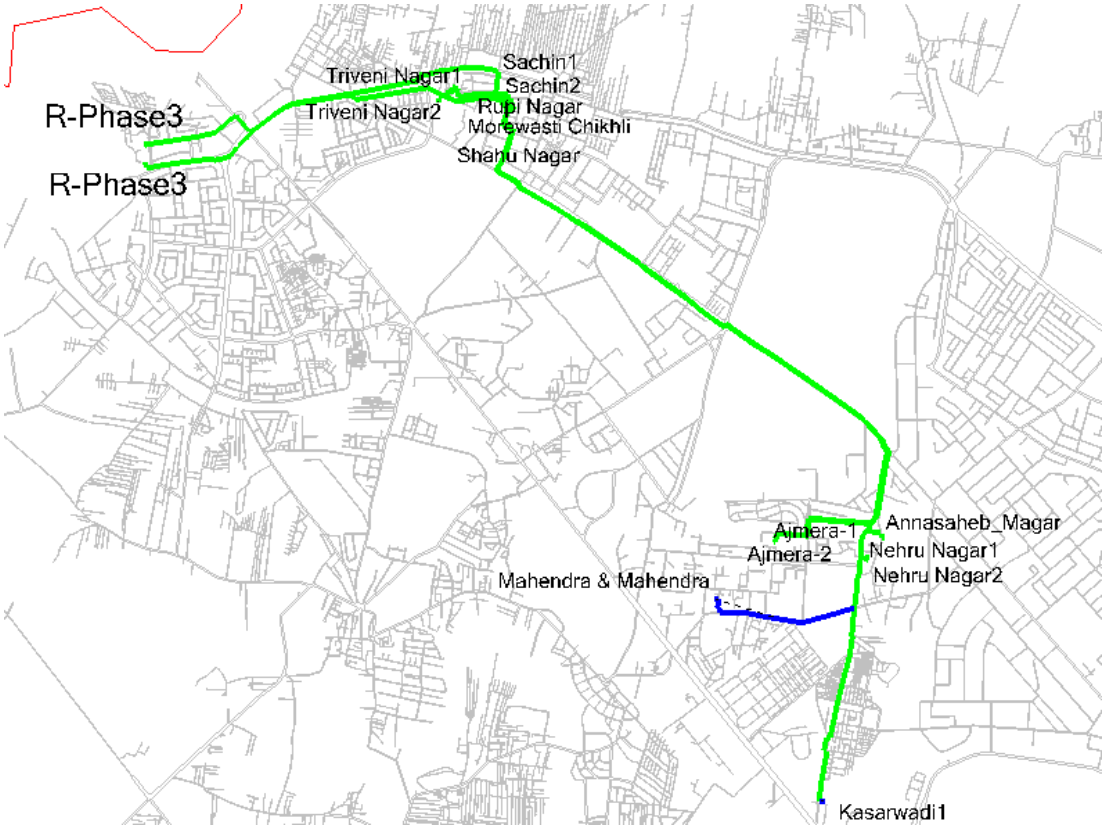

Figure 6.50: Pipe network

Table 6.102: Demands and levels

SN	Label	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)
1	Ajmera-1	6.33	6.61	7.96	8.31
2	Ajmera-2	5.77	6.02	7.26	7.57
3	Annasaheb_Magar	3.83	4.00	4.82	5.03
4	Triveni Nagar1	6.76	7.05	8.50	8.87
5	Triveni Nagar2	8.48	8.85	10.67	11.13
6	Kasarwadi1	1.84	1.92	2.31	2.42
7	Mahendra & Mahendra	5.06	5.28	6.37	6.64
8	Morewasti Chikhli	8.83	9.21	11.11	11.59
9	Nehru Nagar1	3.3	3.44	4.15	4.33
10	Nehru Nagar2	2.82	2.94	3.55	3.70
11	Rupi Nagar	10.67	11.13	13.42	14.01
12	Sachin1	3.5	3.65	4.40	4.59

13	Sachin2	4.34	4.53	5.46	5.70
14	Shahu Nagar	7.07	7.38	8.89	9.28
	Total	78.6	82.02	98.89	103.18

Pump data is shown in Table 6.102 a.

Table 6.102: Demands and levels

Label	Flow (Total) (ML/day)	Pump Head (m)
PMP-Sachin2	4.34	30.8
PMP-Triveni Nagar	15.24	25.68
PMP-Sachin1	3.5	30.79
PMP-Rupi Nagar	10.67	30.81
PMP-Morewasti Chikhli	8.83	30.8
PMP-Shahu Nagar	7.07	30.83

Data as shown in Table 6.102 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.103: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-13	J-166	PMP-Triveni Nagar	DI	135	793	400	15.24	1.404	E
P-14	PMP-Triveni Nagar	Krishna Nagar Sump	DI	135	14	400	15.24	1.404	E
P-131	J-41	J-44	DI	135	101	700	22.63	0.68	E
P-132	J-33	J-35	DI	135	12	700	22.63	0.68	E
P-133	J-35	J-41	DI	135	372	700	22.63	0.68	E
P-134	J-32	J-33	DI	135	179	700	22.63	0.68	E
P-149	FCV-Rupi Nagar	H-91	DI	135	4	500	10.67	0.629	E
P-150	H-91	Rupi Nagar	DI	135	4	500	10.67	0.629	E
P-151	Krishna Nagar Sump	PMP-Rupi Nagar	DI	135	10	500	10.67	0.629	E
P-152	PMP-Rupi Nagar	FCV-Rupi Nagar	DI	135	46	500	10.67	0.629	E
P-184	J-218	FCV-Ajmera-2	DI	135	4	400	5.77	0.532	E
P-185	FCV-Ajmera-2	Ajmera-2	DI	135	9	400	5.77	0.532	E
P-186	J-66	J-80	DI	135	328	400	5.77	0.532	E
P-187	J-56	J-63	DI	135	133	400	5.77	0.532	E
P-188	J-63	J-66	DI	135	106	400	5.77	0.532	E
P-189	J-44	J-56	DI	135	375	400	5.77	0.532	E
P-190	J-80	J-218	DI	135	38	400	5.77	0.532	E
P-195	FCV-	H-92	DI	135	4	500	8.83	0.521	E

	Morewasti Chikhli								
P-196	H-92	Morewasti Chikhli	DI	135	5	500	8.83	0.521	E
P-197	Krishna Nagar Sump	PMP-Morewasti Chikhli	DI	135	9	500	8.83	0.521	E
P-198	PMP-Morewasti Chikhli	FCV-Morewasti Chikhli	DI	135	54	500	8.83	0.521	E
P-209	J-44	J-46	DI	135	63	700	16.85	0.507	E
P-210	J-166	FCV-Triveni Nagar2	DI	135	27	500	8.48	0.5	E
P-211	FCV-Triveni Nagar2	H-94	DI	135	3	500	8.48	0.5	E
P-212	H-94	Triveni Nagar2	DI	135	4	500	8.48	0.5	E
P-261	Ajmera-1	FCV-Ajmera-1	DI	135	4	450	6.33	0.46	E
P-262	J-45	J-59	DI	135	381	450	6.33	0.46	E
P-263	J-69	J-81	DI	135	330	450	6.33	0.46	E
P-264	J-59	J-64	DI	135	129	450	6.33	0.46	E
P-265	J-64	J-69	DI	135	105	450	6.33	0.46	E
P-266	J-81	FCV-Ajmera-1	DI	135	13	450	6.33	0.46	E
P-309	J-94	J-89	DI	135	235	900	22.63	0.412	E
P-310	J-133	J-131	DI	135	23	900	22.63	0.412	E
P-311	J-131	J-101	DI	135	581	900	22.63	0.412	E
P-312	J-101	J-97	DI	135	296	900	22.63	0.412	E
P-313	J-97	J-94	DI	135	339	900	22.63	0.412	E
P-314	J-156	J-133	DI	135	618	900	22.63	0.412	E
P-315	J-161	J-156	DI	135	194	900	22.63	0.412	E
P-316	Krishna Nagar Sump	J-161	DI	135	648	900	22.63	0.412	E
P-317	J-89	J-87	DI	135	294	900	22.63	0.412	E
P-318	J-87	J-32	DI	135	1,378	900	22.63	0.412	E
P-319	J-166	FCV-Triveni Nagar1	DI	135	10	500	6.76	0.398	E
P-320	FCV-Triveni Nagar1	H-95	DI	135	2	500	6.76	0.398	E
P-321	H-95	Triveni Nagar1	DI	135	3	500	6.76	0.398	E
P-332	J-46	J-7	DI	135	229	700	13.02	0.392	E
P-383	Krishna Nagar Sump	PMP-Sachin2	DI	135	19	450	4.34	0.316	E
P-384	PMP-Sachin2	FCV-Sachin2	DI	135	32	450	4.34	0.316	E
P-385	FCV-Sachin2	H-90	DI	135	4	450	4.34	0.316	E
P-386	H-90	Sachin2	DI	135	3	450	4.34	0.316	E
P-411	J-307	FCV-Mahendra & Mahendra	DI-K7	135	1,246	500	5.06	0.298	N
P-412	FCV-Mahendra & Mahendra	H-85	DI-K7	135	4	500	5.06	0.298	N
P-413	H-85	Mahendra & Mahendra	DI-K7	135	4	500	5.06	0.298	N
P-414	FCV-Shahu	H-93	DI	135	4	600	7.07	0.289	E

	Nagar								
P-415	H-93	Shahu Nagar	DI	135	5	600	7.07	0.289	E
P-416	Krishna Nagar Sump	PMP-Shahu Nagar	DI	135	14	600	7.07	0.289	E
P-417	PMP-Shahu Nagar	FCV-Shahu Nagar	DI	135	85	600	7.07	0.289	E
P-424	J-7	J-47	DI	135	44	600	6.9	0.283	E
P-425	J-47	J-307	DI	135	375	600	6.9	0.283	E
P-516	J-253	FCV-Nehru Nagar1	DI	135	25	500	3.3	0.194	E
P-517	FCV-Nehru Nagar1	Nehru Nagar1	DI	135	9	500	3.3	0.194	E
P-518	J-42	J-45	MS	120	80	700	6.33	0.19	E
P-519	J-132	J-110	MS	120	578	700	6.33	0.19	E
P-520	J-88	J-36	MS	120	1,376	700	6.33	0.19	E
P-521	J-110	J-98	MS	120	293	700	6.33	0.19	E
P-522	J-36	J-37	MS	120	181	700	6.33	0.19	E
P-523	J-90	J-88	MS	120	294	700	6.33	0.19	E
P-524	J-162	J-159	MS	120	180	700	6.33	0.19	E
P-525	J-159	J-135	MS	120	628	700	6.33	0.19	E
P-526	J-95	J-90	MS	120	236	700	6.33	0.19	E
P-527	J-38	J-42	MS	120	373	700	6.33	0.19	E
P-528	J-98	J-95	MS	120	335	700	6.33	0.19	E
P-529	J-135	J-132	MS	120	13	700	6.33	0.19	E
P-530	J-37	J-38	MS	120	12	700	6.33	0.19	E
P-531	Krishna Nagar Sump	J-162	MS	120	691	700	6.33	0.19	E
P-532	J-253	J-7	DI	135	35	700	6.12	0.184	E
P-542	FCV-Nehru Nagar2	J-253	DI	135	18	500	2.82	0.166	E
P-543	FCV-Nehru Nagar2	Nehru Nagar2	DI	135	13	500	2.82	0.166	E
P-554	FCV-Sachin1	H-89	DI	135	4	600	3.5	0.143	E
P-555	H-89	Sachin1	DI	135	4	600	3.5	0.143	E
P-556	Krishna Nagar Sump	PMP-Sachin1	DI	135	14	600	3.5	0.143	E
P-557	PMP-Sachin1	FCV-Sachin1	DI	135	53	600	3.5	0.143	E
P-568	J-39	FCV-Annasaheb_Magar	DI	135	17	700	3.83	0.115	E
P-569	Annasaheb_Magar	FCV-Annasaheb_Magar	DI	135	6	700	3.83	0.115	E
P-570	J-46	J-39	DI	135	164	700	3.83	0.115	E
P-586	J-54	J-53	DI	135	62	600	1.84	0.075	E
P-587	J-49	J-51	DI	135	47	600	1.84	0.075	E
P-588	J-54	J-57	DI	135	492	600	1.84	0.075	E
P-589	J-60	J-55	DI	135	195	600	1.84	0.075	E
P-590	J-53	J-51	DI	135	416	600	1.84	0.075	E
P-591	J-307	J-49	DI	135	368	600	1.84	0.075	E
P-593	H-86	Kasarwadi 1	DI-K7	135	5	600	1.84	0.075	N
P-585	J-55	FCV-Kasarwadi 1	DI-K7	135	37	600	1.84	0.075	N
P-592	FCV-Kasarwadi 1	H-86	DI-K7	135	4	600	1.84	0.075	N
P-604	J-57	J-60	DI	135	56	700	1.84	0.055	E

Table 6.104: Junction results

J_Tank_ID	Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
3	Annasaheb_Magar	604.9	3.83	7.91
48	Mahendra & Mahendra	604.5	5.06	7.98
2	Ajmera-2	603.92	5.77	8.22
81	Shahu Nagar	636.5	7.07	8.32
54	Nehru Nagar1	604.14	3.3	8.62
51	Morewasti Chikhli	636.16	8.83	8.62
55	Nehru Nagar2	604.12	2.82	8.64
74	Rupi Nagar	635.99	10.67	8.8
20	Triveni Nagar1	627.1	6.76	9.29
1	Ajmera-1	603.79	6.33	9.38
21	Triveni Nagar2	626.3	8.48	10.09
76	Sachin2	633.05	4.34	11.73
75	Sachin1	632.86	3.5	11.91
0	J-161	599.14	0	14.71
0	J-162	598.89	0	15.04
0	J-89	597.24	0	16.24
0	J-90	597.1	0	16.67
0	J-87	595.8	0	17.62
0	J-88	595.77	0	17.97
0	J-101	594.99	0	18.62
0	J-94	594.81	0	18.7
0	J-110	594.95	0	18.88
0	J-156	594.78	0	19.04
0	J-95	594.69	0	19.09
0	J-159	594.75	0	19.15
0	J-32	594.03	0	19.16
0	J-36	594.12	0	19.53
0	J-33	592.68	0	20.41
0	J-35	592.43	0	20.65
0	J-37	592.97	0	20.67
0	J-38	592.73	0	20.91
0	J-97	590.99	0	22.57
0	J-80	589.37	0	22.75
0	J-218	589.31	0	22.8
0	J-98	590.69	0	23.11
0	J-66	589.01	0	23.37
0	J-63	589.04	0	23.4
0	J-41	589.36	0	23.5
0	J-44	589.14	0	23.66
0	J-81	589.37	0	23.78
0	J-131	589.9	0	23.8
0	J-133	589.86	0	23.84
0	J-46	588.93	0	23.85
0	J-132	589.88	0	23.97
0	J-135	589.86	0	23.99
0	J-42	589.35	0	24.26
0	J-69	589.03	0	24.29
0	J-64	589.06	0	24.3
0	J-45	589.17	0	24.43
0	J-39	587.82	0	24.95
41	Kasarwadi1	586.07	1.84	26.58
0	J-56	585.05	0	27.47
0	J-166	608.72	0	27.64
0	J-59	585.34	0	28.08
0	J-253	584.63	0	28.1
0	J-7	584.29	0	28.43
0	J-47	583.6	0	29.11
0	J-49	579.24	0	33.42
0	J-51	579.18	0	33.47
0	J-307	575.17	0	37.48
0	J-53	569.96	0	42.66

0	J-54	569.76	0	42.87
0	J-57	564.5	0	48.11
0	J-60	563.78	0	48.83
0	J-55	561.26	0	51.34

Design of Sump at Krishnanagar
With 2hours of detention time, volume = 103.18*1000/12=8598.3 m3. With 4m water depth, area = 2149.6 m2. And diameter = (4*Area/3.14)^0.5 = 52.3 say 53 m.

(2)ESR on Jadhavwadi Sump

Pipeline network is shown in Figure 6.51. Levels and demands are shown in Table 6.105.

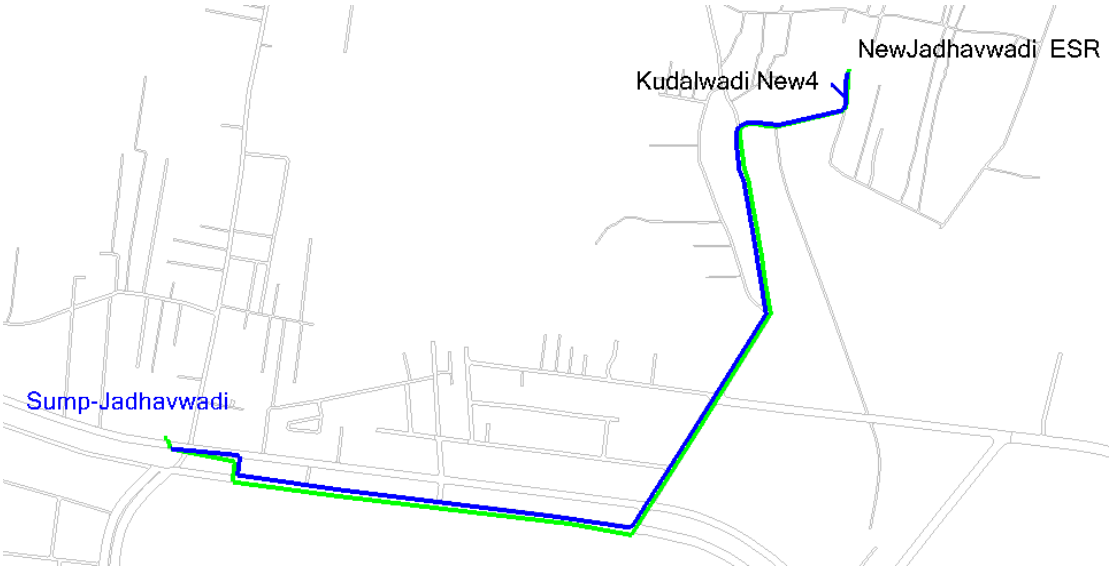

Figure 6.51: Pipe network

Table 6.105: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	NewJadhavwadi ESR	620.94	587.32	33.62	14.23	14.85	17.90	18.68	40
2	Kudalwadi New4	603	587.32	15.68	5.91	6.17	7.44	7.76	40
				Total	20.14	21.02	25.34	26.44	

Data as shown in Table 6.105 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.106: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-728	PMP-Jadhvwadi	New Sump-Jadhavwadi	DI-K9	135	8	400	21.01	1.935	N
P-729	J-77	H-100	DI-K9	135	1,070	400	21.01	1.935	N
P-730	H-100	PMP-Jadhvwadi	DI-K9	135	9	400	21.01	1.935	N
P-39	J-77	J-306	DI-K9	135	2,162	400	14.2	1.308	N
P-60	J-23	J-76	DI	135	10	300	6.8	1.114	E
P-61	J-77	J-23	DI	135	2,223	300	6.8	1.114	E
P-123	J-306	J-76	DI-K9	135	52	400	8.04	0.74	N
P-169	J-76	FCV-NewJadhavwadi ESR	DI	135	5	600	14.84	0.608	E
P-170	FCV-NewJadhavwadi ESR	H-82	DI	135	2	600	14.84	0.608	E
P-171	H-82	NewJadhavwadi ESR	DI	135	2	600	14.84	0.608	E
P-372	FCV-Kudalwadi New4	J-306	DI-K9	135	36	500	6.16	0.363	N
P-373	Kudalwadi New4	H-83	DI-K9	135	2	500	6.16	0.363	N
P-374	H-83	FCV-Kudalwadi New4	DI-K9	135	3	500	6.16	0.363	N

Table 6.107: Junction results

J_Tank_ID	Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
49	NewJadhavwadi ESR	620.94	14.84	6.28
88	Kudalwadi New4	615	6.16	12.27
0	J-306	603.76	0	23.49
0	J-23	601.16	0	26.03
0	J-76	600.37	0	26.81
0	J-77	592.4	0	42.83

Design of Sump at Jadhavwadi:

With 2hours of detention time, volume = 26.44*1000/12= 2203.3 m3. With 4m water depth, area = 550.8 m2. And diameter = (4*Area/3.14)^0.5 = 26.4 say 26 m.

(3)ESR on S1-Jadhavwadi Sump Line

Pipeline network is shown in Figure 6.52. Levels and demands are shown in Table 6.108.

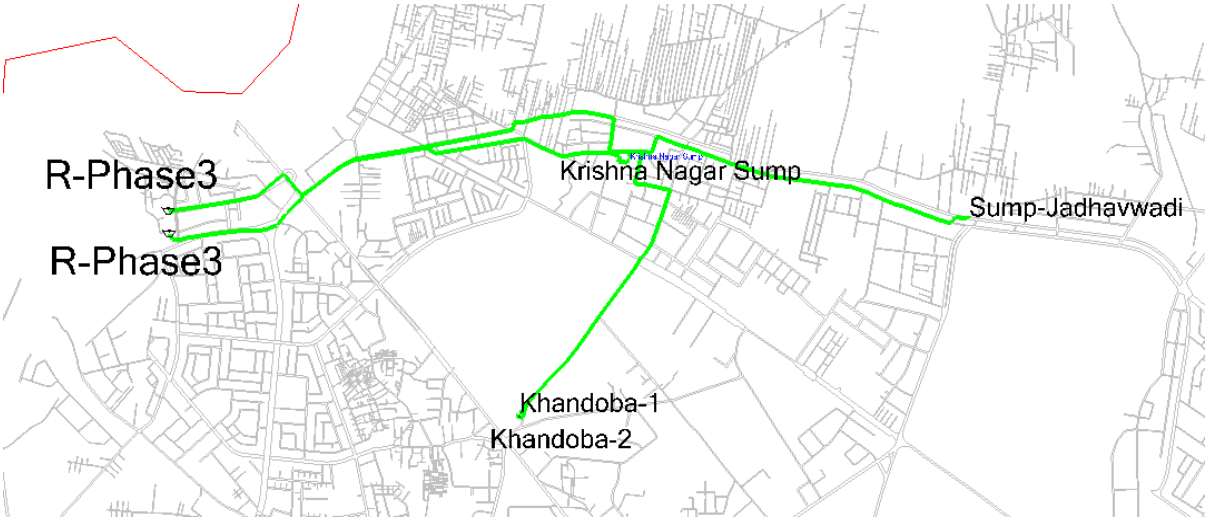

Figure 7.52: Pipe network

Table 6.108: Demands and levels

Label	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)
Sump-Jadhavwadi	21.02	21.93	26.44	27.59
Khandoba-1	7	7.30	8.81	9.19
Khandoba-2	8.08	8.43	10.17	10.61
Total	36.1	37.67	45.42	47.39

Data as shown in Table 6.108 is fed to the model and model run is obtained.

Design for year 2045:

Table 6.109: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-13665	J-244	H-112	DI	135	77	500	26.44	1.559	N
P-13666	H-112	FCV-141	DI	135	2	500	26.44	1.559	N
P-13664	FCV-141	Sump-Jadhavwadi	DI	135	12	500	26.44	1.559	N
P-88	J-147	J-254	DI	135	1,274	500	18.97	1.118	E
P-450	J-160	J-148	DI	135	80	900	45.41	0.826	E
P-704	J-244	J-118	DI	135	256	700	26.44	0.795	E
P-687	J-148	J-144	DI	135	166	700	26.44	0.795	E
P-705	J-136	J-130	DI	135	138	700	26.44	0.795	E
P-706	J-144	J-136	DI	135	342	700	26.44	0.795	E
P-707	J-130	J-118	DI	135	305	700	26.44	0.795	E
P-505	R-Phase3	PMP-635	DI	135	18	600	15.14	0.62	E
P-506	PMP-635	J-205	DI	135	24	600	15.14	0.62	E
P-507	R-Phase3	PMP-635	DI	135	17	600	15.14	0.62	E
P-508	PMP-635	J-205	DI	135	23	600	15.14	0.62	E
P-509	R-Phase3	PMP-635	DI	135	18	600	15.14	0.62	E
P-510	PMP-635	J-205	DI	135	22	600	15.14	0.62	E
P-268	J-254	FCV-Khandoba-2	MS	120	66	500	10.17	0.599	E

P-269	FCV-Khandoba-2	H-88	MS	120	7	500	10.17	0.599	E
P-270	H-88	Khandoba-2	MS	120	7	500	10.17	0.599	E
P-328	J-254	FCV-Khandoba-1	MS	120	20	500	8.8	0.519	E
P-329	FCV-Khandoba-1	H-87	MS	120	4	500	8.8	0.519	E
P-330	H-87	Khandoba-1	MS	120	5	500	8.8	0.519	E
P-546	J-165	J-160	MS	120	794	1,200.00	45.41	0.465	E
P-547	J-183	J-171	MS	120	646	1,200.00	45.41	0.465	E
P-548	J-192	J-183	MS	120	328	1,200.00	45.41	0.465	E
P-549	J-194	J-197	MS	120	354	1,200.00	45.41	0.465	E
P-550	J-205	J-197	MS	120	389	1,200.00	45.41	0.465	E
P-551	J-194	J-192	MS	120	147	1,200.00	45.41	0.465	E
P-552	J-171	J-265	MS	120	537	1,200.00	45.41	0.465	E
P-553	J-265	J-165	MS	120	258	1,200.00	45.41	0.465	E
P-451	J-145	J-147	DI	135	178	900	18.97	0.345	E
P-452	J-148	J-154	DI	135	150	900	18.97	0.345	E
P-453	J-154	J-155	DI	135	79	900	18.97	0.345	E
P-454	J-155	J-145	DI	135	501	900	18.97	0.345	E

Table 6.110: Junction results

J_Tank_ID	Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
0	J-160	612.84	0	19
0	J-154	611.97	0	19.85
45	Khandoba-2	607.84	10.17	21.12
0	J-205	611.39	0	21.27
0	J-155	609.17	0	22.63
0	J-148	608.76	0	23.08
44	Khandoba-1	605.29	8.8	23.71
0	J-165	604.65	0	27.32
0	J-197	604.89	0	27.5
0	J-265	604.39	0	27.62
0	J-171	604	0	28.11
0	J-144	602.84	0	28.9
0	J-194	602.47	0	29.85
0	J-145	599.63	0	32.1
0	J-192	599.72	0	32.57
0	J-183	597.5	0	34.72
0	J-136	596.22	0	35.25
0	J-130	594.77	0	36.59
0	J-147	594.97	0	36.72
0	Sump-Jadhavwadi	591.59	26.44	39.07
0	J-118	591.03	0	40.09
0	J-244	589.59	0	41.42
0	J-254	584.28	0	44.7

Design for year 2030:

Table 6.111: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-13665	J-244	H-112	DI	135	77	500	21.02	1.239	N
P-13666	H-112	FCV-141	DI	135	2	500	21.02	1.239	N
P-13664	FCV-141	Sump-Jadhavwadi	DI	135	12	500	21.02	1.239	N

P-88	J-147	J-254	DI	135	1,274	500	15.08	0.889	E
P-450	J-160	J-148	DI	135	80	900	36.09	0.657	E
P-704	J-244	J-118	DI	135	256	700	21.02	0.632	E
P-687	J-148	J-144	DI	135	166	700	21.02	0.632	E
P-705	J-136	J-130	DI	135	138	700	21.02	0.632	E
P-706	J-144	J-136	DI	135	342	700	21.02	0.632	E
P-707	J-130	J-118	DI	135	305	700	21.02	0.632	E
P-505	R-Phase3	PMP-635	DI	135	18	600	12.03	0.493	E
P-506	PMP-635	J-205	DI	135	24	600	12.03	0.493	E
P-507	R-Phase3	PMP-635	DI	135	17	600	12.03	0.493	E
P-508	PMP-635	J-205	DI	135	23	600	12.03	0.493	E
P-509	R-Phase3	PMP-635	DI	135	18	600	12.03	0.493	E
P-510	PMP-635	J-205	DI	135	22	600	12.03	0.493	E
P-268	J-254	FCV-Khandoba-2	MS	120	66	500	8.08	0.476	E
P-269	FCV-Khandoba-2	H-88	MS	120	7	500	8.08	0.476	E
P-270	H-88	Khandoba-2	MS	120	7	500	8.08	0.476	E
P-328	J-254	FCV-Khandoba-1	MS	120	20	500	7	0.413	E
P-329	FCV-Khandoba-1	H-87	MS	120	4	500	7	0.413	E
P-330	H-87	Khandoba-1	MS	120	5	500	7	0.413	E
P-546	J-165	J-160	MS	120	794	1,200.00	36.09	0.369	E
P-547	J-183	J-171	MS	120	646	1,200.00	36.09	0.369	E
P-548	J-192	J-183	MS	120	328	1,200.00	36.09	0.369	E
P-549	J-194	J-197	MS	120	354	1,200.00	36.09	0.369	E
P-550	J-205	J-197	MS	120	389	1,200.00	36.09	0.369	E
P-551	J-194	J-192	MS	120	147	1,200.00	36.09	0.369	E
P-552	J-171	J-265	MS	120	537	1,200.00	36.09	0.369	E
P-553	J-265	J-165	MS	120	258	1,200.00	36.09	0.369	E
P-451	J-145	J-147	DI	135	178	900	15.08	0.274	E
P-452	J-148	J-154	DI	135	150	900	15.08	0.274	E
P-453	J-154	J-155	DI	135	79	900	15.08	0.274	E
P-454	J-155	J-145	DI	135	501	900	15.08	0.274	E

Table 6.112: Junction results

J_Tank_ID	Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
0	J-160	612.84	0	19.56
0	J-154	611.97	0	20.42
0	J-205	611.39	0	21.54
45	Khandoba-2	607.84	8.08	22.67
0	J-155	609.17	0	23.2
0	J-148	608.76	0	23.64
44	Khandoba-1	605.29	7	25.25
0	J-165	604.65	0	27.83
0	J-197	604.89	0	27.87
0	J-265	604.39	0	28.12
0	J-171	604	0	28.57
0	J-144	602.84	0	29.49
0	J-194	602.47	0	30.23
0	J-145	599.63	0	32.69
0	J-192	599.72	0	32.96
0	J-183	597.5	0	35.14
0	J-136	596.22	0	35.92
0	J-130	594.77	0	37.3

0	J-147	594.97	0	37.32
0	Sump-Jadhavwadi	591.59	21.02	40.02
0	J-118	591.03	0	40.88
0	J-244	589.59	0	42.25
0	J-254	584.28	0	46.23

Redundant Lines:

There are two pipelines- (1) from S1 to Triveni Esrs (Figure 6.53), (2) Inlet and outlets of KrishnaNagar MBR (Figure 6.54) and (3) line joining old Jadhavwadi sump. These lines are not in use and hence these lines are not considered in the design.

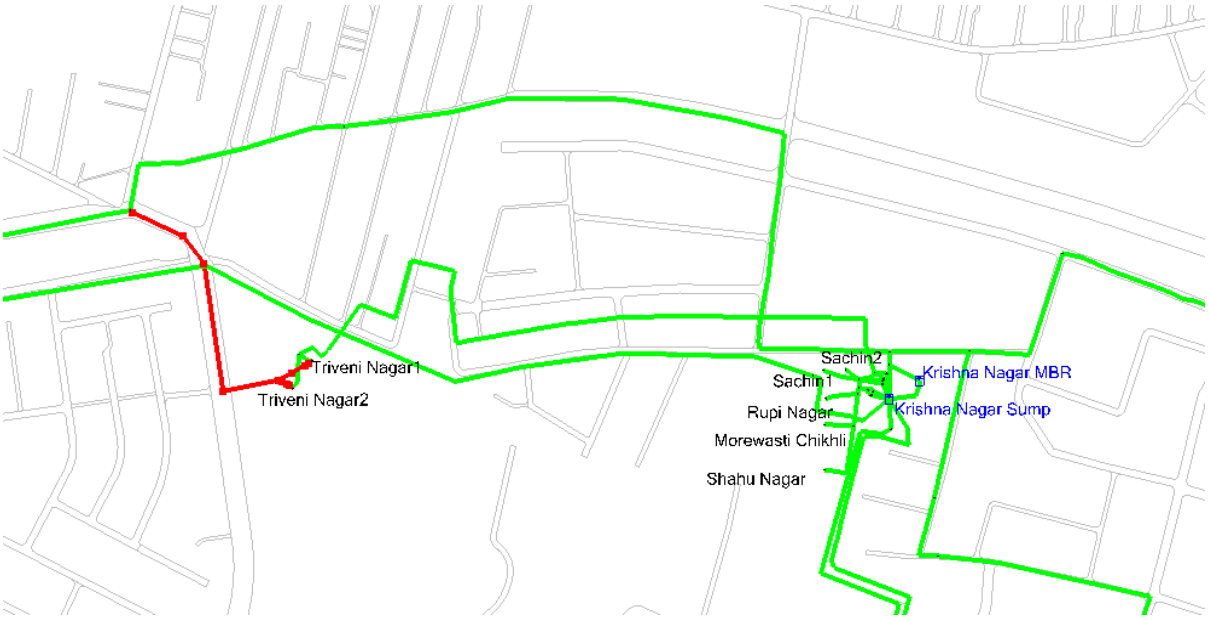

Figure 6.53: Pipe network

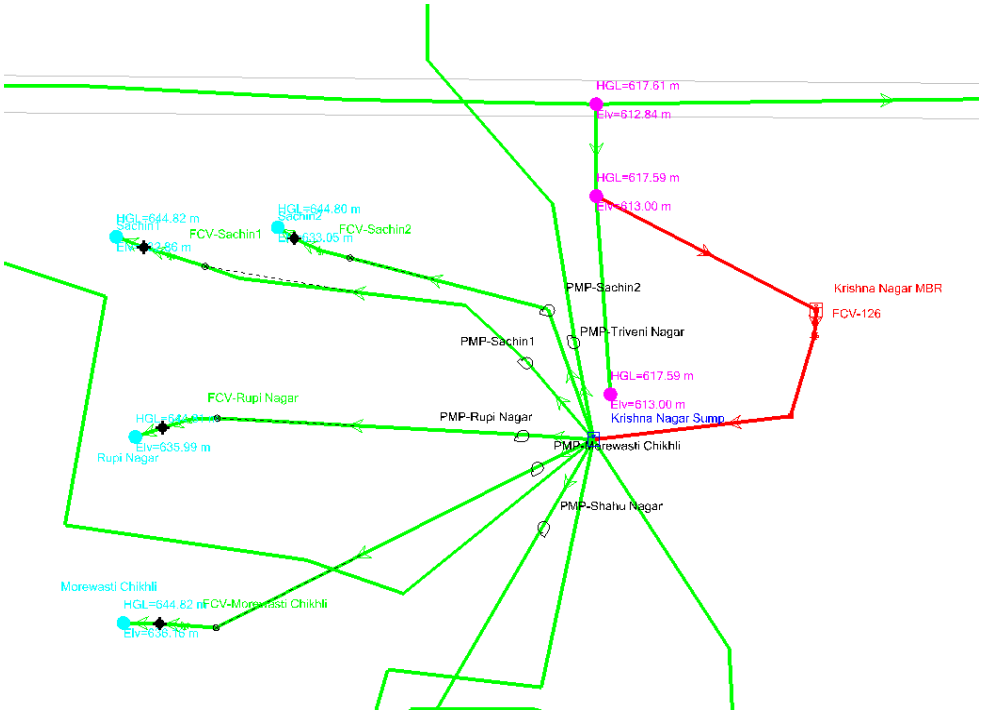

Figure 6.54: Pipe network

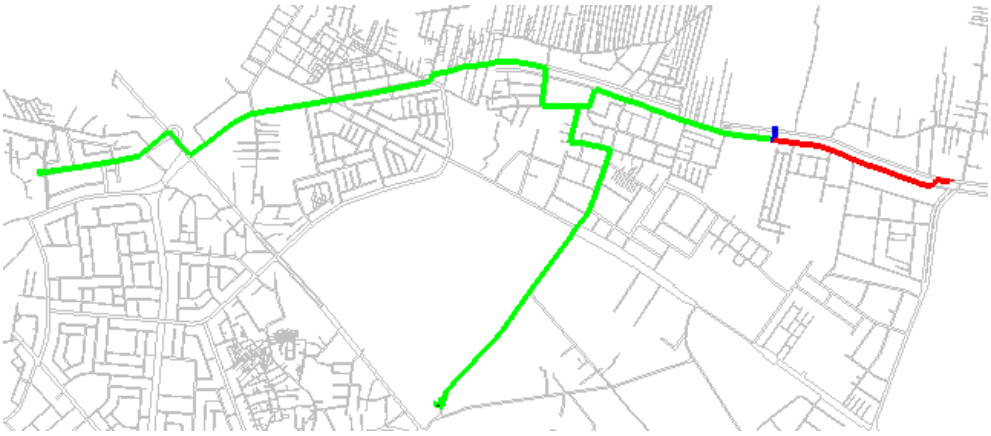

Figure 6.55: Pipe network

6.3.7 ESRs on Kudalwadi Line

Source of water to these ERS is the proposed Bhama-Asked dam. ESRs on the Kudalwadi line are shown in Figure 6.55 and Table 6.113.

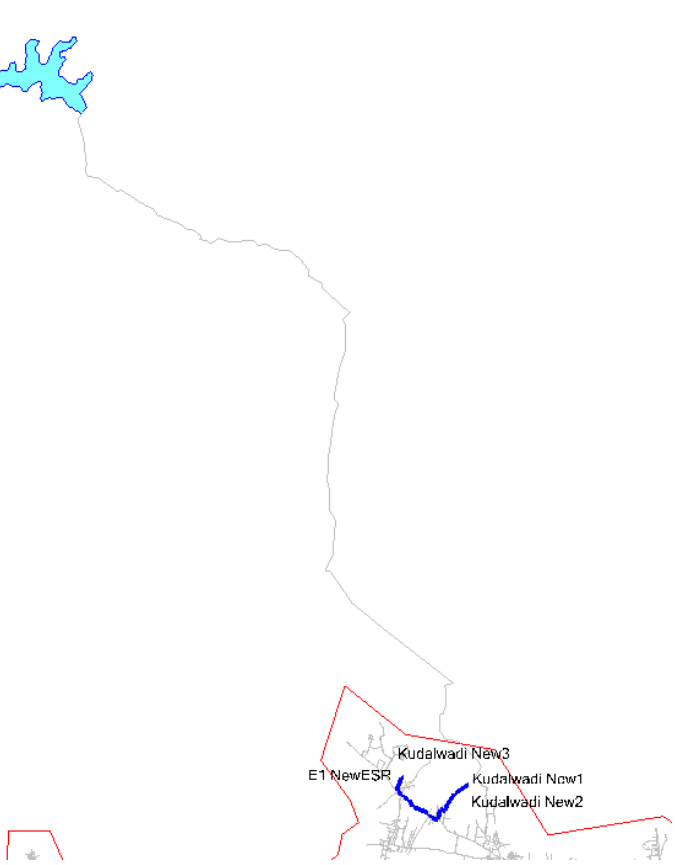

Figure 6.55: ESRs on the Kudalwadi line

Table 6.113: ESRs on the Kudalwadi line

SN	Label	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)
1	Gairan	6.53	6.81	8.22	8.57
2	Kudalwadi New3	7.43	7.75	9.35	9.75
3	Kudalwadi New2	7.65	7.98	9.62	10.04
4	Kudalwadi New1	7.41	7.73	9.32	9.73
	Total	29.02	30.28	36.51	38.10

6.3.8 ESR on Gairan

Pipeline network is shown in Figure 6.56. Levels and demands are shown in Table 6.102.

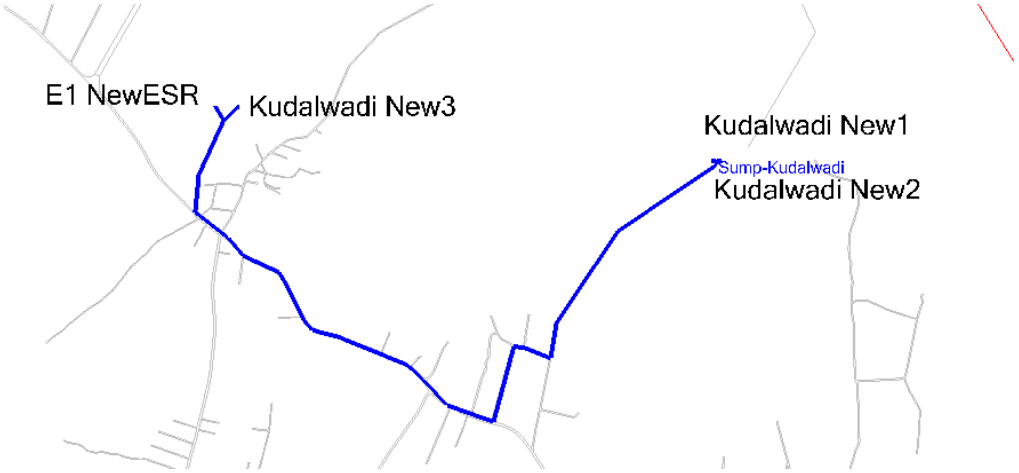

Figure 6.56: Pipe network

Table 6.102: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Kudalwadi New1	607	578.86	28.14	7.41	7.732174	9.322379	9.7277	35
2	Kudalwadi New2	607	578.86	28.14	7.65	7.982609	9.624318	10.04277	35
				Total	15.06	15.71478	18.9467	19.77047	

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Kudalwadi New3	615	578.86	36.14	7.43	7.753043	9.347541	9.753956	45
2	Gairan	620	578.86	41.14	6.53	6.813913	8.215268	8.572454	45
				Total	13.96	14.56696	17.56281	18.32641	

Data as shown in Table 6.102 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.103: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-271	Sump-Kudalwadi	PMP-Kudalwadi1	DI-K9	135	5	700	15.71	0.473	N
P-272	PMP-Kudalwadi1	J-304	DI-K9	135	4	700	15.71	0.473	N
P-273	J-304	FCV-Kudalwadi New2	DI-K9	135	12	500	7.98	0.471	N
P-274	FCV-Kudalwadi New2	H-99	DI-K9	135	3	500	7.98	0.471	N
P-275	H-99	Kudalwadi New2	DI-K9	135	3	500	7.98	0.471	N
P-282	J-305	FCV-Kudalwadi New3	DI-K9	135	54	500	7.75	0.457	N
P-283	FCV-Kudalwadi New3	H-97	DI-K9	135	6	500	7.75	0.457	N
P-284	H-97	Kudalwadi New3	DI-K9	135	6	500	7.75	0.457	N
P-290	J-304	FCV-Kudalwadi New1	DI-K9	135	10	500	7.73	0.455	N

P-291	FCV-Kudalwadi New1	H-98	DI-K9	135	2	500	7.73	0.455	N
P-292	H-98	Kudalwadi New1	DI-K9	135	3	500	7.73	0.455	N
P-299	Sump-Kudalwadi	PMP-Kudalwadi2	DI-K9	135	5	700	14.56	0.438	N
P-300	PMP-Kudalwadi2	J-305	DI-K9	135	2,596	700	14.56	0.438	N
P-333	J-305	FCV-Gairan	DI-K9	135	44	500	6.82	0.402	N
P-334	FCV-Gairan	H-96	DI-K9	135	4	500	6.82	0.402	N
P-335	H-96	Gairan	DI-K9	135	4	500	6.82	0.402	N

Table 6.104: Junction results

J_Tank_ID	Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
84	Gairan	620	6.82	3.32
87	Kudalwadi New3	615	7.75	8.3
86	Kudalwadi New2	607	7.98	11.97
85	Kudalwadi New1	607	7.73	11.97
0	J-305	590.11	0	33.17
0	J-304	582.8	0	36.13

Design of Sump at Gairan:
With 2hours of detention time, volume = 38.1*1000/12=3175 m3. With 4m water depth, area = 793.7 m2. And diameter = (4*Area/3.14)^0.5 = 31.7 say 32 m.

6.3.9 Pradhikaran ESR

Pipeline network is shown in Figure 6.57. Levels and demands are shown in Table 6.105.

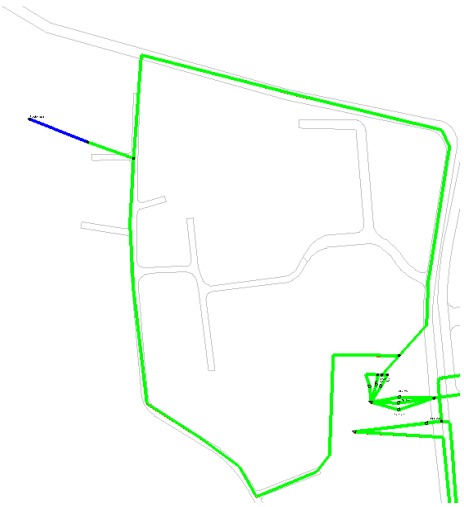

Figure 6.57: Pipe network

Table 6.105: Demands and levels

SN	Pump	FSL of tank (m)	LSL of sump (m)	Static head (m)	Demand of 2030 (ML)	Demand of 2030* 24/23 (ML)	Demand of 2045 (ML)	Demand of 2045* 24/23 (ML)	Design Head (m)
1	Pradhikaran	631	608.1	22.9	11.64	12.15	14.64	15.28	30

Data as shown in Table 6.105 is fed to the model and model run is obtained.

Design for year 2030:

Table 6.106: Pipe results

Label	Start Node	Stop Node	Material	Hazen-Williams C	Length (Scaled) (m)	Diameter (mm)	Flow (Absolute) (ML/day)	Velocity (m/s)	P_EN
P-243	J-266	PMP-Pradhikaran	MS	120	8	600	12.14	0.497	E
P-244	PMP-Pradhikaran	R-Phase3	MS	120	12	600	12.14	0.497	E
P-245	J-266	J-267	MS	120	3	600	12.14	0.497	E
P-246	J-267	J-269	MS	120	17	600	12.14	0.497	E
P-247	J-268	J-277	MS	120	31	600	12.14	0.497	E
P-248	J-277	Pradhikaran	DI-K9	135	40	600	12.14	0.497	N
P-486	J-269	J-268	MS	120	416	600	6.09	0.249	E
P-492	J-269	J-268	MS	120	420	600	6.06	0.248	E

Table 6.107: Junction results

J_Tank_ID	Label	Elevation (m)	Demand (ML/day)	Pressure (m H2O)
28	Pradhikaran	631.8	12.14	10.14
0	J-277	616.01	0	25.92
0	J-268	614.95	0	26.98
0	J-267	611.94	0	30.05
0	J-266	611.88	0	30.11
0	J-269	611.72	0	30.27

6.4 Summary

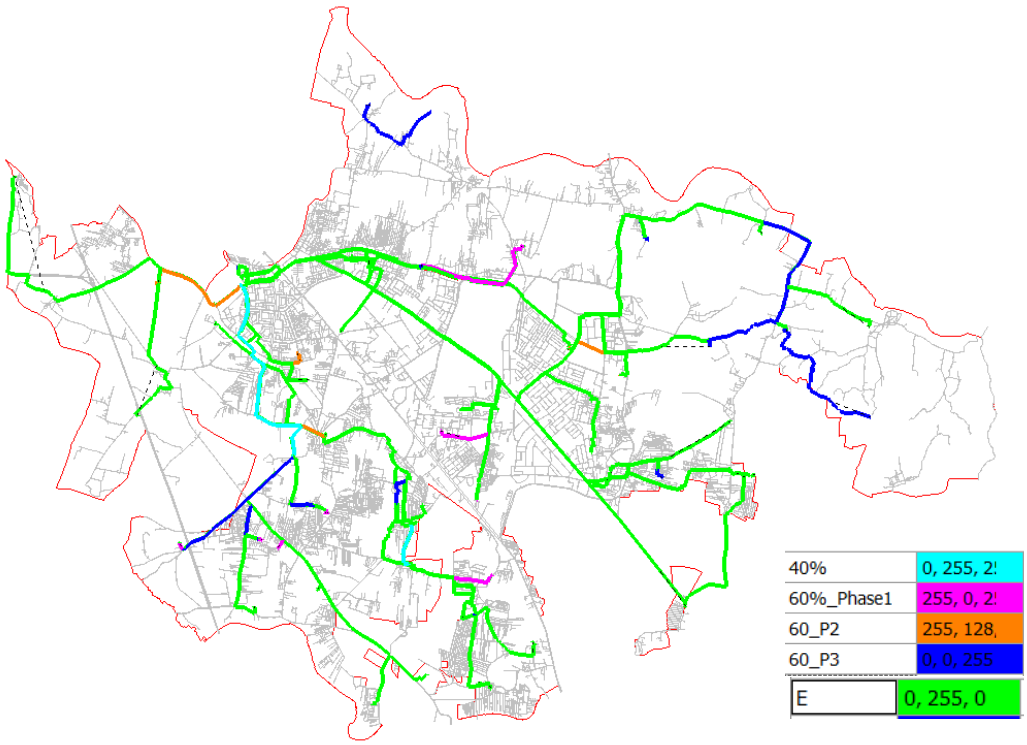

Figure 6.58: Transmission pipelines of all phases

Transmission pipelines of all phases are shown in Figure 6.58. Details of existing and new transmission mains is shown in Table 6.108.

Table 6.108: Details of existing and new transmission mains

Diameter (mm)	E				N			R		Redundant		Grand Total
	CI	DI-K7	MS	Total	DI-K7	DI-K9	Total	MS	Total	DI-K7	Total	
200		2404		2404								2404
250			3163	3163								3163
300	91	7829	865	8785	448	14	462					9247
350		2563		2563								2563
400	11	25834	3886	29731		3301	3301					33032
450		12431		12431	72		72					12503
500	23	7450	7262	14735	18530	776	19306			19	19	34060
550			2746	2746								2746
600		15661	12863	28524	1841	96	1937					30461
700		4911	6575	11486	2424	2610	5034	18	18	1081	1081	17619
750		29	8511	8540	254		254					8794
800			2483	2483								2483
900		17817	479	18296	817		817					19113
1000		3844	14065	17909	5606	1030	6636					24545
1035			2822	2822								2822
1100			4878	4878								4878
1200		41	13993	14034								14034
1400			91	91								91
Grand Total	125	100814	84682	185621	29992	7827	37819	18	18	1100	1100	224558

New pipes to be laid in all the phases is 37837 m. The breakup- phase wise is shown in Table 6.109.

Table 6.109: Break up of new transmission mains

Diameter (mm)	40% area	60% area			Grand Total
		Phase1	Phase2	Phase3	
300			462		462
400		3301			3301
450			72		72
500	1146	2669	3152	12339	19306
600		316	31	1590	1937
700		193		4859	5052
750				254	254
900			423	394	817
1000	5606		1030		6636
Grand Total	6752	6479	5170	19436	37837

Isolation Valves: Isolation valves (Butter fly) required in the transmission system are shown in Table 6.106.

Table 6.106: Number of isolation valves

Diameter (mm)	Count
200	1
300	9
350	2
400	13
450	7
500	60
600	13
700	2
750	1
800	1
1000	1
Grand Total	110

Flow Controlling Valves in Transmission Mains:

Throttling valves required in the transmission system are shown in Table 6.107.

Table 6.107: Number of Flow controlling valves in 60% area

Diameter (mm)	Number			Total
	Phase 1	Phase 2	Phase 3	
300	1	11		12
350		4		4
400	2	12		14
450	1	6		7
500	17	16	31	64
600			1	1
600			12	12
700			1	1
750			1	1
800			1	1
900			1	1
1000			1	1
1200			2	2
Grand Total	21	49	51	121

Bulk Meters in Transmission Mains:

Bulk meters required in the transmission system are shown in Table 6.108.

Table 6.108: Number of bulk meters

Diameter (mm)	Count
200	1
300	8
350	2
400	13
450	7
500	60
600	13
700	2
750	1
800	1
1000	1
Grand Total	109

Summary of pumps:

Summary of pumps is shown in Table 6.109

Table 6.109: Summary of pumps for the year 2030

Label	Flow (Design) (ML/day)	Head (Design) (m)
PMP-WTP_Phase3P	32	13
PMP-WTP_Phase3	32.2	13
PMP-WD4a,b,c	23.32	38
PMP-WTP_Sector10	84.56	10
PMP-Bopkhel	5.43	30
PMP-Sector 28 New	3.16	35
PMP-Dighi_Magzine	2.25	60
PMP-Sector7_10_b	3.04	40
PMP-Pimple Gurav Garden	2.98	35
PMP-Sachin1	3.65	30
PMP-Dighi Gaothan	3.71	65
PMP-Bhosari	4.23	40
PMP-Dapodi1	5.14	26
PMP-Sachin2	4.53	30
PMP-Dapodi2	2.95	26

PMP-Pimple Saudagar a	4.62	25
PMP-WTP_Ph3	41.04	16
PMP-WTP_Ph3	41.04	16
PMP-WTP_Ph3	41.04	16
PMP-Sector7_10_a	5.14	40
PMP_Mamurdi	5.21	55
PMP-PWD Sector 84	5.29	30
PMP-Punavale	7.81	40
PMP-Rahatni3	6.55	35
PMP-WTP_Phase3	6.8	35
PMP-Sector 96	6.88	35
PMP-Kala Khadak	7.23	40
PMP-Rahatni1	7.37	30
PMP-Shahu Nagar	7.38	30
PMP-Sector 96 Part 2	7.47	35
PMP-New Pimple Gurav Garden	7.53	35
PMP-Kaveri Nagar	7.58	35
PMP-New sangvi police Station	7.42	30
PMP-New_Punavale	5.85	45
PMP-Lakshman Nagar 2	8.47	30
PMP-Ashram	8.57	50
PMP-Rahatni2	8.77	35
PMP-Morewasti Chikhli	9.21	30
PMP-Pimple Saudagar b New	10.32	35
PMP-Kala Khadak New1	11.12	40
PMP-Rupi Nagar	11.13	30
PMP-Sector 96 New	11.26	35
PMP-Pradhikaran	12.12	30
PMP-Kala Khadak New 2	12.31	40
PMP-Pimple Gurao	13.02	30
PMP-Dighi	10.36	65
PMP-Lakshman Nagar	14.11	30
PMP-Kudalwadi2	14.57	45
PMP-Kudalwadi1	15.71	40
PMP-Triveni Nagar	15.9	25
PMP-Sant Tukaram	16.65	50
PMP-Jadhvwadi	20.32	60
PMP-GM_WD4	20.11	84.25
PMP-NewMBR	35.7	30

**

Chapter-7

Design of Distribution Network

7.1 All Pipes

All pipes in the distribution system of the PCMC are shown in Table 7.1. Existing (E), New(N), Pipes to be cut (C) and pipes to be replaced(R) are shown in Figure 2 and Table 7.2.

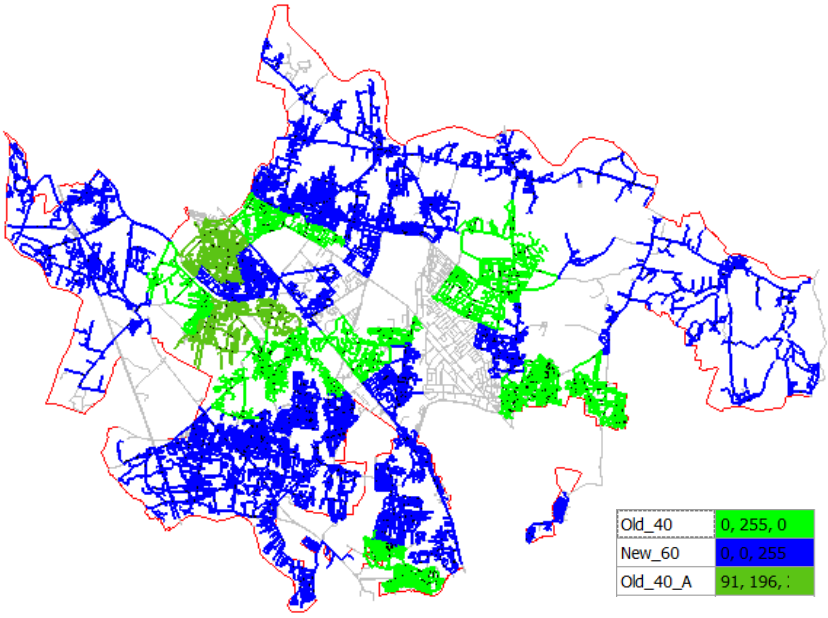

Figure 7.1: All pipelines in the distribution network

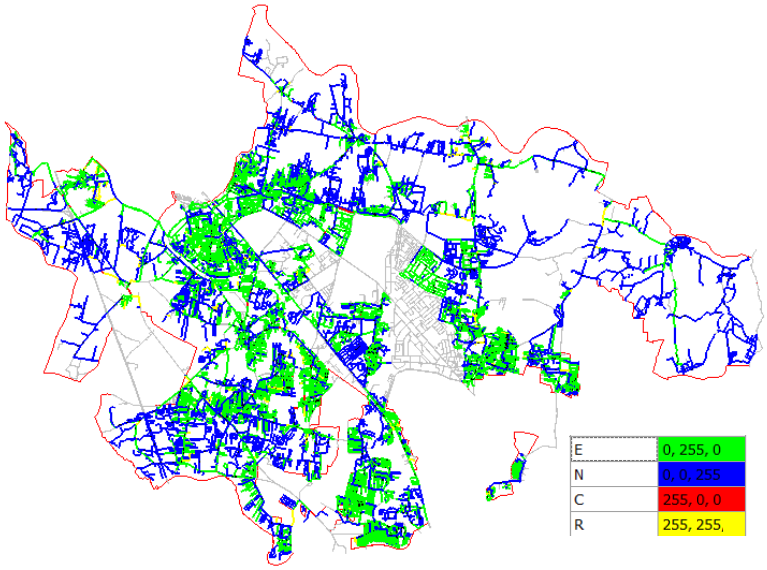

Figure 7.2: All pipelines (existing and new) in the distribution network

Length of all pipes in the distribution system including 40% and 60% area is shown in Table 7.1.

Table 7.1: Length of all pipes in the distribution system including 40% and 60% area

Diameter (mm)	New_60	Old_40	Old_40_A	Grand Total
75	140			140
80	11145	6640	970	18755
99.3	252919	84955	16806	354680
100	282648	124318	40885	447851
144.4	87660	12292	3722	103674
150	149236	102728	21223	273187
175	411	1132		1543
180.6	66251	14465	5852	86568
200	71434	24680	6980	103094
250	30204	15192	1344	46740
300	139303	57386	15826	212515
350	11137	1853	2618	15608
400	54819	24217	3822	82858
450	14334	12047	1644	28025
500	23549	7112	2850	33511
600	16130	12634	1353	30117
700	3552	493	152	4197
750	184			184
800	1419			1419
1000			131	131
Grand Total	1216475	502144	126178	1844797

* PCMC directed to include operational zones of Bijli Nagar a, Bijli Nagar b, Bijli Nagar c, Pradhikaran and Premlok Park in 40% area. Hence pipes in this area is denoted as Old_40_A

Table 7.2: Length of all pipes in the distribution system with status of Existing (E), New(N), Pipes to be cut (C) and pipes to be replaced(R)

Diameter (mm)	New_60					Old_40					Old_40_A					Grand Total
	C	E	N	R	Total	C	E	N	R	Total	C	E	N	R	Total	
75		140			140											140
80	36	11109			11145	33	6607			6640		970			970	18755
99.3	11		241669	11239	252919		632	78464	5859	84955			14885	1921	16806	354680
100	964	281684			282648	389	123929			124318	41	40844			40885	447851
144.4		745	76661	10254	87660			10961	1331	12292		67	2263	1392	3722	103674
150	1468	146845	640	283	149236	785	101714	229		102728	125	21091	7		21223	273187
175		411			411	11	1121			1132						1543
180.6		231	60977	5043	66251			12780	1685	14465			4880	972	5852	86568
200	953	70481			71434	255	24425			24680	52	6928			6980	103094
250	342	29751		111	30204	307	14885			15192	53	1291			1344	46740
300	894	49009	80974	8426	139303	433	32184	24358	411	57386	110	8783	6909	24	15826	212515
350	74	4896	6155	12	11137	21	1357	475		1853	33	1808	777		2618	15608
400	509	15519	37622	1169	54819	116	11060	13020	21	24217		38	3784		3822	82858
450	304	10867	3163		14334	132	11748	167		12047	165	1479			1644	28025
500	755	8050	14659	85	23549	17	1812	5283		7112			2850		2850	33511
600	76	9310	6744		16130	93	10041	2487	13	12634	2	1032	319		1353	30117
700			3552		3552			464	29	493		121	31		152	4197
750	17	167			184											184
800			1419		1419											1419
1000													131		131	131
Grand Total	6403	639215	534235	36622	1216475	2592	341515	148688	9349	502144	581	84452	36836	4309	126178	1844797

7.2 Existing Pipes

The existing pipelines laid in the distribution network of the Pimpri-Chinchwad city are shown in Figure 7.1.

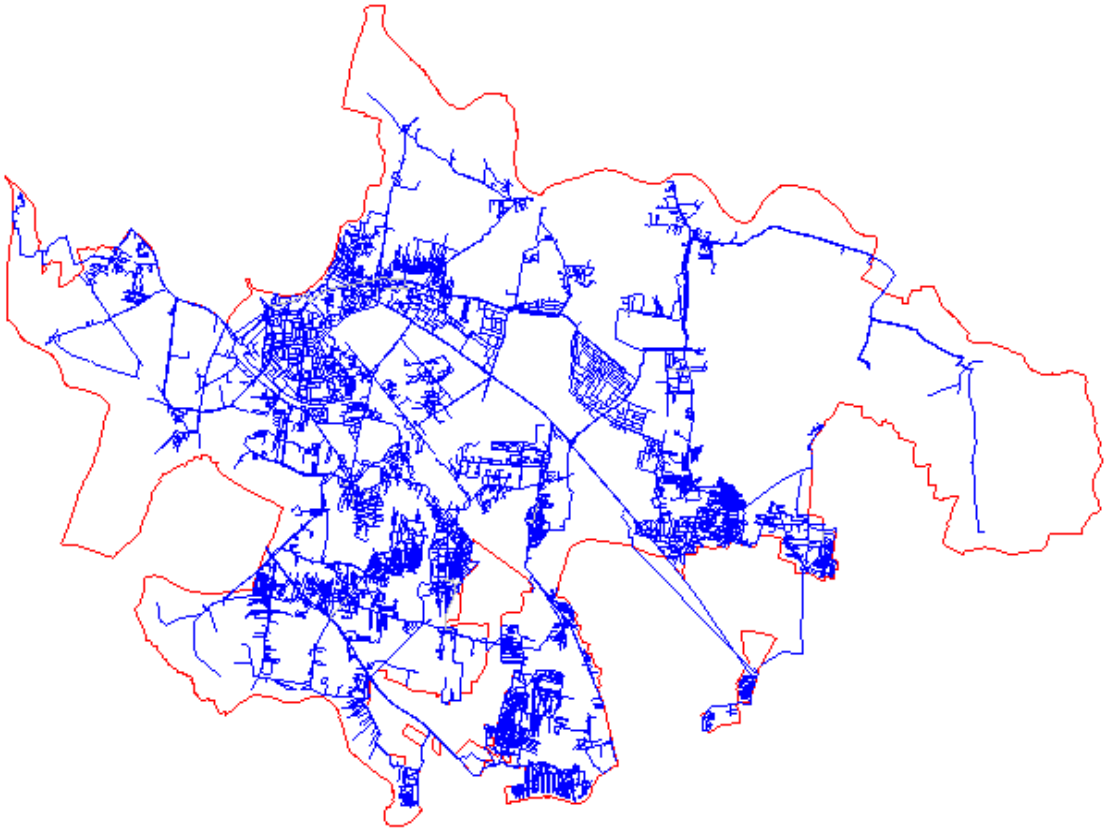

Figure 7.1: Existing pipelines in the distribution network

Length of different pipes in the distribution system including 40% and 60% area is shown in Table 7.1.

Table 7.1: Length of pipes in the distribution system including 40% and 60% area

Diameter (mm)	CI	DI	HDPE	MS	Grand Total
75	140				140
80	18686				18686
99.3			632		632
100	427174	17664		1619	446457
144.4	67		745		812
150	240425	28714		511	269650
175	1532				1532
180.6	149		82		231
200	90232	6960		4642	101834
250	45165	762			45927
300	70759	8436		10781	89976
350	8061				8061
400	17762	3977		4878	26617
450	15147	2117		6830	24094
500	4162	2801		2899	9862
600	10413	3463		6507	20383
700		121			121
750		167			167
Grand Total	949874	75182	1459	38667	1065182

Length of pipes in the distribution system area wise is shown in Table 7.2.

Table 7.2: Length of existing pipes in the distribution system area wise

Diameter (mm)	New_60					Old_40					Old_40_A*				Grand Total
	CI	DI	HDPE	MS	Total	CI	DI	HDPE	MS	Total	CI	DI	MS	Total	
75	140				140										140
80	11109				11109	6607				6607	970			970	18686
99.3								632		632					632
100	266266	15310		108	281684	120064	2354		1511	123929	40844			40844	446457
144.4			745		745						67			67	812
150	130419	16228		198	146845	88915	12486		313	101714	21091			21091	269650
175	411				411	1121				1121					1532
180.6	149		82		231										231
200	61666	4173		4642	70481	21638	2787			24425	6928			6928	101834
250	29431	320			29751	14443	442			14885	1291			1291	45927
300	38170	2770		8069	49009	23806	5666		2712	32184	8783			8783	89976
350	4896				4896	1357				1357	1808			1808	8061
400	10611	2354		2554	15519	7113	1623		2324	11060	38			38	26617
450	5063	574		5230	10867	8605	1543		1600	11748	1479			1479	24094
500	4152	1280		2618	8050	10	1521		281	1812					9862
600	6255	885		2170	9310	3572	2578		3891	10041	586		446	1032	20383
700												121		121	121
750		167			167										167
Grand Total	568738	44061	827	25589	639215	297251	31000	632	12632	341515	83885	121	446	84452	1065182

* PCMC directed to include operational zones of Bijli Nagar a, Bijli Nagar b, Bijli Nagar c, Pradhikaran and Premlok Park in 40% area. Hence pipes in this area is denoted as Old_40_A

7.3 Design of Distribution Pipe Network

The demand is given as per the population density (Table 5.3 and Figure 5.8). The design is carried out by a steady state method. The sizes are computed for the demand of the year 2045 with a peak factor of 2 as per CPHEEO manual. New pipes are added to increase coverage to 100%.

7.4 New Pipes

Total length of the distribution in the PCMC is 1844.797 kms as shown in Table 7.3. The break up of pipes is shown as Existing(E), pipes to be cut(C), New(N) and pipes to be replaced(R) is also shown.

Table 7.3: Existing and new pipes in the distribution system

Diameter (mm)	C	E	N	R	Grand Total
75		140			140
80	69	18686			18755
99.3	11	632	335018	19019	354680
100	1394	446457			447851
144.4		812	89885	12977	103674
150	2378	269650	876	283	273187
175	11	1532			1543
180.6		231	78637	7700	86568
200	1260	101834			103094
250	702	45927		111	46740
300	1437	89976	112241	8861	212515
350	128	8061	7407	12	15608
400	625	26617	54426	1190	82858
450	601	24094	3330		28025
500	772	9862	22792	85	33511
600	171	20383	9550	13	30117
700		121	4047	29	4197
750	17	167			184
800			1419		1419
1000			131		131
Grand Total	9576	1065182	719759	50280	1844797

Total new pipes are 770039 m. These new pipes material wise are shown in Table 7.4.

Table 7.4: New pipes in the distribution system

Diameter (mm)	New_60			Old_40			Old_40_A*			Grand Total
Row Labels	DI	HDPE	Total	DI	HDPE	Total	DI	HDPE	Total	
99.3		252908	252908		84323	84323		16806	16806	354037
144.4	11	86904	86915		12292	12292		3655	3655	102862
150	916	7	923	229		229	7		7	1159
180.6		66020	66020		14465	14465		5852	5852	86337
250	111		111							111
300	89400		89400	24769		24769	6933		6933	121102
350	6167		6167	475		475	777		777	7419
400	38791		38791	13041		13041	3784		3784	55616
450	3163		3163	167		167				3330
500	14744		14744	5283		5283	2850		2850	22877
600	6744		6744	2500		2500	319		319	9563
700	3552		3552	493		493	31		31	4076
800	1419		1419							1419
1000							131		131	131
Grand Total	165018	405839	570857	46957	111080	158037	14832	26313	41145	770039

* PCMC directed to include operational zones of Bijli Nagar a, Bijli Nagar b, Bijli Nagar c, Pradhikaran and Premlok Park in 40% area. Hence pipes in this area is denoted as Old_40_A

Phase wise break up of these new pipes in 60% area is shown in Table 7.5.

Table 7.5: Phase wise break up of the new pipes in 60% area

Diamter (mm)	60_P1			60_P2			60_P3			Grand Total
	DI	HDPE	Total	DI	HDPE	Total	DI	HDPE	Total	
99.3		106066	106066		109229	109229		37613	37613	252908
144.4	11	22034	22045		32915	32915		31955	31955	86915
150	479		479	287	4	291	150	3	153	923
180.6		30290	30290		17209	17209		18521	18521	66020
250				111		111				111
300	38335		38335	29375		29375	21690		21690	89400
350	2262		2262	3121		3121	784		784	6167
400	15729		15729	17525		17525	5537		5537	38791
450	723		723	2290		2290	150		150	3163
500	3721		3721	5392		5392	5631		5631	14744
600	1876		1876	2781		2781	2087		2087	6744
700	187		187	1938		1938	1427		1427	3552
800	1411		1411	8		8				1419
Grand Total	64734	158390	223124	62828	159357	222185	37456	88092	125548	570857

Pipe results for all the zones in the 60% area are shown in Volume II of Phase 2 and 3. It is observed that the velocity of flow is less than 1.8 m/s and most of the nodal pressures are above 0.6 m.

7.5 District Metering Areas

Number of DMAs are Computed as shown in Table 7.6.

Table 7.6: Computation of number of DMAs

SN	Phase	Area (%)	Label	Demand 2020 (MLD)	Population (2020)	No. of properties	Pop/Property (2020)	Family/Property (2020)	Customers (2020)	No. of DMAs (2020)	Actually Provided- No. of DMAs (2020)
1	Phase 1	60	Ashok Cinema	4.58	25926	1313	20	4	5185	1.73	2
2	Phase 1	60	Ashram Shala	2.13	12067	1648	7	1	2413	0.80	2
3	Phase 1	60	B4_Mamurdi	3.13	17751	565	31	6	3550	1.18	1
4	Phase 1	60	Bopkhel	3.35	18992	1316	14	3	3798	1.27	1
5	Phase 1	60	Dapodi1	2.57	14585	471	31	6	2917	0.97	2
6	Phase 1	60	Dapodi2	2.75	15602	646	24	5	3120	1.04	2
7	Phase 1	60	Dighi_Magzine	1.35	7657	2465	3	1	1531	0.51	2
8	Phase 1	60	Indrayaninagara	3.02	17122	804	21	4	3424	1.14	2
9	Phase 1	60	Kala Khadak	4.35	24647	405	61	12	4929	1.64	2
10	Phase 1	60	Kala Khadak New1	6.69	37908	1765	21	4	7582	2.53	2
11	Phase 1	60	Kala Khadak New2	7.41	41964						3
12	Phase 1	60	Kasarwadi1	1.16	6555	2068	3	1	1311	0.44	2
13	Phase 1	60	Kasarwadi2	5.55	31460	1514	21	4	6292	2.10	3
14	Phase 1	60	Kaveri Nagar	4.56	25812	1931	13	3	5162	1.72	3
15	Phase 1	60	Khandoba-1	4.21	23865	2371	10	2	4773	1.59	2
16	Phase 1	60	Khandoba-2	4.86	27529	941	29	6	5506	1.84	3
17	Phase 1	60	Lakshman Nagar	8.48	48064	1468	33	7	9613	3.20	3
18	Phase 1	60	Lakshman Nagar 2	5.10	28904	3354	9	2	5781	1.93	3
19	Phase 1	60	Mahendra & Mahendra	3.18	18001	134	134	27	3600	1.20	2
20	Phase 1	60	NewJadhavwadi 1	3.80	21510	600	36	7	4302	1.43	3
21	Phase 1	60	Thergaon Gaothan2	3.88	21977	1295	17	3	4395	1.47	2
22	Phase 2	60	Morewasti Chikhli	5.54	31417	3514	9	2	6283	2.09	2
23	Phase 2	60	Nav Maha	0.66	3749	250	15	3	750	0.25	1
24	Phase	60	Naydu	3.78	21415	891	24	5	4283	1.43	1

	2										
25	Phase 2	60	Nehru Nagar1	2.07	11719	1794	7	1	2344	0.78	2
26	Phase 2	60	Nehru Nagar2	1.77	10048	87	115	23	2010	0.67	2
27	Phase 2	60	New Panjarpol	0.62	3539	2068	2	0	708	0.24	1
28	Phase 2	60	New Pimple Gurav Garden	4.53	25658	1660	15	3	5132	1.71	3
29	Phase 2	60	New_Punavale	4.69	26604	2068	13	3	5321	1.77	2
30	Phase 2	60	Panjarpol	2.86	16212	674	24	5	3242	1.08	2
31	Phase 2	60	Pimple Gurao1	2.34	13247	1017	13	3	2649	0.88	1
32	Phase 2	60	Pimple Gurao2	2.63	14929	387	39	8	2986	1.00	1
33	Phase 2	60	Pimple Gurao3	2.85	16170	1846	9	2	3234	1.08	2
34	Phase 2	60	Pimple Gurav Garden	1.87	10595	596	18	4	2119	0.71	1
35	Phase 2	60	Pimple Nilakh	6.64	37632	1469	26	5	7526	2.51	3
36	Phase 2	60	Pimple Saudagar a	2.78	15749	418	38	8	3150	1.05	1
37	Phase 2	60	Pimple Saudagar b New	6.21	35182	565	62	12	7036	2.35	2
38	Phase 2	60	Pimpri Delux a	3.95	22364	1557	14	3	4473	1.49	2
39	Phase 2	60	Pimpri Delux b	2.57	14551						2
40	Phase 2	60	Proposed Naydu	2.24	12676	2358	5	1	2535	0.85	2
41	Phase 2	60	Punavale	3.52	19942	565	35	7	3988	1.33	1
42	Phase 2	60	Rahatni1	4.43	25087	515	49	10	5017	1.67	2
43	Phase 2	60	Rahatni2	5.27	29863	575	52	10	5973	1.99	2
44	Phase 2	60	Rahatni3	3.94	22312	1435	16	3	4462	1.49	2
45	Phase 2	60	Rupi Nagar	6.69	37932	3475	11	2	7586	2.53	3
46	Phase 2	60	Sachin1	2.20	12465	1602	8	2	2493	0.83	2
47	Phase 2	60	Sachin2	2.73	15466	91	170	34	3093	1.03	2
48	Phase 2	60	Sector 28 New ESR	2.04	11558	909	13	3	2312	0.77	2
49	Phase 2	60	Sector 96	4.14	23457	1963	12	2	4691	1.56	2
50	Phase 2	60	Sector 96 New Esr	6.78	38397	847	45	9	7679	2.56	3
51	Phase 2	60	Sector 96 Part 2	4.49	25451	605	42	8	5090	1.70	2
52	Phase 2	60	Shahu Nagar	4.44	25145	91	276	55	5029	1.68	2
53	Phase 3	60	Charholi c	1.09	6191	1465	4	1	1238	0.41	2
54	Phase 3	60	Dudulgaon	2.46	13919	243	57	11	2784	0.93	1

55	Phase 3	60	Gairan	4.10	23210	803	29	6	4642	1.55	1
56	Phase 3	60	Kudalwadi New1	4.65	26350	2038	13	3	5270	1.76	2
57	Phase 3	60	Kudalwadi New2	4.80	27197	214	127	25	5439	1.81	2
58	Phase 3	60	Kudalwadi New3	4.66	26396	497	53	11	5279	1.76	2
59	Phase 3	60	Kudalwadi New4	3.70	20991	497	42	8	4198	1.40	1
60	Phase 3	60	Moshi b	3.24	18346	250	73	15	3669	1.22	2
61	Phase 3	60	New_Charoli	2.76	15616						2
62	Phase 3	60	New_Moshi b	5.56	31513	2068	15	3	6303	2.10	2
63	Phase 3	60	New_Wadmukh wadi b	1.41	7963	2068	4	1	1593	0.53	2
64	Phase 3	60	Wadmukhwadi b	1.47	8338	1710	5	1	1668	0.56	1
65	Phase 3	60	NewJadhavwadi 2	5.13	29060. 6	1468	20	4	5812	1.94	2
66	Phase 3	60	Bijli Nagar a	5.19	29385	576	51	10	5877	1.96	2
67	Phase 3	60	Bijli Nagar b	2.44	13852	1233	11	2	2770	0.92	2
68	Phase 3	60	Bijli Nagar c	3.46	19589	561	35	7	3918	1.31	2
69	Phase 3	60	Pradhikaran	7.30	41370	3916	11	2	8274	2.76	4
70	Phase 3	60	Premlok Park	3.13	17719	1193	15	3	3544	1.18	2
			Total								139

Total 139 DMAs are proposed in 70 zones (Figure D excluding those 5 zones which are to be added to 40% area) of the 60% area. A care shall be taken to isolate the DMAs.

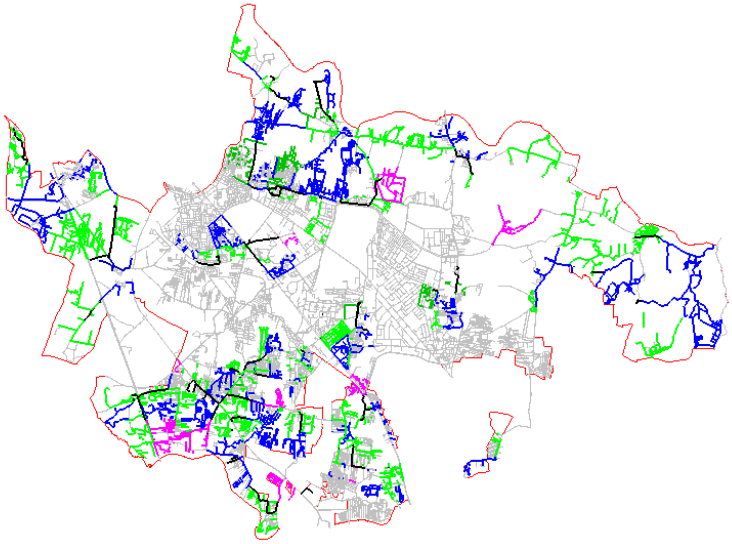

Figure 7.2: DMA in 60% area

Total number of DMAs in PCMC are shown in Table 7.7.

Table 7.7: DMAs in PCMC

40%	60%			Total
	Phase1	Phase2	Phase3	
47	47	58	34	186

(5) Bulk Meters

The bulk meters, at the outlet of each tank and at the entry point of each DMA, have suggested. These meters will be useful in measuring NRW in the system. The details of the bulk meters in Phase1 have been given in Table 7.8.

Table 7.8: Abstract of bulk meters

Diameter (mm)	Phase1	Phase2	Phase3	Total
80	8	6		14
100	130	134	37	301
150	129	144	56	329
200	99	81	33	213
250	20	13	5	38
300	81	88	45	214
350	8	6		14
400	47	33	20	100
450	11	18	1	30
500	8	19	13	40
600	11	15	6	32
700			1	1
800	2	1		3
Grand Total	554	558	217	1329

(6) Flow Control Valves(FCV)

FCVs are essential to control the flows to the respective DMAs. They help to make equitable distribution of water. Abstract of FCV is given in Table 7.9

Table 7.9: Abstract FCV required in 60% area

Diameter (mm)	Number of FCV			Total
	Phase 1	Phase 2	Phase 3	
300	12	22	6	40
350	2	3		5
400	31	17	7	55
450	2	2		4
500		8	5	13
600	1	4	1	6
Total	48	56	19	123

Abstract FCV required in 60% area is shown in Table 7.10.

Table 7.10: Abstract Scour valves required in 60% area

Diameter (mm)	Phase1	Phase2	Phase3	Total
100	33	29	10	72
150	11	10	5	26
200	3	6	2	11
250		1	1	2
350	1	1	1	3
400	1	2	1	4
450	1	2		3
500	1	4		5
Grand Total	51	55	20	126

**

Appendix- A

Mass Balance of ESRs

Table 1: Ashok Cinema

OHT at	Ashok Cinema			
Peak Factor	2	Maximum surplus (m^3)	1470.0	
Inflow Hours	23	Minimum surplus (m^3)	344.8	
Outflow Hours	24	1st Guess Capacity (m^3)	1815	< 2000
Minimum wataer level (m)	579.610	As per CPHEEO Capacity (m^3)	2130	
Initial water level (m)	580.610	Final computed Capacity (m^3)	2000	
Maximum wataer level (m)	584.610	Max. Population serving	40225	
Initial water depth in tank	1	Initial Volume (m^3)	400.09	
Area of CS	400.09	Fire storage (m^3)	73.1	
Diameter (m)	22.57	Depth for Fire (m)	0.061	
Max. serving Demand (mld)	7.10	Av. Flow (m^3/h)=	308.632	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	308.6	708.7	29.6	29.6	679.1	279.05	580.610	20.0	OK
1	0.1	308.6	1017.3	29.6	59.2	958.2	279.05	581.307	33.9	OK
2	0.1	308.6	1326.0	29.6	88.7	1237.2	279.05	582.005	47.9	OK
3	0.3	308.6	1634.6	88.7	177.5	1457.1	219.90	582.702	61.8	OK
4	1	308.6	1943.2	295.8	473.2	1470.0	12.86	583.252	72.8	OK
5	1.2	308.6	2251.9	354.9	828.2	1423.7	-46.29	583.284	73.5	OK
6	2	308.6	2560.5	591.5	1419.7	1140.8	-282.91	583.169	71.2	OK
7	2	308.6	2869.1	591.5	2011.2	857.9	-282.91	582.461	57.0	OK
8	2	308.6	3177.8	591.5	2602.8	575.0	-282.91	581.754	42.9	OK
9	1.5	308.6	3486.4	443.7	3046.5	440.0	-135.03	581.047	28.7	OK
10	1.2	308.6	3795.0	354.9	3401.4	393.7	-46.29	580.710	22.0	OK
11	1	308.6	4103.7	295.8	3697.1	406.5	12.86	580.594	19.7	OK
12	1	308.6	4412.3	295.8	3992.9	419.4	12.86	580.626	20.3	OK
13	0.6	308.6	4720.9	177.5	4170.4	550.5	131.17	580.658	21.0	OK
14	0.6	308.6	5029.6	177.5	4347.8	681.7	131.17	580.986	27.5	OK
15	0.5	308.6	5338.2	147.9	4495.7	842.5	160.75	581.314	34.1	OK
16	1.2	308.6	5646.8	354.9	4850.7	796.2	-46.29	581.716	42.1	OK
17	1.5	308.6	5955.5	443.7	5294.3	661.1	-135.03	581.600	39.8	OK
18	1.5	308.6	6264.1	443.7	5738.0	526.1	-135.03	581.262	33.0	OK
19	1.5	308.6	6572.7	443.7	6181.6	391.1	-135.03	580.925	26.3	OK
20	1.2	308.6	6881.4	354.9	6536.6	344.8	-46.29	580.588	19.6	OK
21	1	308.6	7190.0	295.8	6832.3	357.6	12.86	580.472	17.2	OK
22	0.6	308.6	7498.6	177.5	7009.8	488.8	131.17	580.504	17.9	OK
23	0.3	0.0	7498.6	88.7	7098.5	400.1	-88.73	580.832	24.4	OK
24	0.1	308.6	7807.2	29.6	7128.1	679.1	279.05	580.610	20.0	OK

Table 2: Ashram

OHT at Ashram Shala				
Peak Factor	2	Maximum surplus (m^3)	897.7	
Inflow Hours	23	Minimum surplus (m^3)	374.0	
Outflow Hours	24	1st Guess Capacity (m^3)	1272	< 1999
Minimum wataer level (m)	605.930	As per CPHEEO Capacity (m^3)	991	
Initial water level (m)	606.930	Final computed Capacity (m^3)	1999	
Maximum wataer level (m)	610.930	Max. Population serving	18722	
Initial water depth in tank	1	Initial Volume (m^3)	399.73	
Area of CS	399.73	Fire storage (m^3)	34.0	
Diameter (m)	22.56	Depth for Fire (m)	0.028	
Max. serving Demand (mld)	3.30	Av. Flow (m^3/h)=	143.648	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	143.6	543.4	13.8	13.8	529.6	129.88	606.930	20.0	OK
1	0.1	143.6	687.0	13.8	27.5	659.5	129.88	607.255	26.5	OK
2	0.1	143.6	830.7	13.8	41.3	789.4	129.88	607.580	33.0	OK
3	0.3	143.6	974.3	41.3	82.6	891.7	102.35	607.905	39.5	OK
4	1	143.6	1118.0	137.7	220.3	897.7	5.99	608.161	44.6	OK
5	1.2	143.6	1261.6	165.2	385.5	876.2	-21.55	608.176	44.9	OK
6	2	143.6	1405.3	275.3	660.8	744.5	-131.68	608.122	43.8	OK
7	2	143.6	1548.9	275.3	936.1	612.8	-131.68	607.792	37.2	OK
8	2	143.6	1692.6	275.3	1211.4	481.1	-131.68	607.463	30.7	OK
9	1.5	143.6	1836.2	206.5	1417.9	418.3	-62.85	607.134	24.1	OK
10	1.2	143.6	1979.9	165.2	1583.1	396.7	-21.55	606.976	20.9	OK
11	1	143.6	2123.5	137.7	1720.8	402.7	5.99	606.923	19.9	OK
12	1	143.6	2267.2	137.7	1858.4	408.7	5.99	606.937	20.1	OK
13	0.6	143.6	2410.8	82.6	1941.0	469.8	61.05	606.952	20.4	OK
14	0.6	143.6	2554.4	82.6	2023.6	530.8	61.05	607.105	23.5	OK
15	0.5	143.6	2698.1	68.8	2092.5	605.6	74.82	607.258	26.6	OK
16	1.2	143.6	2841.7	165.2	2257.7	584.1	-21.55	607.445	30.3	OK
17	1.5	143.6	2985.4	206.5	2464.2	521.2	-62.85	607.391	29.2	OK
18	1.5	143.6	3129.0	206.5	2670.7	458.4	-62.85	607.234	26.1	OK
19	1.5	143.6	3272.7	206.5	2877.1	395.5	-62.85	607.077	22.9	OK
20	1.2	143.6	3416.3	165.2	3042.3	374.0	-21.55	606.920	19.8	OK
21	1	143.6	3560.0	137.7	3180.0	380.0	5.99	606.866	18.7	OK
22	0.6	143.6	3703.6	82.6	3262.6	441.0	61.05	606.881	19.0	OK
23	0.3	0.0	3703.6	41.3	3303.9	399.7	-41.30	607.033	22.1	OK
24	0.1	143.6	3847.3	13.8	3317.7	529.6	129.88	606.930	20.0	OK

Table 3: B4_Mamurdi

OHT at B4_Mamurdi				
Peak Factor	2	Maximum surplus (m^3)	1046.7	
Inflow Hours	23	Minimum surplus (m^3)	276.3	
Outflow Hours	24	1st Guess Capacity (m^3)	1323	< 1571
Minimum wataer level (m)	629.000	As per CPHEEO Capacity (m^3)	1458	
Initial water level (m)	630.000	Final computed Capacity (m^3)	1571	
Maximum wataer level (m)	634.000	Max. Population serving	27542	
Initial water depth in tank	1	Initial Volume (m^3)	314.16	
Area of CS	314.16	Fire storage (m^3)	50.0	
Diameter (m)	20	Depth for Fire (m)	0.053	
Max. serving Demand (mld)	4.86	Av. Flow (m^3/h)=	211.322	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	211.3	525.5	20.3	20.3	505.2	191.07	630.000	20.0	OK
1	0.1	211.3	736.8	20.3	40.5	696.3	191.07	630.608	32.2	OK
2	0.1	211.3	948.1	20.3	60.8	887.4	191.07	631.216	44.3	OK
3	0.3	211.3	1159.4	60.8	121.5	1037.9	150.57	631.825	56.5	OK
4	1	211.3	1370.8	202.5	324.0	1046.7	8.81	632.304	66.1	OK
5	1.2	211.3	1582.1	243.0	567.0	1015.0	-31.70	632.332	66.6	OK
6	2	211.3	1793.4	405.0	972.1	821.3	-193.71	632.231	64.6	OK
7	2	211.3	2004.7	405.0	1377.1	627.6	-193.71	631.614	52.3	OK
8	2	211.3	2216.1	405.0	1782.1	433.9	-193.71	630.998	40.0	OK
9	1.5	211.3	2427.4	303.8	2085.9	341.5	-92.45	630.381	27.6	OK
10	1.2	211.3	2638.7	243.0	2328.9	309.8	-31.70	630.087	21.7	OK
11	1	211.3	2850.0	202.5	2531.5	318.6	8.81	629.986	19.7	OK
12	1	211.3	3061.3	202.5	2734.0	327.4	8.81	630.014	20.3	OK
13	0.6	211.3	3272.7	121.5	2855.5	417.2	89.81	630.042	20.8	OK
14	0.6	211.3	3484.0	121.5	2977.0	507.0	89.81	630.328	26.6	OK
15	0.5	211.3	3695.3	101.3	3078.3	617.1	110.06	630.614	32.3	OK
16	1.2	211.3	3906.6	243.0	3321.3	585.4	-31.70	630.964	39.3	OK
17	1.5	211.3	4118.0	303.8	3625.0	492.9	-92.45	630.863	37.3	OK
18	1.5	211.3	4329.3	303.8	3928.8	400.4	-92.45	630.569	31.4	OK
19	1.5	211.3	4540.6	303.8	4232.6	308.0	-92.45	630.275	25.5	OK
20	1.2	211.3	4751.9	243.0	4475.6	276.3	-31.70	629.980	19.6	OK
21	1	211.3	4963.2	202.5	4678.1	285.1	8.81	629.879	17.6	OK
22	0.6	211.3	5174.6	121.5	4799.6	374.9	89.81	629.908	18.2	OK
23	0.3	0.0	5174.6	60.8	4860.4	314.2	-60.76	630.193	23.9	OK
24	0.1	211.3	5385.9	20.3	4880.7	505.2	191.07	630.000	20.0	OK

Table 4: Bopkhrl

OHT at Bopkhe

Peak Factor	2	Maximum surplus (m^3)	1096.4	
Inflow Hours	23	Minimum surplus (m^3)	272.1	
Outflow Hours	24	1st Guess Capacity (m^3)	1368	< 1563
Minimum wataer level (m)	594.330	As per CPHEEO Capacity (m^3)	1560	
Initial water level (m)	595.330	Final computed Capacity (m^3)	1250	
Maximum wataer level (m)	598.330	Max. Population serving	29467	
Initial water depth in tank	1	Initial Volume (m^3)	312.59	
Area of CS	312.59	Fire storage (m^3)	53.5	
Diameter (m)	19.95	Depth for Fire (m)	0.057	
Max. serving Demand (mld)	5.20	Av. Flow (m^3/h)=	226.087	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	226.1	538.7	21.7	21.7	517.0	204.42	595.330	25.0	OK
1	0.1	226.1	764.8	21.7	43.3	721.4	204.42	595.984	41.3	OK
2	0.1	226.1	990.9	21.7	65.0	925.9	204.42	596.638	57.7	OK
3	0.3	226.1	1216.9	65.0	130.0	1086.9	161.09	597.292	74.0	OK
4	1	226.1	1443.0	216.7	346.7	1096.4	9.42	597.807	86.9	OK
5	1.2	226.1	1669.1	260.0	606.7	1062.4	-33.91	597.837	87.7	OK
6	2	226.1	1895.2	433.3	1040.0	855.2	-207.25	597.729	85.0	OK
7	2	226.1	2121.3	433.3	1473.3	648.0	-207.25	597.066	68.4	OK
8	2	226.1	2347.4	433.3	1906.7	440.7	-207.25	596.403	51.8	OK
9	1.5	226.1	2573.5	325.0	2231.7	341.8	-98.91	595.740	35.2	OK
10	1.2	226.1	2799.5	260.0	2491.7	307.9	-33.91	595.423	27.3	OK
11	1	226.1	3025.6	216.7	2708.3	317.3	9.42	595.315	24.6	OK
12	1	226.1	3251.7	216.7	2925.0	326.7	9.42	595.345	25.4	OK
13	0.6	226.1	3477.8	130.0	3055.0	422.8	96.09	595.375	26.1	OK
14	0.6	226.1	3703.9	130.0	3185.0	518.9	96.09	595.683	33.8	OK
15	0.5	226.1	3930.0	108.3	3293.3	636.6	117.75	595.990	41.5	OK
16	1.2	226.1	4156.1	260.0	3553.3	602.7	-33.91	596.367	50.9	OK
17	1.5	226.1	4382.2	325.0	3878.3	503.8	-98.91	596.258	48.2	OK
18	1.5	226.1	4608.2	325.0	4203.3	404.9	-98.91	595.942	40.3	OK
19	1.5	226.1	4834.3	325.0	4528.3	306.0	-98.91	595.625	32.4	OK
20	1.2	226.1	5060.4	260.0	4788.3	272.1	-33.91	595.309	24.5	OK
21	1	226.1	5286.5	216.7	5005.0	281.5	9.42	595.200	21.8	OK
22	0.6	226.1	5512.6	130.0	5135.0	377.6	96.09	595.231	22.5	OK
23	0.3	0.0	5512.6	65.0	5200.0	312.6	-65.00	595.538	30.2	OK
24	0.1	226.1	5738.7	21.7	5221.7	517.0	204.42	595.330	25.0	OK

Table 5: Dapodi1

		OHT at	Dapodi 1		
Peak Factor	2	Maximum surplus (m^3)	924.9		
Inflow Hours	23	Minimum surplus (m^3)	291.9		
Outflow Hours	24	1st Guess Capacity (m^3)	1217	< 1615	
Minimum wataer level (m)	568.180	As per CPHEEO Capacity (m^3)	1198		
Initial water level (m)	569.180	Final computed Capacity (m^3)	1615		
Maximum wataer level (m)	573.180	Max. Population serving	22630		
Initial water depth in tank	1	Initial Volume (m^3)	323.02		
Area of CS	323.02	Fire storage (m^3)	41.1		
Diameter (m)	20.28	Depth for Fire (m)	0.042		
Max. serving Demand (mld)	3.99	Av. Flow (m^3/h)=	173.631		

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	173.6	496.6	16.6	16.6	480.0	156.99	569.180	20.0	OK
1	0.1	173.6	670.3	16.6	33.3	637.0	156.99	569.666	29.7	OK
2	0.1	173.6	843.9	16.6	49.9	794.0	156.99	570.152	39.4	OK
3	0.3	173.6	1017.5	49.9	99.8	917.7	123.71	570.638	49.2	OK
4	1	173.6	1191.2	166.4	266.2	924.9	7.23	571.021	56.8	OK
5	1.2	173.6	1364.8	199.7	465.9	898.9	-26.04	571.043	57.3	OK
6	2	173.6	1538.4	332.8	798.7	739.7	-159.16	570.963	55.7	OK
7	2	173.6	1712.1	332.8	1131.5	580.6	-159.16	570.470	45.8	OK
8	2	173.6	1885.7	332.8	1464.3	421.4	-159.16	569.977	35.9	OK
9	1.5	173.6	2059.3	249.6	1713.9	345.4	-75.96	569.485	26.1	OK
10	1.2	173.6	2233.0	199.7	1913.6	319.4	-26.04	569.249	21.4	OK
11	1	173.6	2406.6	166.4	2080.0	326.6	7.23	569.169	19.8	OK
12	1	173.6	2580.2	166.4	2246.4	333.9	7.23	569.191	20.2	OK
13	0.6	173.6	2753.9	99.8	2346.2	407.7	73.79	569.214	20.7	OK
14	0.6	173.6	2927.5	99.8	2446.0	481.5	73.79	569.442	25.2	OK
15	0.5	173.6	3101.1	83.2	2529.2	571.9	90.43	569.670	29.8	OK
16	1.2	173.6	3274.7	199.7	2728.9	545.8	-26.04	569.950	35.4	OK
17	1.5	173.6	3448.4	249.6	2978.5	469.9	-75.96	569.870	33.8	OK
18	1.5	173.6	3622.0	249.6	3228.1	393.9	-75.96	569.635	29.1	OK
19	1.5	173.6	3795.6	249.6	3477.7	318.0	-75.96	569.399	24.4	OK
20	1.2	173.6	3969.3	199.7	3677.4	291.9	-26.04	569.164	19.7	OK
21	1	173.6	4142.9	166.4	3843.8	299.1	7.23	569.084	18.1	OK
22	0.6	173.6	4316.5	99.8	3943.6	372.9	73.79	569.106	18.5	OK
23	0.3	0.0	4316.5	49.9	3993.5	323.0	-49.92	569.335	23.1	OK
24	0.1	173.6	4490.2	16.6	4010.2	480.0	156.99	569.180	20.0	OK

Table 6: Dapodi2

		OHT at	Dapodi 2		
Peak Factor	2	Maximum surplus (m^3)	966.9		

Inflow Hours	23	Minimum surplus (m^3)	289.7	
Outflow Hours	24	1st Guess Capacity (m^3)	1257	< 1615
Minimum wataer level (m)	568.010	As per CPHEEO Capacity (m^3)	1282	
Initial water level (m)	569.010	Final computed Capacity (m^3)	1615	
Maximum wataer level (m)	573.010	Max. Population serving	24208	
Initial water depth in tank	1	Initial Volume (m^3)	323.02	
Area of CS	323.02	Fire storage (m^3)	44.0	
Diameter (m)	20.28	Depth for Fire (m)	0.045	
Max. serving Demand (mld)	4.27	Av. Flow (m^3/h)=	185.739	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	185.7	508.8	17.8	17.8	491.0	167.94	569.010	20.0	OK
1	0.1	185.7	694.5	17.8	35.6	658.9	167.94	569.530	30.4	OK
2	0.1	185.7	880.2	17.8	53.4	826.8	167.94	570.050	40.8	OK
3	0.3	185.7	1066.0	53.4	106.8	959.2	132.34	570.570	51.2	OK
4	1	185.7	1251.7	178.0	284.8	966.9	7.74	570.979	59.4	OK
5	1.2	185.7	1437.5	213.6	498.4	939.1	-27.86	571.003	59.9	OK
6	2	185.7	1623.2	356.0	854.4	768.8	-170.26	570.917	58.1	OK
7	2	185.7	1808.9	356.0	1210.4	598.5	-170.26	570.390	47.6	OK
8	2	185.7	1994.7	356.0	1566.4	428.3	-170.26	569.863	37.1	OK
9	1.5	185.7	2180.4	267.0	1833.4	347.0	-81.26	569.336	26.5	OK
10	1.2	185.7	2366.1	213.6	2047.0	319.1	-27.86	569.084	21.5	OK
11	1	185.7	2551.9	178.0	2225.0	326.9	7.74	568.998	19.8	OK
12	1	185.7	2737.6	178.0	2403.0	334.6	7.74	569.022	20.2	OK
13	0.6	185.7	2923.4	106.8	2509.8	413.6	78.94	569.046	20.7	OK
14	0.6	185.7	3109.1	106.8	2616.6	492.5	78.94	569.290	25.6	OK
15	0.5	185.7	3294.8	89.0	2705.6	589.2	96.74	569.535	30.5	OK
16	1.2	185.7	3480.6	213.6	2919.2	561.4	-27.86	569.834	36.5	OK
17	1.5	185.7	3666.3	267.0	3186.2	480.1	-81.26	569.748	34.8	OK
18	1.5	185.7	3852.1	267.0	3453.2	398.9	-81.26	569.496	29.7	OK
19	1.5	185.7	4037.8	267.0	3720.2	317.6	-81.26	569.245	24.7	OK
20	1.2	185.7	4223.5	213.6	3933.8	289.7	-27.86	568.993	19.7	OK
21	1	185.7	4409.3	178.0	4111.8	297.5	7.74	568.907	17.9	OK
22	0.6	185.7	4595.0	106.8	4218.6	376.4	78.94	568.931	18.4	OK
23	0.3	0.0	4595.0	53.4	4272.0	323.0	-53.40	569.175	23.3	OK
24	0.1	185.7	4780.8	17.8	4289.8	491.0	167.94	569.010	20.0	OK

Table 7: Dighi_Magzine

		OHT at	Dighi_Magzine	
Peak Factor	2	Maximum surplus	615.9	

		(m^3)		
Inflow Hours	23	Minimum surplus (m^3)	283.5	
Outflow Hours	24	1st Guess Capacity (m^3)	899	< 1499
Minimum wataer level (m)	625.360	As per CPHEEO Capacity (m^3)	629	
Initial water level (m)	626.360	Final computed Capacity (m^3)	1499	
Maximum wataer level (m)	630.360	Max. Population serving	11880	
Initial water depth in tank	1	Initial Volume (m^3)	299.87	
Area of CS	299.87	Fire storage (m^3)	21.6	
Diameter (m)	19.54	Depth for Fire (m)	0.024	
Max. serving Demand (mld)	2.10	Av. Flow (m^3/h)=	91.152	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	91.2	391.0	8.7	8.7	382.3	82.42	626.360	20.0	OK
1	0.1	91.2	482.2	8.7	17.5	464.7	82.42	626.635	25.5	OK
2	0.1	91.2	573.3	8.7	26.2	547.1	82.42	626.910	31.0	OK
3	0.3	91.2	664.5	26.2	52.4	612.1	64.95	627.185	36.5	OK
4	1	91.2	755.6	87.4	139.8	615.9	3.80	627.401	40.8	OK
5	1.2	91.2	846.8	104.8	244.6	602.2	-13.67	627.414	41.1	OK
6	2	91.2	937.9	174.7	419.3	518.6	-83.56	627.368	40.2	OK
7	2	91.2	1029.1	174.7	594.0	435.1	-83.56	627.090	34.6	OK
8	2	91.2	1120.2	174.7	768.7	351.5	-83.56	626.811	29.0	OK
9	1.5	91.2	1211.4	131.0	899.7	311.6	-39.88	626.532	23.4	OK
10	1.2	91.2	1302.5	104.8	1004.6	298.0	-13.67	626.399	20.8	OK
11	1	91.2	1393.7	87.4	1091.9	301.8	3.80	626.354	19.9	OK
12	1	91.2	1484.9	87.4	1179.3	305.6	3.80	626.366	20.1	OK
13	0.6	91.2	1576.0	52.4	1231.7	344.3	38.74	626.379	20.4	OK
14	0.6	91.2	1667.2	52.4	1284.1	383.1	38.74	626.508	23.0	OK
15	0.5	91.2	1758.3	43.7	1327.8	430.5	47.48	626.637	25.5	OK
16	1.2	91.2	1849.5	104.8	1432.6	416.9	-13.67	626.796	28.7	OK
17	1.5	91.2	1940.6	131.0	1563.6	377.0	-39.88	626.750	27.8	OK
18	1.5	91.2	2031.8	131.0	1694.7	337.1	-39.88	626.617	25.1	OK
19	1.5	91.2	2122.9	131.0	1825.7	297.2	-39.88	626.484	22.5	OK
20	1.2	91.2	2214.1	104.8	1930.5	283.5	-13.67	626.351	19.8	OK
21	1	91.2	2305.2	87.4	2017.9	287.3	3.80	626.306	18.9	OK
22	0.6	91.2	2396.4	52.4	2070.3	326.1	38.74	626.318	19.2	OK
23	0.3	0.0	2396.4	26.2	2096.5	299.9	-26.21	626.447	21.7	OK
24	0.1	91.2	2487.5	8.7	2105.2	382.3	82.42	626.360	20.0	OK

Table 8: Indrayaninagar a

	OHT at Indrayaninagar a		
Peak Factor	2	Maximum surplus (m^3)	1206.5

Inflow Hours	23	Minimum surplus (m^3)	463.4	
Outflow Hours	24	1st Guess Capacity (m^3)	1670	< 2500
Minimum wataer level (m)	618.240	As per CPHEEO Capacity (m^3)	1406	
Initial water level (m)	619.240	Final computed Capacity (m^3)	2500	
Maximum wataer level (m)	623.240	Max. Population serving	26565	
Initial water depth in tank	1	Initial Volume (m^3)	499.95	
Area of CS	499.95	Fire storage (m^3)	48.3	
Diameter (m)	25.23	Depth for Fire (m)	0.032	
Max. serving Demand (mld)	4.69	Av. Flow (m^3/h)=	203.826	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	203.8	703.8	19.5	19.5	684.2	184.29	619.240	20.0	OK
1	0.1	203.8	907.6	19.5	39.1	868.5	184.29	619.609	27.4	OK
2	0.1	203.8	1111.4	19.5	58.6	1052.8	184.29	619.977	34.7	OK
3	0.3	203.8	1315.3	58.6	117.2	1198.1	145.23	620.346	42.1	OK
4	1	203.8	1519.1	195.3	312.5	1206.5	8.49	620.636	47.9	OK
5	1.2	203.8	1722.9	234.4	546.9	1176.0	-30.57	620.653	48.3	OK
6	2	203.8	1926.7	390.7	937.6	989.1	-186.84	620.592	47.0	OK
7	2	203.8	2130.6	390.7	1328.3	802.3	-186.84	620.218	39.6	OK
8	2	203.8	2334.4	390.7	1718.9	615.5	-186.84	619.845	32.1	OK
9	1.5	203.8	2538.2	293.0	2011.9	526.3	-89.17	619.471	24.6	OK
10	1.2	203.8	2742.0	234.4	2246.3	495.7	-30.57	619.293	21.1	OK
11	1	203.8	2945.9	195.3	2441.7	504.2	8.49	619.232	19.8	OK
12	1	203.8	3149.7	195.3	2637.0	512.7	8.49	619.248	20.2	OK
13	0.6	203.8	3353.5	117.2	2754.2	599.3	86.63	619.265	20.5	OK
14	0.6	203.8	3557.3	117.2	2871.4	685.9	86.63	619.439	24.0	OK
15	0.5	203.8	3761.2	97.7	2969.1	792.1	106.16	619.612	27.4	OK
16	1.2	203.8	3965.0	234.4	3203.5	761.5	-30.57	619.824	31.7	OK
17	1.5	203.8	4168.8	293.0	3496.5	672.4	-89.17	619.763	30.5	OK
18	1.5	203.8	4372.6	293.0	3789.5	583.2	-89.17	619.585	26.9	OK
19	1.5	203.8	4576.5	293.0	4082.5	494.0	-89.17	619.406	23.3	OK
20	1.2	203.8	4780.3	234.4	4316.9	463.4	-30.57	619.228	19.8	OK
21	1	203.8	4984.1	195.3	4512.2	471.9	8.49	619.167	18.5	OK
22	0.6	203.8	5187.9	117.2	4629.4	558.5	86.63	619.184	18.9	OK
23	0.3	0.0	5187.9	58.6	4688.0	499.9	-58.60	619.357	22.3	OK
24	0.1	203.8	5391.8	19.5	4707.5	684.2	184.29	619.240	20.0	OK

Table 9: Kala Khadak

		OHT at Kala Khadak	
Peak Factor	2	Maximum surplus (m^3)	1317.0
Inflow Hours	23	Minimum surplus (m^3)	247.3
Outflow Hours	24	1st Guess Capacity	1564

		(m^3)	
Minimum wataer level (m)	606.560	As per CPHEEO Capacity (m^3)	2025
Initial water level (m)	607.560	Final computed Capacity (m^3)	1499
Maximum wataer level (m)	611.560	Max. Population serving	38241
Initial water depth in tank	1	Initial Volume (m^3)	299.87
Area of CS	299.87	Fire storage (m^3)	69.5
Diameter (m)	19.54	Depth for Fire (m)	0.077
Max. serving Demand (mld)	6.75	Av. Flow (m^3/h)=	293.409

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	293.4	593.3	28.1	28.1	565.2	265.29	607.560	20.0	OK
1	0.1	293.4	886.7	28.1	56.2	830.5	265.29	608.445	37.7	OK
2	0.1	293.4	1180.1	28.1	84.4	1095.7	265.29	609.329	55.4	OK
3	0.3	293.4	1473.5	84.4	168.7	1304.8	209.05	610.214	73.1	OK
4	1	293.4	1766.9	281.2	449.9	1317.0	12.23	610.911	87.0	OK
5	1.2	293.4	2060.3	337.4	787.3	1273.0	-44.01	610.952	87.8	OK
6	2	293.4	2353.7	562.4	1349.7	1004.1	-268.96	610.805	84.9	OK
7	2	293.4	2647.1	562.4	1912.0	735.1	-268.96	609.908	67.0	OK
8	2	293.4	2940.6	562.4	2474.4	466.1	-268.96	609.011	49.0	OK
9	1.5	293.4	3234.0	421.8	2896.2	337.8	-128.37	608.114	31.1	OK
10	1.2	293.4	3527.4	337.4	3233.6	293.8	-44.01	607.686	22.5	OK
11	1	293.4	3820.8	281.2	3514.8	306.0	12.23	607.540	19.6	OK
12	1	293.4	4114.2	281.2	3796.0	318.2	12.23	607.580	20.4	OK
13	0.6	293.4	4407.6	168.7	3964.7	442.9	124.70	607.621	21.2	OK
14	0.6	293.4	4701.0	168.7	4133.4	567.6	124.70	608.037	29.5	OK
15	0.5	293.4	4994.4	140.6	4274.0	720.4	152.82	608.453	37.9	OK
16	1.2	293.4	5287.8	337.4	4611.4	676.4	-44.01	608.962	48.0	OK
17	1.5	293.4	5581.2	421.8	5033.2	548.0	-128.37	608.816	45.1	OK
18	1.5	293.4	5874.6	421.8	5455.0	419.7	-128.37	608.388	36.6	OK
19	1.5	293.4	6168.0	421.8	5876.7	291.3	-128.37	607.960	28.0	OK
20	1.2	293.4	6461.5	337.4	6214.2	247.3	-44.01	607.531	19.4	OK
21	1	293.4	6754.9	281.2	6495.3	259.5	12.23	607.385	16.5	OK
22	0.6	293.4	7048.3	168.7	6664.0	384.2	124.70	607.425	17.3	OK
23	0.3	0.0	7048.3	84.4	6748.4	299.9	-84.36	607.841	25.6	OK
24	0.1	293.4	7341.7	28.1	6776.5	565.2	265.29	607.560	20.0	OK

Table 10: Kala Khadak New1

		OHT at Kala Khadak New1	
Peak Factor	2	Maximum surplus (m^3)	2137.0

Inflow Hours	23	Minimum surplus (m^3)	491.7	
Outflow Hours	24	1st Guess Capacity (m^3)	2629	< 2863
Minimum wataer level (m)	603.500	As per CPHEEO Capacity (m^3)	3114	
Initial water level (m)	604.500	Final computed Capacity (m^3)	2863	
Maximum wataer level (m)	608.500	Max. Population serving	58816	
Initial water depth in tank	1	Initial Volume (m^3)	572.56	
Area of CS	572.56	Fire storage (m^3)	106.9	
Diameter (m)	27	Depth for Fire (m)	0.062	
Max. serving Demand (mld)	10.38	Av. Flow (m^3/h)=	451.274	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	451.3	1023.8	43.2	43.2	980.6	408.03	604.500	20.0	OK
1	0.1	451.3	1475.1	43.2	86.5	1388.6	408.03	605.213	34.3	OK
2	0.1	451.3	1926.4	43.2	129.7	1796.6	408.03	605.925	48.5	OK
3	0.3	451.3	2377.7	129.7	259.5	2118.2	321.53	606.638	62.8	OK
4	1	451.3	2828.9	432.5	692.0	2137.0	18.80	607.199	74.0	OK
5	1.2	451.3	3280.2	519.0	1210.9	2069.3	-67.69	607.232	74.6	OK
6	2	451.3	3731.5	864.9	2075.9	1655.6	-413.67	607.114	72.3	OK
7	2	451.3	4182.7	864.9	2940.8	1241.9	-413.67	606.392	57.8	OK
8	2	451.3	4634.0	864.9	3805.7	828.3	-413.67	605.669	43.4	OK
9	1.5	451.3	5085.3	648.7	4454.4	630.8	-197.43	604.947	28.9	OK
10	1.2	451.3	5536.6	519.0	4973.4	563.2	-67.69	604.602	22.0	OK
11	1	451.3	5987.8	432.5	5405.9	582.0	18.80	604.484	19.7	OK
12	1	451.3	6439.1	432.5	5838.4	600.8	18.80	604.516	20.3	OK
13	0.6	451.3	6890.4	259.5	6097.8	792.6	191.79	604.549	21.0	OK
14	0.6	451.3	7341.7	259.5	6357.3	984.3	191.79	604.884	27.7	OK
15	0.5	451.3	7792.9	216.2	6573.6	1219.4	235.04	605.219	34.4	OK
16	1.2	451.3	8244.2	519.0	7092.5	1151.7	-67.69	605.630	42.6	OK
17	1.5	451.3	8695.5	648.7	7741.2	954.3	-197.43	605.511	40.2	OK
18	1.5	451.3	9146.8	648.7	8389.9	756.8	-197.43	605.167	33.3	OK
19	1.5	451.3	9598.0	648.7	9038.6	559.4	-197.43	604.822	26.4	OK
20	1.2	451.3	10049.3	519.0	9557.6	491.7	-67.69	604.477	19.5	OK
21	1	451.3	10500.6	432.5	9990.1	510.5	18.80	604.359	17.2	OK
22	0.6	451.3	10951.9	259.5	10249.6	702.3	191.79	604.392	17.8	OK
23	0.3	0.0	10951.9	129.7	10379.3	572.6	-129.74	604.727	24.5	OK
24	0.1	451.3	11403.1	43.2	10422.5	980.6	408.03	604.500	20.0	OK

Table 11: Kala Khadak New2

		OHT at Kala Khadak New2		
Peak Factor	2	Maximum surplus (m^3)	2347.6	
Inflow Hours	23	Minimum surplus (m^3)	526.2	
Outflow Hours	24	1st Guess Capacity	2874	< 3079

		(m^3)	
Minimum wataer level (m)	603.500	As per CPHEEO Capacity (m^3)	3447
Initial water level (m)	604.500	Final computed Capacity (m^3)	3079
Maximum wataer level (m)	608.500	Max. Population serving	65110
Initial water depth in tank	1	Initial Volume (m^3)	615.75
Area of CS	615.75	Fire storage (m^3)	118.3
Diameter (m)	28	Depth for Fire (m)	0.064
Max. serving Demand (mld)	11.49	Av. Flow (m^3/h)=	499.561

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	499.6	1115.3	47.9	47.9	1067.4	451.69	604.500	20.0	OK
1	0.1	499.6	1614.9	47.9	95.7	1519.1	451.69	605.234	34.7	OK
2	0.1	499.6	2114.4	47.9	143.6	1970.8	451.69	605.967	49.3	OK
3	0.3	499.6	2614.0	143.6	287.2	2326.7	355.94	606.701	64.0	OK
4	1	499.6	3113.6	478.7	766.0	2347.6	20.82	607.279	75.6	OK
5	1.2	499.6	3613.1	574.5	1340.5	2272.6	-74.93	607.313	76.3	OK
6	2	499.6	4112.7	957.5	2298.0	1814.7	-457.93	607.191	73.8	OK
7	2	499.6	4612.2	957.5	3255.5	1356.8	-457.93	606.447	58.9	OK
8	2	499.6	5111.8	957.5	4213.0	898.8	-457.93	605.703	44.1	OK
9	1.5	499.6	5611.4	718.1	4931.1	680.3	-218.56	604.960	29.2	OK
10	1.2	499.6	6110.9	574.5	5505.6	605.3	-74.93	604.605	22.1	OK
11	1	499.6	6610.5	478.7	5984.3	626.2	20.82	604.483	19.7	OK
12	1	499.6	7110.0	478.7	6463.1	647.0	20.82	604.517	20.3	OK
13	0.6	499.6	7609.6	287.2	6750.3	859.3	212.31	604.551	21.0	OK
14	0.6	499.6	8109.2	287.2	7037.6	1071.6	212.31	604.896	27.9	OK
15	0.5	499.6	8608.7	239.4	7276.9	1331.8	260.19	605.240	34.8	OK
16	1.2	499.6	9108.3	574.5	7851.4	1256.9	-74.93	605.663	43.3	OK
17	1.5	499.6	9607.8	718.1	8569.6	1038.3	-218.56	605.541	40.8	OK
18	1.5	499.6	10107.4	718.1	9287.7	819.7	-218.56	605.186	33.7	OK
19	1.5	499.6	10607.0	718.1	10005.8	601.2	-218.56	604.831	26.6	OK
20	1.2	499.6	11106.5	574.5	10580.3	526.2	-74.93	604.476	19.5	OK
21	1	499.6	11606.1	478.7	11059.0	547.1	20.82	604.355	17.1	OK
22	0.6	499.6	12105.7	287.2	11346.3	759.4	212.31	604.388	17.8	OK
23	0.3	0.0	12105.7	143.6	11489.9	615.8	-143.62	604.733	24.7	OK
24	0.1	499.6	12605.2	47.9	11537.8	1067.4	451.69	604.500	20.0	OK

Table 12: Kasarwadi1

		OHT at Kasarwadi1		
Peak Factor	2	Maximum surplus (m^3)	670.6	
Inflow Hours	23	Minimum surplus (m^3)	386.1	
Outflow Hours	24	1st Guess Capacity (m^3)	1057	< 2000

Minimum wataer level (m)	581.070	As per CPHEEO Capacity (m^3)	538
Initial water level (m)	582.070	Final computed Capacity (m^3)	2000
Maximum wataer level (m)	586.070	Max. Population serving	10170
Initial water depth in tank	1	Initial Volume (m^3)	400.09
Area of CS	400.09	Fire storage (m^3)	18.5
Diameter (m)	22.57	Depth for Fire (m)	0.015
Max. serving Demand (mld)	1.79	Av. Flow (m^3/h)=	78.033

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	78.0	478.1	7.5	7.5	470.6	70.55	582.070	20.0	OK
1	0.1	78.0	556.2	7.5	15.0	541.2	70.55	582.246	23.5	OK
2	0.1	78.0	634.2	7.5	22.4	611.8	70.55	582.423	27.1	OK
3	0.3	78.0	712.2	22.4	44.9	667.3	55.60	582.599	30.6	OK
4	1	78.0	790.3	74.8	119.7	670.6	3.25	582.738	33.4	OK
5	1.2	78.0	868.3	89.7	209.4	658.9	-11.70	582.746	33.5	OK
6	2	78.0	946.3	149.6	359.0	587.4	-71.53	582.717	32.9	OK
7	2	78.0	1024.3	149.6	508.5	515.8	-71.53	582.538	29.4	OK
8	2	78.0	1102.4	149.6	658.1	444.3	-71.53	582.359	25.8	OK
9	1.5	78.0	1180.4	112.2	770.2	410.2	-34.14	582.181	22.2	OK
10	1.2	78.0	1258.4	89.7	860.0	398.5	-11.70	582.095	20.5	OK
11	1	78.0	1336.5	74.8	934.8	401.7	3.25	582.066	19.9	OK
12	1	78.0	1414.5	74.8	1009.5	405.0	3.25	582.074	20.1	OK
13	0.6	78.0	1492.5	44.9	1054.4	438.1	33.16	582.082	20.2	OK
14	0.6	78.0	1570.6	44.9	1099.3	471.3	33.16	582.165	21.9	OK
15	0.5	78.0	1648.6	37.4	1136.7	511.9	40.64	582.248	23.6	OK
16	1.2	78.0	1726.6	89.7	1226.4	500.2	-11.70	582.350	25.6	OK
17	1.5	78.0	1804.7	112.2	1338.6	466.1	-34.14	582.320	25.0	OK
18	1.5	78.0	1882.7	112.2	1450.8	431.9	-34.14	582.235	23.3	OK
19	1.5	78.0	1960.7	112.2	1562.9	397.8	-34.14	582.150	21.6	OK
20	1.2	78.0	2038.8	89.7	1652.7	386.1	-11.70	582.064	19.9	OK
21	1	78.0	2116.8	74.8	1727.5	389.4	3.25	582.035	19.3	OK
22	0.6	78.0	2194.8	44.9	1772.3	422.5	33.16	582.043	19.5	OK
23	0.3	0.0	2194.8	22.4	1794.8	400.1	-22.43	582.126	21.1	OK
24	0.1	78.0	2272.9	7.5	1802.2	470.6	70.55	582.070	20.0	OK

Table 13: Kasarwadi2

		OHT at Kasarwadi2	
Peak Factor	2	Maximum surplus (m^3)	1698.4
Inflow Hours	23	Minimum surplus (m^3)	333.0
Outflow Hours	24	1st Guess Capacity (m^3)	2031
Minimum wataer level (m)	576.580	As per CPHEEO Capacity (m^3)	2584
Initial water level (m)	577.580	Final computed Capacity (m^3)	2000

Maximum wataer level (m)	581.580	Max. Population serving	48812
Initial water depth in tank	1	Initial Volume (m^3)	400.09
Area of CS	400.09	Fire storage (m^3)	88.7
Diameter (m)	22.57	Depth for Fire (m)	0.074
Max. serving Demand (mld)	8.61	Av. Flow (m^3/h)=	374.517

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	374.5	774.6	35.9	35.9	738.7	338.63	577.580	20.0	OK
1	0.1	374.5	1149.1	35.9	71.8	1077.3	338.63	578.426	36.9	OK
2	0.1	374.5	1523.6	35.9	107.7	1416.0	338.63	579.273	53.9	OK
3	0.3	374.5	1898.2	107.7	215.3	1682.8	266.84	580.119	70.8	OK
4	1	374.5	2272.7	358.9	574.3	1698.4	15.60	580.786	84.1	OK
5	1.2	374.5	2647.2	430.7	1005.0	1642.2	-56.18	580.825	84.9	OK
6	2	374.5	3021.7	717.8	1722.8	1298.9	-343.31	580.685	82.1	OK
7	2	374.5	3396.2	717.8	2440.6	955.6	-343.31	579.827	64.9	OK
8	2	374.5	3770.7	717.8	3158.4	612.3	-343.31	578.969	47.8	OK
9	1.5	374.5	4145.3	538.4	3696.8	448.5	-163.85	578.110	30.6	OK
10	1.2	374.5	4519.8	430.7	4127.5	392.3	-56.18	577.701	22.4	OK
11	1	374.5	4894.3	358.9	4486.4	407.9	15.60	577.560	19.6	OK
12	1	374.5	5268.8	358.9	4845.3	423.5	15.60	577.600	20.4	OK
13	0.6	374.5	5643.3	215.3	5060.7	582.7	159.17	577.639	21.2	OK
14	0.6	374.5	6017.8	215.3	5276.0	741.8	159.17	578.036	29.1	OK
15	0.5	374.5	6392.4	179.5	5455.5	936.9	195.06	578.434	37.1	OK
16	1.2	374.5	6766.9	430.7	5886.2	880.7	-56.18	578.922	46.8	OK
17	1.5	374.5	7141.4	538.4	6424.5	716.9	-163.85	578.781	44.0	OK
18	1.5	374.5	7515.9	538.4	6962.9	553.0	-163.85	578.372	35.8	OK
19	1.5	374.5	7890.4	538.4	7501.3	389.2	-163.85	577.962	27.6	OK
20	1.2	374.5	8265.0	430.7	7932.0	333.0	-56.18	577.553	19.5	OK
21	1	374.5	8639.5	358.9	8290.9	348.6	15.60	577.412	16.6	OK
22	0.6	374.5	9014.0	215.3	8506.2	507.8	159.17	577.451	17.4	OK
23	0.3	0.0	9014.0	107.7	8613.9	400.1	-107.67	577.849	25.4	OK
24	0.1	374.5	9388.5	35.9	8649.8	738.7	338.63	577.580	20.0	OK

Table 14: Kaveri Nagar

OHT at	Kaveri Nagar			
Peak Factor	2	Maximum surplus (m^3)	1681.0	
Inflow Hours	23	Minimum surplus (m^3)	560.7	
Outflow Hours	24	1st Guess Capacity (m^3)	2242	< 3079
Minimum wataer level (m)	600.800	As per CPHEEO Capacity (m^3)	2120	
Initial water level (m)	601.800	Final computed Capacity (m^3)	3079	
Maximum wataer level (m)	605.800	Max. Population	40049	

		serving	
Initial water depth in tank	1	Initial Volume (m^3)	615.75
Area of CS	615.75	Fire storage (m^3)	72.8
Diameter (m)	28	Depth for Fire (m)	0.039
Max. serving Demand (mld)	7.07	Av. Flow (m^3/h)=	307.278

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	307.3	923.0	29.4	29.4	893.6	277.83	601.800	20.0	OK
1	0.1	307.3	1230.3	29.4	58.9	1171.4	277.83	602.251	29.0	OK
2	0.1	307.3	1537.6	29.4	88.3	1449.2	277.83	602.702	38.0	OK
3	0.3	307.3	1844.9	88.3	176.7	1668.2	218.94	603.154	47.1	OK
4	1	307.3	2152.1	294.5	471.2	1681.0	12.80	603.509	54.2	OK
5	1.2	307.3	2459.4	353.4	824.5	1634.9	-46.09	603.530	54.6	OK
6	2	307.3	2766.7	589.0	1413.5	1353.2	-281.67	603.455	53.1	OK
7	2	307.3	3074.0	589.0	2002.4	1071.5	-281.67	602.998	44.0	OK
8	2	307.3	3381.3	589.0	2591.4	789.9	-281.67	602.540	34.8	OK
9	1.5	307.3	3688.5	441.7	3033.1	655.4	-134.43	602.083	25.7	OK
10	1.2	307.3	3995.8	353.4	3386.5	609.4	-46.09	601.864	21.3	OK
11	1	307.3	4303.1	294.5	3680.9	622.2	12.80	601.790	19.8	OK
12	1	307.3	4610.4	294.5	3975.4	635.0	12.80	601.810	20.2	OK
13	0.6	307.3	4917.6	176.7	4152.1	765.6	130.59	601.831	20.6	OK
14	0.6	307.3	5224.9	176.7	4328.8	896.1	130.59	602.043	24.9	OK
15	0.5	307.3	5532.2	147.2	4476.0	1056.2	160.04	602.255	29.1	OK
16	1.2	307.3	5839.5	353.4	4829.4	1010.1	-46.09	602.515	34.3	OK
17	1.5	307.3	6146.8	441.7	5271.1	875.7	-134.43	602.440	32.8	OK
18	1.5	307.3	6454.0	441.7	5712.8	741.2	-134.43	602.222	28.4	OK
19	1.5	307.3	6761.3	441.7	6154.5	606.8	-134.43	602.004	24.1	OK
20	1.2	307.3	7068.6	353.4	6507.9	560.7	-46.09	601.785	19.7	OK
21	1	307.3	7375.9	294.5	6802.4	573.5	12.80	601.711	18.2	OK
22	0.6	307.3	7683.2	176.7	6979.1	704.1	130.59	601.731	18.6	OK
23	0.3	0.0	7683.2	88.3	7067.4	615.8	-88.34	601.943	22.9	OK
24	0.1	307.3	7990.4	29.4	7096.8	893.6	277.83	601.800	20.0	OK

Table 15: Khandoba-1

OHT at Khandoba-1				
Peak Factor	2	Maximum surplus (m^3)	1526.1	
Inflow Hours	23	Minimum surplus (m^3)	490.3	
Outflow Hours	24	1st Guess Capacity (m^3)	2016	< 2706
Minimum wataer level (m)	600.290	As per CPHEEO Capacity (m^3)	1960	
Initial water level (m)	601.290	Final computed Capacity (m^3)	2706	
Maximum wataer level (m)	605.290	Max. Population	37028	

		serving	
Initial water depth in tank	1	Initial Volume (m^3)	541.19
Area of CS	541.19	Fire storage (m^3)	67.3
Diameter (m)	26.25	Depth for Fire (m)	0.041
Max. serving Demand (mld)	6.53	Av. Flow (m^3/h)=	284.104

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	284.1	825.3	27.2	27.2	798.1	256.88	601.290	20.0	OK
1	0.1	284.1	1109.4	27.2	54.5	1054.9	256.88	601.765	29.5	OK
2	0.1	284.1	1393.5	27.2	81.7	1311.8	256.88	602.239	39.0	OK
3	0.3	284.1	1677.6	81.7	163.4	1514.2	202.42	602.714	48.5	OK
4	1	284.1	1961.7	272.3	435.6	1526.1	11.84	603.088	56.0	OK
5	1.2	284.1	2245.8	326.7	762.3	1483.5	-42.62	603.110	56.4	OK
6	2	284.1	2529.9	544.5	1306.9	1223.0	-260.43	603.031	54.8	OK
7	2	284.1	2814.0	544.5	1851.4	962.6	-260.43	602.550	45.2	OK
8	2	284.1	3098.1	544.5	2395.9	702.2	-260.43	602.069	35.6	OK
9	1.5	284.1	3382.2	408.4	2804.3	577.9	-124.30	601.587	25.9	OK
10	1.2	284.1	3666.3	326.7	3131.1	535.3	-42.62	601.358	21.4	OK
11	1	284.1	3950.4	272.3	3403.3	547.1	11.84	601.279	19.8	OK
12	1	284.1	4234.5	272.3	3675.6	558.9	11.84	601.301	20.2	OK
13	0.6	284.1	4518.7	163.4	3839.0	679.7	120.74	601.323	20.7	OK
14	0.6	284.1	4802.8	163.4	4002.3	800.4	120.74	601.546	25.1	OK
15	0.5	284.1	5086.9	136.1	4138.5	948.4	147.97	601.769	29.6	OK
16	1.2	284.1	5371.0	326.7	4465.2	905.8	-42.62	602.042	35.0	OK
17	1.5	284.1	5655.1	408.4	4873.6	781.5	-124.30	601.964	33.5	OK
18	1.5	284.1	5939.2	408.4	5282.0	657.2	-124.30	601.734	28.9	OK
19	1.5	284.1	6223.3	408.4	5690.4	532.9	-124.30	601.504	24.3	OK
20	1.2	284.1	6507.4	326.7	6017.1	490.3	-42.62	601.275	19.7	OK
21	1	284.1	6791.5	272.3	6289.4	502.1	11.84	601.196	18.1	OK
22	0.6	284.1	7075.6	163.4	6452.7	622.9	120.74	601.218	18.6	OK
23	0.3	0.0	7075.6	81.7	6534.4	541.2	-81.68	601.441	23.0	OK
24	0.1	284.1	7359.7	27.2	6561.6	798.1	256.88	601.290	20.0	OK

Table 16: Khandoba-2

		OHT at Khandoba-2		
Peak Factor	2	Maximum surplus (m^3)	1537.6	
Inflow Hours	23	Minimum surplus (m^3)	342.8	
Outflow Hours	24	1st Guess Capacity (m^3)	1880	< 2008
Minimum wataer level (m)	602.840	As per CPHEEO Capacity (m^3)	2261	
Initial water level (m)	603.840	Final computed Capacity (m^3)	2008	
Maximum wataer level (m)	607.840	Max. Population serving	42713	

Initial water depth in tank	1	Initial Volume (m^3)	401.51
Area of CS	401.51	Fire storage (m^3)	77.6
Diameter (m)	22.61	Depth for Fire (m)	0.064
Max. serving Demand (mld)	7.54	Av. Flow (m^3/h)=	327.717

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	327.7	729.2	31.4	31.4	697.8	296.31	603.840	20.0	OK
1	0.1	327.7	1056.9	31.4	62.8	994.1	296.31	604.578	34.8	OK
2	0.1	327.7	1384.7	31.4	94.2	1290.4	296.31	605.316	49.5	OK
3	0.3	327.7	1712.4	94.2	188.4	1523.9	233.50	606.054	64.3	OK
4	1	327.7	2040.1	314.1	502.5	1537.6	13.65	606.636	75.9	OK
5	1.2	327.7	2367.8	376.9	879.4	1488.4	-49.16	606.670	76.6	OK
6	2	327.7	2695.5	628.1	1507.5	1188.0	-300.41	606.547	74.1	OK
7	2	327.7	3023.2	628.1	2135.6	887.6	-300.41	605.799	59.2	OK
8	2	327.7	3351.0	628.1	2763.8	587.2	-300.41	605.051	44.2	OK
9	1.5	327.7	3678.7	471.1	3234.8	443.8	-143.38	604.303	29.3	OK
10	1.2	327.7	4006.4	376.9	3611.7	394.7	-49.16	603.945	22.1	OK
11	1	327.7	4334.1	314.1	3925.8	408.3	13.65	603.823	19.7	OK
12	1	327.7	4661.8	314.1	4239.8	422.0	13.65	603.857	20.3	OK
13	0.6	327.7	4989.5	188.4	4428.3	561.3	139.28	603.891	21.0	OK
14	0.6	327.7	5317.3	188.4	4616.7	700.5	139.28	604.238	28.0	OK
15	0.5	327.7	5645.0	157.0	4773.8	871.2	170.69	604.585	34.9	OK
16	1.2	327.7	5972.7	376.9	5150.6	822.1	-49.16	605.010	43.4	OK
17	1.5	327.7	6300.4	471.1	5621.7	678.7	-143.38	604.887	40.9	OK
18	1.5	327.7	6628.1	471.1	6092.8	535.3	-143.38	604.530	33.8	OK
19	1.5	327.7	6955.9	471.1	6563.9	391.9	-143.38	604.173	26.7	OK
20	1.2	327.7	7283.6	376.9	6940.8	342.8	-49.16	603.816	19.5	OK
21	1	327.7	7611.3	314.1	7254.8	356.4	13.65	603.694	17.1	OK
22	0.6	327.7	7939.0	188.4	7443.3	495.7	139.28	603.728	17.8	OK
23	0.3	0.0	7939.0	94.2	7537.5	401.5	-94.22	604.075	24.7	OK
24	0.1	327.7	8266.7	31.4	7568.9	697.8	296.31	603.840	20.0	OK

Table 17: Lakshman Nagar

Since capacity required is more than 20 Lakhs, It is proposed to construct 2 tanks. Each with 15 lakhs capacity. Each tank shall serve one DMA.

		OHT at Lakshman Nagar		
Peak Factor	2	Maximum surplus (m^3)	2483.5	
Inflow Hours	23	Minimum surplus (m^3)	397.4	
Outflow Hours	24	1st Guess Capacity (m^3)	2881	< 2500
Minimum wataer level (m)	596.160	As per CPHEEO Capacity (m^3)	3948	
Initial water level (m)	597.160	Final computed Capacity (m^3)	2500	

Maximum wataer level (m)	601.160	Max. Population serving	74574
Initial water depth in tank	1	Initial Volume (m^3)	499.95
Area of CS	499.95	Fire storage (m^3)	135.5
Diameter (m)	25.23	Depth for Fire (m)	0.090
Max. serving Demand (mld)	13.16	Av. Flow (m^3/h)=	572.174

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	572.2	1072.1	54.8	54.8	1017.3	517.34	597.160	20.0	OK
1	0.1	572.2	1644.3	54.8	109.7	1534.6	517.34	598.195	40.7	OK
2	0.1	572.2	2216.5	54.8	164.5	2052.0	517.34	599.230	61.4	OK
3	0.3	572.2	2788.6	164.5	329.0	2459.6	407.67	600.264	82.1	OK
4	1	572.2	3360.8	548.3	877.3	2483.5	23.84	601.080	98.4	OK
5	1.2	572.2	3933.0	658.0	1535.3	2397.7	-85.83	601.127	99.3	OK
6	2	572.2	4505.2	1096.7	2632.0	1873.2	-524.49	600.956	95.9	OK
7	2	572.2	5077.3	1096.7	3728.7	1348.7	-524.49	599.907	74.9	OK
8	2	572.2	5649.5	1096.7	4825.3	824.2	-524.49	598.858	54.0	OK
9	1.5	572.2	6221.7	822.5	5647.8	573.9	-250.33	597.809	33.0	OK
10	1.2	572.2	6793.9	658.0	6305.8	488.0	-85.83	597.308	23.0	OK
11	1	572.2	7366.0	548.3	6854.2	511.9	23.84	597.136	19.5	OK
12	1	572.2	7938.2	548.3	7402.5	535.7	23.84	597.184	20.5	OK
13	0.6	572.2	8510.4	329.0	7731.5	778.9	243.17	597.232	21.4	OK
14	0.6	572.2	9082.6	329.0	8060.5	1022.1	243.17	597.718	31.2	OK
15	0.5	572.2	9654.7	274.2	8334.7	1320.1	298.01	598.204	40.9	OK
16	1.2	572.2	10226.9	658.0	8992.7	1234.2	-85.83	598.800	52.8	OK
17	1.5	572.2	10799.1	822.5	9815.2	983.9	-250.33	598.629	49.4	OK
18	1.5	572.2	11371.3	822.5	10637.7	733.6	-250.33	598.128	39.4	OK
19	1.5	572.2	11943.4	822.5	11460.2	483.3	-250.33	597.627	29.3	OK
20	1.2	572.2	12515.6	658.0	12118.2	397.4	-85.83	597.127	19.3	OK
21	1	572.2	13087.8	548.3	12666.5	421.3	23.84	596.955	15.9	OK
22	0.6	572.2	13659.9	329.0	12995.5	664.4	243.17	597.003	16.9	OK
23	0.3	0.0	13659.9	164.5	13160.0	499.9	-164.50	597.489	26.6	OK
24	0.1	572.2	14232.1	54.8	13214.8	1017.3	517.34	597.160	20.0	OK

Table 18: Lakshman Nagar 2

		OHT at Lakshman Nagar 2		
Peak Factor	2	Maximum surplus (m^3)	1594.0	
Inflow Hours	23	Minimum surplus (m^3)	339.5	
Outflow Hours	24	1st Guess Capacity (m^3)	1933	< 2006
Minimum wataer level (m)	595.600	As per CPHEEO Capacity (m^3)	2374	
Initial water level (m)	596.600	Final computed Capacity (m^3)	2006	
Maximum wataer level (m)	600.600	Max. Population serving	44846	
Initial water depth in tank	1	Initial Volume (m^3)	401.15	

Area of CS	401.15	Fire storage (m^3)	81.5
Diameter (m)	22.6	Depth for Fire (m)	0.068
Max. serving Demand (mld)	7.91	Av. Flow (m^3/h)=	344.083

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	344.1	745.2	33.0	33.0	712.3	311.11	596.600	20.0	OK
1	0.1	344.1	1089.3	33.0	65.9	1023.4	311.11	597.376	35.5	OK
2	0.1	344.1	1433.4	33.0	98.9	1334.5	311.11	598.151	51.0	OK
3	0.3	344.1	1777.5	98.9	197.8	1579.6	245.16	598.927	66.5	OK
4	1	344.1	2121.6	329.7	527.6	1594.0	14.34	599.538	78.8	OK
5	1.2	344.1	2465.6	395.7	923.3	1542.4	-51.61	599.573	79.5	OK
6	2	344.1	2809.7	659.5	1582.8	1226.9	-315.41	599.445	76.9	OK
7	2	344.1	3153.8	659.5	2242.3	911.5	-315.41	598.659	61.2	OK
8	2	344.1	3497.9	659.5	2901.8	596.1	-315.41	597.872	45.4	OK
9	1.5	344.1	3842.0	494.6	3396.4	445.6	-150.54	597.086	29.7	OK
10	1.2	344.1	4186.1	395.7	3792.1	394.0	-51.61	596.711	22.2	OK
11	1	344.1	4530.1	329.7	4121.8	408.3	14.34	596.582	19.6	OK
12	1	344.1	4874.2	329.7	4451.6	422.7	14.34	596.618	20.4	OK
13	0.6	344.1	5218.3	197.8	4649.4	568.9	146.24	596.654	21.1	OK
14	0.6	344.1	5562.4	197.8	4847.3	715.1	146.24	597.018	28.4	OK
15	0.5	344.1	5906.5	164.9	5012.1	894.3	179.21	597.383	35.7	OK
16	1.2	344.1	6250.6	395.7	5407.8	842.7	-51.61	597.829	44.6	OK
17	1.5	344.1	6594.6	494.6	5902.5	692.2	-150.54	597.701	42.0	OK
18	1.5	344.1	6938.7	494.6	6397.1	541.7	-150.54	597.326	34.5	OK
19	1.5	344.1	7282.8	494.6	6891.7	391.1	-150.54	596.950	27.0	OK
20	1.2	344.1	7626.9	395.7	7287.4	339.5	-51.61	596.575	19.5	OK
21	1	344.1	7971.0	329.7	7617.1	353.8	14.34	596.446	16.9	OK
22	0.6	344.1	8315.1	197.8	7815.0	500.1	146.24	596.482	17.6	OK
23	0.3	0.0	8315.1	98.9	7913.9	401.2	-98.92	596.847	24.9	OK
24	0.1	344.1	8659.1	33.0	7946.9	712.3	311.11	596.600	20.0	OK

Table 19: Mahendra

		OHT at	Mahendra & Mahendra	
Peak Factor	2	Maximum surplus (m^3)	1123.0	
Inflow Hours	23	Minimum surplus (m^3)	341.7	
Outflow Hours	24	1st Guess Capacity (m^3)	1465	< 1901
Minimum wataer level (m)	599.500	As per CPHEEO Capacity (m^3)	1479	
Initial water level (m)	600.500	Final computed Capacity (m^3)	1901	
Maximum wataer level (m)	604.500	Max. Population serving	27929	
Initial water depth in tank	1	Initial Volume (m^3)	380.13	
Area of CS	380.13	Fire storage (m^3)	50.7	

Diameter (m)	22	Depth for Fire (m)	0.044
Max. serving Demand (mld)	4.93	Av. Flow (m^3/h)=	214.289

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	214.3	594.4	20.5	20.5	573.9	193.75	600.500	20.0	OK
1	0.1	214.3	808.7	20.5	41.1	767.6	193.75	601.010	30.2	OK
2	0.1	214.3	1023.0	20.5	61.6	961.4	193.75	601.519	40.4	OK
3	0.3	214.3	1237.3	61.6	123.2	1114.1	152.68	602.029	50.6	OK
4	1	214.3	1451.6	205.4	328.6	1123.0	8.93	602.431	58.6	OK
5	1.2	214.3	1665.9	246.4	575.0	1090.9	-32.14	602.454	59.1	OK
6	2	214.3	1880.2	410.7	985.7	894.4	-196.43	602.370	57.4	OK
7	2	214.3	2094.4	410.7	1396.5	698.0	-196.43	601.853	47.1	OK
8	2	214.3	2308.7	410.7	1807.2	501.6	-196.43	601.336	36.7	OK
9	1.5	214.3	2523.0	308.0	2115.2	407.8	-93.75	600.819	26.4	OK
10	1.2	214.3	2737.3	246.4	2361.6	375.7	-32.14	600.573	21.5	OK
11	1	214.3	2951.6	205.4	2567.0	384.6	8.93	600.488	19.8	OK
12	1	214.3	3165.9	205.4	2772.4	393.5	8.93	600.512	20.2	OK
13	0.6	214.3	3380.2	123.2	2895.6	484.6	91.07	600.535	20.7	OK
14	0.6	214.3	3594.5	123.2	3018.8	575.7	91.07	600.775	25.5	OK
15	0.5	214.3	3808.8	102.7	3121.5	687.3	111.61	601.014	30.3	OK
16	1.2	214.3	4023.1	246.4	3367.9	655.1	-32.14	601.308	36.2	OK
17	1.5	214.3	4237.3	308.0	3676.0	561.4	-93.75	601.223	34.5	OK
18	1.5	214.3	4451.6	308.0	3984.0	467.6	-93.75	600.977	29.5	OK
19	1.5	214.3	4665.9	308.0	4292.0	373.9	-93.75	600.730	24.6	OK
20	1.2	214.3	4880.2	246.4	4538.5	341.7	-32.14	600.484	19.7	OK
21	1	214.3	5094.5	205.4	4743.8	350.7	8.93	600.399	18.0	OK
22	0.6	214.3	5308.8	123.2	4867.0	441.7	91.07	600.422	18.4	OK
23	0.3	0.0	5308.8	61.6	4928.7	380.1	-61.61	600.662	23.2	OK
24	0.1	214.3	5523.1	20.5	4949.2	573.9	193.75	600.500	20.0	OK

Table 20: New Jadhavwadi1

Earlier there was one one tank proposed. But it had a capacity required is more than 20 Lakhs. It was directed by PCMC to limit capacity to 20 Lakhs. Hence, it is now proposed to construct 2 tanks. Each with 20 lakhs capacity. Another tank New Jadhavwadi2 is proposed in Phase3.

		OHT at NewJadhavwadi1		
Peak Factor	2	Maximum surplus (m^3)	1201.9	
Inflow Hours	23	Minimum surplus (m^3)	268.3	
Outflow Hours	24	1st Guess Capacity (m^3)	1470	< 1571
Minimum wataer level (m)	615.940	As per CPHEEO Capacity (m^3)	1767	

Initial water level (m)	616.940	Final computed Capacity (m^3)	1571
Maximum wataer level (m)	620.940	Max. Population serving	33377
Initial water depth in tank	1	Initial Volume (m^3)	314.16
Area of CS	314.16	Fire storage (m^3)	60.6
Diameter (m)	20	Depth for Fire (m)	0.064
Max. serving Demand (mld)	5.89	Av. Flow (m^3/h)=	256.087

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	256.1	570.2	24.5	24.5	545.7	231.55	616.940	20.0	OK
1	0.1	256.1	826.3	24.5	49.1	777.3	231.55	617.677	34.7	OK
2	0.1	256.1	1082.4	24.5	73.6	1008.8	231.55	618.414	49.5	OK
3	0.3	256.1	1338.5	73.6	147.3	1191.3	182.46	619.151	64.2	OK
4	1	256.1	1594.6	245.4	392.7	1201.9	10.67	619.732	75.8	OK
5	1.2	256.1	1850.7	294.5	687.2	1163.5	-38.41	619.766	76.5	OK
6	2	256.1	2106.8	490.8	1178.0	928.8	-234.75	619.644	74.1	OK
7	2	256.1	2362.9	490.8	1668.8	694.0	-234.75	618.896	59.1	OK
8	2	256.1	2618.9	490.8	2159.7	459.3	-234.75	618.149	44.2	OK
9	1.5	256.1	2875.0	368.1	2527.8	347.2	-112.04	617.402	29.2	OK
10	1.2	256.1	3131.1	294.5	2822.3	308.8	-38.41	617.045	22.1	OK
11	1	256.1	3387.2	245.4	3067.7	319.5	10.67	616.923	19.7	OK
12	1	256.1	3643.3	245.4	3313.1	330.2	10.67	616.957	20.3	OK
13	0.6	256.1	3899.4	147.3	3460.4	439.0	108.84	616.991	21.0	OK
14	0.6	256.1	4155.5	147.3	3607.6	547.8	108.84	617.337	27.9	OK
15	0.5	256.1	4411.6	122.7	3730.3	681.2	133.38	617.684	34.9	OK
16	1.2	256.1	4667.6	294.5	4024.8	642.8	-38.41	618.108	43.4	OK
17	1.5	256.1	4923.7	368.1	4393.0	530.8	-112.04	617.986	40.9	OK
18	1.5	256.1	5179.8	368.1	4761.1	418.7	-112.04	617.629	33.8	OK
19	1.5	256.1	5435.9	368.1	5129.2	306.7	-112.04	617.273	26.7	OK
20	1.2	256.1	5692.0	294.5	5423.7	268.3	-38.41	616.916	19.5	OK
21	1	256.1	5948.1	245.4	5669.1	278.9	10.67	616.794	17.1	OK
22	0.6	256.1	6204.2	147.3	5816.4	387.8	108.84	616.828	17.8	OK
23	0.3	0.0	6204.2	73.6	5890.0	314.2	-73.63	617.174	24.7	OK
24	0.1	256.1	6460.2	24.5	5914.5	545.7	231.55	616.940	20.0	OK

OHT at NewJadhavwadi1

Peak Factor	2	Maximum surplus (m^3)	1201.9	
Inflow Hours	23	Minimum surplus (m^3)	268.3	
Outflow Hours	24	1st Guess Capacity (m^3)	1470	< 1571
Minimum wataer level (m)	615.940	As per CPHEEO Capacity (m^3)	1767	
Initial water level (m)	616.940	Final computed Capacity (m^3)	1571	
Maximum wataer level (m)	620.940	Max. Population serving	33377	
Initial water depth in tank	1	Initial Volume (m^3)	314.16	
Area of CS	314.16	Fire storage (m^3)	60.6	
Diameter (m)	20	Depth for Fire (m)	0.064	
Max. serving Demand (mld)	5.89	Av. Flow (m^3/h)=	256.087	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	256.1	570.2	24.5	24.5	545.7	231.55	616.940	20.0	OK
1	0.1	256.1	826.3	24.5	49.1	777.3	231.55	617.677	34.7	OK
2	0.1	256.1	1082.4	24.5	73.6	1008.8	231.55	618.414	49.5	OK
3	0.3	256.1	1338.5	73.6	147.3	1191.3	182.46	619.151	64.2	OK

4	1	256.1	1594.6	245.4	392.7	1201.9	10.67	619.732	75.8	OK
5	1.2	256.1	1850.7	294.5	687.2	1163.5	-38.41	619.766	76.5	OK
6	2	256.1	2106.8	490.8	1178.0	928.8	-234.75	619.644	74.1	OK
7	2	256.1	2362.9	490.8	1668.8	694.0	-234.75	618.896	59.1	OK
8	2	256.1	2618.9	490.8	2159.7	459.3	-234.75	618.149	44.2	OK
9	1.5	256.1	2875.0	368.1	2527.8	347.2	-112.04	617.402	29.2	OK
10	1.2	256.1	3131.1	294.5	2822.3	308.8	-38.41	617.045	22.1	OK
11	1	256.1	3387.2	245.4	3067.7	319.5	10.67	616.923	19.7	OK
12	1	256.1	3643.3	245.4	3313.1	330.2	10.67	616.957	20.3	OK
13	0.6	256.1	3899.4	147.3	3460.4	439.0	108.84	616.991	21.0	OK
14	0.6	256.1	4155.5	147.3	3607.6	547.8	108.84	617.337	27.9	OK
15	0.5	256.1	4411.6	122.7	3730.3	681.2	133.38	617.684	34.9	OK
16	1.2	256.1	4667.6	294.5	4024.8	642.8	-38.41	618.108	43.4	OK
17	1.5	256.1	4923.7	368.1	4393.0	530.8	-112.04	617.986	40.9	OK
18	1.5	256.1	5179.8	368.1	4761.1	418.7	-112.04	617.629	33.8	OK
19	1.5	256.1	5435.9	368.1	5129.2	306.7	-112.04	617.273	26.7	OK
20	1.2	256.1	5692.0	294.5	5423.7	268.3	-38.41	616.916	19.5	OK
21	1	256.1	5948.1	245.4	5669.1	278.9	10.67	616.794	17.1	OK
22	0.6	256.1	6204.2	147.3	5816.4	387.8	108.84	616.828	17.8	OK
23	0.3	0.0	6204.2	73.6	5890.0	314.2	-73.63	617.174	24.7	OK
24	0.1	256.1	6460.2	24.5	5914.5	545.7	231.55	616.940	20.0	OK

Table 21: Thergaon Gaothan2

		OHT at	Thergaon Gaothan2		
Peak Factor	2	Maximum surplus (m^3)	1247.4		
Inflow Hours	23	Minimum surplus (m^3)	293.6		
Outflow Hours	24	1st Guess Capacity (m^3)	1541	< 1702	
Minimum wataer level (m)	584.170	As per CPHEEO Capacity (m^3)	1805		
Initial water level (m)	585.170	Final computed Capacity (m^3)	1702		
Maximum wataer level (m)	589.170	Max. Population serving	34098		
Initial water depth in tank	1	Initial Volume (m^3)	340.45		
Area of CS	340.45	Fire storage (m^3)	62.0		
Diameter (m)	20.82	Depth for Fire (m)	0.061		
Max. serving Demand (mld)	6.02	Av. Flow (m^3/h)=	261.622		

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	261.6	602.1	25.1	25.1	577.0	236.55	585.170	20.0	OK
1	0.1	261.6	863.7	25.1	50.1	813.5	236.55	585.865	33.9	OK
2	0.1	261.6	1125.3	25.1	75.2	1050.1	236.55	586.560	47.8	OK
3	0.3	261.6	1386.9	75.2	150.4	1236.5	186.41	587.254	61.7	OK
4	1	261.6	1648.6	250.7	401.2	1247.4	10.90	587.802	72.6	OK
5	1.2	261.6	1910.2	300.9	702.0	1208.2	-39.24	587.834	73.3	OK
6	2	261.6	2171.8	501.4	1203.5	968.3	-239.82	587.719	71.0	OK
7	2	261.6	2433.4	501.4	1704.9	728.5	-239.82	587.014	56.9	OK
8	2	261.6	2695.0	501.4	2206.3	488.7	-239.82	586.310	42.8	OK
9	1.5	261.6	2956.7	376.1	2582.4	374.2	-114.46	585.605	28.7	OK

10	1.2	261.6	3218.3	300.9	2883.3	335.0	-39.24	585.269	22.0	OK
11	1	261.6	3479.9	250.7	3134.0	345.9	10.90	585.154	19.7	OK
12	1	261.6	3741.5	250.7	3384.7	356.8	10.90	585.186	20.3	OK
13	0.6	261.6	4003.2	150.4	3535.2	468.0	111.19	585.218	21.0	OK
14	0.6	261.6	4264.8	150.4	3685.6	579.2	111.19	585.545	27.5	OK
15	0.5	261.6	4526.4	125.4	3811.0	715.4	136.26	585.871	34.0	OK
16	1.2	261.6	4788.0	300.9	4111.8	676.2	-39.24	586.271	42.0	OK
17	1.5	261.6	5049.6	376.1	4487.9	561.7	-114.46	586.156	39.7	OK
18	1.5	261.6	5311.3	376.1	4864.0	447.3	-114.46	585.820	33.0	OK
19	1.5	261.6	5572.9	376.1	5240.1	332.8	-114.46	585.484	26.3	OK
20	1.2	261.6	5834.5	300.9	5540.9	293.6	-39.24	585.148	19.6	OK
21	1	261.6	6096.1	250.7	5791.7	304.5	10.90	585.032	17.2	OK
22	0.6	261.6	6357.7	150.4	5942.1	415.7	111.19	585.064	17.9	OK
23	0.3	0.0	6357.7	75.2	6017.3	340.4	-75.22	585.391	24.4	OK
24	0.1	261.6	6619.4	25.1	6042.4	577.0	236.55	585.170	20.0	OK

Table 22: Morewasti Chikhli

OHT at Morewasti Chikhli				
Peak Factor	2	Maximum surplus (m^3)	1796.5	
Inflow Hours	23	Minimum surplus (m^3)	432.9	
Outflow Hours	24	1st Guess Capacity (m^3)	2229	< 2500
Minimum wataer level (m)	631.160	As per CPHEEO Capacity (m^3)	2581	
Initial water level (m)	632.160	Final computed Capacity (m^3)	2500	
Maximum wataer level (m)	636.160	Max. Population serving	48745	
Initial water depth in tank	1	Initial Volume (m^3)	499.95	
Area of CS	499.95	Fire storage (m^3)	88.6	
Diameter (m)	25.23	Depth for Fire (m)	0.059	
Max. serving Demand (mld)	8.60	Av. Flow (m^3/h)=	374.000	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	374.0	873.9	35.8	35.8	838.1	338.16	632.160	20.0	OK
1	0.1	374.0	1247.9	35.8	71.7	1176.3	338.16	632.836	33.5	OK
2	0.1	374.0	1621.9	35.8	107.5	1514.4	338.16	633.513	47.1	OK
3	0.3	374.0	1995.9	107.5	215.1	1780.9	266.48	634.189	60.6	OK
4	1	374.0	2369.9	358.4	573.5	1796.5	15.58	634.722	71.2	OK
5	1.2	374.0	2743.9	430.1	1003.6	1740.4	-56.10	634.753	71.9	OK
6	2	374.0	3117.9	716.8	1720.4	1397.5	-342.83	634.641	69.6	OK
7	2	374.0	3491.9	716.8	2437.2	1054.7	-342.83	633.955	55.9	OK
8	2	374.0	3865.9	716.8	3154.1	711.9	-342.83	633.270	42.2	OK
9	1.5	374.0	4239.9	537.6	3691.7	548.3	-163.63	632.584	28.5	OK
10	1.2	374.0	4613.9	430.1	4121.8	492.2	-56.10	632.257	21.9	OK
11	1	374.0	4987.9	358.4	4480.2	507.7	15.58	632.144	19.7	OK
12	1	374.0	5361.9	358.4	4838.6	523.3	15.58	632.176	20.3	OK

13	0.6	374.0	5735.9	215.1	5053.7	682.3	158.95	632.207	20.9	OK
14	0.6	374.0	6109.9	215.1	5268.7	841.2	158.95	632.525	27.3	OK
15	0.5	374.0	6483.9	179.2	5447.9	1036.0	194.79	632.843	33.7	OK
16	1.2	374.0	6857.9	430.1	5878.0	979.9	-56.10	633.232	41.4	OK
17	1.5	374.0	7231.9	537.6	6415.7	816.3	-163.63	633.120	39.2	OK
18	1.5	374.0	7605.9	537.6	6953.3	652.7	-163.63	632.793	32.7	OK
19	1.5	374.0	7979.9	537.6	7490.9	489.0	-163.63	632.465	26.1	OK
20	1.2	374.0	8353.9	430.1	7921.0	432.9	-56.10	632.138	19.6	OK
21	1	374.0	8727.9	358.4	8279.4	448.5	15.58	632.026	17.3	OK
22	0.6	374.0	9101.9	215.1	8494.5	607.5	158.95	632.057	17.9	OK
23	0.3	0.0	9101.9	107.5	8602.0	499.9	-107.53	632.375	24.3	OK
24	0.1	374.0	9475.9	35.8	8637.8	838.1	338.16	632.160	20.0	OK

Table 23: Nav Maha

		OHT at Nav Maha		
Peak Factor	2	Maximum surplus (m^3)	279.8	
Inflow Hours	23	Minimum surplus (m^3)	117.1	
Outflow Hours	24	1st Guess Capacity (m^3)	397	< 625
Minimum wataer level (m)	582.440	As per CPHEEO Capacity (m^3)	308	
Initial water level (m)	583.440	Final computed Capacity (m^3)	625	
Maximum wataer level (m)	587.440	Max. Population serving	5817	
Initial water depth in tank	1	Initial Volume (m^3)	125.09	
Area of CS	125.09	Fire storage (m^3)	10.6	
Diameter (m)	12.62	Depth for Fire (m)	0.028	
Max. serving Demand (mld)	1.03	Av. Flow (m^3/h)=	44.630	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	44.6	169.7	4.3	4.3	165.4	40.35	583.440	20.0	OK
1	0.1	44.6	214.3	4.3	8.6	205.8	40.35	583.763	26.5	OK
2	0.1	44.6	259.0	4.3	12.8	246.1	40.35	584.085	32.9	OK
3	0.3	44.6	303.6	12.8	25.7	277.9	31.80	584.408	39.4	OK
4	1	44.6	348.2	42.8	68.4	279.8	1.86	584.662	44.4	OK
5	1.2	44.6	392.9	51.3	119.8	273.1	-6.69	584.677	44.7	OK
6	2	44.6	437.5	85.5	205.3	232.2	-40.91	584.623	43.7	OK
7	2	44.6	482.1	85.5	290.8	191.3	-40.91	584.296	37.1	OK
8	2	44.6	526.8	85.5	376.4	150.4	-40.91	583.969	30.6	OK
9	1.5	44.6	571.4	64.2	440.5	130.9	-19.53	583.642	24.0	OK
10	1.2	44.6	616.0	51.3	491.9	124.2	-6.69	583.486	20.9	OK
11	1	44.6	660.7	42.8	534.6	126.0	1.86	583.433	19.9	OK
12	1	44.6	705.3	42.8	577.4	127.9	1.86	583.447	20.1	OK
13	0.6	44.6	749.9	25.7	603.1	146.8	18.97	583.462	20.4	OK

14	0.6	44.6	794.5	25.7	628.7	165.8	18.97	583.614	23.5	OK
15	0.5	44.6	839.2	21.4	650.1	189.1	23.25	583.766	26.5	OK
16	1.2	44.6	883.8	51.3	701.4	182.4	-6.69	583.951	30.2	OK
17	1.5	44.6	928.4	64.2	765.6	162.8	-19.53	583.898	29.2	OK
18	1.5	44.6	973.1	64.2	829.8	143.3	-19.53	583.742	26.0	OK
19	1.5	44.6	1017.7	64.2	893.9	123.8	-19.53	583.586	22.9	OK
20	1.2	44.6	1062.3	51.3	945.2	117.1	-6.69	583.430	19.8	OK
21	1	44.6	1107.0	42.8	988.0	118.9	1.86	583.376	18.7	OK
22	0.6	44.6	1151.6	25.7	1013.7	137.9	18.97	583.391	19.0	OK
23	0.3	0.0	1151.6	12.8	1026.5	125.1	-12.83	583.543	22.1	OK
24	0.1	44.6	1196.2	4.3	1030.8	165.4	40.35	583.440	20.0	OK

Table 24: Naydu

		OHT at Naydu	
Peak Factor	2	Maximum surplus (m^3)	1110.8
Inflow Hours	23	Minimum surplus (m^3)	181.3
Outflow Hours	24	1st Guess Capacity (m^3)	1292
Minimum wataer level (m)	583.140	As per CPHEEO Capacity (m^3)	1759
Initial water level (m)	584.140	Final computed Capacity (m^3)	1135
Maximum wataer level (m)	588.140	Max. Population serving	33227
Initial water depth in tank	1	Initial Volume (m^3)	226.98
Area of CS	226.98	Fire storage (m^3)	60.4
Diameter (m)	17	Depth for Fire (m)	0.089
Max. serving Demand (mld)	5.86	Av. Flow (m^3/h)=	254.935

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	254.9	481.9	24.4	24.4	457.5	230.50	584.140	20.0	OK
1	0.1	254.9	736.9	24.4	48.9	688.0	230.50	585.156	40.3	OK
2	0.1	254.9	991.8	24.4	73.3	918.5	230.50	586.171	60.6	OK
3	0.3	254.9	1246.7	73.3	146.6	1100.1	181.64	587.187	80.9	OK
4	1	254.9	1501.7	244.3	390.9	1110.8	10.62	587.987	96.9	OK
5	1.2	254.9	1756.6	293.2	684.1	1072.5	-38.24	588.034	97.9	OK
6	2	254.9	2011.5	488.6	1172.7	838.8	-233.69	587.865	94.5	OK
7	2	254.9	2266.5	488.6	1661.3	605.1	-233.69	586.836	73.9	OK
8	2	254.9	2521.4	488.6	2150.0	371.4	-233.69	585.806	53.3	OK
9	1.5	254.9	2776.3	366.5	2516.4	259.9	-111.53	584.776	32.7	OK
10	1.2	254.9	3031.3	293.2	2809.6	221.7	-38.24	584.285	22.9	OK
11	1	254.9	3286.2	244.3	3053.9	232.3	10.62	584.117	19.5	OK
12	1	254.9	3541.1	244.3	3298.2	242.9	10.62	584.163	20.5	OK
13	0.6	254.9	3796.1	146.6	3444.8	351.3	108.35	584.210	21.4	OK
14	0.6	254.9	4051.0	146.6	3591.4	459.6	108.35	584.688	31.0	OK
15	0.5	254.9	4305.9	122.2	3713.6	592.4	132.78	585.165	40.5	OK

16	1.2	254.9	4560.9	293.2	4006.7	554.1	-38.24	585.750	52.2	OK
17	1.5	254.9	4815.8	366.5	4373.2	442.6	-111.53	585.581	48.8	OK
18	1.5	254.9	5070.7	366.5	4739.7	331.1	-111.53	585.090	39.0	OK
19	1.5	254.9	5325.7	366.5	5106.1	219.5	-111.53	584.599	29.2	OK
20	1.2	254.9	5580.6	293.2	5399.3	181.3	-38.24	584.107	19.3	OK
21	1	254.9	5835.5	244.3	5643.6	191.9	10.62	583.939	16.0	OK
22	0.6	254.9	6090.5	146.6	5790.2	300.3	108.35	583.986	16.9	OK
23	0.3	0.0	6090.5	73.3	5863.5	227.0	-73.29	584.463	26.5	OK
24	0.1	254.9	6345.4	24.4	5887.9	457.5	230.50	584.140	20.0	OK

Table 25: Nehru Nagar1

		OHT at Nehru Nagar1		
Peak Factor	2	Maximum surplus (m^3)	833.6	
Inflow Hours	23	Minimum surplus (m^3)	325.0	
Outflow Hours	24	1st Guess Capacity (m^3)	1159	< 1750
Minimum wataer level (m)	599.140	As per CPHEEO Capacity (m^3)	963	
Initial water level (m)	600.140	Final computed Capacity (m^3)	1750	
Maximum wataer level (m)	604.140	Max. Population serving	18183	
Initial water depth in tank	1	Initial Volume (m^3)	350.00	
Area of CS	350.00	Fire storage (m^3)	33.0	
Diameter (m)	21.11	Depth for Fire (m)	0.031	
Max. serving Demand (mld)	3.21	Av. Flow (m^3/h)=	139.513	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	139.5	489.5	13.4	13.4	476.1	126.14	600.140	20.0	OK
1	0.1	139.5	629.0	13.4	26.7	602.3	126.14	600.500	27.2	OK
2	0.1	139.5	768.5	13.4	40.1	728.4	126.14	600.861	34.4	OK
3	0.3	139.5	908.1	40.1	80.2	827.8	99.40	601.221	41.6	OK
4	1	139.5	1047.6	133.7	213.9	833.6	5.81	601.505	47.3	OK
5	1.2	139.5	1187.1	160.4	374.4	812.7	-20.93	601.522	47.6	OK
6	2	139.5	1326.6	267.4	641.8	684.8	-127.89	601.462	46.4	OK
7	2	139.5	1466.1	267.4	909.2	556.9	-127.89	601.097	39.1	OK
8	2	139.5	1605.6	267.4	1176.6	429.1	-127.89	600.731	31.8	OK
9	1.5	139.5	1745.1	200.6	1377.1	368.0	-61.04	600.366	24.5	OK
10	1.2	139.5	1884.6	160.4	1537.6	347.1	-20.93	600.191	21.0	OK
11	1	139.5	2024.2	133.7	1671.3	352.9	5.81	600.132	19.8	OK
12	1	139.5	2163.7	133.7	1805.0	358.7	5.81	600.148	20.2	OK
13	0.6	139.5	2303.2	80.2	1885.2	418.0	59.29	600.165	20.5	OK
14	0.6	139.5	2442.7	80.2	1965.4	477.3	59.29	600.334	23.9	OK
15	0.5	139.5	2582.2	66.9	2032.2	550.0	72.66	600.504	27.3	OK
16	1.2	139.5	2721.7	160.4	2192.7	529.0	-20.93	600.711	31.4	OK

17	1.5	139.5	2861.2	200.6	2393.2	468.0	-61.04	600.652	30.2	OK
18	1.5	139.5	3000.7	200.6	2593.8	407.0	-61.04	600.477	26.7	OK
19	1.5	139.5	3140.3	200.6	2794.3	345.9	-61.04	600.303	23.3	OK
20	1.2	139.5	3279.8	160.4	2954.8	325.0	-20.93	600.128	19.8	OK
21	1	139.5	3419.3	133.7	3088.5	330.8	5.81	600.069	18.6	OK
22	0.6	139.5	3558.8	80.2	3168.7	390.1	59.29	600.085	18.9	OK
23	0.3	0.0	3558.8	40.1	3208.8	350.0	-40.11	600.255	22.3	OK
24	0.1	139.5	3698.3	13.4	3222.2	476.1	126.14	600.140	20.0	OK

Table 26: Nehru Nagar2

		OHT at Nehru Nagar2		
Peak Factor	2	Maximum surplus (m^3)	764.7	
Inflow Hours	23	Minimum surplus (m^3)	328.6	
Outflow Hours	24	1st Guess Capacity (m^3)	1093	< 3
Minimum wataer level (m)	599.120	As per CPHEEO Capacity (m^3)	825	
Initial water level (m)	600.120	Final computed Capacity (m^3)	1750	
Maximum wataer level (m)	604.120	Max. Population serving	15590	
Initial water depth in tank	1	Initial Volume (m^3)	350.00	
Area of CS	350	Fire storage (m^3)	28.3	
Diameter (m)	21.11	Depth for Fire (m)	0.027	
Max. serving Demand (mld)	2.75	Av. Flow (m^3/h)=	119.617	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	119.6	469.6	11.5	11.5	458.2	108.15	600.120	20.0	OK
1	0.1	119.6	589.2	11.5	22.9	566.3	108.15	600.429	26.2	OK
2	0.1	119.6	708.9	11.5	34.4	674.5	108.15	600.738	32.4	OK
3	0.3	119.6	828.5	34.4	68.8	759.7	85.23	601.047	38.5	OK
4	1	119.6	948.1	114.6	183.4	764.7	4.98	601.291	43.4	OK
5	1.2	119.6	1067.7	137.6	321.0	746.7	-17.94	601.305	43.7	OK
6	2	119.6	1187.3	229.3	550.2	637.1	-109.65	601.254	42.7	OK
7	2	119.6	1306.9	229.3	779.5	527.4	-109.65	600.940	36.4	OK
8	2	119.6	1426.6	229.3	1008.8	417.8	-109.65	600.627	30.1	OK
9	1.5	119.6	1546.2	172.0	1180.7	365.5	-52.33	600.314	23.9	OK
10	1.2	119.6	1665.8	137.6	1318.3	347.5	-17.94	600.164	20.9	OK
11	1	119.6	1785.4	114.6	1432.9	352.5	4.98	600.113	19.9	OK
12	1	119.6	1905.0	114.6	1547.6	357.5	4.98	600.127	20.1	OK
13	0.6	119.6	2024.6	68.8	1616.3	408.3	50.84	600.141	20.4	OK
14	0.6	119.6	2144.3	68.8	1685.1	459.2	50.84	600.287	23.3	OK
15	0.5	119.6	2263.9	57.3	1742.4	521.5	62.30	600.432	26.2	OK
16	1.2	119.6	2383.5	137.6	1880.0	503.5	-17.94	600.610	29.8	OK
17	1.5	119.6	2503.1	172.0	2051.9	451.2	-52.33	600.559	28.8	OK

18	1.5	119.6	2622.7	172.0	2223.9	398.8	-52.33	600.409	25.8	OK
19	1.5	119.6	2742.3	172.0	2395.8	346.5	-52.33	600.260	22.8	OK
20	1.2	119.6	2862.0	137.6	2533.4	328.6	-17.94	600.110	19.8	OK
21	1	119.6	2981.6	114.6	2648.0	333.6	4.98	600.059	18.8	OK
22	0.6	119.6	3101.2	68.8	2716.8	384.4	50.84	600.073	19.1	OK
23	0.3	0.0	3101.2	34.4	2751.2	350.0	-34.39	600.218	22.0	OK
24	0.1	119.6	3220.8	11.5	2762.7	458.2	108.15	600.120	20.0	OK

Table 27: New Panjarpol

OHT at	New Panjarpol			
Peak Factor	2	Maximum surplus (m^3)	546.1	
Inflow Hours	23	Minimum surplus (m^3)	392.5	
Outflow Hours	24	1st Guess Capacity (m^3)	939	< 2000
Minimum wataer level (m)	616.000	As per CPHEEO Capacity (m^3)	291	
Initial water level (m)	617.000	Final computed Capacity (m^3)	2000	
Maximum wataer level (m)	621.000	Max. Population serving	5491	
Initial water depth in tank	1	Initial Volume (m^3)	400.09	
Area of CS	400.09	Fire storage (m^3)	10.0	
Diameter (m)	22.57	Depth for Fire (m)	0.008	
Max. serving Demand (mld)	0.97	Av. Flow (m^3/h)=	42.130	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	42.1	442.2	4.0	4.0	438.2	38.09	617.000	20.0	OK
1	0.1	42.1	484.3	4.0	8.1	476.3	38.09	617.095	21.9	OK
2	0.1	42.1	526.5	4.0	12.1	514.4	38.09	617.190	23.8	OK
3	0.3	42.1	568.6	12.1	24.2	544.4	30.02	617.286	25.7	OK
4	1	42.1	610.7	40.4	64.6	546.1	1.76	617.361	27.2	OK
5	1.2	42.1	652.9	48.5	113.1	539.8	-6.32	617.365	27.3	OK
6	2	42.1	695.0	80.8	193.8	501.2	-38.62	617.349	27.0	OK
7	2	42.1	737.1	80.8	274.6	462.6	-38.62	617.253	25.1	OK
8	2	42.1	779.3	80.8	355.3	424.0	-38.62	617.156	23.1	OK
9	1.5	42.1	821.4	60.6	415.9	405.5	-18.43	617.060	21.2	OK
10	1.2	42.1	863.5	48.5	464.3	399.2	-6.32	617.014	20.3	OK
11	1	42.1	905.7	40.4	504.7	401.0	1.76	616.998	20.0	OK
12	1	42.1	947.8	40.4	545.1	402.7	1.76	617.002	20.0	OK
13	0.6	42.1	989.9	24.2	569.3	420.6	17.91	617.007	20.1	OK
14	0.6	42.1	1032.0	24.2	593.5	438.5	17.91	617.051	21.0	OK
15	0.5	42.1	1074.2	20.2	613.7	460.5	21.94	617.096	21.9	OK
16	1.2	42.1	1116.3	48.5	662.2	454.2	-6.32	617.151	23.0	OK
17	1.5	42.1	1158.4	60.6	722.7	435.7	-18.43	617.135	22.7	OK
18	1.5	42.1	1200.6	60.6	783.3	417.3	-18.43	617.089	21.8	OK
19	1.5	42.1	1242.7	60.6	843.8	398.9	-18.43	617.043	20.9	OK

20	1.2	42.1	1284.8	48.5	892.3	392.5	-6.32	616.997	19.9	OK
21	1	42.1	1327.0	40.4	932.7	394.3	1.76	616.981	19.6	OK
22	0.6	42.1	1369.1	24.2	956.9	412.2	17.91	616.986	19.7	OK
23	0.3	0.0	1369.1	12.1	969.0	400.1	-12.11	617.030	20.6	OK
24	0.1	42.1	1411.2	4.0	973.0	438.2	38.09	617.000	20.0	OK

Table 28: New Pimple Gurav Garden 20 Lakhs

		OHT at	New Pimple Gurav Garden 20 Lakhs	
Peak Factor	2	Maximum surplus (m^3)	1439.0	
Inflow Hours	23	Minimum surplus (m^3)	325.4	
Outflow Hours	24	1st Guess Capacity (m^3)	1764	< 1901
Minimum wataer level (m)	582.500	As per CPHEEO Capacity (m^3)	2108	
Initial water level (m)	583.500	Final computed Capacity (m^3)	1901	
Maximum wataer level (m)	587.500	Max. Population serving	39810	
Initial water depth in tank	1	Initial Volume (m^3)	380.13	
Area of CS	380.13	Fire storage (m^3)	72.3	
Diameter (m)	22	Depth for Fire (m)	0.063	
Max. serving Demand (mld)	7.03	Av. Flow (m^3/h)=	305.448	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	305.4	685.6	29.3	29.3	656.3	276.18	583.500	20.0	OK
1	0.1	305.4	991.0	29.3	58.5	932.5	276.18	584.227	34.5	OK
2	0.1	305.4	1296.5	29.3	87.8	1208.7	276.18	584.953	49.1	OK
3	0.3	305.4	1601.9	87.8	175.6	1426.3	217.63	585.680	63.6	OK
4	1	305.4	1907.4	292.7	468.4	1439.0	12.73	586.252	75.0	OK
5	1.2	305.4	2212.8	351.3	819.6	1393.2	-45.82	586.286	75.7	OK
6	2	305.4	2518.3	585.4	1405.1	1113.2	-279.99	586.165	73.3	OK
7	2	305.4	2823.7	585.4	1990.5	833.2	-279.99	585.428	58.6	OK
8	2	305.4	3129.2	585.4	2575.9	553.2	-279.99	584.692	43.8	OK
9	1.5	305.4	3434.6	439.1	3015.0	419.6	-133.63	583.955	29.1	OK
10	1.2	305.4	3740.1	351.3	3366.3	373.8	-45.82	583.604	22.1	OK
11	1	305.4	4045.5	292.7	3659.0	386.5	12.73	583.483	19.7	OK
12	1	305.4	4351.0	292.7	3951.7	399.2	12.73	583.517	20.3	OK
13	0.6	305.4	4656.4	175.6	4127.4	529.0	129.82	583.550	21.0	OK
14	0.6	305.4	4961.9	175.6	4303.0	658.9	129.82	583.892	27.8	OK
15	0.5	305.4	5267.3	146.4	4449.4	817.9	159.09	584.233	34.7	OK
16	1.2	305.4	5572.7	351.3	4800.6	772.1	-45.82	584.652	43.0	OK
17	1.5	305.4	5878.2	439.1	5239.7	638.5	-133.63	584.531	40.6	OK

18	1.5	305.4	6183.6	439.1	5678.8	504.9	-133.63	584.180	33.6	OK
19	1.5	305.4	6489.1	439.1	6117.9	371.2	-133.63	583.828	26.6	OK
20	1.2	305.4	6794.5	351.3	6469.1	325.4	-45.82	583.477	19.5	OK
21	1	305.4	7100.0	292.7	6761.9	338.1	12.73	583.356	17.1	OK
22	0.6	305.4	7405.4	175.6	6937.5	467.9	129.82	583.390	17.8	OK
23	0.3	0.0	7405.4	87.8	7025.3	380.1	-87.82	583.731	24.6	OK
24	0.1	305.4	7710.9	29.3	7054.6	656.3	276.18	583.500	20.0	OK

Table 29: New_Punavale

		OHT at	New_Punavale	
Peak Factor	2	Maximum surplus (m^3)	1495.5	
Inflow Hours	23	Minimum surplus (m^3)	340.9	
Outflow Hours	24	1st Guess Capacity (m^3)	1836	< 1988
Minimum wataer level (m)	591.970	As per CPHEEO Capacity (m^3)	2185	
Initial water level (m)	592.970	Final computed Capacity (m^3)	1988	
Maximum wataer level (m)	596.970	Max. Population serving	41277	
Initial water depth in tank	1	Initial Volume (m^3)	397.61	
Area of CS	397.61	Fire storage (m^3)	75.0	
Diameter (m)	22.5	Depth for Fire (m)	0.063	
Max. serving Demand (mld)	7.28	Av. Flow (m^3/h)=	316.704	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	316.7	714.3	30.4	30.4	684.0	286.35	592.970	20.0	OK
1	0.1	316.7	1031.0	30.4	60.7	970.3	286.35	593.690	34.4	OK
2	0.1	316.7	1347.7	30.4	91.1	1256.7	286.35	594.410	48.8	OK
3	0.3	316.7	1664.4	91.1	182.1	1482.3	225.65	595.131	63.2	OK
4	1	316.7	1981.1	303.5	485.6	1495.5	13.20	595.698	74.6	OK
5	1.2	316.7	2297.8	364.2	849.8	1448.0	-47.51	595.731	75.2	OK
6	2	316.7	2614.5	607.0	1456.8	1157.7	-290.31	595.612	72.8	OK
7	2	316.7	2931.2	607.0	2063.9	867.4	-290.31	594.882	58.2	OK
8	2	316.7	3247.9	607.0	2670.9	577.1	-290.31	594.152	43.6	OK
9	1.5	316.7	3564.7	455.3	3126.1	438.5	-138.56	593.421	29.0	OK
10	1.2	316.7	3881.4	364.2	3490.3	391.0	-47.51	593.073	22.1	OK
11	1	316.7	4198.1	303.5	3793.9	404.2	13.20	592.953	19.7	OK
12	1	316.7	4514.8	303.5	4097.4	417.4	13.20	592.987	20.3	OK
13	0.6	316.7	4831.5	182.1	4279.5	552.0	134.60	593.020	21.0	OK
14	0.6	316.7	5148.2	182.1	4461.6	686.6	134.60	593.358	27.8	OK
15	0.5	316.7	5464.9	151.8	4613.3	851.6	164.95	593.697	34.5	OK
16	1.2	316.7	5781.6	364.2	4977.5	804.0	-47.51	594.112	42.8	OK
17	1.5	316.7	6098.3	455.3	5432.8	665.5	-138.56	593.992	40.4	OK
18	1.5	316.7	6415.0	455.3	5888.1	526.9	-138.56	593.644	33.5	OK
19	1.5	316.7	6731.7	455.3	6343.3	388.4	-138.56	593.295	26.5	OK
20	1.2	316.7	7048.4	364.2	6707.5	340.9	-47.51	592.947	19.5	OK
21	1	316.7	7365.1	303.5	7011.0	354.1	13.20	592.827	17.1	OK

22	0.6	316.7	7681.8	182.1	7193.1	488.7	134.60	592.860	17.8	OK
23	0.3	0.0	7681.8	91.1	7284.2	397.6	-91.05	593.199	24.6	OK
24	0.1	316.7	7998.5	30.4	7314.6	684.0	286.35	592.970	20.0	OK

Table 30: Panjarpol

		OHT at Panjarpol		
Peak Factor	2	Maximum surplus (m^3)	1218.9	
Inflow Hours	23	Minimum surplus (m^3)	515.3	
Outflow Hours	24	1st Guess Capacity (m^3)	1734	< 2749
Minimum wataer level (m)	614.900	As per CPHEEO Capacity (m^3)	1332	
Initial water level (m)	615.900	Final computed Capacity (m^3)	2749	
Maximum wataer level (m)	619.900	Max. Population serving	25153	
Initial water depth in tank	1	Initial Volume (m^3)	549.88	
Area of CS	549.88	Fire storage (m^3)	45.7	
Diameter (m)	26.46	Depth for Fire (m)	0.028	
Max. serving Demand (mld)	4.44	Av. Flow (m^3/h)=	192.991	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	193.0	742.9	18.5	18.5	724.4	174.50	615.900	20.0	OK
1	0.1	193.0	935.9	18.5	37.0	898.9	174.50	616.217	26.3	OK
2	0.1	193.0	1128.9	18.5	55.5	1073.4	174.50	616.535	32.7	OK
3	0.3	193.0	1321.8	55.5	111.0	1210.9	137.51	616.852	39.0	OK
4	1	193.0	1514.8	185.0	295.9	1218.9	8.04	617.102	44.0	OK
5	1.2	193.0	1707.8	221.9	517.9	1190.0	-28.95	617.117	44.3	OK
6	2	193.0	1900.8	369.9	887.8	1013.1	-176.91	617.064	43.3	OK
7	2	193.0	2093.8	369.9	1257.7	836.2	-176.91	616.742	36.8	OK
8	2	193.0	2286.8	369.9	1627.6	659.2	-176.91	616.421	30.4	OK
9	1.5	193.0	2479.8	277.4	1905.0	574.8	-84.43	616.099	24.0	OK
10	1.2	193.0	2672.8	221.9	2126.9	545.9	-28.95	615.945	20.9	OK
11	1	193.0	2865.8	185.0	2311.9	553.9	8.04	615.893	19.9	OK
12	1	193.0	3058.8	185.0	2496.8	561.9	8.04	615.907	20.1	OK
13	0.6	193.0	3251.8	111.0	2607.8	644.0	82.02	615.922	20.4	OK
14	0.6	193.0	3444.8	111.0	2718.8	726.0	82.02	616.071	23.4	OK
15	0.5	193.0	3637.7	92.5	2811.2	826.5	100.52	616.220	26.4	OK
16	1.2	193.0	3830.7	221.9	3033.2	797.6	-28.95	616.403	30.1	OK
17	1.5	193.0	4023.7	277.4	3310.6	713.1	-84.43	616.350	29.0	OK
18	1.5	193.0	4216.7	277.4	3588.0	628.7	-84.43	616.197	25.9	OK
19	1.5	193.0	4409.7	277.4	3865.5	544.3	-84.43	616.043	22.9	OK
20	1.2	193.0	4602.7	221.9	4087.4	515.3	-28.95	615.890	19.8	OK
21	1	193.0	4795.7	185.0	4272.3	523.3	8.04	615.837	18.7	OK

22	0.6	193.0	4988.7	111.0	4383.3	605.4	82.02	615.852	19.0	OK
23	0.3	0.0	4988.7	55.5	4438.8	549.9	-55.49	616.001	22.0	OK
24	0.1	193.0	5181.7	18.5	4457.3	724.4	174.50	615.900	20.0	OK

Table 31: Pimple Gurao1

OHT at Pimple Gurao1				
Peak Factor	2	Maximum surplus (m^3)	816.9	
Inflow Hours	23	Minimum surplus (m^3)	242.0	
Outflow Hours	24	1st Guess Capacity (m^3)	1059	< 1351
Minimum wataer level (m)	577.430	As per CPHEEO Capacity (m^3)	1088	
Initial water level (m)	578.430	Final computed Capacity (m^3)	1351	
Maximum wataer level (m)	582.430	Max. Population serving	20553	
Initial water depth in tank	1	Initial Volume (m^3)	270.26	
Area of CS	270.26	Fire storage (m^3)	37.3	
Diameter (m)	18.55	Depth for Fire (m)	0.046	
Max. serving Demand (mld)	3.63	Av. Flow (m^3/h)=	157.696	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	157.7	428.0	15.1	15.1	412.8	142.58	578.430	20.0	OK
1	0.1	157.7	585.6	15.1	30.2	555.4	142.58	578.958	30.6	OK
2	0.1	157.7	743.3	15.1	45.3	698.0	142.58	579.485	41.1	OK
3	0.3	157.7	901.0	45.3	90.7	810.4	112.36	580.013	51.7	OK
4	1	157.7	1058.7	151.1	241.8	816.9	6.57	580.428	60.0	OK
5	1.2	157.7	1216.4	181.4	423.2	793.3	-23.65	580.453	60.5	OK
6	2	157.7	1374.1	302.3	725.4	648.7	-144.55	580.365	58.7	OK
7	2	157.7	1531.8	302.3	1027.7	504.2	-144.55	579.830	48.0	OK
8	2	157.7	1689.5	302.3	1329.9	359.6	-144.55	579.296	37.3	OK
9	1.5	157.7	1847.2	226.7	1556.6	290.6	-68.99	578.761	26.6	OK
10	1.2	157.7	2004.9	181.4	1737.9	267.0	-23.65	578.505	21.5	OK
11	1	157.7	2162.6	151.1	1889.1	273.5	6.57	578.418	19.8	OK
12	1	157.7	2320.3	151.1	2040.2	280.1	6.57	578.442	20.2	OK
13	0.6	157.7	2478.0	90.7	2130.9	347.1	67.02	578.466	20.7	OK
14	0.6	157.7	2635.7	90.7	2221.5	414.2	67.02	578.714	25.7	OK
15	0.5	157.7	2793.4	75.6	2297.1	496.3	82.13	578.962	30.6	OK
16	1.2	157.7	2951.1	181.4	2478.5	472.6	-23.65	579.266	36.7	OK
17	1.5	157.7	3108.8	226.7	2705.1	403.6	-68.99	579.179	35.0	OK
18	1.5	157.7	3266.5	226.7	2931.8	334.7	-68.99	578.924	29.9	OK
19	1.5	157.7	3424.2	226.7	3158.5	265.7	-68.99	578.668	24.8	OK
20	1.2	157.7	3581.9	181.4	3339.9	242.0	-23.65	578.413	19.7	OK

21	1	157.7	3739.6	151.1	3491.0	248.6	6.57	578.325	17.9	OK
22	0.6	157.7	3897.3	90.7	3581.7	315.6	67.02	578.350	18.4	OK
23	0.3	0.0	3897.3	45.3	3627.0	270.3	-45.34	578.598	23.4	OK
24	0.1	157.7	4055.0	15.1	3642.1	412.8	142.58	578.430	20.0	OK

Table 32: Pimple Gurao2

		OHT at Pimple Gurao2		
Peak Factor	2	Maximum surplus (m^3)	828.9	
Inflow Hours	23	Minimum surplus (m^3)	180.9	
Outflow Hours	24	1st Guess Capacity (m^3)	1010	< 1064
Minimum wataer level (m)	577.430	As per CPHEEO Capacity (m^3)	1226	
Initial water level (m)	578.430	Final computed Capacity (m^3)	1064	
Maximum wataer level (m)	582.430	Max. Population serving	23163	
Initial water depth in tank	1	Initial Volume (m^3)	212.79	
Area of CS	212.79	Fire storage (m^3)	42.1	
Diameter (m)	16.46	Depth for Fire (m)	0.066	
Max. serving Demand (mld)	4.09	Av. Flow (m^3/h)=	177.720	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	177.7	390.5	17.0	17.0	373.5	160.69	578.430	20.0	OK
1	0.1	177.7	568.2	17.0	34.1	534.2	160.69	579.185	35.1	OK
2	0.1	177.7	746.0	17.0	51.1	694.9	160.69	579.940	50.2	OK
3	0.3	177.7	923.7	51.1	102.2	821.5	126.63	580.695	65.3	OK
4	1	177.7	1101.4	170.3	272.5	828.9	7.41	581.291	77.2	OK
5	1.2	177.7	1279.1	204.4	476.9	802.2	-26.66	581.325	77.9	OK
6	2	177.7	1456.8	340.6	817.5	639.3	-162.91	581.200	75.4	OK
7	2	177.7	1634.6	340.6	1158.1	476.4	-162.91	580.434	60.1	OK
8	2	177.7	1812.3	340.6	1498.8	313.5	-162.91	579.669	44.8	OK
9	1.5	177.7	1990.0	255.5	1754.2	235.7	-77.75	578.903	29.5	OK
10	1.2	177.7	2167.7	204.4	1958.6	209.1	-26.66	578.538	22.2	OK
11	1	177.7	2345.4	170.3	2128.9	216.5	7.41	578.413	19.7	OK
12	1	177.7	2523.2	170.3	2299.3	223.9	7.41	578.447	20.3	OK
13	0.6	177.7	2700.9	102.2	2401.4	299.4	75.53	578.482	21.0	OK
14	0.6	177.7	2878.6	102.2	2503.6	375.0	75.53	578.837	28.1	OK
15	0.5	177.7	3056.3	85.2	2588.8	467.5	92.56	579.192	35.2	OK
16	1.2	177.7	3234.0	204.4	2793.2	440.9	-26.66	579.627	43.9	OK
17	1.5	177.7	3411.8	255.5	3048.6	363.1	-77.75	579.502	41.4	OK
18	1.5	177.7	3589.5	255.5	3304.1	285.4	-77.75	579.136	34.1	OK
19	1.5	177.7	3767.2	255.5	3559.6	207.6	-77.75	578.771	26.8	OK
20	1.2	177.7	3944.9	204.4	3764.0	180.9	-26.66	578.406	19.5	OK
21	1	177.7	4122.6	170.3	3934.3	188.4	7.41	578.280	17.0	OK
22	0.6	177.7	4300.4	102.2	4036.5	263.9	75.53	578.315	17.7	OK

23	0.3	0.0	4300.4	51.1	4087.6	212.8	-51.09	578.670	24.8	OK
24	0.1	177.7	4478.1	17.0	4104.6	373.5	160.69	578.430	20.0	OK

Table 33: Pimple Gurao3

OHT at Pimple Gurao3				
Peak Factor	2	Maximum surplus (m^3)	867.4	
Inflow Hours	23	Minimum surplus (m^3)	165.6	
Outflow Hours	24	1st Guess Capacity (m^3)	1033	< 1000
Minimum wataer level (m)	577.630	As per CPHEEO Capacity (m^3)	1328	
Initial water level (m)	578.630	Final computed Capacity (m^3)	1000	
Maximum wataer level (m)	582.630	Max. Population serving	25088	
Initial water depth in tank	1	Initial Volume (m^3)	200.06	
Area of CS	200.06	Fire storage (m^3)	45.6	
Diameter (m)	15.96	Depth for Fire (m)	0.076	
Max. serving Demand (mld)	4.43	Av. Flow (m^3/h)=	192.494	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	192.5	392.6	18.4	18.4	374.1	174.05	578.630	20.0	OK
1	0.1	192.5	585.0	18.4	36.9	548.2	174.05	579.500	37.4	OK
2	0.1	192.5	777.5	18.4	55.3	722.2	174.05	580.370	54.8	OK
3	0.3	192.5	970.0	55.3	110.7	859.4	137.15	581.240	72.2	OK
4	1	192.5	1162.5	184.5	295.2	867.4	8.02	581.925	85.9	OK
5	1.2	192.5	1355.0	221.4	516.5	838.5	-28.87	581.966	86.7	OK
6	2	192.5	1547.5	368.9	885.5	662.0	-176.45	581.821	83.8	OK
7	2	192.5	1740.0	368.9	1254.4	485.6	-176.45	580.939	66.2	OK
8	2	192.5	1932.5	368.9	1623.4	309.1	-176.45	580.057	48.5	OK
9	1.5	192.5	2125.0	276.7	1900.1	224.9	-84.22	579.175	30.9	OK
10	1.2	192.5	2317.5	221.4	2121.4	196.0	-28.87	578.754	22.5	OK
11	1	192.5	2510.0	184.5	2305.9	204.1	8.02	578.610	19.6	OK
12	1	192.5	2702.5	184.5	2490.4	212.1	8.02	578.650	20.4	OK
13	0.6	192.5	2895.0	110.7	2601.1	293.9	81.81	578.690	21.2	OK
14	0.6	192.5	3087.5	110.7	2711.8	375.7	81.81	579.099	29.4	OK
15	0.5	192.5	3280.0	92.2	2804.0	476.0	100.26	579.508	37.6	OK
16	1.2	192.5	3472.5	221.4	3025.4	447.1	-28.87	580.009	47.6	OK
17	1.5	192.5	3664.9	276.7	3302.1	362.9	-84.22	579.865	44.7	OK
18	1.5	192.5	3857.4	276.7	3578.8	278.7	-84.22	579.444	36.3	OK
19	1.5	192.5	4049.9	276.7	3855.5	194.4	-84.22	579.023	27.9	OK
20	1.2	192.5	4242.4	221.4	4076.9	165.6	-28.87	578.602	19.4	OK

21	1	192.5	4434.9	184.5	4261.3	173.6	8.02	578.458	16.6	OK
22	0.6	192.5	4627.4	110.7	4372.0	255.4	81.81	578.498	17.4	OK
23	0.3	0.0	4627.4	55.3	4427.4	200.1	-55.34	578.907	25.5	OK
24	0.1	192.5	4819.9	18.4	4445.8	374.1	174.05	578.630	20.0	OK

Table 34: Pimple Gurav Garden

		OHT at	Pimple Gurav Garden	
Peak Factor	2	Maximum surplus (m^3)	737.1	
Inflow Hours	23	Minimum surplus (m^3)	277.3	
Outflow Hours	24	1st Guess Capacity (m^3)	1014	< 1499
Minimum wataer level (m)	576.850	As per CPHEEO Capacity (m^3)	870	
Initial water level (m)	577.850	Final computed Capacity (m^3)	1499	
Maximum wataer level (m)	581.850	Max. Population serving	16438	
Initial water depth in tank	1	Initial Volume (m^3)	299.87	
Area of CS	299.87	Fire storage (m^3)	29.9	
Diameter (m)	19.54	Depth for Fire (m)	0.033	
Max. serving Demand (mld)	2.90	Av. Flow (m^3/h)=	126.125	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	126.1	426.0	12.1	12.1	413.9	114.04	577.850	20.0	OK
1	0.1	126.1	552.1	12.1	24.2	528.0	114.04	578.230	27.6	OK
2	0.1	126.1	678.2	12.1	36.3	642.0	114.04	578.611	35.2	OK
3	0.3	126.1	804.4	36.3	72.5	731.9	89.86	578.991	42.8	OK
4	1	126.1	930.5	120.9	193.4	737.1	5.26	579.291	48.8	OK
5	1.2	126.1	1056.6	145.0	338.4	718.2	-18.92	579.308	49.2	OK
6	2	126.1	1182.7	241.7	580.2	602.6	-115.61	579.245	47.9	OK
7	2	126.1	1308.9	241.7	821.9	487.0	-115.61	578.859	40.2	OK
8	2	126.1	1435.0	241.7	1063.7	371.3	-115.61	578.474	32.5	OK
9	1.5	126.1	1561.1	181.3	1245.0	316.2	-55.18	578.088	24.8	OK
10	1.2	126.1	1687.2	145.0	1390.0	297.2	-18.92	577.904	21.1	OK
11	1	126.1	1813.4	120.9	1510.9	302.5	5.26	577.841	19.8	OK
12	1	126.1	1939.5	120.9	1631.7	307.8	5.26	577.859	20.2	OK
13	0.6	126.1	2065.6	72.5	1704.3	361.4	53.60	577.876	20.5	OK
14	0.6	126.1	2191.7	72.5	1776.8	415.0	53.60	578.055	24.1	OK
15	0.5	126.1	2317.9	60.4	1837.2	480.7	65.69	578.234	27.7	OK
16	1.2	126.1	2444.0	145.0	1982.3	461.7	-18.92	578.453	32.1	OK
17	1.5	126.1	2570.1	181.3	2163.6	406.6	-55.18	578.390	30.8	OK
18	1.5	126.1	2696.2	181.3	2344.9	351.4	-55.18	578.206	27.1	OK
19	1.5	126.1	2822.4	181.3	2526.2	296.2	-55.18	578.022	23.4	OK
20	1.2	126.1	2948.5	145.0	2671.2	277.3	-18.92	577.838	19.8	OK
21	1	126.1	3074.6	120.9	2792.1	282.5	5.26	577.775	18.5	OK

22	0.6	126.1	3200.7	72.5	2864.6	336.1	53.60	577.792	18.8	OK
23	0.3	0.0	3200.7	36.3	2900.9	299.9	-36.26	577.971	22.4	OK
24	0.1	126.1	3326.9	12.1	2913.0	413.9	114.04	577.850	20.0	OK

Table 35: Pimple Nilakh

OHT at	Pimple Nilakh		
Peak Factor	2	Maximum surplus (m^3)	1968.5
Inflow Hours	23	Minimum surplus (m^3)	335.2
Outflow Hours	24	1st Guess Capacity (m^3)	2304
Minimum wataer level (m)	575.250	As per CPHEEO Capacity (m^3)	3091
Initial water level (m)	576.250	Final computed Capacity (m^3)	2077
Maximum wataer level (m)	580.250	Max. Population serving	58388
Initial water depth in tank	1	Initial Volume (m^3)	415.48
Area of CS	415.48	Fire storage (m^3)	106.1
Diameter (m)	23	Depth for Fire (m)	0.085
Max. serving Demand (mld)	10.30	Av. Flow (m^3/h)=	447.990

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	448.0	863.5	42.9	42.9	820.5	405.06	576.250	20.0	OK
1	0.1	448.0	1311.5	42.9	85.9	1225.6	405.06	577.225	39.5	OK
2	0.1	448.0	1759.4	42.9	128.8	1630.6	405.06	578.200	59.0	OK
3	0.3	448.0	2207.4	128.8	257.6	1949.8	319.19	579.175	78.5	OK
4	1	448.0	2655.4	429.3	686.9	1968.5	18.67	579.943	93.9	OK
5	1.2	448.0	3103.4	515.2	1202.1	1901.3	-67.20	579.988	94.8	OK
6	2	448.0	3551.4	858.6	2060.8	1490.7	-410.66	579.826	91.5	OK
7	2	448.0	3999.4	858.6	2919.4	1080.0	-410.66	578.838	71.8	OK
8	2	448.0	4447.4	858.6	3778.0	669.3	-410.66	577.849	52.0	OK
9	1.5	448.0	4895.4	644.0	4422.0	473.3	-196.00	576.861	32.2	OK
10	1.2	448.0	5343.4	515.2	4937.2	406.1	-67.20	576.389	22.8	OK
11	1	448.0	5791.4	429.3	5366.5	424.8	18.67	576.228	19.6	OK
12	1	448.0	6239.3	429.3	5795.9	443.5	18.67	576.272	20.4	OK
13	0.6	448.0	6687.3	257.6	6053.5	633.9	190.40	576.317	21.3	OK
14	0.6	448.0	7135.3	257.6	6311.1	824.3	190.40	576.776	30.5	OK
15	0.5	448.0	7583.3	214.7	6525.7	1057.6	233.33	577.234	39.7	OK
16	1.2	448.0	8031.3	515.2	7040.9	990.4	-67.20	577.795	50.9	OK
17	1.5	448.0	8479.3	644.0	7684.9	794.4	-196.00	577.634	47.7	OK
18	1.5	448.0	8927.3	644.0	8328.9	598.4	-196.00	577.162	38.2	OK
19	1.5	448.0	9375.3	644.0	8972.9	402.4	-196.00	576.690	28.8	OK
20	1.2	448.0	9823.3	515.2	9488.1	335.2	-67.20	576.219	19.4	OK
21	1	448.0	10271.3	429.3	9917.4	353.9	18.67	576.057	16.1	OK
22	0.6	448.0	10719.2	257.6	10175.0	544.3	190.40	576.102	17.0	OK

23	0.3	0.0	10719.2	128.8	10303.8	415.5	-128.80	576.560	26.2	OK
24	0.1	448.0	11167.2	42.9	10346.7	820.5	405.06	576.250	20.0	OK

OHT at Pimple Nilakh			
Peak Factor	2	Maximum surplus (m^3)	1968.5
Inflow Hours	23	Minimum surplus (m^3)	335.2
Outflow Hours	24	1st Guess Capacity (m^3)	2304
Minimum wataer level (m)	575.250	As per CPHEEO Capacity (m^3)	3091
Initial water level (m)	576.250	Final computed Capacity (m^3)	2077
Maximum wataer level (m)	580.250	Max. Population serving	58388
Initial water depth in tank	1	Initial Volume (m^3)	415.48
Area of CS	415.48	Fire storage (m^3)	106.1
Diameter (m)	23	Depth for Fire (m)	0.085
Max. serving Demand (mld)	10.30	Av. Flow (m^3/h)=	447.990

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	448.0	863.5	42.9	42.9	820.5	405.06	576.250	20.0	OK
1	0.1	448.0	1311.5	42.9	85.9	1225.6	405.06	577.225	39.5	OK
2	0.1	448.0	1759.4	42.9	128.8	1630.6	405.06	578.200	59.0	OK
3	0.3	448.0	2207.4	128.8	257.6	1949.8	319.19	579.175	78.5	OK
4	1	448.0	2655.4	429.3	686.9	1968.5	18.67	579.943	93.9	OK
5	1.2	448.0	3103.4	515.2	1202.1	1901.3	-67.20	579.988	94.8	OK
6	2	448.0	3551.4	858.6	2060.8	1490.7	-410.66	579.826	91.5	OK
7	2	448.0	3999.4	858.6	2919.4	1080.0	-410.66	578.838	71.8	OK
8	2	448.0	4447.4	858.6	3778.0	669.3	-410.66	577.849	52.0	OK
9	1.5	448.0	4895.4	644.0	4422.0	473.3	-196.00	576.861	32.2	OK
10	1.2	448.0	5343.4	515.2	4937.2	406.1	-67.20	576.389	22.8	OK
11	1	448.0	5791.4	429.3	5366.5	424.8	18.67	576.228	19.6	OK
12	1	448.0	6239.3	429.3	5795.9	443.5	18.67	576.272	20.4	OK
13	0.6	448.0	6687.3	257.6	6053.5	633.9	190.40	576.317	21.3	OK
14	0.6	448.0	7135.3	257.6	6311.1	824.3	190.40	576.776	30.5	OK
15	0.5	448.0	7583.3	214.7	6525.7	1057.6	233.33	577.234	39.7	OK
16	1.2	448.0	8031.3	515.2	7040.9	990.4	-67.20	577.795	50.9	OK
17	1.5	448.0	8479.3	644.0	7684.9	794.4	-196.00	577.634	47.7	OK
18	1.5	448.0	8927.3	644.0	8328.9	598.4	-196.00	577.162	38.2	OK
19	1.5	448.0	9375.3	644.0	8972.9	402.4	-196.00	576.690	28.8	OK
20	1.2	448.0	9823.3	515.2	9488.1	335.2	-67.20	576.219	19.4	OK
21	1	448.0	10271.3	429.3	9917.4	353.9	18.67	576.057	16.1	OK
22	0.6	448.0	10719.2	257.6	10175.0	544.3	190.40	576.102	17.0	OK
23	0.3	0.0	10719.2	128.8	10303.8	415.5	-128.80	576.560	26.2	OK
24	0.1	448.0	11167.2	42.9	10346.7	820.5	405.06	576.250	20.0	OK

Table 36: Pimple Saudagar a

OHT at	Pimple Saudagar a			
Peak Factor	2	Maximum surplus (m^3)	949.8	
Inflow Hours	23	Minimum surplus (m^3)	266.3	
Outflow Hours	24	1st Guess Capacity (m^3)	1216	< 1499
Minimum wataer level (m)	572.000	As per CPHEEO Capacity (m^3)	1294	
Initial water level (m)	573.000	Final computed Capacity (m^3)	1499	
Maximum wataer level (m)	577.000	Max. Population serving	24435	
Initial water depth in tank	1	Initial Volume (m^3)	299.87	
Area of CS	299.87	Fire storage (m^3)	44.4	
Diameter (m)	19.54	Depth for Fire (m)	0.049	
Max. serving Demand (mld)	4.31	Av. Flow (m^3/h)=	187.483	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	187.5	487.4	18.0	18.0	469.4	169.52	573.000	20.0	OK
1	0.1	187.5	674.8	18.0	35.9	638.9	169.52	573.565	31.3	OK
2	0.1	187.5	862.3	18.0	53.9	808.4	169.52	574.131	42.6	OK
3	0.3	187.5	1049.8	53.9	107.8	942.0	133.58	574.696	53.9	OK
4	1	187.5	1237.3	179.7	287.5	949.8	7.81	575.141	62.8	OK
5	1.2	187.5	1424.8	215.6	503.1	921.7	-28.12	575.167	63.3	OK
6	2	187.5	1612.3	359.3	862.4	749.8	-171.86	575.074	61.5	OK
7	2	187.5	1799.7	359.3	1221.8	578.0	-171.86	574.500	50.0	OK
8	2	187.5	1987.2	359.3	1581.1	406.1	-171.86	573.927	38.5	OK
9	1.5	187.5	2174.7	269.5	1850.6	324.1	-82.02	573.354	27.1	OK
10	1.2	187.5	2362.2	215.6	2066.2	296.0	-28.12	573.081	21.6	OK
11	1	187.5	2549.7	179.7	2245.9	303.8	7.81	572.987	19.7	OK
12	1	187.5	2737.1	179.7	2425.6	311.6	7.81	573.013	20.3	OK
13	0.6	187.5	2924.6	107.8	2533.4	391.3	79.68	573.039	20.8	OK
14	0.6	187.5	3112.1	107.8	2641.2	471.0	79.68	573.305	26.1	OK
15	0.5	187.5	3299.6	89.8	2731.0	568.6	97.65	573.570	31.4	OK
16	1.2	187.5	3487.1	215.6	2946.6	540.5	-28.12	573.896	37.9	OK
17	1.5	187.5	3674.6	269.5	3216.1	458.5	-82.02	573.802	36.0	OK
18	1.5	187.5	3862.0	269.5	3485.6	376.4	-82.02	573.529	30.6	OK
19	1.5	187.5	4049.5	269.5	3755.1	294.4	-82.02	573.255	25.1	OK
20	1.2	187.5	4237.0	215.6	3970.7	266.3	-28.12	572.982	19.6	OK
21	1	187.5	4424.5	179.7	4150.4	274.1	7.81	572.888	17.8	OK
22	0.6	187.5	4612.0	107.8	4258.2	353.8	79.68	572.914	18.3	OK
23	0.3	0.0	4612.0	53.9	4312.1	299.9	-53.90	573.180	23.6	OK
24	0.1	187.5	4799.5	18.0	4330.1	469.4	169.52	573.000	20.0	OK

Table 37: Pimple Saudagar b New

OHT at	Pimple Saudagar b New

Peak Factor	2		Maximum surplus (m^3)	1849.5	
Inflow Hours	23		Minimum surplus (m^3)	322.6	
Outflow Hours	24		1st Guess Capacity (m^3)	2172	< 1988
Minimum wataer level (m)	580.000		As per CPHEEO Capacity (m^3)	2890	
Initial water level (m)	581.000		Final computed Capacity (m^3)	1988	
Maximum wataer level (m)	585.000		Max. Population serving	54587	
Initial water depth in tank	1		Initial Volume (m^3)	397.61	
Area of CS	397.61		Fire storage (m^3)	99.2	
Diameter (m)	22.5		Depth for Fire (m)	0.083	
Max. serving Demand (mld)	9.63		Av. Flow (m^3/h)=	418.823	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	418.8	816.4	40.1	40.1	776.3	378.69	581.000	20.0	OK
1	0.1	418.8	1235.3	40.1	80.3	1155.0	378.69	581.952	39.0	OK
2	0.1	418.8	1654.1	40.1	120.4	1533.7	378.69	582.905	58.1	OK
3	0.3	418.8	2072.9	120.4	240.8	1832.1	298.41	583.857	77.1	OK
4	1	418.8	2491.7	401.4	642.2	1849.5	17.45	584.608	92.2	OK
5	1.2	418.8	2910.5	481.6	1123.8	1786.7	-62.82	584.652	93.0	OK
6	2	418.8	3329.4	802.7	1926.6	1402.8	-383.92	584.494	89.9	OK
7	2	418.8	3748.2	802.7	2729.3	1018.9	-383.92	583.528	70.6	OK
8	2	418.8	4167.0	802.7	3532.1	634.9	-383.92	582.562	51.2	OK
9	1.5	418.8	4585.8	602.1	4134.1	451.7	-183.23	581.597	31.9	OK
10	1.2	418.8	5004.7	481.6	4615.8	388.9	-62.82	581.136	22.7	OK
11	1	418.8	5423.5	401.4	5017.1	406.3	17.45	580.978	19.6	OK
12	1	418.8	5842.3	401.4	5418.5	423.8	17.45	581.022	20.4	OK
13	0.6	418.8	6261.1	240.8	5659.3	601.8	178.00	581.066	21.3	OK
14	0.6	418.8	6680.0	240.8	5900.2	779.8	178.00	581.514	30.3	OK
15	0.5	418.8	7098.8	200.7	6100.9	997.9	218.14	581.961	39.2	OK
16	1.2	418.8	7517.6	481.6	6582.5	935.1	-62.82	582.510	50.2	OK
17	1.5	418.8	7936.4	602.1	7184.6	751.9	-183.23	582.352	47.0	OK
18	1.5	418.8	8355.2	602.1	7786.6	568.6	-183.23	581.891	37.8	OK
19	1.5	418.8	8774.1	602.1	8388.7	385.4	-183.23	581.430	28.6	OK
20	1.2	418.8	9192.9	481.6	8870.3	322.6	-62.82	580.969	19.4	OK
21	1	418.8	9611.7	401.4	9271.7	340.0	17.45	580.811	16.2	OK
22	0.6	418.8	10030.5	240.8	9512.5	518.0	178.00	580.855	17.1	OK
23	0.3	0.0	10030.5	120.4	9632.9	397.6	-120.41	581.303	26.1	OK
24	0.1	418.8	10449.4	40.1	9673.1	776.3	378.69	581.000	20.0	OK

Table 38: Pimpri Delux a

OHT at Pimpri Delux a				
Peak Factor	2	Maximum surplus (m^3)	1323.0	
Inflow Hours	23	Minimum surplus (m^3)	352.4	
Outflow Hours	24	1st Guess Capacity (m^3)	1675	< 2000
Minimum wataer level (m)	582.720	As per CPHEEO Capacity (m^3)	1837	
Initial water level (m)	583.720	Final computed Capacity (m^3)	2000	
Maximum wataer level (m)	587.720	Max. Population serving	34698	
Initial water depth in tank	1	Initial Volume (m^3)	400.09	
Area of CS	400.09	Fire storage (m^3)	63.0	
Diameter (m)	22.57	Depth for Fire (m)	0.053	
Max. serving Demand (mld)	6.12	Av. Flow (m^3/h)=	266.227	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	266.2	666.3	25.5	25.5	640.8	240.71	583.720	20.0	OK
1	0.1	266.2	932.5	25.5	51.0	881.5	240.71	584.322	32.0	OK
2	0.1	266.2	1198.8	25.5	76.5	1122.2	240.71	584.923	44.1	OK
3	0.3	266.2	1465.0	76.5	153.1	1311.9	189.69	585.525	56.1	OK
4	1	266.2	1731.2	255.1	408.2	1323.0	11.09	585.999	65.6	OK
5	1.2	266.2	1997.5	306.2	714.4	1283.1	-39.93	586.027	66.1	OK
6	2	266.2	2263.7	510.3	1224.6	1039.0	-244.04	585.927	64.1	OK
7	2	266.2	2529.9	510.3	1734.9	795.0	-244.04	585.317	51.9	OK
8	2	266.2	2796.1	510.3	2245.2	550.9	-244.04	584.707	39.7	OK
9	1.5	266.2	3062.4	382.7	2627.9	434.5	-116.47	584.097	27.5	OK
10	1.2	266.2	3328.6	306.2	2934.0	394.5	-39.93	583.806	21.7	OK
11	1	266.2	3594.8	255.1	3189.2	405.6	11.09	583.706	19.7	OK
12	1	266.2	3861.0	255.1	3444.3	416.7	11.09	583.734	20.3	OK
13	0.6	266.2	4127.3	153.1	3597.4	529.9	113.15	583.762	20.8	OK
14	0.6	266.2	4393.5	153.1	3750.5	643.0	113.15	584.044	26.5	OK
15	0.5	266.2	4659.7	127.6	3878.0	781.7	138.66	584.327	32.1	OK
16	1.2	266.2	4926.0	306.2	4184.2	741.7	-39.93	584.674	39.1	OK
17	1.5	266.2	5192.2	382.7	4566.9	625.3	-116.47	584.574	37.1	OK
18	1.5	266.2	5458.4	382.7	4949.6	508.8	-116.47	584.283	31.3	OK
19	1.5	266.2	5724.6	382.7	5332.3	392.3	-116.47	583.992	25.4	OK
20	1.2	266.2	5990.9	306.2	5638.5	352.4	-39.93	583.701	19.6	OK
21	1	266.2	6257.1	255.1	5893.6	363.5	11.09	583.601	17.6	OK
22	0.6	266.2	6523.3	153.1	6046.7	476.6	113.15	583.629	18.2	OK
23	0.3	0.0	6523.3	76.5	6123.2	400.1	-76.54	583.911	23.8	OK
24	0.1	266.2	6789.5	25.5	6148.7	640.8	240.71	583.720	20.0	OK

Table 39: Pimpri Delux b

OHT at Pimpri Delux b			
Peak Factor	2	Maximum surplus	1000.6

		(m^3)		
Inflow Hours	23	Minimum surplus (m^3)	369.1	
Outflow Hours	24	1st Guess Capacity (m^3)	1370	< 2000
Minimum wataer level (m)	582.810	As per CPHEEO Capacity (m^3)	1195	
Initial water level (m)	583.810	Final computed Capacity (m^3)	2000	
Maximum wataer level (m)	587.810	Max. Population serving	22577	
Initial water depth in tank	1	Initial Volume (m^3)	400.09	
Area of CS	400.09	Fire storage (m^3)	41.0	
Diameter (m)	22.57	Depth for Fire (m)	0.034	
Max. serving Demand (mld)	3.98	Av. Flow (m^3/h)=	173.226	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	173.2	573.3	16.6	16.6	556.7	156.63	583.810	20.0	OK
1	0.1	173.2	746.5	16.6	33.2	713.3	156.63	584.201	27.8	OK
2	0.1	173.2	919.8	16.6	49.8	870.0	156.63	584.593	35.7	OK
3	0.3	173.2	1093.0	49.8	99.6	993.4	123.42	584.984	43.5	OK
4	1	173.2	1266.2	166.0	265.6	1000.6	7.22	585.293	49.7	OK
5	1.2	173.2	1439.4	199.2	464.8	974.6	-25.98	585.311	50.0	OK
6	2	173.2	1612.7	332.0	796.8	815.8	-158.79	585.246	48.7	OK
7	2	173.2	1785.9	332.0	1128.9	657.0	-158.79	584.849	40.8	OK
8	2	173.2	1959.1	332.0	1460.9	498.2	-158.79	584.452	32.8	OK
9	1.5	173.2	2132.3	249.0	1709.9	422.5	-75.79	584.055	24.9	OK
10	1.2	173.2	2305.6	199.2	1909.1	396.5	-25.98	583.866	21.1	OK
11	1	173.2	2478.8	166.0	2075.1	403.7	7.22	583.801	19.8	OK
12	1	173.2	2652.0	166.0	2241.1	410.9	7.22	583.819	20.2	OK
13	0.6	173.2	2825.3	99.6	2340.7	484.5	73.62	583.837	20.5	OK
14	0.6	173.2	2998.5	99.6	2440.3	558.2	73.62	584.021	24.2	OK
15	0.5	173.2	3171.7	83.0	2523.3	648.4	90.22	584.205	27.9	OK
16	1.2	173.2	3344.9	199.2	2722.5	622.4	-25.98	584.431	32.4	OK
17	1.5	173.2	3518.2	249.0	2971.5	546.6	-75.79	584.366	31.1	OK
18	1.5	173.2	3691.4	249.0	3220.6	470.8	-75.79	584.176	27.3	OK
19	1.5	173.2	3864.6	249.0	3469.6	395.0	-75.79	583.987	23.5	OK
20	1.2	173.2	4037.8	199.2	3668.8	369.1	-25.98	583.797	19.7	OK
21	1	173.2	4211.1	166.0	3834.8	376.3	7.22	583.732	18.4	OK
22	0.6	173.2	4384.3	99.6	3934.4	449.9	73.62	583.750	18.8	OK
23	0.3	0.0	4384.3	49.8	3984.2	400.1	-49.80	583.934	22.5	OK
24	0.1	173.2	4557.5	16.6	4000.8	556.7	156.63	583.810	20.0	OK

Table 40: Proposed Naydu

OHT at	Proposed Naydu			
Peak Factor	2	Maximum surplus (m^3)	920.7	
Inflow Hours	23	Minimum surplus (m^3)	370.6	
Outflow Hours	24	1st Guess Capacity (m^3)	1291	< 1988
Minimum wataer level (m)	583.600	As per CPHEEO Capacity (m^3)	1041	
Initial water level (m)	584.600	Final computed Capacity (m^3)	1988	
Maximum wataer level (m)	588.600	Max. Population serving	19668	
Initial water depth in tank	1	Initial Volume (m^3)	397.61	
Area of CS	397.61	Fire storage (m^3)	35.7	
Diameter (m)	22.5	Depth for Fire (m)	0.030	
Max. serving Demand (mld)	3.47	Av. Flow (m^3/h)=	150.904	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	150.9	548.5	14.5	14.5	534.1	136.44	584.600	20.0	OK
1	0.1	150.9	699.4	14.5	28.9	670.5	136.44	584.943	26.9	OK
2	0.1	150.9	850.3	14.5	43.4	806.9	136.44	585.286	33.7	OK
3	0.3	150.9	1001.2	43.4	86.8	914.5	107.52	585.629	40.6	OK
4	1	150.9	1152.1	144.6	231.4	920.7	6.29	585.900	46.0	OK
5	1.2	150.9	1303.0	173.5	404.9	898.1	-22.64	585.916	46.3	OK
6	2	150.9	1453.9	289.2	694.2	759.8	-138.33	585.859	45.2	OK
7	2	150.9	1604.8	289.2	983.4	621.5	-138.33	585.511	38.2	OK
8	2	150.9	1755.7	289.2	1272.6	483.1	-138.33	585.163	31.3	OK
9	1.5	150.9	1906.7	216.9	1489.6	417.1	-66.02	584.815	24.3	OK
10	1.2	150.9	2057.6	173.5	1663.1	394.5	-22.64	584.649	21.0	OK
11	1	150.9	2208.5	144.6	1807.7	400.8	6.29	584.592	19.8	OK
12	1	150.9	2359.4	144.6	1952.3	407.0	6.29	584.608	20.2	OK
13	0.6	150.9	2510.3	86.8	2039.1	471.2	64.13	584.624	20.5	OK
14	0.6	150.9	2661.2	86.8	2125.9	535.3	64.13	584.785	23.7	OK
15	0.5	150.9	2812.1	72.3	2198.2	613.9	78.60	584.946	26.9	OK
16	1.2	150.9	2963.0	173.5	2371.7	591.3	-22.64	585.144	30.9	OK
17	1.5	150.9	3113.9	216.9	2588.6	525.2	-66.02	585.087	29.7	OK
18	1.5	150.9	3264.8	216.9	2805.6	459.2	-66.02	584.921	26.4	OK
19	1.5	150.9	3415.7	216.9	3022.5	393.2	-66.02	584.755	23.1	OK
20	1.2	150.9	3566.6	173.5	3196.0	370.6	-22.64	584.589	19.8	OK
21	1	150.9	3717.5	144.6	3340.6	376.9	6.29	584.532	18.6	OK
22	0.6	150.9	3868.4	86.8	3427.4	441.0	64.13	584.548	19.0	OK
23	0.3	0.0	3868.4	43.4	3470.8	397.6	-43.39	584.709	22.2	OK
24	0.1	150.9	4019.3	14.5	3485.3	534.1	136.44	584.600	20.0	OK

Table 41: Punavale

OHT at	Punavale

Peak Factor	2	Maximum surplus (m^3)	1122.9	
Inflow Hours	23	Minimum surplus (m^3)	257.3	
Outflow Hours	24	1st Guess Capacity (m^3)	1380	< 1499
Minimum wataer level (m)	597.000	As per CPHEEO Capacity (m^3)	1638	
Initial water level (m)	598.000	Final computed Capacity (m^3)	1499	
Maximum wataer level (m)	602.000	Max. Population serving	30942	
Initial water depth in tank	1	Initial Volume (m^3)	299.87	
Area of CS	299.87	Fire storage (m^3)	56.2	
Diameter (m)	19.54	Depth for Fire (m)	0.062	
Max. serving Demand (mld)	5.46	Av. Flow (m^3/h)=	237.404	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	237.4	537.3	22.8	22.8	514.5	214.65	598.000	20.0	OK
1	0.1	237.4	774.7	22.8	45.5	729.2	214.65	598.716	34.3	OK
2	0.1	237.4	1012.1	22.8	68.3	943.8	214.65	599.432	48.6	OK
3	0.3	237.4	1249.5	68.3	136.5	1113.0	169.15	600.147	62.9	OK
4	1	237.4	1486.9	227.5	364.0	1122.9	9.89	600.711	74.2	OK
5	1.2	237.4	1724.3	273.0	637.0	1087.3	-35.61	600.744	74.9	OK
6	2	237.4	1961.7	455.0	1092.1	869.6	-217.62	600.626	72.5	OK
7	2	237.4	2199.1	455.0	1547.1	652.0	-217.62	599.900	58.0	OK
8	2	237.4	2436.5	455.0	2002.1	434.4	-217.62	599.174	43.5	OK
9	1.5	237.4	2673.9	341.3	2343.4	330.5	-103.86	598.449	29.0	OK
10	1.2	237.4	2911.3	273.0	2616.4	294.9	-35.61	598.102	22.0	OK
11	1	237.4	3148.7	227.5	2843.9	304.8	9.89	597.984	19.7	OK
12	1	237.4	3386.1	227.5	3071.4	314.7	9.89	598.016	20.3	OK
13	0.6	237.4	3623.5	136.5	3207.9	415.6	100.90	598.049	21.0	OK
14	0.6	237.4	3860.9	136.5	3344.4	516.5	100.90	598.386	27.7	OK
15	0.5	237.4	4098.3	113.8	3458.2	640.2	123.65	598.722	34.4	OK
16	1.2	237.4	4335.7	273.0	3731.2	604.5	-35.61	599.135	42.7	OK
17	1.5	237.4	4573.2	341.3	4072.5	500.7	-103.86	599.016	40.3	OK
18	1.5	237.4	4810.6	341.3	4413.7	396.8	-103.86	598.670	33.4	OK
19	1.5	237.4	5048.0	341.3	4755.0	293.0	-103.86	598.323	26.5	OK
20	1.2	237.4	5285.4	273.0	5028.0	257.3	-35.61	597.977	19.5	OK
21	1	237.4	5522.8	227.5	5255.5	267.2	9.89	597.858	17.2	OK
22	0.6	237.4	5760.2	136.5	5392.0	368.1	100.90	597.891	17.8	OK
23	0.3	0.0	5760.2	68.3	5460.3	299.9	-68.25	598.228	24.6	OK
24	0.1	237.4	5997.6	22.8	5483.1	514.5	214.65	598.000	20.0	OK

Table 42: Rahatni1

Peak Factor	2	Maximum surplus (m^3)	1435.4
Inflow Hours	23	Minimum surplus (m^3)	346.6

Outflow Hours	24	1st Guess Capacity (m^3)	1782	< 2000
Minimum wataer level (m)	586.980	As per CPHEEO Capacity (m^3)	2061	
Initial water level (m)	587.980	Final computed Capacity (m^3)	2000	
Maximum wataer level (m)	591.980	Max. Population serving	38924	
Initial water depth in tank	1	Initial Volume (m^3)	400.09	
Area of CS	400.09	Fire storage (m^3)	70.7	
Diameter (m)	22.57	Depth for Fire (m)	0.059	
Max. serving Demand (mld)	6.87	Av. Flow (m^3/h)=	298.648	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	298.6	698.7	28.6	28.6	670.1	270.03	587.980	20.0	OK
1	0.1	298.6	997.4	28.6	57.2	940.1	270.03	588.655	33.5	OK
2	0.1	298.6	1296.0	28.6	85.9	1210.2	270.03	589.330	47.0	OK
3	0.3	298.6	1594.7	85.9	171.7	1423.0	212.79	590.005	60.5	OK
4	1	298.6	1893.3	286.2	457.9	1435.4	12.44	590.537	71.1	OK
5	1.2	298.6	2192.0	343.4	801.4	1390.6	-44.80	590.568	71.8	OK
6	2	298.6	2490.6	572.4	1373.8	1116.8	-273.76	590.456	69.5	OK
7	2	298.6	2789.3	572.4	1946.2	843.1	-273.76	589.771	55.8	OK
8	2	298.6	3087.9	572.4	2518.6	569.3	-273.76	589.087	42.1	OK
9	1.5	298.6	3386.6	429.3	2947.9	438.7	-130.66	588.403	28.5	OK
10	1.2	298.6	3685.2	343.4	3291.3	393.9	-44.80	588.076	21.9	OK
11	1	298.6	3983.9	286.2	3577.6	406.3	12.44	587.964	19.7	OK
12	1	298.6	4282.5	286.2	3863.8	418.8	12.44	587.996	20.3	OK
13	0.6	298.6	4581.2	171.7	4035.5	545.7	126.93	588.027	20.9	OK
14	0.6	298.6	4879.8	171.7	4207.2	672.6	126.93	588.344	27.3	OK
15	0.5	298.6	5178.5	143.1	4350.3	828.1	155.55	588.661	33.6	OK
16	1.2	298.6	5477.1	343.4	4693.7	783.4	-44.80	589.050	41.4	OK
17	1.5	298.6	5775.7	429.3	5123.1	652.7	-130.66	588.938	39.2	OK
18	1.5	298.6	6074.4	429.3	5552.4	522.0	-130.66	588.611	32.6	OK
19	1.5	298.6	6373.0	429.3	5981.7	391.4	-130.66	588.285	26.1	OK
20	1.2	298.6	6671.7	343.4	6325.1	346.6	-44.80	587.958	19.6	OK
21	1	298.6	6970.3	286.2	6611.3	359.0	12.44	587.846	17.3	OK
22	0.6	298.6	7269.0	171.7	6783.0	485.9	126.93	587.877	17.9	OK
23	0.3	0.0	7269.0	85.9	6868.9	400.1	-85.86	588.195	24.3	OK
24	0.1	298.6	7567.6	28.6	6897.5	670.1	270.03	587.980	20.0	OK

Table 43: Rahatni2

		OHT at Rahatni 2	
Peak Factor	2	Maximum surplus (m^3)	1857.4
Inflow Hours	23	Minimum surplus (m^3)	561.3

Outflow Hours	24	1st Guess Capacity (m^3)	2419	< 3125
Minimum wataer level (m)	588.610	As per CPHEEO Capacity (m^3)	2453	
Initial water level (m)	589.610	Final computed Capacity (m^3)	3125	
Maximum wataer level (m)	593.610	Max. Population serving	46334	
Initial water depth in tank	1	Initial Volume (m^3)	625.02	
Area of CS	625.02	Fire storage (m^3)	84.2	
Diameter (m)	28.21	Depth for Fire (m)	0.045	
Max. serving Demand (mld)	8.18	Av. Flow (m^3/h)=	355.500	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	355.5	980.5	34.1	34.1	946.5	321.43	589.610	20.0	OK
1	0.1	355.5	1336.0	34.1	68.1	1267.9	321.43	590.124	30.3	OK
2	0.1	355.5	1691.5	34.1	102.2	1589.3	321.43	590.639	40.6	OK
3	0.3	355.5	2047.0	102.2	204.4	1842.6	253.29	591.153	50.9	OK
4	1	355.5	2402.5	340.7	545.1	1857.4	14.81	591.558	59.0	OK
5	1.2	355.5	2758.0	408.8	953.9	1804.1	-53.32	591.582	59.4	OK
6	2	355.5	3113.5	681.4	1635.3	1478.2	-325.88	591.496	57.7	OK
7	2	355.5	3469.0	681.4	2316.7	1152.3	-325.88	590.975	47.3	OK
8	2	355.5	3824.5	681.4	2998.1	826.5	-325.88	590.454	36.9	OK
9	1.5	355.5	4180.0	511.0	3509.1	670.9	-155.53	589.932	26.4	OK
10	1.2	355.5	4535.5	408.8	3917.9	617.6	-53.32	589.683	21.5	OK
11	1	355.5	4891.0	340.7	4258.6	632.4	14.81	589.598	19.8	OK
12	1	355.5	5246.5	340.7	4599.3	647.2	14.81	589.622	20.2	OK
13	0.6	355.5	5602.0	204.4	4803.7	798.3	151.09	589.646	20.7	OK
14	0.6	355.5	5957.5	204.4	5008.1	949.4	151.09	589.887	25.5	OK
15	0.5	355.5	6313.0	170.3	5178.5	1134.6	185.16	590.129	30.4	OK
16	1.2	355.5	6668.5	408.8	5587.3	1081.2	-53.32	590.425	36.3	OK
17	1.5	355.5	7024.0	511.0	6098.3	925.7	-155.53	590.340	34.6	OK
18	1.5	355.5	7379.5	511.0	6609.3	770.2	-155.53	590.091	29.6	OK
19	1.5	355.5	7735.0	511.0	7120.4	614.7	-155.53	589.842	24.6	OK
20	1.2	355.5	8090.5	408.8	7529.2	561.3	-53.32	589.593	19.7	OK
21	1	355.5	8446.0	340.7	7869.9	576.1	14.81	589.508	18.0	OK
22	0.6	355.5	8801.5	204.4	8074.3	727.2	151.09	589.532	18.4	OK
23	0.3	0.0	8801.5	102.2	8176.5	625.0	-102.21	589.774	23.3	OK
24	0.1	355.5	9157.0	34.1	8210.6	946.5	321.43	589.610	20.0	OK

Table 44: Rahatni3

		OHT at	Rahatni 3	
Peak Factor	2	Maximum surplus (m^3)	1420.7	

Inflow Hours	23	Minimum surplus (m^3)	452.4	
Outflow Hours	24	1st Guess Capacity (m^3)	1873	< 2500
Minimum wataer level (m)	590.000	As per CPHEEO Capacity (m^3)	1833	
Initial water level (m)	591.000	Final computed Capacity (m^3)	2500	
Maximum wataer level (m)	595.000	Max. Population serving	34618	
Initial water depth in tank	1	Initial Volume (m^3)	499.95	
Area of CS	499.95	Fire storage (m^3)	62.9	
Diameter (m)	25.23	Depth for Fire (m)	0.042	
Max. serving Demand (mld)	6.11	Av. Flow (m^3/h)=	265.609	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	265.6	765.6	25.5	25.5	740.1	240.15	591.000	20.0	OK
1	0.1	265.6	1031.2	25.5	50.9	980.3	240.15	591.480	29.6	OK
2	0.1	265.6	1296.8	25.5	76.4	1220.4	240.15	591.961	39.2	OK
3	0.3	265.6	1562.4	76.4	152.7	1409.7	189.25	592.441	48.8	OK
4	1	265.6	1828.0	254.5	407.3	1420.7	11.07	592.820	56.4	OK
5	1.2	265.6	2093.6	305.5	712.7	1380.9	-39.84	592.842	56.8	OK
6	2	265.6	2359.2	509.1	1221.8	1137.4	-243.47	592.762	55.2	OK
7	2	265.6	2624.8	509.1	1730.9	893.9	-243.47	592.275	45.5	OK
8	2	265.6	2890.4	509.1	2240.0	650.5	-243.47	591.788	35.8	OK
9	1.5	265.6	3156.0	381.8	2621.8	534.3	-116.20	591.301	26.0	OK
10	1.2	265.6	3421.6	305.5	2927.2	494.4	-39.84	591.069	21.4	OK
11	1	265.6	3687.3	254.5	3181.8	505.5	11.07	590.989	19.8	OK
12	1	265.6	3952.9	254.5	3436.3	516.5	11.07	591.011	20.2	OK
13	0.6	265.6	4218.5	152.7	3589.0	629.4	112.88	591.033	20.7	OK
14	0.6	265.6	4484.1	152.7	3741.8	742.3	112.88	591.259	25.2	OK
15	0.5	265.6	4749.7	127.3	3869.0	880.7	138.34	591.485	29.7	OK
16	1.2	265.6	5015.3	305.5	4174.5	840.8	-39.84	591.761	35.2	OK
17	1.5	265.6	5280.9	381.8	4556.3	724.6	-116.20	591.682	33.6	OK
18	1.5	265.6	5546.5	381.8	4938.1	608.4	-116.20	591.449	29.0	OK
19	1.5	265.6	5812.1	381.8	5319.9	492.2	-116.20	591.217	24.3	OK
20	1.2	265.6	6077.7	305.5	5625.4	452.4	-39.84	590.985	19.7	OK
21	1	265.6	6343.3	254.5	5879.9	463.4	11.07	590.905	18.1	OK
22	0.6	265.6	6608.9	152.7	6032.6	576.3	112.88	590.927	18.5	OK
23	0.3	0.0	6608.9	76.4	6109.0	499.9	-76.36	591.153	23.1	OK
24	0.1	265.6	6874.6	25.5	6134.5	740.1	240.15	591.000	20.0	OK

Table 45: Rupi Nagar

	OHT at Rupi Nagar		
Peak Factor	2	Maximum surplus (m^3)	2065.4

Inflow Hours	23	Minimum surplus (m^3)	419.0
Outflow Hours	24	1st Guess Capacity (m^3)	2484
Minimum wataer level (m)	630.990	As per CPHEEO Capacity (m^3)	3116
Initial water level (m)	631.990	Final computed Capacity (m^3)	2500
Maximum wataer level (m)	635.990	Max. Population serving	58854
Initial water depth in tank	1	Initial Volume (m^3)	499.95
Area of CS	499.95	Fire storage (m^3)	106.9
Diameter (m)	25.23	Depth for Fire (m)	0.071
Max. serving Demand (mld)	10.39	Av. Flow (m^3/h)=	451.561

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	451.6	951.5	43.3	43.3	908.2	408.29	631.990	20.0	OK
1	0.1	451.6	1403.1	43.3	86.5	1316.5	408.29	632.807	36.3	OK
2	0.1	451.6	1854.6	43.3	129.8	1724.8	408.29	633.623	52.7	OK
3	0.3	451.6	2306.2	129.8	259.6	2046.5	321.74	634.440	69.0	OK
4	1	451.6	2757.8	432.7	692.4	2065.4	18.82	635.084	81.9	OK
5	1.2	451.6	3209.3	519.3	1211.7	1997.6	-67.73	635.121	82.6	OK
6	2	451.6	3660.9	865.5	2077.2	1583.7	-413.93	634.986	79.9	OK
7	2	451.6	4112.4	865.5	2942.7	1169.8	-413.93	634.158	63.4	OK
8	2	451.6	4564.0	865.5	3808.2	755.8	-413.93	633.330	46.8	OK
9	1.5	451.6	5015.6	649.1	4457.3	558.3	-197.56	632.502	30.2	OK
10	1.2	451.6	5467.1	519.3	4976.6	490.5	-67.73	632.107	22.3	OK
11	1	451.6	5918.7	432.7	5409.3	509.4	18.82	631.971	19.6	OK
12	1	451.6	6370.2	432.7	5842.1	528.2	18.82	632.009	20.4	OK
13	0.6	451.6	6821.8	259.6	6101.7	720.1	191.91	632.046	21.1	OK
14	0.6	451.6	7273.4	259.6	6361.4	912.0	191.91	632.430	28.8	OK
15	0.5	451.6	7724.9	216.4	6577.7	1147.2	235.19	632.814	36.5	OK
16	1.2	451.6	8176.5	519.3	7097.0	1079.5	-67.73	633.285	45.9	OK
17	1.5	451.6	8628.0	649.1	7746.2	881.9	-197.56	633.149	43.2	OK
18	1.5	451.6	9079.6	649.1	8395.3	684.3	-197.56	632.754	35.3	OK
19	1.5	451.6	9531.2	649.1	9044.4	486.8	-197.56	632.359	27.4	OK
20	1.2	451.6	9982.7	519.3	9563.7	419.0	-67.73	631.964	19.5	OK
21	1	451.6	10434.3	432.7	9996.4	437.9	18.82	631.828	16.8	OK
22	0.6	451.6	10885.8	259.6	10256.1	629.8	191.91	631.866	17.5	OK
23	0.3	0.0	10885.8	129.8	10385.9	499.9	-129.82	632.250	25.2	OK
24	0.1	451.6	11337.4	43.3	10429.2	908.2	408.29	631.990	20.0	OK

Table 46: Sachin1

		OHT at Sachin1		
Peak Factor	2	Maximum surplus (m^3)	792.9	
Inflow Hours	23	Minimum surplus (m^3)	251.9	
Outflow Hours	24	1st Guess Capacity	1045	< 1392

		(m^3)	
Minimum wataer level (m)	627.860	As per CPHEEO Capacity (m^3)	1024
Initial water level (m)	628.860	Final computed Capacity (m^3)	1392
Maximum wataer level (m)	632.860	Max. Population serving	19341
Initial water depth in tank	1	Initial Volume (m^3)	278.48
Area of CS	278.48	Fire storage (m^3)	35.1
Diameter (m)	18.83	Depth for Fire (m)	0.042
Max. serving Demand (mld)	3.41	Av. Flow (m^3/h)=	148.394

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	148.4	426.9	14.2	14.2	412.7	134.17	628.860	20.0	OK
1	0.1	148.4	575.3	14.2	28.4	546.8	134.17	629.342	29.6	OK
2	0.1	148.4	723.7	14.2	42.7	681.0	134.17	629.824	39.3	OK
3	0.3	148.4	872.1	42.7	85.3	786.7	105.73	630.305	48.9	OK
4	1	148.4	1020.4	142.2	227.5	792.9	6.18	630.685	56.5	OK
5	1.2	148.4	1168.8	170.7	398.2	770.7	-22.26	630.707	56.9	OK
6	2	148.4	1317.2	284.4	682.6	634.6	-136.03	630.627	55.3	OK
7	2	148.4	1465.6	284.4	967.0	498.6	-136.03	630.139	45.6	OK
8	2	148.4	1614.0	284.4	1251.5	362.6	-136.03	629.650	35.8	OK
9	1.5	148.4	1762.4	213.3	1464.8	297.6	-64.92	629.162	26.0	OK
10	1.2	148.4	1910.8	170.7	1635.4	275.4	-22.26	628.929	21.4	OK
11	1	148.4	2059.2	142.2	1777.6	281.6	6.18	628.849	19.8	OK
12	1	148.4	2207.6	142.2	1919.8	287.8	6.18	628.871	20.2	OK
13	0.6	148.4	2356.0	85.3	2005.2	350.8	63.07	628.893	20.7	OK
14	0.6	148.4	2504.4	85.3	2090.5	413.9	63.07	629.120	25.2	OK
15	0.5	148.4	2652.8	71.1	2161.6	491.2	77.29	629.346	29.7	OK
16	1.2	148.4	2801.2	170.7	2332.3	468.9	-22.26	629.624	35.3	OK
17	1.5	148.4	2949.6	213.3	2545.6	404.0	-64.92	629.544	33.7	OK
18	1.5	148.4	3098.0	213.3	2758.9	339.1	-64.92	629.311	29.0	OK
19	1.5	148.4	3246.4	213.3	2972.2	274.2	-64.92	629.078	24.4	OK
20	1.2	148.4	3394.8	170.7	3142.9	251.9	-22.26	628.844	19.7	OK
21	1	148.4	3543.1	142.2	3285.1	258.1	6.18	628.765	18.1	OK
22	0.6	148.4	3691.5	85.3	3370.4	321.1	63.07	628.787	18.5	OK
23	0.3	0.0	3691.5	42.7	3413.1	278.5	-42.66	629.013	23.1	OK
24	0.1	148.4	3839.9	14.2	3427.3	412.7	134.17	628.860	20.0	OK

Table 47: Sachin2

		OHT at Sachin2	
Peak Factor	2	Maximum surplus (m^3)	916.7
Inflow Hours	23	Minimum surplus (m^3)	245.5

Outflow Hours	24	1st Guess Capacity (m^3)	1162	< 1392	
Minimum wataer level (m)	628.050	As per CPHEEO Capacity (m^3)	1270		
Initial water level (m)	629.050	Final computed Capacity (m^3)	1392		
Maximum wataer level (m)	633.050	Max. Population serving	23996		
Initial water depth in tank	1	Initial Volume (m^3)	278.48		
Area of CS	278.48	Fire storage (m^3)	43.6		
Diameter (m)	18.83	Depth for Fire (m)	0.052		
Max. serving Demand (mld)	4.23	Av. Flow (m^3/h)=	184.114		

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	184.1	462.6	17.6	17.6	444.9	166.47	629.050	20.0	OK
1	0.1	184.1	646.7	17.6	35.3	611.4	166.47	629.648	32.0	OK
2	0.1	184.1	830.8	17.6	52.9	777.9	166.47	630.246	43.9	OK
3	0.3	184.1	1014.9	52.9	105.9	909.1	131.18	630.843	55.9	OK
4	1	184.1	1199.1	176.4	282.3	916.7	7.67	631.314	65.3	OK
5	1.2	184.1	1383.2	211.7	494.0	889.1	-27.62	631.342	65.8	OK
6	2	184.1	1567.3	352.9	846.9	720.4	-168.77	631.243	63.9	OK
7	2	184.1	1751.4	352.9	1199.8	551.6	-168.77	630.637	51.7	OK
8	2	184.1	1935.5	352.9	1552.7	382.8	-168.77	630.031	39.6	OK
9	1.5	184.1	2119.6	264.7	1817.4	302.3	-80.55	629.425	27.5	OK
10	1.2	184.1	2303.7	211.7	2029.1	274.6	-27.62	629.135	21.7	OK
11	1	184.1	2487.9	176.4	2205.5	282.3	7.67	629.036	19.7	OK
12	1	184.1	2672.0	176.4	2382.0	290.0	7.67	629.064	20.3	OK
13	0.6	184.1	2856.1	105.9	2487.8	368.2	78.25	629.091	20.8	OK
14	0.6	184.1	3040.2	105.9	2593.7	446.5	78.25	629.372	26.4	OK
15	0.5	184.1	3224.3	88.2	2681.9	542.4	95.89	629.653	32.1	OK
16	1.2	184.1	3408.4	211.7	2893.7	514.8	-27.62	629.998	39.0	OK
17	1.5	184.1	3592.5	264.7	3158.3	434.2	-80.55	629.898	37.0	OK
18	1.5	184.1	3776.7	264.7	3423.0	353.7	-80.55	629.609	31.2	OK
19	1.5	184.1	3960.8	264.7	3687.7	273.1	-80.55	629.320	25.4	OK
20	1.2	184.1	4144.9	211.7	3899.4	245.5	-27.62	629.031	19.6	OK
21	1	184.1	4329.0	176.4	4075.8	253.2	7.67	628.932	17.6	OK
22	0.6	184.1	4513.1	105.9	4181.7	331.4	78.25	628.959	18.2	OK
23	0.3	0.0	4513.1	52.9	4234.6	278.5	-52.93	629.240	23.8	OK
24	0.1	184.1	4697.2	17.6	4252.3	444.9	166.47	629.050	20.0	OK

Table 48: Sector 28 New ESR

		OHT at Sector 28 New ESR		
Peak Factor	2	Maximum surplus (m^3)	877.0	
Inflow Hours	23	Minimum surplus (m^3)	375.3	
Outflow Hours	24	1st Guess Capacity	1252	< 2000

		(m^3)	
Minimum wataer level (m)	604.800	As per CPHEEO Capacity (m^3)	949
Initial water level (m)	605.800	Final computed Capacity (m^3)	2000
Maximum wataer level (m)	609.800	Max. Population serving	17933
Initial water depth in tank	1	Initial Volume (m^3)	400.00
Area of CS	400.00	Fire storage (m^3)	32.6
Diameter (m)	22.567593	Depth for Fire (m)	0.027
Max. serving Demand (mld)	3.16	Av. Flow (m^3/h)=	137.593

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	137.6	537.6	13.2	13.2	524.4	124.41	605.800	20.0	OK
1	0.1	137.6	675.2	13.2	26.4	648.8	124.41	606.111	26.2	OK
2	0.1	137.6	812.8	13.2	39.6	773.2	124.41	606.422	32.4	OK
3	0.3	137.6	950.4	39.6	79.1	871.3	98.03	606.733	38.7	OK
4	1	137.6	1088.0	131.9	211.0	877.0	5.73	606.978	43.6	OK
5	1.2	137.6	1225.6	158.2	369.2	856.3	-20.64	606.992	43.8	OK
6	2	137.6	1363.1	263.7	632.9	730.2	-126.13	606.941	42.8	OK
7	2	137.6	1500.7	263.7	896.6	604.1	-126.13	606.626	36.5	OK
8	2	137.6	1638.3	263.7	1160.4	478.0	-126.13	606.310	30.2	OK
9	1.5	137.6	1775.9	197.8	1358.2	417.8	-60.20	605.995	23.9	OK
10	1.2	137.6	1913.5	158.2	1516.4	397.1	-20.64	605.844	20.9	OK
11	1	137.6	2051.1	131.9	1648.2	402.9	5.73	605.793	19.9	OK
12	1	137.6	2188.7	131.9	1780.1	408.6	5.73	605.807	20.1	OK
13	0.6	137.6	2326.3	79.1	1859.2	467.1	58.48	605.821	20.4	OK
14	0.6	137.6	2463.9	79.1	1938.3	525.6	58.48	605.968	23.4	OK
15	0.5	137.6	2601.5	65.9	2004.3	597.2	71.66	606.114	26.3	OK
16	1.2	137.6	2739.1	158.2	2162.5	576.6	-20.64	606.293	29.9	OK
17	1.5	137.6	2876.7	197.8	2360.3	516.4	-60.20	606.241	28.8	OK
18	1.5	137.6	3014.3	197.8	2558.1	456.2	-60.20	606.091	25.8	OK
19	1.5	137.6	3151.9	197.8	2755.9	396.0	-60.20	605.940	22.8	OK
20	1.2	137.6	3289.4	158.2	2914.1	375.3	-20.64	605.790	19.8	OK
21	1	137.6	3427.0	131.9	3046.0	381.1	5.73	605.738	18.8	OK
22	0.6	137.6	3564.6	79.1	3125.1	439.6	58.48	605.753	19.1	OK
23	0.3	0.0	3564.6	39.6	3164.6	400.0	-39.56	605.899	22.0	OK
24	0.1	137.6	3702.2	13.2	3177.8	524.4	124.41	605.800	20.0	OK

Table 49: Sector 96

		OHT at	Sector 96	
Peak Factor	2	Maximum surplus (m^3)		1272.9
Inflow Hours	23	Minimum surplus (m^3)		254.8

Outflow Hours	24	1st Guess Capacity (m^3)	1528	< 1524
Minimum wataer level (m)	610.170	As per CPHEEO Capacity (m^3)	1927	
Initial water level (m)	611.170	Final computed Capacity (m^3)	1524	
Maximum wataer level (m)	615.170	Max. Population serving	36395	
Initial water depth in tank	1	Initial Volume (m^3)	304.81	
Area of CS	304.81	Fire storage (m^3)	66.1	
Diameter (m)	19.7	Depth for Fire (m)	0.072	
Max. serving Demand (mld)	6.42	Av. Flow (m^3/h)=	279.248	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	279.2	584.1	26.8	26.8	557.3	252.49	611.170	20.0	OK
1	0.1	279.2	863.3	26.8	53.5	809.8	252.49	611.998	36.6	OK
2	0.1	279.2	1142.5	26.8	80.3	1062.3	252.49	612.827	53.1	OK
3	0.3	279.2	1421.8	80.3	160.6	1261.2	198.96	613.655	69.7	OK
4	1	279.2	1701.0	267.6	428.2	1272.9	11.64	614.308	82.8	OK
5	1.2	279.2	1980.3	321.1	749.3	1231.0	-41.89	614.346	83.5	OK
6	2	279.2	2259.5	535.2	1284.5	975.0	-255.98	614.209	80.8	OK
7	2	279.2	2538.8	535.2	1819.8	719.0	-255.98	613.369	64.0	OK
8	2	279.2	2818.0	535.2	2355.0	463.0	-255.98	612.529	47.2	OK
9	1.5	279.2	3097.3	401.4	2756.4	340.9	-122.17	611.689	30.4	OK
10	1.2	279.2	3376.5	321.1	3077.5	299.0	-41.89	611.288	22.4	OK
11	1	279.2	3655.8	267.6	3345.2	310.6	11.64	611.151	19.6	OK
12	1	279.2	3935.0	267.6	3612.8	322.3	11.64	611.189	20.4	OK
13	0.6	279.2	4214.3	160.6	3773.3	440.9	118.68	611.227	21.1	OK
14	0.6	279.2	4493.5	160.6	3933.9	559.6	118.68	611.617	28.9	OK
15	0.5	279.2	4772.8	133.8	4067.7	705.1	145.44	612.006	36.7	OK
16	1.2	279.2	5052.0	321.1	4388.8	663.2	-41.89	612.483	46.3	OK
17	1.5	279.2	5331.3	401.4	4790.3	541.0	-122.17	612.346	43.5	OK
18	1.5	279.2	5610.5	401.4	5191.7	418.8	-122.17	611.945	35.5	OK
19	1.5	279.2	5889.8	401.4	5593.1	296.7	-122.17	611.544	27.5	OK
20	1.2	279.2	6169.0	321.1	5914.2	254.8	-41.89	611.143	19.5	OK
21	1	279.2	6448.3	267.6	6181.8	266.4	11.64	611.006	16.7	OK
22	0.6	279.2	6727.5	160.6	6342.4	385.1	118.68	611.044	17.5	OK
23	0.3	0.0	6727.5	80.3	6422.7	304.8	-80.28	611.433	25.3	OK
24	0.1	279.2	7006.8	26.8	6449.5	557.3	252.49	611.170	20.0	OK

Table 50: Sector 96 New Esr

		OHT at Sector 96 New Esr	
Peak Factor	2	Maximum surplus (m^3)	1982.2
Inflow Hours	23	Minimum surplus (m^3)	315.7
Outflow Hours	24	1st Guess Capacity (m^3)	2298

Minimum wataer level (m)	611.550	As per CPHEEO Capacity (m^3)	3154
Initial water level (m)	612.550	Final computed Capacity (m^3)	1988
Maximum wataer level (m)	616.550	Max. Population serving	59575
Initial water depth in tank	1	Initial Volume (m^3)	397.61
Area of CS	397.61	Fire storage (m^3)	108.2
Diameter (m)	22.5	Depth for Fire (m)	0.091
Max. serving Demand (mld)	10.51	Av. Flow (m^3/h)=	457.092

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	457.1	854.7	43.8	43.8	810.9	413.29	612.550	20.0	OK
1	0.1	457.1	1311.8	43.8	87.6	1224.2	413.29	613.589	40.8	OK
2	0.1	457.1	1768.9	43.8	131.4	1637.5	413.29	614.629	61.6	OK
3	0.3	457.1	2226.0	131.4	262.8	1963.1	325.68	615.668	82.4	OK
4	1	457.1	2683.1	438.0	700.9	1982.2	19.05	616.487	98.7	OK
5	1.2	457.1	3140.2	525.7	1226.5	1913.6	-68.56	616.535	99.7	OK
6	2	457.1	3597.3	876.1	2102.6	1494.6	-419.00	616.363	96.3	OK
7	2	457.1	4054.3	876.1	2978.7	1075.6	-419.00	615.309	75.2	OK
8	2	457.1	4511.4	876.1	3854.8	656.6	-419.00	614.255	54.1	OK
9	1.5	457.1	4968.5	657.1	4511.9	456.6	-199.98	613.201	33.0	OK
10	1.2	457.1	5425.6	525.7	5037.5	388.1	-68.56	612.698	23.0	OK
11	1	457.1	5882.7	438.0	5475.6	407.1	19.05	612.526	19.5	OK
12	1	457.1	6339.8	438.0	5913.6	426.2	19.05	612.574	20.5	OK
13	0.6	457.1	6796.9	262.8	6176.5	620.4	194.26	612.622	21.4	OK
14	0.6	457.1	7254.0	262.8	6439.3	814.7	194.26	613.110	31.2	OK
15	0.5	457.1	7711.1	219.0	6658.3	1052.8	238.07	613.599	41.0	OK
16	1.2	457.1	8168.2	525.7	7184.0	984.2	-68.56	614.198	53.0	OK
17	1.5	457.1	8625.3	657.1	7841.0	784.2	-199.98	614.025	49.5	OK
18	1.5	457.1	9082.4	657.1	8498.1	584.3	-199.98	613.522	39.4	OK
19	1.5	457.1	9539.5	657.1	9155.2	384.3	-199.98	613.019	29.4	OK
20	1.2	457.1	9996.5	525.7	9680.8	315.7	-68.56	612.516	19.3	OK
21	1	457.1	10453.6	438.0	10118.9	334.8	19.05	612.344	15.9	OK
22	0.6	457.1	10910.7	262.8	10381.7	529.0	194.26	612.392	16.8	OK
23	0.3	0.0	10910.7	131.4	10513.1	397.6	-131.41	612.881	26.6	OK
24	0.1	457.1	11367.8	43.8	10556.9	810.9	413.29	612.550	20.0	OK

Table 51: Sector 96 Part 2

		OHT at Sector 96 Part 2		
Peak Factor	2	Maximum surplus (m^3)	1355.1	
Inflow Hours	23	Minimum surplus (m^3)	250.5	
Outflow Hours	24	1st Guess Capacity (m^3)	1606	< 1524
Minimum wataer level (m)	609.970	As per CPHEEO Capacity (m^3)	2091	
Initial water level (m)	610.970	Final computed Capacity (m^3)	1524	

Maximum wataer level (m)	614.970	Max. Population serving	39489
Initial water depth in tank	1	Initial Volume (m^3)	304.81
Area of CS	304.81	Fire storage (m^3)	71.7
Diameter (m)	19.7	Depth for Fire (m)	0.078
Max. serving Demand (mld)	6.97	Av. Flow (m^3/h)=	302.983

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	303.0	607.8	29.0	29.0	578.8	273.95	610.970	20.0	OK
1	0.1	303.0	910.8	29.0	58.1	852.7	273.95	611.869	38.0	OK
2	0.1	303.0	1213.8	29.0	87.1	1126.6	273.95	612.768	56.0	OK
3	0.3	303.0	1516.7	87.1	174.2	1342.5	215.88	613.666	73.9	OK
4	1	303.0	1819.7	290.4	464.6	1355.1	12.62	614.375	88.1	OK
5	1.2	303.0	2122.7	348.4	813.0	1309.7	-45.45	614.416	88.9	OK
6	2	303.0	2425.7	580.7	1393.7	1032.0	-277.73	614.267	85.9	OK
7	2	303.0	2728.7	580.7	1974.4	754.2	-277.73	613.356	67.7	OK
8	2	303.0	3031.6	580.7	2555.2	476.5	-277.73	612.444	49.5	OK
9	1.5	303.0	3334.6	435.5	2990.7	343.9	-132.55	611.533	31.3	OK
10	1.2	303.0	3637.6	348.4	3339.1	298.5	-45.45	611.098	22.6	OK
11	1	303.0	3940.6	290.4	3629.5	311.1	12.62	610.949	19.6	OK
12	1	303.0	4243.6	290.4	3919.8	323.7	12.62	610.991	20.4	OK
13	0.6	303.0	4546.6	174.2	4094.1	452.5	128.77	611.032	21.2	OK
14	0.6	303.0	4849.5	174.2	4268.3	581.3	128.77	611.455	29.7	OK
15	0.5	303.0	5152.5	145.2	4413.4	739.1	157.80	611.877	38.1	OK
16	1.2	303.0	5455.5	348.4	4761.9	693.6	-45.45	612.395	48.5	OK
17	1.5	303.0	5758.5	435.5	5197.4	561.1	-132.55	612.246	45.5	OK
18	1.5	303.0	6061.5	435.5	5633.0	428.5	-132.55	611.811	36.8	OK
19	1.5	303.0	6364.5	435.5	6068.5	296.0	-132.55	611.376	28.1	OK
20	1.2	303.0	6667.4	348.4	6416.9	250.5	-45.45	610.941	19.4	OK
21	1	303.0	6970.4	290.4	6707.3	263.1	12.62	610.792	16.4	OK
22	0.6	303.0	7273.4	174.2	6881.5	391.9	128.77	610.833	17.3	OK
23	0.3	0.0	7273.4	87.1	6968.6	304.8	-87.11	611.256	25.7	OK
24	0.1	303.0	7576.4	29.0	6997.6	578.8	273.95	610.970	20.0	OK

Table 52: Shahu Nagar

		OHT at Shahu Nagar		
Peak Factor	2	Maximum surplus (m^3)	1537.7	
Inflow Hours	23	Minimum surplus (m^3)	446.3	
Outflow Hours	24	1st Guess Capacity (m^3)	1984	< 2500
Minimum wataer level (m)	631.500	As per CPHEEO Capacity (m^3)	2065	
Initial water level (m)	632.500	Final computed Capacity (m^3)	2500	
Maximum wataer level (m)	636.500	Max. Population	39014	

		serving	
Initial water depth in tank	1	Initial Volume (m^3)	499.95
Area of CS	499.95	Fire storage (m^3)	70.9
Diameter (m)	25.23	Depth for Fire (m)	0.047
Max. serving Demand (mld)	6.88	Av. Flow (m^3/h)=	299.339

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	299.3	799.3	28.7	28.7	770.6	270.65	632.500	20.0	OK
1	0.1	299.3	1098.6	28.7	57.4	1041.3	270.65	633.041	30.8	OK
2	0.1	299.3	1398.0	28.7	86.1	1311.9	270.65	633.583	41.7	OK
3	0.3	299.3	1697.3	86.1	172.1	1525.2	213.28	634.124	52.5	OK
4	1	299.3	1996.6	286.9	459.0	1537.7	12.47	634.551	61.0	OK
5	1.2	299.3	2296.0	344.2	803.2	1492.8	-44.90	634.576	61.5	OK
6	2	299.3	2595.3	573.7	1377.0	1218.4	-274.39	634.486	59.7	OK
7	2	299.3	2894.7	573.7	1950.7	944.0	-274.39	633.937	48.7	OK
8	2	299.3	3194.0	573.7	2524.4	669.6	-274.39	633.388	37.8	OK
9	1.5	299.3	3493.3	430.3	2954.7	538.6	-130.96	632.839	26.8	OK
10	1.2	299.3	3792.7	344.2	3299.0	493.7	-44.90	632.577	21.5	OK
11	1	299.3	4092.0	286.9	3585.8	506.2	12.47	632.488	19.8	OK
12	1	299.3	4391.4	286.9	3872.7	518.7	12.47	632.512	20.2	OK
13	0.6	299.3	4690.7	172.1	4044.8	645.9	127.22	632.537	20.7	OK
14	0.6	299.3	4990.0	172.1	4216.9	773.1	127.22	632.792	25.8	OK
15	0.5	299.3	5289.4	143.4	4360.4	929.0	155.91	633.046	30.9	OK
16	1.2	299.3	5588.7	344.2	4704.6	884.1	-44.90	633.358	37.2	OK
17	1.5	299.3	5888.1	430.3	5134.9	753.1	-130.96	633.268	35.4	OK
18	1.5	299.3	6187.4	430.3	5565.2	622.2	-130.96	633.006	30.1	OK
19	1.5	299.3	6486.7	430.3	5995.5	491.2	-130.96	632.744	24.9	OK
20	1.2	299.3	6786.1	344.2	6339.8	446.3	-44.90	632.483	19.7	OK
21	1	299.3	7085.4	286.9	6626.6	458.8	12.47	632.393	17.9	OK
22	0.6	299.3	7384.7	172.1	6798.7	586.0	127.22	632.418	18.4	OK
23	0.3	0.0	7384.7	86.1	6884.8	499.9	-86.06	632.672	23.4	OK
24	0.1	299.3	7684.1	28.7	6913.5	770.6	270.65	632.500	20.0	OK

Table 53: Charholi c

		OHT at Charholi c		
Peak Factor	2	Maximum surplus (m^3)	555.4	
Inflow Hours	23	Minimum surplus (m^3)	286.7	
Outflow Hours	24	1st Guess Capacity (m^3)	842	< 1499
Minimum wataer level (m)	581.800	As per CPHEEO Capacity (m^3)	509	
Initial water level (m)	582.800	Final computed Capacity (m^3)	1499	
Maximum wataer level (m)	586.800	Max. Population	9606	

		serving	
Initial water depth in tank	1	Initial Volume (m^3)	299.87
Area of CS	299.87	Fire storage (m^3)	17.5
Diameter (m)	19.54	Depth for Fire (m)	0.019
Max. serving Demand (mld)	1.70	Av. Flow (m^3/h)=	73.704

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	73.7	373.6	7.1	7.1	366.5	66.64	582.800	20.0	OK
1	0.1	73.7	447.3	7.1	14.1	433.2	66.64	583.022	24.4	OK
2	0.1	73.7	521.0	7.1	21.2	499.8	66.64	583.244	28.9	OK
3	0.3	73.7	594.7	21.2	42.4	552.3	52.51	583.467	33.3	OK
4	1	73.7	668.4	70.6	113.0	555.4	3.07	583.642	36.8	OK
5	1.2	73.7	742.1	84.8	197.8	544.3	-11.06	583.652	37.0	OK
6	2	73.7	815.8	141.3	339.0	476.8	-67.56	583.615	36.3	OK
7	2	73.7	889.5	141.3	480.3	409.2	-67.56	583.390	31.8	OK
8	2	73.7	963.2	141.3	621.6	341.6	-67.56	583.165	27.3	OK
9	1.5	73.7	1036.9	106.0	727.5	309.4	-32.25	582.939	22.8	OK
10	1.2	73.7	1110.6	84.8	812.3	298.3	-11.06	582.832	20.6	OK
11	1	73.7	1184.3	70.6	882.9	301.4	3.07	582.795	19.9	OK
12	1	73.7	1258.0	70.6	953.6	304.5	3.07	582.805	20.1	OK
13	0.6	73.7	1331.7	42.4	995.9	335.8	31.32	582.815	20.3	OK
14	0.6	73.7	1405.4	42.4	1038.3	367.1	31.32	582.920	22.4	OK
15	0.5	73.7	1479.1	35.3	1073.6	405.5	38.39	583.024	24.5	OK
16	1.2	73.7	1552.8	84.8	1158.4	394.5	-11.06	583.152	27.0	OK
17	1.5	73.7	1626.6	106.0	1264.3	362.2	-32.25	583.115	26.3	OK
18	1.5	73.7	1700.3	106.0	1370.3	330.0	-32.25	583.008	24.2	OK
19	1.5	73.7	1774.0	106.0	1476.2	297.7	-32.25	582.900	22.0	OK
20	1.2	73.7	1847.7	84.8	1561.0	286.7	-11.06	582.793	19.9	OK
21	1	73.7	1921.4	70.6	1631.6	289.7	3.07	582.756	19.1	OK
22	0.6	73.7	1995.1	42.4	1674.0	321.1	31.32	582.766	19.3	OK
23	0.3	0.0	1995.1	21.2	1695.2	299.9	-21.19	582.871	21.4	OK
24	0.1	73.7	2068.8	7.1	1702.3	366.5	66.64	582.800	20.0	OK

Table 54: Dudulgaon

		OHT at Dudulgaon		
Peak Factor	2	Maximum surplus (m^3)	774.5	
Inflow Hours	23	Minimum surplus (m^3)	170.4	
Outflow Hours	24	1st Guess Capacity (m^3)	945	< 1000
Minimum wataer level (m)	594.940	As per CPHEEO Capacity (m^3)	1143	
Initial water level (m)	595.940	Final computed Capacity (m^3)	1000	
Maximum wataer level (m)	599.940	Max. Population serving	21596	

Initial water depth in tank	1	Initial Volume (m^3)	200.06
Area of CS	200.06	Fire storage (m^3)	39.2
Diameter (m)	15.96	Depth for Fire (m)	0.065
Max. serving Demand (mld)	3.81	Av. Flow (m^3/h)=	165.696

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	165.7	365.8	15.9	15.9	349.9	149.82	595.940	20.0	OK
1	0.1	165.7	531.4	15.9	31.8	499.7	149.82	596.689	35.0	OK
2	0.1	165.7	697.1	15.9	47.6	649.5	149.82	597.438	50.0	OK
3	0.3	165.7	862.8	47.6	95.3	767.6	118.06	598.187	64.9	OK
4	1	165.7	1028.5	158.8	254.1	774.5	6.90	598.777	76.7	OK
5	1.2	165.7	1194.2	190.6	444.6	749.6	-24.85	598.811	77.4	OK
6	2	165.7	1359.9	317.6	762.2	597.7	-151.89	598.687	74.9	OK
7	2	165.7	1525.6	317.6	1079.8	445.8	-151.89	597.928	59.8	OK
8	2	165.7	1691.3	317.6	1397.4	294.0	-151.89	597.169	44.6	OK
9	1.5	165.7	1857.0	238.2	1635.6	221.5	-72.49	596.409	29.4	OK
10	1.2	165.7	2022.7	190.6	1826.1	196.6	-24.85	596.047	22.1	OK
11	1	165.7	2188.4	158.8	1984.9	203.5	6.90	595.923	19.7	OK
12	1	165.7	2354.1	158.8	2143.7	210.4	6.90	595.957	20.3	OK
13	0.6	165.7	2519.8	95.3	2239.0	280.8	70.42	595.992	21.0	OK
14	0.6	165.7	2685.5	95.3	2334.2	351.3	70.42	596.344	28.1	OK
15	0.5	165.7	2851.2	79.4	2413.6	437.6	86.30	596.696	35.1	OK
16	1.2	165.7	3016.9	190.6	2604.2	412.7	-24.85	597.127	43.7	OK
17	1.5	165.7	3182.6	238.2	2842.4	340.2	-72.49	597.003	41.3	OK
18	1.5	165.7	3348.3	238.2	3080.6	267.7	-72.49	596.641	34.0	OK
19	1.5	165.7	3514.0	238.2	3318.7	195.2	-72.49	596.278	26.8	OK
20	1.2	165.7	3679.7	190.6	3509.3	170.4	-24.85	595.916	19.5	OK
21	1	165.7	3845.4	158.8	3668.1	177.3	6.90	595.792	17.0	OK
22	0.6	165.7	4011.1	95.3	3763.4	247.7	70.42	595.826	17.7	OK
23	0.3	0.0	4011.1	47.6	3811.0	200.1	-47.64	596.178	24.8	OK
24	0.1	165.7	4176.8	15.9	3826.9	349.9	149.82	595.940	20.0	OK

Table 55: Gairan

		OHT at Gairan		
Peak Factor	2	Maximum surplus (m^3)	1355.5	
Inflow Hours	23	Minimum surplus (m^3)	348.1	
Outflow Hours	24	1st Guess Capacity (m^3)	1704	< 1988
Minimum wataer level (m)	615.000	As per CPHEEO Capacity (m^3)	1907	
Initial water level (m)	616.000	Final computed Capacity (m^3)	1988	
Maximum wataer level (m)	620.000	Max. Population serving	36012	
Initial water depth in tank	1	Initial Volume (m^3)	397.61	
Area of CS	397.61	Fire storage (m^3)	65.4	
Diameter (m)	22.5	Depth for Fire (m)	0.055	
Max. serving Demand (mld)	6.36	Av. Flow (m^3/h)=	276.309	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	276.3	673.9	26.5	26.5	647.4	249.83	616.000	20.0	OK
1	0.1	276.3	950.2	26.5	53.0	897.3	249.83	616.628	32.6	OK
2	0.1	276.3	1226.5	26.5	79.4	1147.1	249.83	617.257	45.1	OK
3	0.3	276.3	1502.8	79.4	158.9	1344.0	196.87	617.885	57.7	OK
4	1	276.3	1779.2	264.8	423.7	1355.5	11.51	618.380	67.6	OK
5	1.2	276.3	2055.5	317.8	741.4	1314.0	-41.45	618.409	68.2	OK
6	2	276.3	2331.8	529.6	1271.0	1060.7	-253.28	618.305	66.1	OK
7	2	276.3	2608.1	529.6	1800.6	807.5	-253.28	617.668	53.4	OK
8	2	276.3	2884.4	529.6	2330.2	554.2	-253.28	617.031	40.6	OK
9	1.5	276.3	3160.7	397.2	2727.4	433.3	-120.89	616.394	27.9	OK
10	1.2	276.3	3437.0	317.8	3045.2	391.9	-41.45	616.090	21.8	OK
11	1	276.3	3713.3	264.8	3309.9	403.4	11.51	615.986	19.7	OK
12	1	276.3	3989.6	264.8	3574.7	414.9	11.51	616.014	20.3	OK
13	0.6	276.3	4265.9	158.9	3733.6	532.3	117.43	616.043	20.9	OK
14	0.6	276.3	4542.2	158.9	3892.5	649.7	117.43	616.339	26.8	OK
15	0.5	276.3	4818.5	132.4	4024.9	793.7	143.91	616.634	32.7	OK
16	1.2	276.3	5094.9	317.8	4342.7	752.2	-41.45	616.996	39.9	OK
17	1.5	276.3	5371.2	397.2	4739.8	631.3	-120.89	616.892	37.8	OK
18	1.5	276.3	5647.5	397.2	5137.0	510.4	-120.89	616.588	31.8	OK
19	1.5	276.3	5923.8	397.2	5534.2	389.5	-120.89	616.284	25.7	OK
20	1.2	276.3	6200.1	317.8	5852.0	348.1	-41.45	615.980	19.6	OK
21	1	276.3	6476.4	264.8	6116.8	359.6	11.51	615.875	17.5	OK
22	0.6	276.3	6752.7	158.9	6275.7	477.0	117.43	615.904	18.1	OK
23	0.3	0.0	6752.7	79.4	6355.1	397.6	-79.44	616.200	24.0	OK
24	0.1	276.3	7029.0	26.5	6381.6	647.4	249.83	616.000	20.0	OK

Table 56: Kudalwadi New1

OHT at Kudalwadi New1				
Peak Factor	2	Maximum surplus (m^3)	1485.1	
Inflow Hours	23	Minimum surplus (m^3)	341.4	
Outflow Hours	24	1st Guess Capacity (m^3)	1826	< 1988
Minimum wataer level (m)	602.000	As per CPHEEO Capacity (m^3)	2164	
Initial water level (m)	603.000	Final computed Capacity (m^3)	1988	
Maximum wataer level (m)	607.000	Max. Population serving	40884	
Initial water depth in tank	1	Initial Volume (m^3)	397.61	
Area of CS	397.61	Fire storage (m^3)	74.3	

Diameter (m)	22.5	Depth for Fire (m)	0.062
Max. serving Demand (mld)	7.21	Av. Flow (m^3/h)=	313.686

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	313.7	711.3	30.1	30.1	681.2	283.62	603.000	20.0	OK
1	0.1	313.7	1025.0	30.1	60.1	964.9	283.62	603.713	34.3	OK
2	0.1	313.7	1338.7	30.1	90.2	1248.5	283.62	604.427	48.5	OK
3	0.3	313.7	1652.4	90.2	180.4	1472.0	223.50	605.140	62.8	OK
4	1	313.7	1966.0	300.6	481.0	1485.1	13.07	605.702	74.0	OK
5	1.2	313.7	2279.7	360.7	841.7	1438.0	-47.05	605.735	74.7	OK
6	2	313.7	2593.4	601.2	1443.0	1150.5	-287.55	605.617	72.3	OK
7	2	313.7	2907.1	601.2	2044.2	862.9	-287.55	604.893	57.9	OK
8	2	313.7	3220.8	601.2	2645.4	575.4	-287.55	604.170	43.4	OK
9	1.5	313.7	3534.5	450.9	3096.3	438.1	-137.24	603.447	28.9	OK
10	1.2	313.7	3848.2	360.7	3457.1	391.1	-47.05	603.102	22.0	OK
11	1	313.7	4161.8	300.6	3757.7	404.1	13.07	602.984	19.7	OK
12	1	313.7	4475.5	300.6	4058.3	417.2	13.07	603.016	20.3	OK
13	0.6	313.7	4789.2	180.4	4238.7	550.5	133.32	603.049	21.0	OK
14	0.6	313.7	5102.9	180.4	4419.0	683.8	133.32	603.385	27.7	OK
15	0.5	313.7	5416.6	150.3	4569.4	847.2	163.38	603.720	34.4	OK
16	1.2	313.7	5730.3	360.7	4930.1	800.2	-47.05	604.131	42.6	OK
17	1.5	313.7	6044.0	450.9	5381.0	662.9	-137.24	604.012	40.2	OK
18	1.5	313.7	6357.6	450.9	5831.9	525.7	-137.24	603.667	33.3	OK
19	1.5	313.7	6671.3	450.9	6282.9	388.5	-137.24	603.322	26.4	OK
20	1.2	313.7	6985.0	360.7	6643.6	341.4	-47.05	602.977	19.5	OK
21	1	313.7	7298.7	300.6	6944.2	354.5	13.07	602.859	17.2	OK
22	0.6	313.7	7612.4	180.4	7124.6	487.8	133.32	602.892	17.8	OK
23	0.3	0.0	7612.4	90.2	7214.8	397.6	-90.18	603.227	24.5	OK
24	0.1	313.7	7926.1	30.1	7244.8	681.2	283.62	603.000	20.0	OK

Table 57: Kudalwadi New2

		OHT at Kudalwadi New2		
Peak Factor	2	Maximum surplus (m^3)	1520.0	
Inflow Hours	23	Minimum surplus (m^3)	339.6	
Outflow Hours	24	1st Guess Capacity (m^3)	1860	< 1988
Minimum wataer level (m)	602.000	As per CPHEEO Capacity (m^3)	2234	
Initial water level (m)	603.000	Final computed Capacity (m^3)	1988	
Maximum wataer level (m)	607.000	Max. Population serving	42198	
Initial water depth in tank	1	Initial Volume (m^3)	397.61	
Area of CS	397.61	Fire storage (m^3)	76.7	
Diameter (m)	22.5	Depth for Fire (m)	0.064	

Max. serving Demand (mld) **7.45** Av. Flow (m^3/h)= 323.770

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	323.8	721.4	31.0	31.0	690.4	292.74	603.000	20.0	OK
1	0.1	323.8	1045.1	31.0	62.1	983.1	292.74	603.736	34.7	OK
2	0.1	323.8	1368.9	31.0	93.1	1275.8	292.74	604.473	49.5	OK
3	0.3	323.8	1692.7	93.1	186.2	1506.5	230.69	605.209	64.2	OK
4	1	323.8	2016.5	310.3	496.4	1520.0	13.49	605.789	75.8	OK
5	1.2	323.8	2340.2	372.3	868.8	1471.4	-48.57	605.823	76.5	OK
6	2	323.8	2664.0	620.6	1489.3	1174.7	-296.79	605.701	74.0	OK
7	2	323.8	2987.8	620.6	2109.9	877.9	-296.79	604.954	59.1	OK
8	2	323.8	3311.5	620.6	2730.5	581.1	-296.79	604.208	44.2	OK
9	1.5	323.8	3635.3	465.4	3195.9	439.4	-141.65	603.461	29.2	OK
10	1.2	323.8	3959.1	372.3	3568.2	390.9	-48.57	603.105	22.1	OK
11	1	323.8	4282.8	310.3	3878.5	404.4	13.49	602.983	19.7	OK
12	1	323.8	4606.6	310.3	4188.8	417.8	13.49	603.017	20.3	OK
13	0.6	323.8	4930.4	186.2	4374.9	555.4	137.60	603.051	21.0	OK
14	0.6	323.8	5254.2	186.2	4561.1	693.0	137.60	603.397	27.9	OK
15	0.5	323.8	5577.9	155.1	4716.2	861.7	168.63	603.743	34.9	OK
16	1.2	323.8	5901.7	372.3	5088.6	813.1	-48.57	604.167	43.3	OK
17	1.5	323.8	6225.5	465.4	5554.0	671.5	-141.65	604.045	40.9	OK
18	1.5	323.8	6549.2	465.4	6019.4	529.8	-141.65	603.689	33.8	OK
19	1.5	323.8	6873.0	465.4	6484.8	388.2	-141.65	603.333	26.7	OK
20	1.2	323.8	7196.8	372.3	6857.2	339.6	-48.57	602.976	19.5	OK
21	1	323.8	7520.5	310.3	7167.4	353.1	13.49	602.854	17.1	OK
22	0.6	323.8	7844.3	186.2	7353.6	490.7	137.60	602.888	17.8	OK
23	0.3	0.0	7844.3	93.1	7446.7	397.6	-93.08	603.234	24.7	OK
24	0.1	323.8	8168.1	31.0	7477.7	690.4	292.74	603.000	20.0	OK

Table 58: Kudalwadi New3

		OHT at Kudalwadi New3		
Peak Factor	2	Maximum surplus (m^3)	1486.9	
Inflow Hours	23	Minimum surplus (m^3)	341.3	
Outflow Hours	24	1st Guess Capacity (m^3)	1828	< 1988
Minimum wataer level (m)	610.000	As per CPHEEO Capacity (m^3)	2168	
Initial water level (m)	611.000	Final computed Capacity (m^3)	1988	
Maximum wataer level (m)	615.000	Max. Population serving	40954	
Initial water depth in tank	1	Initial Volume (m^3)	397.61	
Area of CS	397.61	Fire storage (m^3)	74.4	
Diameter (m)	22.5	Depth for Fire (m)	0.062	
Max. serving Demand (mld)	**7.23**	Av. Flow (m^3/h)=	314.228	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	314.2	711.8	30.1	30.1	681.7	284.11	611.000	20.0	OK
1	0.1	314.2	1026.1	30.1	60.2	965.8	284.11	611.715	34.3	OK
2	0.1	314.2	1340.3	30.1	90.3	1250.0	284.11	612.429	48.6	OK
3	0.3	314.2	1654.5	90.3	180.7	1473.8	223.89	613.144	62.9	OK
4	1	314.2	1968.7	301.1	481.8	1486.9	13.09	613.707	74.1	OK
5	1.2	314.2	2283.0	361.4	843.2	1439.8	-47.13	613.740	74.8	OK
6	2	314.2	2597.2	602.3	1445.4	1151.8	-288.04	613.621	72.4	OK
7	2	314.2	2911.4	602.3	2047.7	863.7	-288.04	612.897	57.9	OK
8	2	314.2	3225.7	602.3	2650.0	575.7	-288.04	612.172	43.4	OK
9	1.5	314.2	3539.9	451.7	3101.7	438.2	-137.47	611.448	29.0	OK
10	1.2	314.2	3854.1	361.4	3463.1	391.1	-47.13	611.102	22.0	OK
11	1	314.2	4168.3	301.1	3764.2	404.2	13.09	610.984	19.7	OK
12	1	314.2	4482.6	301.1	4065.3	417.2	13.09	611.016	20.3	OK
13	0.6	314.2	4796.8	180.7	4246.0	550.8	133.55	611.049	21.0	OK
14	0.6	314.2	5111.0	180.7	4426.7	684.3	133.55	611.385	27.7	OK
15	0.5	314.2	5425.3	150.6	4577.3	848.0	163.66	611.721	34.4	OK
16	1.2	314.2	5739.5	361.4	4938.6	800.9	-47.13	612.133	42.7	OK
17	1.5	314.2	6053.7	451.7	5390.3	663.4	-137.47	612.014	40.3	OK
18	1.5	314.2	6367.9	451.7	5842.0	525.9	-137.47	611.668	33.4	OK
19	1.5	314.2	6682.2	451.7	6293.7	388.4	-137.47	611.323	26.5	OK
20	1.2	314.2	6996.4	361.4	6655.1	341.3	-47.13	610.977	19.5	OK
21	1	314.2	7310.6	301.1	6956.2	354.4	13.09	610.858	17.2	OK
22	0.6	314.2	7624.8	180.7	7136.9	487.9	133.55	610.891	17.8	OK
23	0.3	0.0	7624.8	90.3	7227.2	397.6	-90.34	611.227	24.5	OK
24	0.1	314.2	7939.1	30.1	7257.4	681.7	284.11	611.000	20.0	OK

Table 59: Kudalwadi New4

OHT at Kudalwadi New4				
Peak Factor	2	Maximum surplus (m^3)	1263.9	
Inflow Hours	23	Minimum surplus (m^3)	352.8	
Outflow Hours	24	1st Guess Capacity (m^3)	1617	< 1988
Minimum wataer level (m)	610.000	As per CPHEEO Capacity (m^3)	1724	
Initial water level (m)	611.000	Final computed Capacity (m^3)	1988	
Maximum wataer level (m)	615.000	Max. Population serving	32568	
Initial water depth in tank	1	Initial Volume (m^3)	397.61	
Area of CS	397.61	Fire storage (m^3)	59.2	
Diameter (m)	22.5	Depth for Fire (m)	0.050	
Max. serving Demand (mld)	5.75	Av. Flow (m^3/h)=	249.884	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	249.9	647.5	23.9	23.9	623.5	225.94	611.000	20.0	OK
1	0.1	249.9	897.4	23.9	47.9	849.5	225.94	611.568	31.4	OK
2	0.1	249.9	1147.3	23.9	71.8	1075.4	225.94	612.136	42.7	OK
3	0.3	249.9	1397.1	71.8	143.7	1253.5	178.04	612.705	54.1	OK
4	1	249.9	1647.0	239.5	383.2	1263.9	10.41	613.152	63.0	OK
5	1.2	249.9	1896.9	287.4	670.5	1226.4	-37.48	613.179	63.6	OK
6	2	249.9	2146.8	478.9	1149.5	997.3	-229.06	613.084	61.7	OK
7	2	249.9	2396.7	478.9	1628.4	768.3	-229.06	612.508	50.2	OK
8	2	249.9	2646.6	478.9	2107.4	539.2	-229.06	611.932	38.6	OK
9	1.5	249.9	2896.4	359.2	2466.6	429.9	-109.32	611.356	27.1	OK
10	1.2	249.9	3146.3	287.4	2753.9	392.4	-37.48	611.081	21.6	OK
11	1	249.9	3396.2	239.5	2993.4	402.8	10.41	610.987	19.7	OK
12	1	249.9	3646.1	239.5	3232.9	413.2	10.41	611.013	20.3	OK
13	0.6	249.9	3896.0	143.7	3376.6	519.4	106.20	611.039	20.8	OK
14	0.6	249.9	4145.9	143.7	3520.2	625.6	106.20	611.306	26.1	OK
15	0.5	249.9	4395.7	119.7	3640.0	755.8	130.15	611.573	31.5	OK
16	1.2	249.9	4645.6	287.4	3927.3	718.3	-37.48	611.901	38.0	OK
17	1.5	249.9	4895.5	359.2	4286.5	609.0	-109.32	611.807	36.1	OK
18	1.5	249.9	5145.4	359.2	4645.8	499.6	-109.32	611.532	30.6	OK
19	1.5	249.9	5395.3	359.2	5005.0	390.3	-109.32	611.257	25.1	OK
20	1.2	249.9	5645.2	287.4	5292.3	352.8	-37.48	610.982	19.6	OK
21	1	249.9	5895.0	239.5	5531.8	363.2	10.41	610.887	17.7	OK
22	0.6	249.9	6144.9	143.7	5675.5	469.5	106.20	610.914	18.3	OK
23	0.3	0.0	6144.9	71.8	5747.3	397.6	-71.84	611.181	23.6	OK
24	0.1	249.9	6394.8	23.9	5771.3	623.5	225.94	611.000	20.0	OK

Table 60: Moshi b

		OHT at Moshi b		
Peak Factor	2	Maximum surplus (m^3)	1057.2	
Inflow Hours	23	Minimum surplus (m^3)	260.9	
Outflow Hours	24	1st Guess Capacity (m^3)	1318	< 1500
Minimum wataer level (m)	595.200	As per CPHEEO Capacity (m^3)	1507	
Initial water level (m)	596.200	Final computed Capacity (m^3)	1500	
Maximum wataer level (m)	600.200	Max. Population serving	28465	
Initial water depth in tank	1	Initial Volume (m^3)	300.06	
Area of CS	300.06	Fire storage (m^3)	51.7	
Diameter (m)	19.545944	Depth for Fire (m)	0.057	
Max. serving Demand (mld)	5.02	Av. Flow (m^3/h)=	218.398	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	218.4	518.5	20.9	20.9	497.5	197.47	596.200	20.0	OK
1	0.1	218.4	736.9	20.9	41.9	695.0	197.47	596.858	33.2	OK
2	0.1	218.4	955.3	20.9	62.8	892.5	197.47	597.516	46.3	OK
3	0.3	218.4	1173.6	62.8	125.6	1048.1	155.61	598.174	59.5	OK
4	1	218.4	1392.0	209.3	334.9	1057.2	9.10	598.693	69.9	OK
5	1.2	218.4	1610.4	251.2	586.0	1024.4	-32.76	598.723	70.5	OK
6	2	218.4	1828.8	418.6	1004.6	824.2	-200.20	598.614	68.3	OK
7	2	218.4	2047.2	418.6	1423.2	624.0	-200.20	597.947	54.9	OK
8	2	218.4	2265.6	418.6	1841.8	423.8	-200.20	597.280	41.6	OK
9	1.5	218.4	2484.0	313.9	2155.8	328.3	-95.55	596.612	28.2	OK
10	1.2	218.4	2702.4	251.2	2406.9	295.5	-32.76	596.294	21.9	OK
11	1	218.4	2920.8	209.3	2616.2	304.6	9.10	596.185	19.7	OK
12	1	218.4	3139.2	209.3	2825.5	313.7	9.10	596.215	20.3	OK
13	0.6	218.4	3357.6	125.6	2951.1	406.5	92.82	596.245	20.9	OK
14	0.6	218.4	3576.0	125.6	3076.7	499.3	92.82	596.555	27.1	OK
15	0.5	218.4	3794.4	104.6	3181.3	613.1	113.75	596.864	33.3	OK
16	1.2	218.4	4012.8	251.2	3432.5	580.3	-32.76	597.243	40.9	OK
17	1.5	218.4	4231.2	313.9	3746.4	484.8	-95.55	597.134	38.7	OK
18	1.5	218.4	4449.6	313.9	4060.4	389.2	-95.55	596.816	32.3	OK
19	1.5	218.4	4668.0	313.9	4374.3	293.7	-95.55	596.497	25.9	OK
20	1.2	218.4	4886.4	251.2	4625.5	260.9	-32.76	596.179	19.6	OK
21	1	218.4	5104.8	209.3	4834.8	270.0	9.10	596.070	17.4	OK
22	0.6	218.4	5323.2	125.6	4960.4	362.8	92.82	596.100	18.0	OK
23	0.3	0.0	5323.2	62.8	5023.1	300.1	-62.79	596.409	24.2	OK
24	0.1	218.4	5541.6	20.9	5044.1	497.5	197.47	596.200	20.0	OK

Table 61: New_Charoli

		OHT at New_Charoli		
Peak Factor	2	Maximum surplus (m^3)	1042.1	
Inflow Hours	23	Minimum surplus (m^3)	364.3	
Outflow Hours	24	1st Guess Capacity (m^3)	1406	< 1988
Minimum wataer level (m)	604.000	As per CPHEEO Capacity (m^3)	1283	
Initial water level (m)	605.000	Final computed Capacity (m^3)	1988	
Maximum wataer level (m)	609.000	Max. Population serving	24229	
Initial water depth in tank	1	Initial Volume (m^3)	397.61	
Area of CS	397.61	Fire storage (m^3)	44.0	
Diameter (m)	22.5	Depth for Fire (m)	0.037	
Max. serving Demand (mld)	4.28	Av. Flow (m^3/h)=	185.900	

Time	Peak	Inflow (m^3/h)	Outflow (m3/h)	Cumu.	Surplus	Level	%Tank	Tank Status

from Start (hours)	Factor	Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)	Inflow-Cumu. Outflow (m^3)	or Deficit (Inflow-Outflow) (m^3)	(m)	Full	
0	0.1	185.9	583.5	17.8	17.8	565.7	168.08	605.000	20.0	OK
1	0.1	185.9	769.4	17.8	35.6	733.8	168.08	605.423	28.5	OK
2	0.1	185.9	955.3	17.8	53.4	901.9	168.08	605.845	36.9	OK
3	0.3	185.9	1141.2	53.4	106.9	1034.3	132.45	606.268	45.4	OK
4	1	185.9	1327.1	178.2	285.0	1042.1	7.75	606.601	52.0	OK
5	1.2	185.9	1513.0	213.8	498.8	1014.2	-27.89	606.621	52.4	OK
6	2	185.9	1698.9	356.3	855.1	843.8	-170.41	606.551	51.0	OK
7	2	185.9	1884.8	356.3	1211.4	673.4	-170.41	606.122	42.4	OK
8	2	185.9	2070.7	356.3	1567.8	503.0	-170.41	605.694	33.9	OK
9	1.5	185.9	2256.6	267.2	1835.0	421.6	-81.33	605.265	25.3	OK
10	1.2	185.9	2442.5	213.8	2048.8	393.7	-27.89	605.060	21.2	OK
11	1	185.9	2628.4	178.2	2226.9	401.5	7.75	604.990	19.8	OK
12	1	185.9	2814.3	178.2	2405.1	409.2	7.75	605.010	20.2	OK
13	0.6	185.9	3000.2	106.9	2512.0	488.2	79.01	605.029	20.6	OK
14	0.6	185.9	3186.1	106.9	2618.9	567.2	79.01	605.228	24.6	OK
15	0.5	185.9	3372.0	89.1	2707.9	664.1	96.82	605.427	28.5	OK
16	1.2	185.9	3557.9	213.8	2921.7	636.2	-27.89	605.670	33.4	OK
17	1.5	185.9	3743.8	267.2	3189.0	554.8	-81.33	605.600	32.0	OK
18	1.5	185.9	3929.7	267.2	3456.2	473.5	-81.33	605.395	27.9	OK
19	1.5	185.9	4115.6	267.2	3723.4	392.2	-81.33	605.191	23.8	OK
20	1.2	185.9	4301.5	213.8	3937.2	364.3	-27.89	604.986	19.7	OK
21	1	185.9	4487.4	178.2	4115.4	372.0	7.75	604.916	18.3	OK
22	0.6	185.9	4673.3	106.9	4222.3	451.1	79.01	604.936	18.7	OK
23	0.3	0.0	4673.3	53.4	4275.7	397.6	-53.45	605.134	22.7	OK
24	0.1	185.9	4859.2	17.8	4293.5	565.7	168.08	605.000	20.0	OK

Table 62: New_Moshi b

		OHT at New_Moshi b		
Peak Factor	2	Maximum surplus (m^3)	1687.6	
Inflow Hours	23	Minimum surplus (m^3)	319.9	
Outflow Hours	24	1st Guess Capacity (m^3)	2007	< 1935
Minimum wataer level (m)	600.100	As per CPHEEO Capacity (m^3)	2588	
Initial water level (m)	601.100	Final computed Capacity (m^3)	1935	
Maximum wataer level (m)	605.100	Max. Population serving	48894	
Initial water depth in tank	1	Initial Volume (m^3)	387.08	
Area of CS	387.08	Fire storage (m^3)	88.8	
Diameter (m)	22.2	Depth for Fire (m)	0.077	
Max. serving Demand (mld)	8.63	Av. Flow (m^3/h)=	375.143	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	375.1	762.2	36.0	36.0	726.3	339.19	601.100	20.0	OK
1	0.1	375.1	1137.4	36.0	71.9	1065.5	339.19	601.976	37.5	OK
2	0.1	375.1	1512.5	36.0	107.9	1404.7	339.19	602.853	55.1	OK
3	0.3	375.1	1887.7	107.9	215.7	1671.9	267.29	603.729	72.6	OK
4	1	375.1	2262.8	359.5	575.2	1687.6	15.63	604.419	86.4	OK
5	1.2	375.1	2637.9	431.4	1006.6	1631.3	-56.27	604.460	87.2	OK
6	2	375.1	3013.1	719.0	1725.7	1287.4	-343.88	604.314	84.3	OK
7	2	375.1	3388.2	719.0	2444.7	943.5	-343.88	603.426	66.5	OK
8	2	375.1	3763.4	719.0	3163.7	599.7	-343.88	602.538	48.8	OK
9	1.5	375.1	4138.5	539.3	3703.0	435.5	-164.13	601.649	31.0	OK
10	1.2	375.1	4513.7	431.4	4134.4	379.3	-56.27	601.225	22.5	OK
11	1	375.1	4888.8	359.5	4493.9	394.9	15.63	601.080	19.6	OK
12	1	375.1	5263.9	359.5	4853.4	410.5	15.63	601.120	20.4	OK
13	0.6	375.1	5639.1	215.7	5069.1	570.0	159.44	601.161	21.2	OK
14	0.6	375.1	6014.2	215.7	5284.8	729.4	159.44	601.572	29.4	OK
15	0.5	375.1	6389.4	179.8	5464.6	924.8	195.39	601.984	37.7	OK
16	1.2	375.1	6764.5	431.4	5896.0	868.5	-56.27	602.489	47.8	OK
17	1.5	375.1	7139.7	539.3	6435.3	704.4	-164.13	602.344	44.9	OK
18	1.5	375.1	7514.8	539.3	6974.5	540.3	-164.13	601.920	36.4	OK
19	1.5	375.1	7889.9	539.3	7513.8	376.1	-164.13	601.496	27.9	OK
20	1.2	375.1	8265.1	431.4	7945.2	319.9	-56.27	601.072	19.4	OK
21	1	375.1	8640.2	359.5	8304.7	335.5	15.63	600.926	16.5	OK
22	0.6	375.1	9015.4	215.7	8520.4	494.9	159.44	600.967	17.3	OK
23	0.3	0.0	9015.4	107.9	8628.3	387.1	-107.85	601.379	25.6	OK
24	0.1	375.1	9390.5	36.0	8664.3	726.3	339.19	601.100	20.0	OK

Table 63: New_Wadmukhwadi b

		OHT at	New_Wadmukhwadi b	
Peak Factor	2	Maximum surplus (m^3)	726.2	
Inflow Hours	23	Minimum surplus (m^3)	380.6	
Outflow Hours	24	1st Guess Capacity (m^3)	1107	< 1988
Minimum wataer level (m)	604.000	As per CPHEEO Capacity (m^3)	654	
Initial water level (m)	605.000	Final computed Capacity (m^3)	1988	
Maximum wataer level (m)	609.000	Max. Population serving	12355	
Initial water depth in tank	1	Initial Volume (m^3)	397.61	
Area of CS	397.61	Fire storage (m^3)	22.4	
Diameter (m)	22.5	Depth for Fire (m)	0.019	
Max. serving Demand (mld)	2.18	Av. Flow (m^3/h)=	94.796	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	94.8	492.4	9.1	9.1	483.3	85.71	605.000	20.0	OK
1	0.1	94.8	587.2	9.1	18.2	569.0	85.71	605.216	24.3	OK
2	0.1	94.8	682.0	9.1	27.3	654.7	85.71	605.431	28.6	OK
3	0.3	94.8	776.8	27.3	54.5	722.3	67.54	605.647	32.9	OK
4	1	94.8	871.6	90.8	145.4	726.2	3.95	605.817	36.3	OK
5	1.2	94.8	966.4	109.0	254.4	712.0	-14.22	605.827	36.5	OK
6	2	94.8	1061.2	181.7	436.1	625.1	-86.90	605.791	35.8	OK
7	2	94.8	1156.0	181.7	617.8	538.2	-86.90	605.572	31.4	OK
8	2	94.8	1250.8	181.7	799.4	451.3	-86.90	605.354	27.1	OK
9	1.5	94.8	1345.6	136.3	935.7	409.9	-41.47	605.135	22.7	OK
10	1.2	94.8	1440.4	109.0	1044.7	395.6	-14.22	605.031	20.6	OK
11	1	94.8	1535.2	90.8	1135.6	399.6	3.95	604.995	19.9	OK
12	1	94.8	1630.0	90.8	1226.4	403.5	3.95	605.005	20.1	OK
13	0.6	94.8	1724.7	54.5	1280.9	443.8	40.29	605.015	20.3	OK
14	0.6	94.8	1819.5	54.5	1335.4	484.1	40.29	605.116	22.3	OK
15	0.5	94.8	1914.3	45.4	1380.9	533.5	49.37	605.218	24.4	OK
16	1.2	94.8	2009.1	109.0	1489.9	519.3	-14.22	605.342	26.8	OK
17	1.5	94.8	2103.9	136.3	1626.1	477.8	-41.47	605.306	26.1	OK
18	1.5	94.8	2198.7	136.3	1762.4	436.3	-41.47	605.202	24.0	OK
19	1.5	94.8	2293.5	136.3	1898.7	394.8	-41.47	605.097	21.9	OK
20	1.2	94.8	2388.3	109.0	2007.7	380.6	-14.22	604.993	19.9	OK
21	1	94.8	2483.1	90.8	2098.5	384.6	3.95	604.957	19.1	OK
22	0.6	94.8	2577.9	54.5	2153.0	424.9	40.29	604.967	19.3	OK
23	0.3	0.0	2577.9	27.3	2180.3	397.6	-27.25	605.069	21.4	OK
24	0.1	94.8	2672.7	9.1	2189.4	483.3	85.71	605.000	20.0	OK

Table 64: Wadmukhwadi b

OHT at Wadmukhwadi b				
Peak Factor	2	Maximum surplus (m^3)	744.2	
Inflow Hours	23	Minimum surplus (m^3)	382.3	
Outflow Hours	24	1st Guess Capacity (m^3)	1126	< 2000
Minimum wataer level (m)	589.700	As per CPHEEO Capacity (m^3)	685	
Initial water level (m)	590.700	Final computed Capacity (m^3)	2000	
Maximum wataer level (m)	594.700	Max. Population serving	12936	
Initial water depth in tank	1	Initial Volume (m^3)	400.09	
Area of CS	400.09	Fire storage (m^3)	23.5	
Diameter (m)	22.57	Depth for Fire (m)	0.020	
Max. serving Demand (mld)	2.28	Av. Flow (m^3/h)=	99.255	

Time	Peak	Inflow (m^3/h)	Outflow (m3/h)	Cumu.	Surplus	Level	%Tank	Tank Status

from Start (hours)	Factor	Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)	Inflow-Cumu. Outflow (m^3)	or Deficit (Inflow-Outflow) (m^3)	(m)	Full	
0	0.1	99.3	499.3	9.5	9.5	489.8	89.74	590.700	20.0	OK
1	0.1	99.3	598.6	9.5	19.0	579.6	89.74	590.924	24.5	OK
2	0.1	99.3	697.9	9.5	28.5	669.3	89.74	591.149	29.0	OK
3	0.3	99.3	797.1	28.5	57.1	740.0	70.72	591.373	33.5	OK
4	1	99.3	896.4	95.1	152.2	744.2	4.14	591.550	37.0	OK
5	1.2	99.3	995.6	114.1	266.3	729.3	-14.89	591.560	37.2	OK
6	2	99.3	1094.9	190.2	456.6	638.3	-90.98	591.523	36.5	OK
7	2	99.3	1194.1	190.2	646.8	547.3	-90.98	591.295	31.9	OK
8	2	99.3	1293.4	190.2	837.0	456.3	-90.98	591.068	27.4	OK
9	1.5	99.3	1392.6	142.7	979.7	412.9	-43.42	590.841	22.8	OK
10	1.2	99.3	1491.9	114.1	1093.9	398.0	-14.89	590.732	20.6	OK
11	1	99.3	1591.1	95.1	1189.0	402.2	4.14	590.695	19.9	OK
12	1	99.3	1690.4	95.1	1284.1	406.3	4.14	590.705	20.1	OK
13	0.6	99.3	1789.7	57.1	1341.2	448.5	42.18	590.716	20.3	OK
14	0.6	99.3	1888.9	57.1	1398.2	490.7	42.18	590.821	22.4	OK
15	0.5	99.3	1988.2	47.6	1445.8	542.4	51.70	590.926	24.5	OK
16	1.2	99.3	2087.4	114.1	1560.0	527.5	-14.89	591.056	27.1	OK
17	1.5	99.3	2186.7	142.7	1702.6	484.0	-43.42	591.018	26.4	OK
18	1.5	99.3	2285.9	142.7	1845.3	440.6	-43.42	590.910	24.2	OK
19	1.5	99.3	2385.2	142.7	1988.0	397.2	-43.42	590.801	22.0	OK
20	1.2	99.3	2484.4	114.1	2102.1	382.3	-14.89	590.693	19.9	OK
21	1	99.3	2583.7	95.1	2197.2	386.4	4.14	590.656	19.1	OK
22	0.6	99.3	2682.9	57.1	2254.3	428.6	42.18	590.666	19.3	OK
23	0.3	0.0	2682.9	28.5	2282.9	400.1	-28.54	590.771	21.4	OK
24	0.1	99.3	2782.2	9.5	2292.4	489.8	89.74	590.700	20.0	OK

Table 65: New Jadhavwadi2

		OHT at NewJadhavwadi2		
Peak Factor	2	Maximum surplus (m^3)	1201.9	
Inflow Hours	23	Minimum surplus (m^3)	268.3	
Outflow Hours	24	1st Guess Capacity (m^3)	1470	< 1571
Minimum wataer level (m)	615.940	As per CPHEEO Capacity (m^3)	1767	
Initial water level (m)	616.940	Final computed Capacity (m^3)	1571	
Maximum wataer level (m)	620.940	Max. Population serving	33375	
Initial water depth in tank	1	Initial Volume (m^3)	314.16	
Area of CS	314.16	Fire storage (m^3)	60.6	
Diameter (m)	20	Depth for Fire (m)	0.064	
Max. serving Demand (mld)	5.89	Av. Flow (m^3/h)=	256.070	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	256.1	570.2	24.5	24.5	545.7	231.53	616.940	20.0	OK
1	0.1	256.1	826.3	24.5	49.1	777.2	231.53	617.677	34.7	OK
2	0.1	256.1	1082.4	24.5	73.6	1008.7	231.53	618.414	49.5	OK
3	0.3	256.1	1338.4	73.6	147.2	1191.2	182.45	619.151	64.2	OK
4	1	256.1	1594.5	245.4	392.6	1201.9	10.67	619.732	75.8	OK
5	1.2	256.1	1850.6	294.5	687.1	1163.5	-38.41	619.766	76.5	OK
6	2	256.1	2106.6	490.8	1177.9	928.7	-234.73	619.643	74.1	OK
7	2	256.1	2362.7	490.8	1668.7	694.0	-234.73	618.896	59.1	OK
8	2	256.1	2618.8	490.8	2159.5	459.3	-234.73	618.149	44.2	OK
9	1.5	256.1	2874.9	368.1	2527.6	347.2	-112.03	617.402	29.2	OK
10	1.2	256.1	3130.9	294.5	2822.1	308.8	-38.41	617.045	22.1	OK
11	1	256.1	3387.0	245.4	3067.5	319.5	10.67	616.923	19.7	OK
12	1	256.1	3643.1	245.4	3312.9	330.2	10.67	616.957	20.3	OK
13	0.6	256.1	3899.1	147.2	3460.1	439.0	108.83	616.991	21.0	OK
14	0.6	256.1	4155.2	147.2	3607.4	547.8	108.83	617.337	27.9	OK
15	0.5	256.1	4411.3	122.7	3730.1	681.2	133.37	617.684	34.9	OK
16	1.2	256.1	4667.3	294.5	4024.6	642.8	-38.41	618.108	43.4	OK
17	1.5	256.1	4923.4	368.1	4392.7	530.8	-112.03	617.986	40.9	OK
18	1.5	256.1	5179.5	368.1	4760.8	418.7	-112.03	617.629	33.8	OK
19	1.5	256.1	5435.6	368.1	5128.9	306.7	-112.03	617.273	26.7	OK
20	1.2	256.1	5691.6	294.5	5423.3	268.3	-38.41	616.916	19.5	OK
21	1	256.1	5947.7	245.4	5668.7	279.0	10.67	616.794	17.1	OK
22	0.6	256.1	6203.8	147.2	5816.0	387.8	108.83	616.828	17.8	OK
23	0.3	0.0	6203.8	73.6	5889.6	314.2	-73.62	617.174	24.7	OK
24	0.1	256.1	6459.8	24.5	5914.1	545.7	231.53	616.940	20.0	OK

OHT at NewJadhavwadi2				
Peak Factor	2	Maximum surplus (m^3)	1201.9	
Inflow Hours	23	Minimum surplus (m^3)	268.3	
Outflow Hours	24	1st Guess Capacity (m^3)	1470	< 1571
Minimum wataer level (m)	615.940	As per CPHEEO Capacity (m^3)	1767	
Initial water level (m)	616.940	Final computed Capacity (m^3)	1571	
Maximum wataer level (m)	620.940	Max. Population serving	33375	
Initial water depth in tank	1	Initial Volume (m^3)	314.16	
Area of CS	314.16	Fire storage (m^3)	60.6	
Diameter (m)	20	Depth for Fire (m)	0.064	
Max. serving Demand (mld)	5.89	Av. Flow (m^3/h)=	256.070	

Time from Start (hours)	Peak Factor	Inflow (m^3/h)		Outflow (m3/h)		Cumu. Inflow-Cumu. Outflow (m^3)	Surplus or Deficit (Inflow-Outflow) (m^3)	Level (m)	%Tank Full	Tank Status
		Inflow (m^3)	Cumulative Inflow (m3)	Outflow (m^3)	Cumulative Outflow (m3)					
0	0.1	256.1	570.2	24.5	24.5	545.7	231.53	616.940	20.0	OK
1	0.1	256.1	826.3	24.5	49.1	777.2	231.53	617.677	34.7	OK
2	0.1	256.1	1082.4	24.5	73.6	1008.7	231.53	618.414	49.5	OK
3	0.3	256.1	1338.4	73.6	147.2	1191.2	182.45	619.151	64.2	OK
4	1	256.1	1594.5	245.4	392.6	1201.9	10.67	619.732	75.8	OK
5	1.2	256.1	1850.6	294.5	687.1	1163.5	-38.41	619.766	76.5	OK
6	2	256.1	2106.6	490.8	1177.9	928.7	-234.73	619.643	74.1	OK
7	2	256.1	2362.7	490.8	1668.7	694.0	-234.73	618.896	59.1	OK
8	2	256.1	2618.8	490.8	2159.5	459.3	-234.73	618.149	44.2	OK
9	1.5	256.1	2874.9	368.1	2527.6	347.2	-112.03	617.402	29.2	OK
10	1.2	256.1	3130.9	294.5	2822.1	308.8	-38.41	617.045	22.1	OK
11	1	256.1	3387.0	245.4	3067.5	319.5	10.67	616.923	19.7	OK

12	1	256.1	3643.1	245.4	3312.9	330.2	10.67	616.957	20.3	OK
13	0.6	256.1	3899.1	147.2	3460.1	439.0	108.83	616.991	21.0	OK
14	0.6	256.1	4155.2	147.2	3607.4	547.8	108.83	617.337	27.9	OK
15	0.5	256.1	4411.3	122.7	3730.1	681.2	133.37	617.684	34.9	OK
16	1.2	256.1	4667.3	294.5	4024.6	642.8	-38.41	618.108	43.4	OK
17	1.5	256.1	4923.4	368.1	4392.7	530.8	-112.03	617.986	40.9	OK
18	1.5	256.1	5179.5	368.1	4760.8	418.7	-112.03	617.629	33.8	OK
19	1.5	256.1	5435.6	368.1	5128.9	306.7	-112.03	617.273	26.7	OK
20	1.2	256.1	5691.6	294.5	5423.3	268.3	-38.41	616.916	19.5	OK
21	1	256.1	5947.7	245.4	5668.7	279.0	10.67	616.794	17.1	OK
22	0.6	256.1	6203.8	147.2	5816.0	387.8	108.83	616.828	17.8	OK
23	0.3	0.0	6203.8	73.6	5889.6	314.2	-73.62	617.174	24.7	OK
24	0.1	256.1	6459.8	24.5	5914.1	545.7	231.53	616.940	20.0	OK