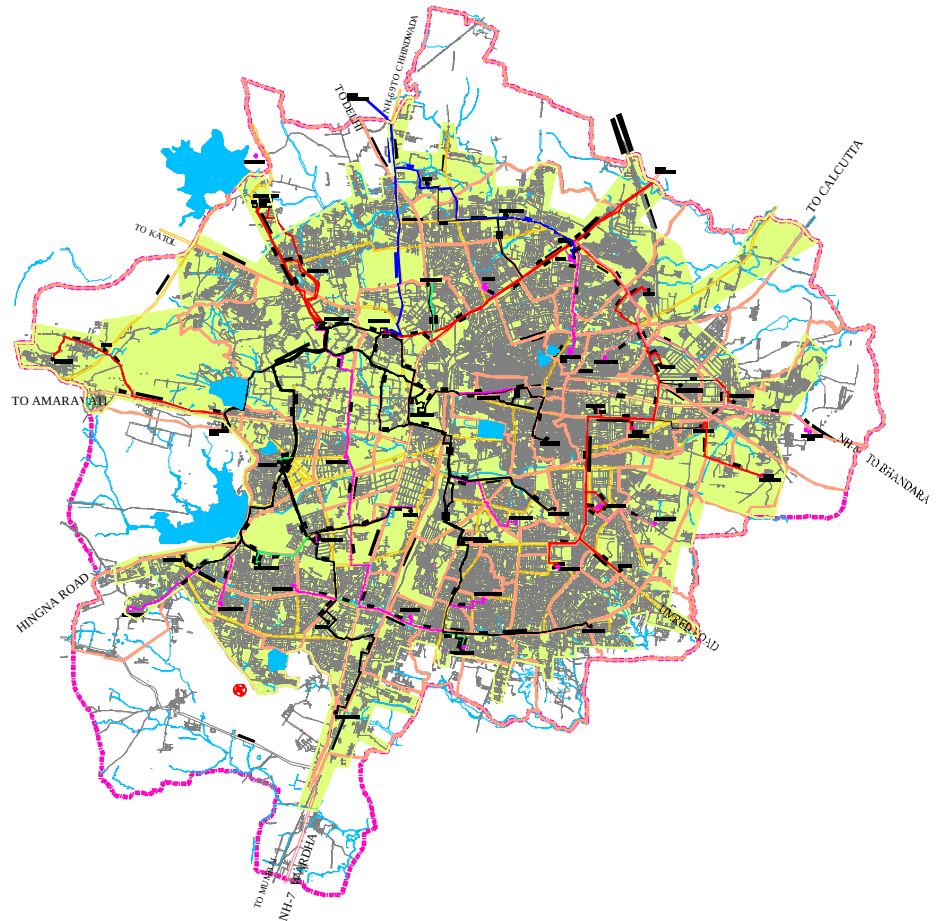




24 x 7 Water Supply Project For Nagpur City



6, Tatyia Tope Nagar, West High Court Road, Nagpur – 440 015 [M.S.] India
Ph. : 0712-2225566, 2241911/21/22, 2223813, Fax : 0712-2241912,
E-mail : dra.nagpur@gmail.com; dra.municipal@gmail.com
Website : www.dineshrathi.com



TABLE OF CONTENTS

PREAMBLE :-	6
1.0] Nagpur City :-	6
2.0] City Statistics :-	6
3.0] Population Projection (Within NMC Limits) :-	7
4.0] Prospective Water Demand Vs Present Supply to City :-	8
5.0] Prospective Water Demand Vs. Supply upto 2031 (Master Plan) :-	8
6.0] Measures Taken-up by NMC to Improve Water Supply :-	9
CHAPTER-1:.....	10
SECTOR BACK GROUND CONTEXT & BROAD PROJECT RATIONALE	10
1.1] Existing Status of the Physical Infrastructure :-	10
1.1.1] Old Gorewada Source :-	10
1.1.2] Kanhan Water Source :-	10
1.1.3] Pench Source :-	11
1.1.4] Present Annual Water Reservation & Actual Drawel :-	11
1.1.5] Present Treated Water Supply :-	12
1.1.6] Present Water Distribution System :-	12
1.2] Base Line Information in Terms of Users Coverage & Access :-	14
1.2.1] Population Served, Area Covered & Qty. Supplied in Water Dist. Zone :-	14
1.2.2] Urban Poor in Total Population :-	14
1.4] List of Ongoing Project under JnNURM :-	16
1.5] Existing Tariff and Cost Recovery Methods :-	17
1.5.1] Existing Water Tariff Structure :- (Refer Annexure- for more details)....	17
1.5.2] Tariff and Cost Recovery :-	18
1.5.3] Existing per Unit Cost :-	19
1.5.4] New Water Tariff Structure :-	21
1.6] Existing areas of Private Sector / Community Participation :-	22

1.6.1]	Design :-	22
1.6.2]	Construction :-.....	22
1.6.3]	Operations & Maintenance :-	22
1.6.4]	PPP approach of NMC for ongoing JNNURM Phase-1 projects :-.....	23
1.6.5]	PPP projects Under Implementation :-	23
1.7]	Importance of the Project :-	25
1.7.1]	Expected Results of the Project are :-.....	26
1.7.2]	Service Performance Objectives :-.....	26
CHAPTER-2:.....		28
PROJECT DEFINITION, CONCEPT AND SCOPE		28
2.1]	Phase One : Water Audit :-	28
2.1.1]	Background :-.....	28
2.1.2]	Water Losses :-.....	29
2.1.3]	Rehabilitation Phases :-	32
2.2]	Phase Two : Pilot 24X7 Project and DMA's for Leak Detection :-	34
2.2.1]	Pilot Project for 24x7 Water Supply :-	34
2.2.2]	Leak Detection :-.....	55
2.2.3]	Leak Detection in Bulk Water :-.....	55
2.2.4]	Leak Detection in Distribution System :-	56
2.3]	Phase Three : Rehabilitation Plan :-.....	73
2.4]	Environmental Compliance / Protection Measures / Improvement Measures :-.....	82
2.4.1]	Environment & Social Impact Assessment Report (ESIAR) :-	82
2.4.2]	Positive Impacts :-.....	82
2.4.3]	Potential adverse impacts and their mitigation :-.....	82
2.4.4]	Adverse Impacts during Construction Period and their Mitigation :-.....	82
2.4.5]	Adverse Impacts during Operation and their Mitigation :-	84

2.4.6]	Environment Management Plan (EMP) :-	84
2.5]	Land :-	86
2.6]	Rehabilitation and Resettlement :-	86
2.7]	Specialized Procured Services for Design, Independent Supervision & Quality Assurance :-	86
2.7.1]	Project Management Consultancy :-	86
2.7.2]	Special Design Consultancy :-	86
2.8]	Other Information :-	87
2.8.1]	List of Clearances :-	87
CHAPTER-3:		88
PROJECT COMPONENT AND COST		88
CHAPTER-4:		89
PROJECT INSTITUTION FRAME WORK		89
4.1]	Role of Different Institution Involved in Construction Phase :-	89
4.1.1	Pre-Implementation :-	89
4.1.2	Post-Implementation :-	89
4.1.3	Responsibility Matrix :-	90
4.2]	Manner of undertaking Construction Work :-	90
4.3]	Involvement of the construction entity in the subsequent O & M :-	90
4.4]	Areas of Involvement of Private Sector :-	90
4.5]	Construction “Packages” for works Construction :-	91
CHAPTER-5:		92
PROJECT FINANCIAL STRUCTURING :-		92
5.1]	Overall Financial Structuring of the Project :-	92
5.2]	Review for Institutional Debt & Private Sector Participation :-	92
5.2.1]	Financing Strategies for the Project :-	92
5.2.2]	Other funding Options with Developing Authority :-	93
CHAPTER-6:		94
PROJECT PHASING		94

6.1]	Schedule of Tendering / Selection for Procurement of Services :-	94
6.2]	Schedule of Bringing in State & ULB level Contribution to Project :-	94
6.3]	Schedule for Obtaining Clearances :-	94
6.4]	Schedule of Shifting Utilities :-.....	95
6.5]	Project Infrastructure Component-wise Implementation Plan : Bar-Chart for Key Activities :-	95
6.6]	CPM/PERT Chart :-.....	95
6.7]	PPP Strategic Approach :-	95
CHAPTER-7:.....		96
PROJECT O&M PLANNING		96
7.1]	Nagpur Full City 24X7 Water Supply Project Background :-	96
7.2]	PPP Strategy and Logical Framework :-	97
7.3]	Key Issues :-	98
7.4]	Agreed PPP Transaction Structure :-	100
7.4]	Operational Performance :-	103
7.4.1]	Current NMC Performance :-	103
CHAPTER-8:.....		112
PROJECT FINANCIAL VIABILITY & SUSTAINABILITY		112
8.1]	Overall Project Perspective :-	112
8.2]	Risk Analysis :-.....	117
CHAPTER-9:.....		126
PROJECT BENEFITS ASSESSMENT (Social Cost Benefit Assessment)		126
9.1]	Service Performance Objectives :-.....	127
CHAPTER-10:.....		128
PROCUREMENT STRATEGY.....		128
Annex 1: Operational Data		130
Annexe 2.....		134
New Tariff Setting implemented by NMC – to be applied from April 2009 onwards		134
Annex 3:.....		135
NMC – Water Supply Department Nagpur – Income and Expenditures.....		135

Annex 4:.....	136
NMC – Water Supply Department Nagpur – Capital Expenses	136

Estimate

Sr. No.	Description
01]	Abstract of Project Cost
02]	Package-A Rehabilitation Cost
03]	Detailed HSC & Pipe Replacement for Slum as per Location
04]	Design for 2000 mm Diameter Pipe From BPT to Pench WTP-1, 2, 3
05]	Rate Analysis

PREAMBLE :-

1.0] Nagpur City :-

The city got its name from the River Nag or Nag people and is known since prehistoric times. Nagpur and its surrounding region also find a mention in the Vedic and Mauryan scriptures.

Nagpur is the 13th largest urban developing metropolitan city in India. Located near the geographical center of India

Nagpur the second capital of Maharashtra is also called as Orange city. It has potential to become a cosmopolitan city since it is one of the fastest growing cities in India with one of the highest per capita income. Three National & Three State Highways passes through Nagpur.

Nagpur is also the next most favored IT destination in Maharashtra after the saturation in Mumbai and Pune. One of the biggest industrial estates namely a Botibori category under five star infrastructural facilities is located @ 25-30 km from the City. Nagpur also houses the Maintenance Command of the Indian Air Force and has an Ordnance factory for Indian Armed forces.

City has very good quality network of internal IRDP roads. The city has been awarded first prize for 2004-2005 in Maharashtra for its overall performances in municipal services.

NMC is the recipient of prestigious HUDCO award in the year 2001 for excellent infrastructure. NMC was also awarded by GoM with prestigious Sant. Gadgebaba award for year 2004 for cleanness of the city.

Nagpur is also recipient of state level award in water sector for the year 2006-07.

The Government of Maharashtra (GoM) has started to develop the existing airport at Nagpur as Multimodal International Hub Airport at Nagpur (MIHAN) and Special Economic Zone (SEZ) and along with related allied facilities. Multi-Modal International Hub Airport Nagpur (MIHAN) is a multi dimensional, multidisciplinary project of International Standard with proposed world-class facilities.

2.0] City Statistics :-

Location	Toposheet No. 55 O/4 21.15° N 79.08° E
State	Maharashtra, India
Altitude	300 meters above MSL
Area	217.56 km ²
Population (2004)	2,350,000
Population Density	10802 / km ²

Climate:	Summers	March to June (Avg high 46oC)
	Winters	November to Jan (Avg low 10oC)
	Monsoon	June to September (Annual Max. 1933 mm) (Annual Avg. 1242 mm) (Annual Min. 606 mm)
Present Water Resources		Gorewada Lake (16 mld), Kanhana River (100-120mld), Pench Dam Canal (350-370 mld)
Present Pure Water Supply		470 mld (Yr.-2005)
Ave. LPCD rate of Supply		@135-150 ltrs./cap./day.

Nagpur city, is presently getting water for from two major sources namely Kanhana River (Head work located near village Juni Kamptee) & Pench Dam (through Right Bank Canal with Lifting Point at Mahadula @ 48.5 Km of canal).

Kanhana Water Supply Scheme was commissioned in four phases during the years 1940 to 1970. The first phase capacity in 1940 was 27.3Mld which was augmented to 63.6Mld in 1954. The capacity was further augmented to 86.3Mld in 1966 and finally to 109Mld in 1970. Present supply from this source is @ 109 to 120 Mld.

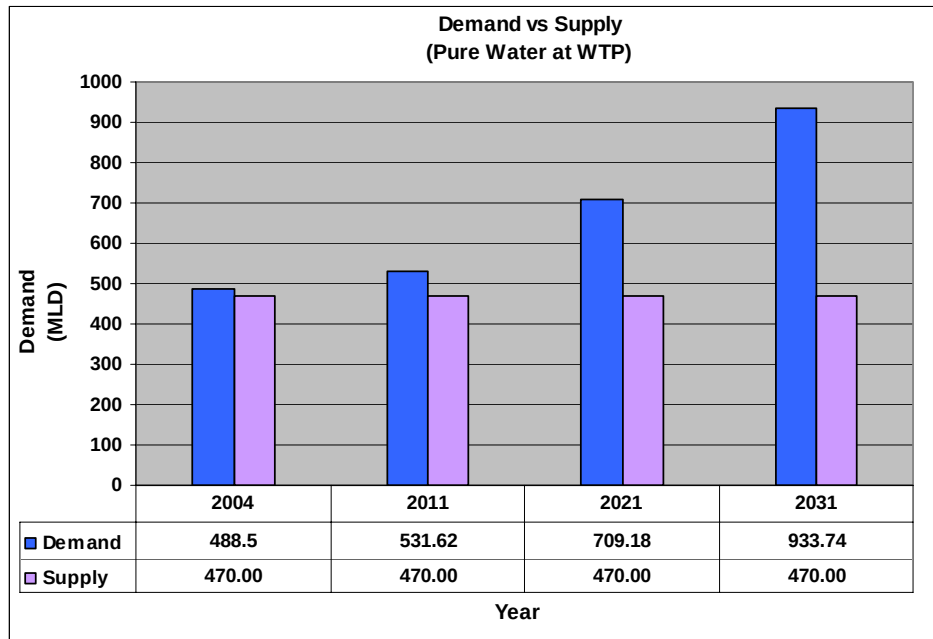
Pench-I, Pench-II & Pench-III Scheme was commissioned in 1982, 1984, and 2003 respectively. Pench-IV under implementation and likely to be completed in 2011.

Existing Reservation of water in Pench Project for city 190 Mm³/year (521mld)

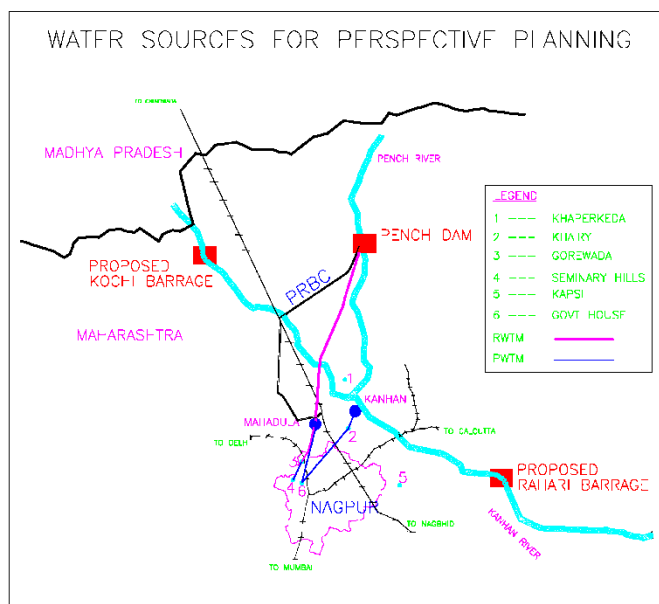
3.0] Population Projection (Within NMC Limits) :-

Sr. No.	Area	Year			
		2001	2011	2011	2031
05.	Nagpur – 217 km ²	21,50,000	28,30,000	36,90,000	47,50,000

4.0] Prospective Water Demand Vs Present Supply to City :-



5.0] Prospective Water Demand Vs. Supply upto 2031 (Master Plan) :-



NMC has prepared the master Plan for Water Supply to meet the water supply up to 2031 from identified sources. The future source for city would be proposed Rahari barrage on Kanhan River which will meet the water demand up to Year 2031. Kochi barrage and Jamghat will be required to be developed to meet water demand beyond 2031.

Year	Demand (Treated water)	Supply (As on 2004)	Future Source	Surplus/Deficit over Existing supply (+/-) Mld	Net surplus /deficit over existing + future planning supply
2011	532	470	113 (Pench-IV Additional + Kanhan Augmentation)	(-)62	+51
2021	709	470	113(Pench-IV) + 175 (Rahari-1)	(-)239	+49
2031	934	470	113(Pench-IV) + 175 (Rahari-I)+ 175(Rahari-II)	(-)464	(+)1

6.0] Measures Taken-up by NMC to Improve Water Supply :-

Nagpur Municipal Corporation, looking after Water supply & sewerage system of city has taken-up & planning for various projects to,

- Planing for 24x7 safe water supply in an equitable, efficient and sustainable manner through customer oriented and accountable service.
- Various reforms have
- Improve level of services & efficiency of system,
- Upgrading of existing infrastructure to increase the serviceability & minimized losses in system.
- Minimized operation & maintenance cost.
- Reuse of water to minimized stress on existing water source
- Augmentation/Development of New sources to meet prospective demand.

CHAPTER-1: SECTOR BACK GROUND CONTEXT & BROAD PROJECT RATIONALE

1.1] Existing Status of the Physical Infrastructure :-

Water supply to Nagpur City was drawn from three surface sources viz. Gorewada Tank, Kanhan river, and Pench canal.

Gorewada tank source was developed in the year 1911. As city grew and the need for water increased, Gorewada tank source became inadequate. As augmentation was not possible due to site conditions, surface water source from river Kanhan 15 km. away from city was considered as perennial source.

In 1976, the Irrigation Department, Govt. of Maharashtra executed a storage dam across river Pench for hydroelectric project at Totaladoh and pickup dam at Navegaon Khairy.

With source as Pench Dam, Pench-I ,II & III Scheme was commissioned in 1982, 1984, and 2003 respectively. Pench-IV scheme is under construction.

1.1.1] Old Gorewada Source :-

This was developed in the year 1911. It consists of an earthen bund across river Pili at a distance of about 8 km towards North-East of Nagpur City having gross and live storage capacities 8.82 Mm³ and 7.92 Mm³ respectively. On the downstream of Gorewada Tank, conventional Water Treatment Plant of 16.0 MLD capacity is constructed. Treated water is collected in pure water sump and then pumped to Seminary hills G.S.R for further distribution

1.1.2] Kanhan Water Source :-

Surface water intake located approximately 14 km from Nagpur City and 300 m. downstream of the confluence of the River Kolar and the River Kanhan was constructed in year 1940. In 1956 a barrage was constructed across Kanhan River about 500 m upstream of Kanhan head works with a storage capacity of 7.82 Mm³. Kanhan Water Supply Scheme was commissioned in four phases during the years 1940 - 1970. The first phase capacity in 1940 was 27.3 MLD which was augmented to 63.6 MLD in 1954. The capacity was further augmented to 86.3 MLD in 1966 and finally to 109 MLD in 1970.

Under this scheme, two intake wells in Kanhan river bed and two dry wells on the right bank of Kanhan River are constructed. Raw water is pumped to conventional treatment plant of 109 MLD capacity. Treated water from the Treatment Plant is pumped to G.S.R. of capacity 22.74 ML at Government House through 600 to 900 mm dia. M.S. parallel rising mains of length 15.24 km. which are interconnected to each other.

1.1.3] Pench Source :-

Pench Project - Phase-I

In this scheme 113.5 MLD water is drawn from Pench right bank canal by gravity to the Mahadulla pumping station. The raw water is pumped to the B.P.T. of capacity 5.7 lakhs liters through 1606 mm dia M.S. Rising Main of length 5624 m. from B.P.T. water is taken to the Gorewada balancing tank through 700 mm dia duplicate C.I. gravity mains each of length 400 m. from Gorewada Tank it is drawn to the conventional treatment plant of capacity 113.5 MLD through 1200 mm dia M.S. gravity main. The filtered and chlorinated water from the treatment plant is pumped to Seminary Hills G.S.R. of capacity 20.43 ML and Gittikhadan G.S.R. of capacity 5.94 ML. Sitabuldi G.S.R. is fed from Seminary Hills G.S.R. through 700 mm dia M.S. Feeder Main of length 4000 m.

Pench Project - Phase-II

Under Pench Phase - II a baby canal from Pench right bank canal to Mahadulla pumping station was constructed to draw additional 136 MLD of water. The raw water is pumped to the existing B.P.T. of capacity 5.70 lakh ltrs. through 1626mm dia M.S. Rising Main of length 5.60 km from B.P.T. water is conveyed to Gorewada tank through 1500 mm dia P.S.C. 8 Kg.cm² gravity main of length 400 m. from Gorewada Tank water is taken to conventional water treatment plant of capacity 145 MLD through 1100 mm and 1000 mm dia P.S.C. 4 Kg./Sq.cm. gravity mains of length 650 m and 325 m respectively. Pure water is pumped to Seminary Hills G.S.R. of capacity 20.43 ML through 1321mm dia M.S. Rising Main of length 3760 m. In this scheme two E.S.R.s at Jaripatka and Sharda Rolling Mill each of capacity 22.7 lakhs liters are constructed.

Pench project - Phase-III

Under Pench III Phase – I, additional 100 MLD water drawn from PRBC to Mahadula pumping station through the baby canal. Additional pumps are provided at Mahadula for Raw Water Pumping. A new treatment plant is also constructed at Gorewada. The system is identical to Pench - I & Pench - II project.

1.1.4] Present Annual Water Reservation & Actual Drawel :-

Present Annual Raw Water reservation from various source for city water supply & respective present drawel is as below:

Source	Annual Reservation		Actual Drawel (As per Billing to NMC)	
	Mm ³ / year	MLD	Mm ³ / year	MLD
Kanhan River	55.00	150.70	43.80	120.00
Pench Project (PRBC) @ Mahadula	112.00	306.88	143.00*	400.00
	78.00	213..72		

Gorewada Lake	5.80	16.00	6.80	20.00
Total	250.80	687.30	217.60	540.00

As per billing by Irrigation department to NMC. Losses through Canal seepage in the length of 48.50 Km length of travel is @ 20-25% as per the observation of Water audit & Leak detection Study.

1.1.5] Present Treated Water Supply :-

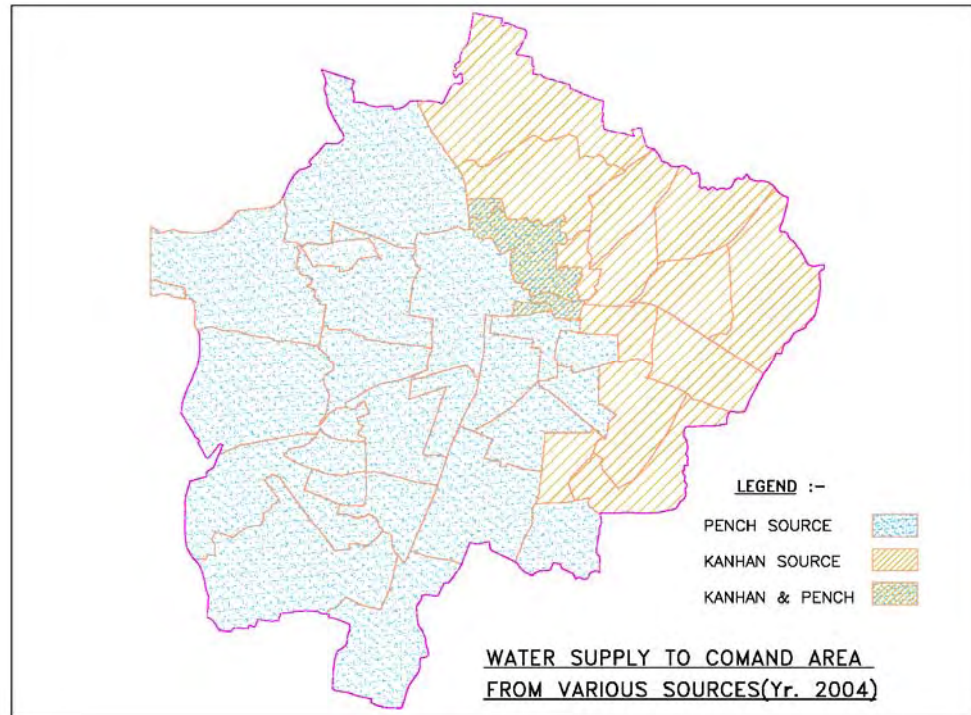
Treated Water from Various WTP

Kanhan Water Works	120.00	Mld
Pench Phase – I	136.00	Mld
Pench Phase – II	140.00	Mld
Pench Phase – III, Stage – I	100.00 to 120.0	Mld
Old Gorewada	16.00	Mld
Total	500.00 to 530.00	Mld

1.1.6] Present Water Distribution System :-

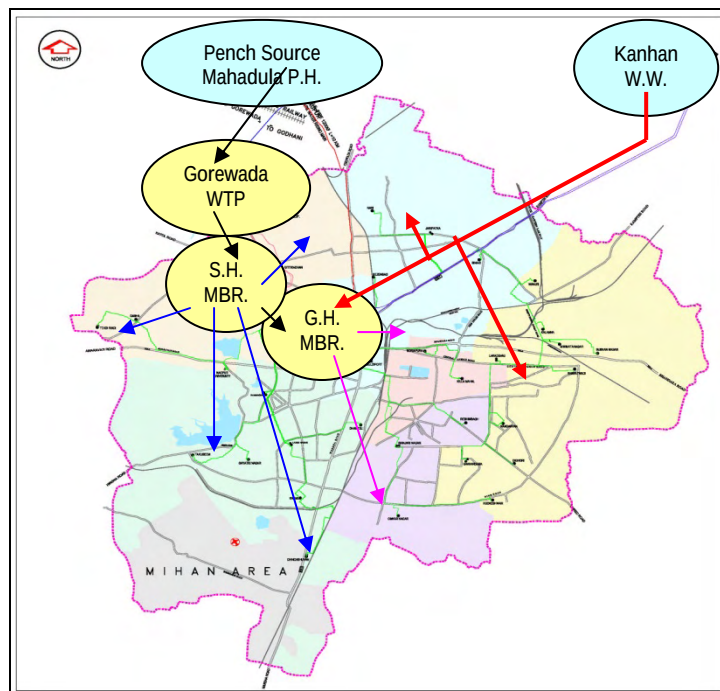
Existing water distribution system of Nagpur city consist of appx 2100 km of pipe network is broadly divided in to three areas.

- North / East / South part of Nagpur city with water supply from Kanhan Head Works & WTP.
- North / West / South / Central part of Nagpur city with water supply from Pench project and WTP at Gorewada.
- North / Central part of Nagpur city with water supply from both the sources i.e. Pench & Kanhan.



The total city area has been divided into ten water supply zones for better operation and maintenance.

Water is supplied to the city by Master Balancing Reservoirs at Seminary Hills (SH) & Govt. House (GH). From Seminary hills and Govt. house master balancing reservoirs water is supplied to other reservoirs. These two MBR's also supply water to its command area.



There are 43 service reservoirs in the city at 31 locations. The existing storage capacity is 150.79 MI which @ 32 % of the total supply.

1.2] Base Line Information in Terms of Users Coverage & Access :-

1.2.1] Population Served, Area Covered & Qty. Supplied in Water Dist. Zone :

Water Supply Service Area

Water supply service area is statutory limit of Nagpur Municipal Corporation. The total service area within the City is 217 Sq km of which about 7 sq km area is under catchment of lakes at periphery of city. The city is divided in to 10 administration zone. The population, service area, and appx water supply to respective zone is given in the following table

ZONE	POPULATION	AREA	QTY. SUPPLIED
	2004	Ha.	IN MLD
I DHARAMPETH	261666	4084.63	78.55
II LAXMI NAGAR	257960	3516.31	54.05
III HANUMAN NAGAR	165717	2181.52	27.91
IV DHANTOLI	236701	815.37	36.16
V NEHARU NAGAR	198411	1423.69	27.22
VI SOKTA BHAWAN	290076	556.07	61.03
VII SATRANJIPURA	336267	744.48	91.98
VIII LAKHADGANJ	176716	2406.16	16.04
IX ASHI NAGAR	225881	3225.02	23.14
X MANGALWARI	204606	2109.06	44.26
PUMPING/FEEDER MAIN			29.65
Total	2354001	21062	490.00

Source: Water Audit & leak detection Report March-2004

Water Supply Perimeter

The fringe areas of Nagpur city is under developed and not covered under piped water supply network, about 20% of population resides in this area at scattered location. Nagpur Improvement Trust (NIT) is a development authority for these areas is preparing the separate investment plan for civic facilities. The water supply perimeter for existing network is shown below as shaded area within the statutory limit.

1.2.2] Urban Poor in Total Population :-

There are 422 identified slum areas with in the city. A decade back detailed survey of these slums were conducted by GTZ with the financial aid from govt of Germany. NMC is providing the basic civic infrastructure like water supply, drainage, sanitation and roads to these slums . Majority of slums within core city area is connected with civic services.. Slums located at fringe areas are supplied by Tanker or bore well. The 30% of city population resides in slums

Slum population with house connections	4,94,340 souls
Slum population on stand post/Tanker supply	3,29,560 souls
Total Slum Population	8,23,900 souls

1.3] List of Various Project for the Sector in CDP :-

City Investment Plan Summary 2005-2011							
Sector	Investment in Rs crores			Source of Funding			
	2005-11	1st Year	Balance Period	PPP	State Governmen	MHADA / NIT / SRA	NMC
Water supply and distribution							
Pench IV	422	163	260	-	-	-	422
Leak detection	3	3	-	-	-	-	3
Energy and water Audit projects	50	50	-	-	-	-	50
Strengthening of WS System	115	44	71	-	-	-	115
Total	590	260	331	0	0	0	590
Sewerage							
North zone	130	-	130	-	-	-	130
Central zone	239	-	239	-	-	-	239
South zone	147	-	147	-	-	-	147
Total	515	0	515	0	0	0	515
Storm water drainage							
Drainage along side Road	45	-	45	-	-	-	45
Nalla canalization	56	-	56	-	-	-	56
Strengthening existing nallas	45	-	45	-	-	-	45
Rejuvenation of Nag and Pilli rivers	50	-	50	-	-	-	50
Lake rejuvenation	50	-	50	-	-	-	50
Total	246	0	246	0	0	0	246
Solid Waste Management							
Sanitary landfill	25	25	0	-	-	-	25
Bin free city	25	-	25	-	-	-	25
Total	50	25	25	0	0	0	50
Slum Development / Housing							
NIT (EWS/ LIG)	125	-	125	-	-	125	-
MHADA	42	-	42	-	-	42	-
SRA	1350	-	250	1100	-	250	-
Urban poor amenities	75	-	75	-	-	-	75
Total	1592	0	492	1100	0	417	75
Water recycling and reuse	250	0	0	250	0	0	0
Roads							
Outer Ring Roads 6-lane highways	650	90	560	-	650	-	-
Seven ROBs within city limits	128	90	38	-	-	-	128
10 Flyovers	100	-	100	-	-	-	100
Road widening /improvements(>24 m)	200	19	181	-	-	-	200
Bridges over rivers (Three)	8	8	-	-	-	-	8
Total	1086	207	879	0	650	0	436
MRTS and Traffic Management							
Traffic management	50	10	40	0	-	-	50
MRTS	1500	-	0	1500	-	-	0
Total	1550	10	40	1500	0	0	50
Social Amenities							
Destitute Home (one)	1	0	1	0	0	0	1
Marriage Halls (ten)	5	0	5	0	0	0	5
Night Shelters (four)	4	0	4	0	0	0	4
Public Toilets	5	0	5	0	0	0	5
Total	15	0	15	0	0	0	15
Grand Total	5894	502	2542	2850	650	417	1977

This project is the part of water sector project and outcome of Water audit, leak detection program undertaken by NMC with support of JNNURM. This project as a part strengthening of water supply system. The project is most important to achievement of CDP vision on water supply **“Water for all and 24X7 supplies with focus on safety, equity, and reliability”**.

1.4] List of Ongoing Project under JnNURM :-

JNNURM PHASE-1 Projects	Cost In Rs crore	Completion	Outcome
Leak Detection	3.30	Dec'2008	Flow Meters from source to ESR Reduction in BW –UFW to 2% from 23% Completed the leak detection in test zone
Water Audit	25.00	June'2009	24x7 for 15000 connection by Sep'09 Replacement of 20000 consumer meter Reduction in UFW < 25%
Energy Audit	28.00	Dec'2008	Replacement of All Pumps installed prior to Year 2000 with minimum efficiency of 70% Reduction in system head by 12m for Pench-1 Centralized monitoring system Infrastructure for equitable dist. Rehabilitation of Pench-1 WTP for reduction in water losses and energy consumption
Expansion of Network	43.21	July'2009	Connectivity to 572 layouts Population over 2.0 lakhs will be covered in piped water network
Kanhan Up gradation	87.65	Dec'2010	New Plant of 240 mld and discarding the old plant of 120 mld with Pumps
Pench-4 Part-1	210.00	Feb'2011	Replacement of Canal by 2300 mm pipe Additional Raw water of 115 mld from reduction in water losses in canal
Pench-4 Part-2	70.80	Feb'2011	New WTP of 115 mld at Godhani Trunk main up to MBR
Pench-4 Part-3	87.68	Feb'2011	Service Reservoirs 25 nos Feeder Mains 35 Km
Pench-4 Part-4	174.00	Feb'2011	Distribution system of 225 Km
Total JNNURM Phase-1	729.64	Feb-2011	Total Production Capacity 765 mld Rehabilitation of old Pumps and WTP 10% of Area will be converted in to 24x7

1.5] Existing Tariff and Cost Recovery Methods :-

1.5.1] Existing Water Tariff Structure :- (Refer Annexure- for more details)

i) **Water Supply without Meter :-**

A consumer having an authorized connection but having no meter fixed to his water supply pipe, shall be charged according to the following rates, namely :-

Size of Connection	Rates	
	Residential	Non Residential
15 mm dia	Rupees 75	Rupees 300
20 mm dia	Rupees 150	Rupees 600
25 mm dia	Rupees 350	Rupees 2000

The rates shall be per month per house or unit (Tenement) :

Provided that in notified slum water rate for 15 mm dia connection shall be charged according to the following rates namely :-

Type of House	Rates
Roof without slab	Rupees 25
Roof with slab	Rupees 50

ii) **Water Supply by Meter :-**

Water supplied by meter to the residential buildings & Non residential Building **In R1 Category.**

1st 10,000 liters	at	Rupees 3.00 per 1000 liters
Next 30,000 liters	at	Rupees 3.50 per 1000 liters
And above	at	Rupees 4.00 per 1000 liters

Water supplied by meter to Institution
& Commercial organization

Rs. 12 per 1000 liters.

Water supplied by meter to Industries

Rs. 20 per 1000 liters.

1.5.2] Tariff and Cost Recovery :-

The old tariff was last revised in the year 2000. The old tariff was just sufficient to meet the operating expenses till year 2006. With steep rise in energy and raw water cost the deficit was started as shown in following table

	2003-04 Actual	2004-05 Actual	2005-06 Actual	2006-07 Actual	2007-08 (BUDGET)
Establishment Expenses	501.96	574.85	623.86	640.00	705.00
Energy	2186.32	2110.02	2040.02	2770.00	3265.00
Raw water	1173.25	939.35	1356.12	852.29	1200.00
Other expenses	195.90	274.85	191.74	346.00	439.00
M & R	480.20	397.46	679.53	582.71	794.00
Total Operating Expenses	4537.63	4296.51	4891.27	5181.50	6397.00
Water Charges recovery	4891.20	5146.01	4840.70	5011.00	5500.00

The general body of NMC vide resolution dt –Jan'2008 as attached in **annexure** to revise the old tariff for full cost recovery with minimum burden on urban poor . The telescopic tariff structure has adapted for water conservation and minimum access charges to ensure the recovery of operating expenses. The new tariff structure has decided on the following principals.

- Water Tariff for full cost recovery for sustainable water business.
- Subsidized Tariff to Urban poor and low domestic consumption 55 lpcd
- Tariff at cost for domestic consumption up to 135 lpcd
- Premium Tariff for domestic consumption beyond 135 lpcd and non domestic usage
- Indexation with raw water and energy charges. It enable to pass additional cost (70% of operating expenses) directly to consumer as surcharge.
- Tariffs are sufficient to meet Operating expenses and repay the loan for Jnnurm Projects
- Earning will be better with operational efficiency and reduction in Non Revenue Water.

Source Water Audit Report (2004)

1.5.3] Existing per Unit Cost :-

Assumptions		Base				
Item	Unit	2005-06	2006-07	2007-08	2008-09	2008-09
General Inflation	%		8%	8%	8%	8%
Inflation - Electricity	%		10%	10%	10%	10%
Inflation - Establishment	%		12%	12%	12%	12%
Population growth	%		3%	3%	3%	3%
Residential connection growth	%		3%	3%	3%	3%
Other connection growth	%		0.50%	0.50%	0.50%	0.50%
Revenue water	%		46%	46%	50%	54%
Collection efficiency	%		72%	74%	77%	80%
Annual Costs						
Raw water charges to Irrigation Dept	Rs. Cr	13.6	14.6	15.8	17.1	18.4
Power	Rs. Cr	30.0	33.0	36.3	39.9	43.9
Establishment	Rs. Cr	7.0	7.8	8.8	9.8	11.0
Chemicals	Rs. Cr	1.3	1.4	1.5	1.6	1.7
Repairs and Maintenance	Rs. Cr	10.0	10.8	11.7	12.6	13.6
Depreciation	Rs. Cr	15.0	16.2	17.5	18.9	20.4
Debt service JNNURM	Rs. Cr	31.0	31.0	31.0	31.0	31.0
Total O&M cost	Rs. Cr	107.8	114.8	122.5	130.9	140.1

		Year	Base 2006-07	2006-07	2007-08	2008-09
Tariff calculations						
O&M Costs+meter costs	Rs. Cr		114.83	114.83	127.30	135.81
Cost recovery ratio	%		60%	60%	68%	76%
Collection efficiency	%		72%	72%	77%	81%
Average tariff required	Rs./Cum		8.56	8.56	9.94	10.99
Tariff for slums	Rs./Cum		3.00	3.00	4.00	4.00
Monthly flat charge for slums	Rs./month		24.00	24.00	32.00	32.00
Residential Lifeline 8 cum	Rs./Cum		6.00	6.00	7.00	8.00
Residential above 8 -upto 15 cum	Rs./Cum		7.00	7.00	8.00	9.00
Residential above 15 - upto 80cum	Rs./Cum		9.00	9.00	11.00	12.00
Residential above 80cum	Rs./Cum		13.00	13.00	15.00	16.00
Institutional upto 15 cum	Rs./Cum		13.00	13.00	15.00	16.00
Institutional above 15 upto 80 cum	Rs./Cum		15.00	15.00	17.00	19.00
Institutional above 80 cum	Rs./Cum		17.00	17.00	20.00	22.00
Commercial-1	Rs./Cum		21.00	21.00	25.00	27.00
Commercial-2	Rs./Cum		51.00	51.00	60.00	66.00

Source Water Audit Report & leak detection report (March-2005)

1.5.4] New Water Tariff Structure :-

The detailed tariff bylaws are provided in the annexure-5b. The comparison between old and new tariff structure is given below.

Catagory	Old Tariff /1000 Ltrs	New Tariff	Remark
Residential	Rs 3 to 4	Rs. 8 to 15 for > 8 units per month as per telescopic consumption	Minimum charges Replaced by Monthly access charges (Rs 56 for 15mm)
Semi Residential	NA	Rs 8 to 18 >8 units	Min access charges are Rs 100
Institutional	Rs 12	Rs. 15 to 20	
Commercial-1	Rs 20	Rs. 25 to 100	
Commercial-2	NA	Rs 60 to 540	Mineral water + Cold drink
Slum	Rs 25 PM	Rs. 30 to 80 PM	Kaccha, Concrete, Multifloor
Indexation	NA	Energy + Raw water	Directly passing to consumer as surcharge
Annual Revision	NA	5% to MC and 10% to 25% to SC	No need to approval from GOM

1.6] Existing areas of Private Sector / Community Participation :-

NMC has taken proactive stand in private sector participation in water supply systems design, construction, operation and now the financing.

1.6.1] Design :-

The entire design, detailed engineering, surveys have been done through private consultant and surveyors engaged by NMC in all sector i.e Water, Sewerage, Drainage, Transport etc.

1.6.2] Construction :-

NMC undertake all construction activity through private contractor and In water sector NMC has adapted dual approach for construction a) EPC contract for works like ESR construction ,pipe laying with defect liability 3-5 years b) EPC contract with minimum 5-10 years O & M for DBO contracts for pumping station, WTP or UFW reduction projects. C)For Design, Built, Finance and operation contract for 15 – 25 years is given to operators

1.6.3] Operations & Maintenance :-

- All new assets created since 1999 is managed through service contract.
- Existing assets also managed through service contract for Pumping station/ WTP O&M / Valve operations/ Billing distribution/ Annual maintenance contract for Zonal level
- Disadvantages
 - It is only a labor contract replacing retired employees.
 - No link with performance
 - No accountability towards consumer
 - Short term Contracts break up in small parts with no feasibility for private investment
- Advantage
 - Reduced number of NMC employees as of now 80% of assets managed by private contractors
 - Short term annual contract can be replaced by better contract
 - Non performing contractor can be replaced by better one
 - Reduced O & M cost
 - Over the period of time capacity building of local contractors in O & M
 - Prepared the ground for larger involvement of Private participation without affecting the NMC employees. Hence, less resistance for PPP.

1.6.4] PPP approach of NMC for ongoing JNNURM Phase-1 projects :-

- Performance based long term contract
- Private Participation in capital cost from Operator
- Technology by operator for lower life cycle cost
- New assets to generate income rather than increase financial burden on NMC or at least reduce cost for NMC
- Better service to consumer and urban poor
- Asset ownership with NMC
- JNNURM funding for better viability of project and reduced cost of capital.
- No NMC employee for operating the New assets for Augmentation to water supply projects

1.6.5] PPP projects Under Implementation :-

- Pench-I WTP Improvement & Up gradation (Rs 6.42 Crore)
 - 70% grant in aid, 30% by private operator
 - 5 Years O & M by operator
- Water reuse For Power Plant (Rs 130 crore)
 - 70% grant in aid, 30% by Mahagenco
 - 30% O & M by Mahagenco & pay to NMC the raw sewage charges @ Rs3.0 – 3.50 per 1000 Ltr for 110 MLD. Annual revenue to NMC Rs 15 crore from sewage
- 24/7 Water Supply (Rs 20 Crore)
 - 5 years O & M with performance based targets to reduce UFW and improvement in service level to customers in a pilot zone of 1.25 lakhs population.
- Improvement to Kanhan Water Supply (Rs 65 Crore)
 - 70% grant in aid, 30% by private operator
 - 15 Years O & M by operator

Table below provides the summary of existing and ongoing contracts for O & M in water sector as out source activity.

Sr. No.	Location	Description of work	Name of Contractor	Date of Start	Duration of Contract	O & M Cost / Yr. (Rs.)		Capital Cost (Rs.)	
						Monthly	Yearly	EMI	Annuity
1	Old Gorewada Pumping Station	O & M of Old Gorewada pumping Station	M/s Balaji Associates	5/15/2008	1 Year	151269	1,815,228		
2	Gorewada pench-I	O & M of WTP and pure water pumping machinery	M/s Veolia Water India Ltd.	6/7/2008	5 year	1079750	12957000	466667	5,600,004
3	Gorewada Pench-II	O & M of Gorewada Pench-II pumping Station	M/s Central India Engineering	2007-2008	1 Year	265467.7	3,185,612		
4	Gorewada Pench-III	O & M of WTP and pure water pumping machinery	M/s Degrimont Ltd.	2005-2008	3 year	410000	4,920,000		
5	Mahadula P-II	O & M of Raw water pumping Pench-I & pench-II	M/s Balaji Associates	2007-2008	1 Year	161605.9	1,939,271		
6	Kanhana	O & M of Raw water & pure water pumping station	M/s Veolia Water India Ltd.	2008-2011	2 1/2 years	646,667	7,760,000		
				2011-2026	15 Years	194670	35040564	2316100	27,793,200
7	ESR / GSR & Zonal Area	Valve operations and O & M of various ESR / GSR and all Zone Area	1) M/s Transwell Engineers, Nagpur Zone I, VI, VIII	2007-2010	3 Year	369,060	4,428,720		
			2) M/s Sonu Construction, Nagpur Zone I, III, V			237,740	2,852,880		
			3) M/s Balaji Associates, Nagpur Zone II, IV			133,920	1,607,040		
			4) M/s Central India Engineering Zone VII, IX, X			238,080	2,856,960		
8	ALL ESR & GSR of Nagpur Water Supply	Installation & commissioning of Electrochlorination system at different ESR/GSR with annual maintenance & operation for five years.	M/s Titnor Components Ltd.	2003-2008	5 years	282269	3,387,233		

9	24 x7 water supply, Dharampeth Zone as a pilot work	Implementation of Un-interrupted Water Supply and Reduction in UFW with Improvements in Level of Service to the Consumers in Dharampeth Zone as a pilot project.	M/s Veolia Water India Ltd.	6/7/2007	5 years (2009-2014)	2439347	29,272,164		
10	Central Monitoring System for Nagpur water supply & distribution system	Automation / Instrumentation of all ESRs / GSRs / Pumping stations and WTP for low cost on line remote monitoring of water quality and system efficiency including pumping efficiency of all the pumps houses at central office based on radio telemetry with warning system cabling etc. and O & M of above for the period of 5 years.	M/s Mechatronics Systems Pvt. Ltd.	2009-2014	5 years	1266216	15194592	229608	2,755,296
11	Pench-IV (DPR-I)	Conveyance of raw water from Pench dam to Mahadula	M/s CRSGC-SEW	2011-2018	7 Years	1250000	15,000,000		
12	Tanker Water Supply	Distribution of pure water in various zones of Nagpur City							
13	Borewell Maintenance Contract	Borewell maintenance contract for water			3 year		4,000,000		
		Pipeline maintenance			1 year		1,500,000		

1.7] Importance of the Project :-

Poor technical and commercial efficiency in water supply system and low tariff has affected cost recovery and even difficult to meet operating expenses. This resulted in to poor asset and service to consumer. This resulted in to huge financial losses and dissatisfaction amongst the stakeholder. The JNNURM grant has enable NMC to improve the supply side efficiency through refurbishing of water production facilities and distribution network. NMC has rationalized the tariff and connection policy for full cost recovery. The proposed project is very important for improving the infrastructure up to consumer meter for whole city.

The specific objectives of the project are

- (i) to improve the conditions of operation of the water supply systems of Nagpur City,
- (ii) to achieve uninterrupted water supply services before April 2012 including for population living in slum areas, and
- (iii) to ensure project's sustainability based in long-term full cost recovery of water supply operations,

1.7.1] Expected Results of the Project are :-

- Rehabilitate and upgraded the system with reduced water losses.
- A private Operator is appointed by NMC to operate, maintain, commission/de-commission and refurbish NMC related infrastructure and equipments as required to operate efficiently water supply infrastructure for a period of 25 years.
- 24x7 uninterrupted water supply is implemented in the entire city of Nagpur before April 2012 without exceptional tariff increase.
- All population of slum areas in Nagpur city can access water supply services from the municipal network.
- NMC does not required to allocate municipal budget resources to cover eligible water supply service costs, including debt service, for infrastructure's expansion.
- All investment projects committed under JNNURM arrangements for water supply improvement in Nagpur City are fully implemented in accordance with the corresponding Financing Memoranda.

1.7.2] Service Performance Objectives :-

Service performance targets aim at achieving 24/7 water supply to 100% of potential customers in the whole city since 1st of April 2012. Uninterrupted water supply services should be metered, which ever the applicable tariff setting establishes, and comply with applicable Regulations.

NMC recognizes three applicable service levels :

- 1] Full uninterrupted 24x7 open access to drinking water supply through legal metered connections.
- 2] Uninterrupted 24x7 access to drinking water supply through legal slum connections billed on a lump sum basis for not less than 70 litre per capita per day.
- 3] Bulk water supply to communities outside the jurisdiction of NMC through community metered connections located in the right of way of the transmission mains.

The operational efficiency targeted expected by NMC are expressed by two key contract parameters :

- Technical Efficiency (TE), which represents the volume of water billed to eligible customers expressed as a percentage of the volume of water supplied to the distribution systems: is expected to increase from 62% to 75% while the hours of service increase from 5 hours per day to 24 hours per day.
- Commercial Efficiency (CE), which represents the amounts collected from eligible customers expressed as a percentage of the amounts billed to these customers, is expected to increase from 76% to 95%.

CHAPTER-2: PROJECT DEFINITION, CONCEPT AND SCOPE

The water loss control programs are being implemented by NMC in four phases :

- **Phase one** : Water audit and leak detection study, assessment of economic optimum volume of water losses, and performance indicators as done through water and energy audit study.
- **Phase two** : Pilot study at Dharampeth zone for 15000 connection and leak detection in Test zone.
- **Phase three** : Full city intervention using apparent (Commercial) and real (Technical) loss reduction methods based on outcome of first two phases.
- **Phase four** : Ongoing maintenance of the loss control mechanism by Implementation of 24x7 water supply program through long term performance based Rehabilitate, Finance, Operations and Maintenance contract by Public Private Partnership mode for sustainability.

This report deals with all the four phases where, the observations of phase one which is completed and phase two for which investigation is completed and being partially implemented. The rehabilitation plan for phase three submitted in this report and formulated the model to implement the program through PPP mode for phase four.

2.1] Phase One : Water Audit :-

2.1.1] Background :-

On 31st March 2004 completed the first accounting year after commissioning of Pench-III. Pench-III project was undertaken for 120 mld augmentation to water supply of Nagpur Municipal Corporation. The project includes increase in capacity of raw water pumping, construction of Water treatment facilities, water mains, 14 Elevated service reservoir and distribution network.

The water sales figure were static, inspite of increase in input volume by 32% i.e from 370 mld to 490 mld. The entire output of Pench-III converted in to water loss in both technical or real losses and commercial losses. These

Year end	Water Sales In million Rs	Receipt In million Rs	Water Supply In mld
2001- 2002	700	44	370
2002- 2003	735	45	370
2003- 2004	715	50	490

losses act as double wedge sword for NMC water sector. The financial losses increase many fold as repayment of loan for Pench-III started and dissatisfaction amongst the stake holders like citizens, people's representative. Many localities of city were expecting the relief from water problem after commissioning of Pench-III were disappointed, when they found water that water has not reach, in spite of all the infrastructure in place.

The authorities had difficult task to explain to public and press for the reason behind continuation of water problems when water supply to city is more than 200 lpcd.

The most convenient decision to solve the water problem is always to launch a new water supply project to increase water supply. Similarly it was most convenient to blame Pench project team, who were entrusted the responsibility of completion of project. The team had hard time to explain that the infrastructure created by them is performing well and all pumping station and New Water treatment facilities are operating as per design, but unable to explain for reasons continuation of problem and counter blame on water distribution team for not managing the system properly.

The department of water supply and sanitation of government of Maharashtra who was facing similar problems in all cities had launched the water audit, leak detection and energy audit program as per recommendation of one Sukhantkar committee who was appointed to prepare the action plan tackle these

problem as loss at state level was very high and more and more cities are facing the water problems. The program provide financial aid to ULB's to conduct audits from empanelled Technical Service providers (TSP) and grant support to implement the recommendations. NMC decided to take benefit of program to conduct the water audit, leak detection and energy audit.

Water Supply in Maharashtra			
• ULBs -			
- Municipal Corporations			-
- 'A' Class Municipal Council			-
- 'B' Class Municipal Council			-
- 'C' Class Municipal Council			-
- N Panchayat			-
• Total Investment in water supply			
- For completed	9000 crore	-	333 schemes
- On going	4500 crore	-	189 schemes
• O&M Expenditure			
- Required	600 crore	-	Per Annum
- Water charges levied	350 crore	-	Per Annum
- Recovery	250 crore	-	Per Annum

2.1.2] Water Losses :-

a] Type of Water Losses :-

Understanding the types of water losses and having consistent and clear definitions for the types of water losses occurring in distribution systems is the first step to be able to manage the problem of water losses.

Simply stated, the problems of water and revenue losses are'

- **Technical:** Not all water supplied by a NMC reaches the customer.
- **Financial or Commercial:** Not all of the water that reaches the end user is properly measured or paid-for.
- **Terminology:** Standardized definitions of water and revenue losses are essential to quantify and control the losses.

The International Water Association (IWA) defines two major categories under which all types of supplier water loss occurrences fall:

- **Real losses** are the physical escape of water from the distribution system, and include leakage from pipes, joints, and fittings; leakage from reservoirs and tanks; and water losses caused by reservoir

overflows. Real losses occur prior to the point of end use or consumer meter.

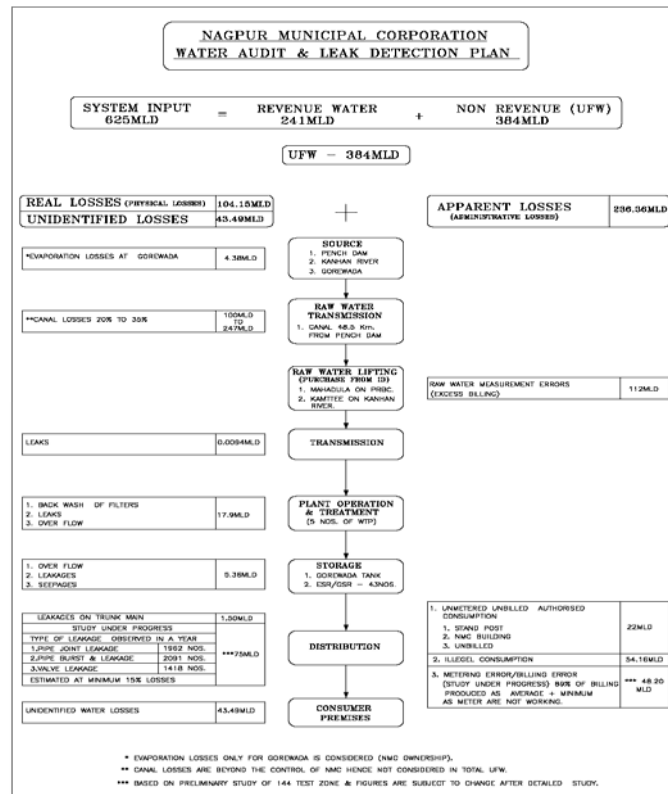
- Apparent losses are caused by inaccuracies associated with customer metering, consumption and billing data handling error, assumptions of unmeasured or free water for social, captive and public use, and any form of unauthorized consumption (theft or illegal use).

Figure 1 Water Audit Worksheet-Phase-1

A	B	C	D	E
System Input Volume 625 mld	Authorised Consumption (Billed Authorised Consumption + Unbilled Authorised Consumption) 263 mld	Billed Authorised Consumption 241 mld	Billed Metered Consumption (Including water exported)	Revenue Water
			Billed Un-metered Consumption	241 Mld
		Unbilled Authorised Consumption 22 mld	Unbilled Metered Consumption	Non-Revenue Water (System Input volume – Revenue Water)
			Unbilled Un-metered Consumption	
	Water Losses (System Input Volume – Authorised Consumption) 362 mld	Apparent Losses 214.36 mld	Un-authorized Consumption 54.16 mld	
			Metering Inaccuracies 160.20 mld	
	Real Losses 147.64 mld	<i>Leakages on Transmission and/or Distribution Mains 1.50 mld*</i>		
			Leakages and Overflows at Utility's Storage Tanks/WTP 27.65 mld	
			<i>Leakage on Distribution Service Network Connections up to point of Customer metering 75 mld*</i>	
	Unidentified Water Losses 43.49 mld*			

Figure 2 Source from Water Audit DPR

The water losses for Nagpur is summarized in following chart



As it is observed that major water losses occurred at canal transmission managed by Water resource department. In NMC, contributors in water losses were more of apparent losses than real physical losses. Transmission lines, pumping station, water treatment were contributing much less compare to distribution system as these facilities were visible and any loss can not be unnoticed for long.

Water losses in water supply to Nagpur city is divided in two parts I) Water losses in raw water transmission in canal from Pench Dam to Nagpur city II) Water losses in Distribution System.

b) Water Losses in Canal :-

NMC lift the raw from 48.5 km chainage from Dam at Mahadula. Canal is owned and maintained by Water resource department of government of Maharashtra. Nagpur lift water round the clock from canal and there is no

time available to repair and maintenance of canal. The huge water losses in the form of seepage, illegal use and evaporation is observed while normal working of canal. Lack of

Rate of Water Discharge (with nil Irrigation)	Only from NMC	NMC + Koradi / Khaparkheda
In the month of March, 2005 enquired on 1 st week of March)	225 Cusec.	325 Cusec.
Total discharge in Mld	≈550 Mld	≈795 Mld
Less for Koradi / Khaparkheda TPS	–	175 Mld
Less for NMC	450 Mld	450 Mld
Canal Losses	100 Mld	170 Mld
% of losses (on productive use)	22%	27.2%

Above study suggest that losses to increase with irrigation use of canal with increase of water level & velocity at canal, as actual capacity of canal is 21.23 cumec ≈ 750 cusec ≈ 1835 mld with irrigation.

maintenance also resulted in breach of canal and waste of large quantum of water.

The water audit observations are shown as in box that losses in canal was resulted in to loss of water and revenue as raw water tariff is four times higher in canal compare to water charges lifting from dam as shown in the box. NMC has undertaken the project of pipe line to replace canal and augmentation to water supply for city by 115 mld through saving of water from the project. The project approved for ACA under JNNURM and will be completed by Feb 2011. Hence this project will benefit city by reducing the pressure on water resources by converting recovered losses as new water source and also benefiting the environment.

RAW WATER TARIFF :-

Raw water tariff of Irrigation Department as applicable on 01/01/2005 was as follows.

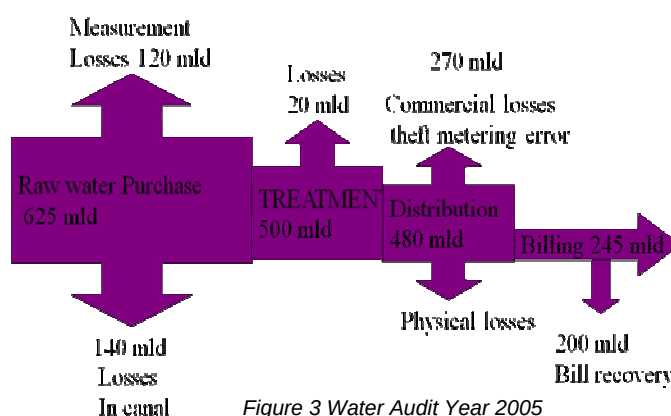
01]	Raw water lifting from canal	Rs. 500/mld + 20% cess	Rs. 600 / mld
02]	Raw water lifting directly from Dam (Ref. Annexure-8)	Rs. 130/mld + 20% cess	Rs. 156 / mld
Saving in Tariff			Rs. 444 / mld

Hence,

1]	Saving for existing water requirements (137 mm ³)	6.08 Crore/Year
2]	Savings for total water reservation (190 mm ³)	8.43 Crore/Year

c] Water Losses in Distribution System :-

The water balance for Nagpur water supply as shown in figure suggests that in 2005. The water purchase and paid to water resource department for 625 mld water. The losses in canal as described earlier was in the account of WRD. While NMC was able to treat 500 mld and after making losses in treatment, the 480 mld water was supplying in to the distribution system. NMC could bill only 245 mld of water and final recovery of payment from consumer was counted for 200 mld. The business efficiency for water is only 32%. It resulted in to big financial loss to NMC, unsatisfied consumers as water was not available to all consumers in the city and engineers were not getting the budget enough to maintained the system.



2.1.3] Rehabilitation Phases :-

Water loss control Program was divided in two phases

a] Water Efficiency Improvement Projects Phase-1 :-

Reduction of water loss (Technical and Commercial) as was approved under JNNURM for ACA.

- i] Raw water losses in canal
- ii] Losses at Pench-1 and Kanhan WTP
- iii] Transmission up to ESR
- iv] Leak detection study for preparation of realistic plan for rehabilitation of distribution system
- v] 24x7 Pilot project : for water loss control program in distribution system and implement 24x7 water supply through private participation and to prepare strategy for full city for implementation of 24x7.
- vi] The energy audit : Program for rehabilitation of Old inefficient pumps and treatment plant, reduction in system head and water distribution monitoring system

Water audit Phase-1 was approved for ACA under JNNURM and completed many component and balance projects are under execution as given below

JNNURM PHASE-1 Water efficiency Projects	Cost In Rs crore	Completion	Outcome
Pench-4 Part-1	210.00	Feb'2011	Replacement of Canal by 2300 mm pipe Additional Raw water of 115 mld from reduction in water losses in canal Reduced raw water cost
Leak Detection	3.30	Dec'2008	Flow Meters from source to ESR Reduction in BW –UFW to 2% from 23% Completed the leak detection in 100 test zone
Water Audit	25.00	June'2009	24x7 for 15000 connection by Sep'09 Replacement of 20000 consumer meter Reduction in UFW < 25% in pilot area

Energy Audit	28.00	Dec'2008	Replacement of All Pumps installed prior to Year 2000 with minimum efficiency of 70% Reduction in system head by 12m for Pench-1 Centralized monitoring system Infrastructure for equitable dist. Rehabilitation of Pench-1 WTP for reduction in water losses and energy consumption
Kanhan Up gradation	87.65	Dec'2010	New Plant of 240 mld and discarding the old plant of 120 mld with Pumps Reduction in water losses Reduced energy consumption/mld

b] Water Efficiency Project Phase-2 :-

Reduction of water losses in distribution system through observation and lesson learnt from leak detection and Phase-1 pilot for full city. The results are shown in next section.

2.2] Phase Two : Pilot 24X7 Project and DMA's for Leak Detection :-

NMC has undertaken following projects to prepare the strategy for global water loss reduction program

- Pilot project for 24x7 water supply to 15000 connection
- Test zone (DMA) for leak detection
- Maintenance and repairs record for reported leaks.

2.2.1] Pilot Project for 24x7 Water Supply :-

Nagpur Municipal Corporation has undertaken the pilot 24x7 water supply for a zone as approved under Water Audit Project which was approved under JNNURM.

a] Objectives :-

Objectives of implementation of Un-interrupted Water Supply in a pilot zone are :

- Provide consumers with un-interrupted water supply at desired pressure.
- Reduction of an Un-account for Water (UFW) to within 15% by reducing leakages and unmeasured supply.
- 100% metering with good quality meters having long life spans.

- Improved billing mechanism (Reading, bills generation & distribution) to reduce time & cost per bill including spot billing.
- Better services to Urban poor by implementation of slum policy.
- Attending consumer complaint within short time.
- Improved satisfaction for stake holders.
- Implement good engineering practices to upgrade existing network.
- Bring accountability on design, implementation, and O&M with single agency through performance based contract and Bench Marking of Services.
- Implement the lessons learnt from pilot zone to other parts of city.

Operator is expected to provide world class Engineering practices in water distribution business, Management techniques & tools i.e. software system, to NMC.

On successful completion of assignment in pilot zone, NMC may extend the contract for other part of city with mutually agreed conditions and deviations from original contract duly approved by NMC authority.

b] Scope of Work :-

The scope of work given below is the minimum output expected from the operator; however operator may suggest the methodology and work plan to achieve the desired results.

Operator to set up the complete engineering office (Computers, AutoCAD facilities with plotting and scanning with leak detection equipments, pipe locator, conference room facilities) at Nagpur.

Operator is expected to engage minimum one expert of International repute on the job to the benefit of the project.

Operator to follow the specifications given in the Technical Specifications sheet as minimum requirement for specific items or services. The deviation from given technical specification shall be only with better specifications & operator shall take approval from Executive Engineer.

Operator to arrange a minimum of seven meetings with stake holders (citizens & representatives) on behalf of NMC during the project and minimum of two meeting during Phase 1. Operator shall prepare a film of approximate 10 minutes duration for each phase of the contract. Operator shall arrange minimum one public program per year on water conservation & awareness either by arranging exhibition or school competition, publication of news article, brochures & hoardings.

Total work is to be divided in to three Phases.

Phase-1 MAJOR TASK

- a] Establishment of Baselines.
- b] Preparation of Rehabilitation Plan.
- c] Procurement of Customer meters and starting of replacement of consumer meter and service connections.
- d] Approval to Rehabilitation Plan.

Phase-2 MAJOR TASK

- a] Implementation of Rehabilitation Plan.
- b] Take over of O & M.
- c] Take over of customer service management.

Phase-3 MAJOR TASK

Operations & Maintenance for Five Years. (performance based contract)

b-1] Phase-1 Tasks :- (1 to 9 months) :-

Task-a] Baselines :-

- installation of bulk water meter on inlet and outlet (approximate 8): volume of production (distribution input)
- calculation of current volume billed: volume of distribution and amount billed
- number of current consumers: location of consumers
- review of historical data available with the Corporation and weakness of the network
- review of customer complaints data from the Corporation and status of the customer satisfaction
- review of existing functioning of the area with valves and updating of map
- current pressure to verify the functioning of the network (model)
- current water quality (inlet and dead ends) and current status of distribution

Task-b] Preparation of Rehabilitation Plan :-

- updating of the network map: AutoCAD map of the network on available base map
- conditions assessment of the network
- identification of illegal connections in the zone.
- leakage detection and estimation of volume lost or weakness of pipes
- hydraulic analysis for year 2031 and pipes replacement for year 2021

- hydraulic analysis shall be done through WaterCAD by Heasted Methods or software compatible with WaterCAD.
- definition of rehabilitation works to be performed in Phase 2 including but not limited to
- replacement of pipes
 - parallel pipes to be eliminated
 - replacement of operating valves
 - the installation of flow meters and pressure monitoring points
 - chlorination facilities
 - replacement of pipeline above 500 mm shall be carried out by NMC through separate tender however operator has to prepare the rehabilitation plan for all the sizes.
- replacement of service connections
 - survey of consumers
 - assessment of number of service connection to be replaced
 - assessment of number of consumer meters to be installed
- slum policy implementation
 - designing slums areas networks
 - assessment of service connections to be installed
 - installation of bulk flow meter
- monitoring points to be established in the demonstration zone
 - 10 pressure monitoring points
 - bulk water flow meters (numbers to be determined by the study)
 - 10 water quality control points to be determined according to the network flow analysis
 - design one remote monitoring terminal for monitoring flows in & out of the zone in the NMC office with monitoring of pressure & flow in addition to operators office
- Operator shall estimate the economical level of water loss control program in the project area. Each investment plan proposed by operator shall be supported by pay-back calculations.
- For the action plan exceeding the BOQ quantities, with pay-back period of more than 7 years, NMC has the prerogative to tender the works separately or to include it into the rehabilitation plan. The cost of service connection replacements, consumer meters, operating valve replacements shall not be considered for pay back calculations. The responsibility of service connection replacement, consumer meters and valve replacement remain in the scope of work of the Operator.

Task-b.1] Submission of Rehabilitation Plan :- (within 6 months)

- Operator shall submit the draft rehabilitation plan within six months from the effective date. In the event the operator fails to submit draft rehabilitation plan within 6 months from effective date, NMC may at its sole discretion agree to provide additional time to the operator to complete rehabilitation plan, or may immediately terminate the contract. On termination payment due for submission of rehabilitation plan shall not in any case, shall be admissible. The additional period granted for submission of rehabilitation plan shall not have effect on completion period of Phase-2 ending on 24th months from effective date.

Task-c] Procurement of Consumer Meter and Starting of Replacement of Consumer Meter and Service Connections :-

- replacement of consumer meters & service connections shall be carried out immediately after establishment of baselines without waiting for approval of rehabilitation plan.
- procurement as per BOQ quantities and Technical specifications.
- starting of replacement of consumer service connections and meters as per the first result of customer survey (identified location) for:
- the calculation of UFW balance in selected sub-zones as per baseline study requirement
 - the ascertain of general condition of the service connections in selected sub-zones

Task-d] Approval of Rehabilitation Plan :-

The report will be given to Municipal Corporation within 6 months.

Within 15 days after submission, the discussion will take place between the NMC and the Operator to finalise the rehabilitation plan and the costing. NMC may retain, increase or decrease the number of connections and / or area proposed under Pilot zone based on estimated cost of rehabilitation as per the fund availability or may alternatively divide the work into Phases.

- If an agreement is reached within two weeks after submission of the report, the Operator will revise accordingly the rehabilitation plan.
- If an agreement cannot be reached within two months after submission of final plan, the contract ends. Operator will be paid for technical services without bonus.

Task-d.1] Approval of Rehabilitation Plan :-

- Within one month from the date on which NMC receives rehabilitation plan from the operator. NMC shall review and in consultation with PMC approve or suggest revision to the draft rehabilitation plan. Operator shall provide assistance to understand the rehabilitation plan.

In case NMC fails to suggest revision to the rehabilitation plan NMC shall loose its right to modify the rehabilitation plan and the plan shall be deemed to be approved.

NMC may retain, increase or decrease number of connections and / or area proposed under pilot zone based on the estimated cost of rehabilitation as per fund availability.

Within 15 days after receipt of draft rehabilitation plan with modification & suggestion from NMC, the operator shall discuss and finalize the draft rehabilitation plan and submit the final rehabilitation plan.

In case operator fails to submit the final rehabilitation plan within the 15 days period NMC may at its sole description agree to provide additional time to the operator for submission of final rehabilitation plan but such additional granted period shall not have effect on the completion period of Phase-2 ending on 24th months from the effective date.

The sum of the extra period granted by NMC in submission of draft rehabilitation plan and/or final rehabilitation plan shall be added to the completion period of (9 months from the effective date) Phase-1 activity for granting approved to the rehabilitation plan, but shall not have effect on the completion period of Phase-2 on 24th months from effect date.

In case operator has submitted the draft rehabilitation plan to NMC within specified period and NMC fails to provide revision/suggestion or approved to the rehabilitation plan with ending period of Phase-1 (in 9th months from effective date) then the rehabilitation plan shall be deemed to be approved and the period taken by NMC after 9th month for granting actual approved shall be added as extra period for completion of Phase-2 activity i.e. extra above 24th months.

If operator fails to complete the activities mentioned in Phase-2 with 24 months or the period ending with the extra period as admissible in clause-5.1d then NMC may at its sole description grant additional period for completion of activities in Phase-2 but no escalation shall be admissible.

b-2] Phase-2 Tasks :- (10 to 24 months) :-

Operator to arrange minimum one meeting with NMC officials at every fortnight during rehabilitation period.

Quantity given in the Bills of Quantity is approximate and given for rate fixation, the final quantity shall be as per approved rehabilitation plan by NMC. The extra item if any required shall be paid as per the condition of contract in the works.

Task-a] Implementation of Rehabilitation Plan by Operator :-

- Implementation of rehabilitation plan.
 - rehabilitation & installation of pipes
 - installation of valves and other equipment
 - replacement & installation of 100 % consumer meters

- rehabilitation of Service connections
- slum policy implementation
- establishment of chlorination points
- establishment of monitoring points for quantity & quality
- establishment of one remote monitoring terminal for measuring flows in & out of the zone in the NMC office with monitoring of pressure & flow in addition to operators office

Task-b] Taking over Operation from Day 1 of 9th Months :-

- overlapping of NMC personnel with Operator personnel up to a period of 6 months.
- day to day operation such as valves operations, leaks repairs, assistance to customer complaints etc...

Task-c] Customer Service Management :-

- Operator shall establish customer care centre within the zone. The location shall be within 3 km. reach from last consumer. The customer care centre shall prominently display information to the consumer. The contact details shall be printed on bill.
- Taking over customer services.
 - development and installation of Efficient customer billing and collection (month 9 to 15).
 - Overlapping of NMC and Operator billing systems up to a period of 2 billing cycles.
 - Establishment of customer care centre for water supply at Customer Facility Centre (CFC of NMC).
- Metering of 100% of service connections.
- Bill preparation and distribution on behalf of NMC (after 2 billing cycles test and approval by NMC).

b-3] Phase-3 Tasks :- (25 to 84 months) :-

Operator to arrange minimum one meeting with NMC officials each month during O&M period.

For any dispute with customer during the O&M Phase 3, the decision of Municipal Commissioner shall be final.

Task-a] Operation & Maintenance (performance based contract) :-

- Day to day O&M of the system.
- Management, Operations & Maintenance of complete water supply system in the zone.
- Remote Monitoring of out flow and in flow of the zone
- Monitoring of 10 pressure control points
- Monitoring of 10 water quality points (content of chlorine)

- Quarterly volumetric billing for domestic customers
- Monthly volumetric billing for bulk water customer and major consumers
- Payment collection and statistics
- Transfer of payment to the Corporation
- Attending customer complaints within 48 hrs
- Quarterly performance report in prescribed format.
- Quarterly water audit report as per AWWA/ IWA guidelines (loss report).
- New connections & disconnections.
- Detection of illegal connection.

Operator shall install a meter for all the free connection provided by NMC & shall produce the bill & submit it to NMC water works department.

Water meters shall be installed at inlet of each slum area & one bill shall be produced for each slum area for the quantity and rate as given by NMC and submit the bill to NMC.

Operator shall deposit the amount collected from consumer within 24 hrs. in the account of NMC. Operator shall not collect the cash on public holiday or holiday declared by NMC. The receipt format and serial number issued to consumer shall be given by NMC. The receipt record as per serial number shall be submitted to NMC every day. The failure of submission of record or cash receipt will liable for penalty of 1% per day of total amount of cash receipt of this particular day, or Rs. 1000 per day whichever is more.

Logging of customer complaint receipts shall be kept at central location with one soft copy to zone office of NMC by email. Weekly report of complaint receipt & attended shall be given to zonal office & monthly report shall be submitted to head quarter. No bill of the operator shall be paid without submission of customer complaint status report. The digital photograph of each customer complaint & it's solution shall be submitted before & after solution provided to customer on behalf of operator (in case of works required).

Operator shall provide the new connection within 72 hrs. after receipt of approval letter from NMC.

The responsibility of non measurement of water consumption due to non-working of consumer meter shall be with operator. The operator is expected to keep spare consumer meters ready.

Any tampering in the customer meter shall be immediately reported to NMC and water supply shall be disconnected after informing to zonal office. The digital photograph shall be kept in record.

Repairs & maintenance cost of existing network during the O&M period (Not covered in rehabilitation plan) shall be carried out by operator with base rate given in rehabilitation plan.

After completion of O&M period, the operator shall handover all the equipments, instruments, billing system, software with source code etc. to NMC.

The system performance level shall be as per average of previous three years at the time of hand over.

b-4] Training Program :-

Operator shall arrange minimum 2 training programs per year to be benefit of it's employee and NMC staff on good Engineering practices & developments in water supply and O&M.

Operator to arrange the 15 days training of 2 NMC officials on the working system of urban water supply of city managed by operator with minimum 1.0 million population of un-interrupted water supply successfully for minimum 3 years.

The training of NMC officials shall be arrange before submission of rehabilitation plan.

c] Performances :-

The technical services of Phase 3 and 10% of the amount of technical services of Phase 1 and 2 shall be paid in equal quarterly instalments for Operations & Maintenance period with bonus & Penalty as calculated below.

Bonus / Penalties Formula :-

Bonus will be calculated in percentage of total technical services divided by the number of quarter included in the O&M period (20 quarters), as follow:

(Phase 1 + Phase 2 + Phase 3) / (5 years x 4 quarters)

costs only and on each quarterly billing, starting at Phase 3 (1st day of 25th month).

General Performance to be Maintained :

- UFW level to be maintained within 30%
- Quantity of revenue water to be increased (from baseline parameter)
- Pressure to be maintained as per requirement in each 10 measurement points
- Water quality to be maintained as per requirement in each 10 measurement points
- Consumer complaints to be attended and solved in due time

c-1] UFW :-

Ratio calculation for UFW performance : sum of monthly and quarterly customer billing quantum in m³ / inlet flow in m³

flow:

Less than 50%	50% to 55%	55% to 60%	60% to 70%	70% to 75%	75% to 80%	80% to 85%
-20%	-10%	-5%	0%	0 to 5% (1% per 1%)	5% to 12.5% (1.5% per 1%)	12.5% to 22.5% (2% per 1%)

c-2] Revenue Water Increase :-

Ratio calculation of revenue water : current sum of monthly and quarterly billing / baseline billing before project:

> 1	1 to 1.1	1.1 to 1.2	> 1.2
0%	2%	5%	10%

All bonus are calculated according to the quarterly technical services bills presented by the Operator before any contractual or taxes retention.

- Pressure to be maintained as per requirement in each 10 measurement points
- Water quality to be maintained as per requirement in each 10 measurement points
- Consumer complaints to be attended and solved in due time

c-3] Pressure :-

Pressure will be recorded in 10 measurement points. Penalty will be calculated as : pressure lower than 2m of water for a continuous period of 24 hours : each unscheduled occurrence -1%.

c-4] Quality of Water :-

Quality will be recorded in 10 measurement points. Penalty will be calculated as : chlorine inferior of 2 ppm measurement for the current quarter and with one measurement per day per point.

less than 10 measurements	10 to 30 measurements	30 to 50 measurements	> 50 measurements
0%	-2%	-5%	-10%

c-5] Customer Care :-

Customer complaints will be properly recorded at Operator office. Penalty will be calculated as : complaint not solved within 3 workings days in all the area during the current quarter.

less than 10 complaints unsolved	10 to 30 complaints unsolved	30 to 50 complaints unsolved	> 50 complaints unsolved
0%	-2%	-5%	-10%

All penalties and bonus are calculated on the quarterly technical services bills presented by the Operator before any contractual or taxes retention.

d] Baselines Report Summary :-

This executive summary presents the main findings and results of the Baselines Report is attached as annexure-10 for the project "Implementation of Uninterrupted Water Supply and Reduction of UFW with Improvements of Services to the Customers of Dharampeth Zone."

The purpose of this baselines report is to:

- 1] Outline the existing situation of the water supply system in the demonstration area before the rehabilitation of the system and the improvements to be brought by the operator during the Operation and Maintenance phase.
- 2] Provide justifications for the rehabilitation and investment plans
- 3] Provide baseline Key Performance Indicators.

The baselines report is composed of three different volumes:

- Volume 1 – Main Report
- Volume 2 – Appendices Report
- Volume 3 – Maps Report

The main results of the baselines report are provided hereafter:

Functioning and O&M of the system (Section Error! Reference source not found.) :

The existing water distribution network is organised into 8 zones of distribution and 31 hydraulic sub-zones controlled by various operating valves. All these zones can be more or less isolated from the rest of the demonstration area using existing valves.

The distribution of water in the zone is currently very unequal with zones receiving less than two hours supply a day whilst others already receiving

water under 24/7 basis. The review of the current maintenance practises has shown that they can be drastically improved.

Volume Distributed (Section Error! Reference source not found.) :

The demonstration area is currently supplied through 7 different sources of water and includes 15 inlets and 2 outlets with diameters ranging from 80 to 600 mm.

All these entry/exit points have been equipped with flow meters (except 2 inlets of 80 mm which are however negligible compared to the total volume distributed in the zone). 5 boundary valves have also been installed and closed to limit the number of inlets to the zone.

Out of 17 sites, 5 sites have been equipped by NMC with dual path insertion type ultrasonic flow meters. On the other 10 sites, mechanical flow meters with strainers have been installed to monitor the flow.

Readings have been taken during a period of 19 days between 19th January and 06th February 2008. It was found that the average flow amounted to 43 MLD. However, this figure must be confirmed over a longer period of time in order to take into account the seasonal variation and eliminate the uncertainties related to the readings of the ultrasonic flow meters.

In order to strengthen the reliability of the assessment of the volume distributed, an upgrade of the ultrasonic flow meters with adequate logging system and battery back-up will have to be implemented at the earliest.

Identification and location of customers (Section Error! Reference source not found.) :

A full scale customer survey was conducted in order to locate physically each of the customers of the demonstration area, improve the reliability and completeness of NMC database and identify the unregistered connections.

The main results of the survey and analysis of existing NMC database are as follows:

- 93% of customers are residential customers. 7% are commercial and institutional customers. 93% of connections have a 15 mm size.
- During Financial Year 2006-07, 31% of the bills were on volumetric basis, 16% on minimum basis and 52% on average basis.
- 13 684 active connections and 258 inactive connections have been located in the demonstration area during the survey
- 1663 unregistered connections have been identified with 77% in the slums and 23% outside the slums.
- The estimated total connections to take into account for the rehabilitation plan amounts to 15 275 (4 439 in the slums and 10 836 outside the slums).

Volume & Amount Billed (Section Error! Reference source not found.) :

The volume and amount billed by NMC were assessed for the Financial Year 2006-07. It was found that :

- The baseline volume billed amounts to 7 902 226 m³, ie 21 650 m³/day on average.
- 69% of the volume billed is assessed and not measured (64% of the volume billed is based on average and 5% on minimum basis)
- The bulk customers (2% of total connections) represent 38% of the volume billed whilst individual 41% and semi-bulk 21%.
- The amount billed (including the water charge and meter rent) amounts to Rs 59,3 million for FY 2006-07. This gives an average price of water is around 7,69 Rs/ m³.
- The level of Non Revenue Water is estimated at 50% and will have to be confirmed over time when the assessment of the volume distributed will be more reliable. This figure shall be however used for the cost benefit analysis of the investment plan.

Current pressure (Section Error! Reference source not found.) :

The average pressure in the system is 4 meters with a maximum of around 18 meters in the areas close the sources of water.

Customer complaints (Section Error! Reference source not found.):

There is no complaint tracking system within NMC. It is estimated that the actual number of complaints in FY 2006-07 is much higher than the report number (135). There is no record of how or when the complaint was resolved and how long it took.

Water Quality (Section Error! Reference source not found.) :

63% of the samples (out of 314) analysed over a two week period had a level of residual chlorine higher than 0,2 ppm which is the minimum level set in the contract for the KPI "water quality".

Network assets & weaknesses (Section Error! Reference source not found.) :

The table below summarises the key network assets of the demonstration area:

Main assets	Total	Comments
Reservoirs	2 in Ramnagar	ESR: 910 m ³ GSR: 2,270 m ³
Pumping Station	1 (7.5 HP capacity)	In poor condition. To be abandoned.
Pipes	180 km in total: Trunk mains (15 km) Distribution Network (165 km)	81% of water supply system in Cast Iron. The rest of the system is in Galvanised Iron and Mild Steel. 7.7 km of "conservancy lines" to be abandoned 50% of the pipes 50 to 60 years old and 80% of the network older than 30 years
Valves	155	Includes 54 operating valves in poor condition

NMC records show that 3 248 network interventions have made in the last 3 years. 43% of them were on House Service Connections (HSC) & 18% for leak repair on pipes.

The existing assets present many weaknesses and are considered to be in poor condition. Most of the HSC and GI pipes are corroded and are subject to high level of leakages and a significant part of the network has exceeded its useful life time.

The level of Unaccounted-For-Water is judged to be high on the basis of the NRW value. However, it can not be estimated accurately at this stage due to the low number of customers equipped with a working meter.

Conclusion :

The table below summarises the baselines KPI and provides a comparison with the target KPI.

KPI	Baseline KPI	Target KPI
UFW level	The NRW is assessed at 50% (refer section Error! Reference source not found.)	UFW below 30% for bonus
Increase of volume billed compared to FY 2007-08	Volume billed for FY 2006-07 = 21,7 MLD on average. This value shall be used for the cost-benefit analysis of the rehabilitation plan. The baseline KPI for the assessment of bonus/penalties during O&M will be based on FY 2007-08 data.	Higher than baselines by 10% for bonus
Continuity of supply	2 to 24 hours depending on the area of supply	24/7 throughout the zone with minimum 2m pressure at customer tap
Water Quality	63% of samples tested had a residual chlorine level higher than 0,2 ppm	Residual chlorine higher than 0,2 ppm
Time for handling customer complaints	Not applicable	Within 3 days

Table 1: Baseline KPI

Investigations carried out during the audit phase have enabled to gather valuable information regarding the existing situation of the system and highlight the main issues and weaknesses of the existing distribution system to be tackled, namely:

- Inequitable water distribution
- Low level of pressure
- Significant number of interventions on the network per year and leakages
- High level of NRW

Recommendations to improve the existing situation in terms of infrastructure and level of service shall be proposed in the rehabilitation and investment plan.

e] **Rehabilitation and Investment Plan : Summary :-**

This executive summary presents the main findings and results of the rehabilitation and investment plan for the project "Implementation of Uninterrupted Water Supply and Reduction of UFW with Improvements of Services to the Customers of Dharampeth Zone."

This rehabilitation report is composed of three different volumes:

- Volume 1 – Main Report
- Volume 2 – Appendices
- Volume 3 – Maps

The main report includes mainly:

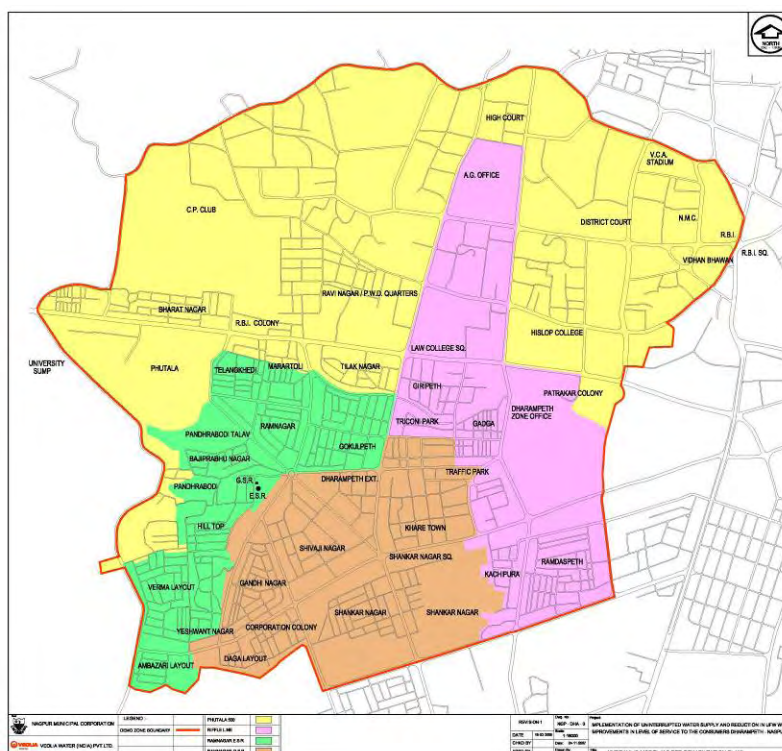
- The comparison between the general organisation of the water supply system proposed by the master plan and the proposed solution of VW India to implement continuous and equitable water distribution
- The assessment of the water demand at three horizons: 2011, 2021 & 2031
- The assumptions of the mathematic model with the results for the four main hydraulic zones which have been defined: Ramnagar ESR & GSR, Riffle and Phutala zones.
- The overall cost estimate of the rehabilitation plan with the breakdown between the network and the House Service Connection, as well as between slum and non slum.
- A cost-benefit analysis demonstrating the financial viability of the investment plan.

The main results of the rehabilitation plan are provided hereafter:

General organisation of the restructured water Distribution System :

After studying in detail the existing distribution network of the demonstration area and the solution retained in the master plan, it is proposed the following general hydraulic solution for the restructured system to be operated under 24/7 :

- To have one single point of supply to the project area from Seminary Hills MBR instead of having several sources of water. This will reduce significantly the number of inlets and outlets of the whole system from 17 to 4.
- To use two intermediate storage tanks at Ramnagar linked to the MBR via a feeder main. To use two existing major Primary mains namely Phutala line & Rifle line supplied from MBR
- To supply water to the zone under gravity only from the four incoming pipes connected to Seminary Hills MBR
 - Phutala line
 - Riffle line
 - Ramnagar ESR
 - Ramnagar GSR
- To create four zones of distribution based on the four incoming pipes instead of having eight distribution zones as today.

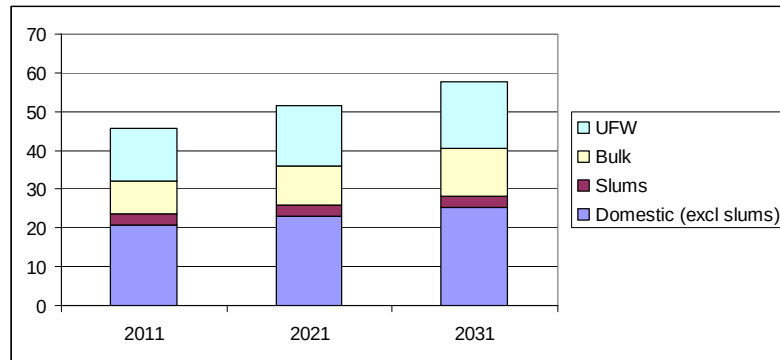


- To isolate the demo zone network from the rest of NMC distribution network by closing all boundary sites and restructuring the network wherever necessary.
- To interconnect pipes together to form loops in the distribution network to balance pressure and avoid dead ends wherever possible. Interconnect loops together to have minimum 2 inlet points per loop.
- To restructure the system to create 88 hydraulic sub-zones which can be fully isolated from the rest of the system installing distribution valves.
- To supply water to the low level area of the zone through Ramnagar GSR instead of Ramnagar ESR. The high level area should be supplied through Ramnagar ESR.
- To reduce the number of points of supply to the slum areas and install a flow meter to all inlets/outlets in order to record the amount of water distributed.
- To abandon all conservancy lines and pipes below 80 mm.
- To replace old and defective CI pipes with new DI/ HDPE pipes in areas other than slums.

Water Demand :

The water demand assessment is based on the assumptions described in section **Error! Reference source not found.**. The water demand in 2011 approximates 46MLD whilst it reaches 58MLD in 2031 showing an increase of 26% over 20 years in the demonstration area.

The evolution of the water demand by type between 2011 and 2031 is shown below:



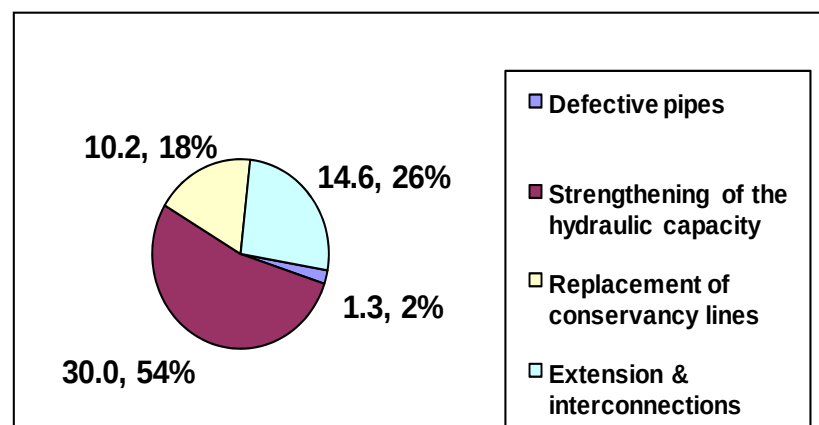
Hydraulic Modelling :

The main assumptions for the hydraulic modelling are provided in the section **Error! Reference source not found.** and include continuous supply 24/7, 30% UFW, 12 meter pressure at each node and a peak factor equal to 3 for the domestic water demand.

Due to the number of nodes in system and the limitation of the Watercad software, 4 hydraulic models have been developed for the demonstration area . These hydraulic models show that:

- The total length of the restructured system is around 174 km, which is more or less the length of the existing system (180 km)
- It is proposed to lay 56 km of pipes with a diameter above 100 mm which represents 31% of the existing network length.
- It is proposed to lay around 51km of distribution network (diameters between 75 & 250) and 5km of primary and transmission mains (diameters from 300 & above).
- 9.4 kms. of pipes above 100mm must be replaced in the slums (17% of the total pipes to be replaced).

The reasons for proposing the laying of the 56km of pipes can be summarised as follows:



Investment Plan :

The main assumptions of the investment plan include:

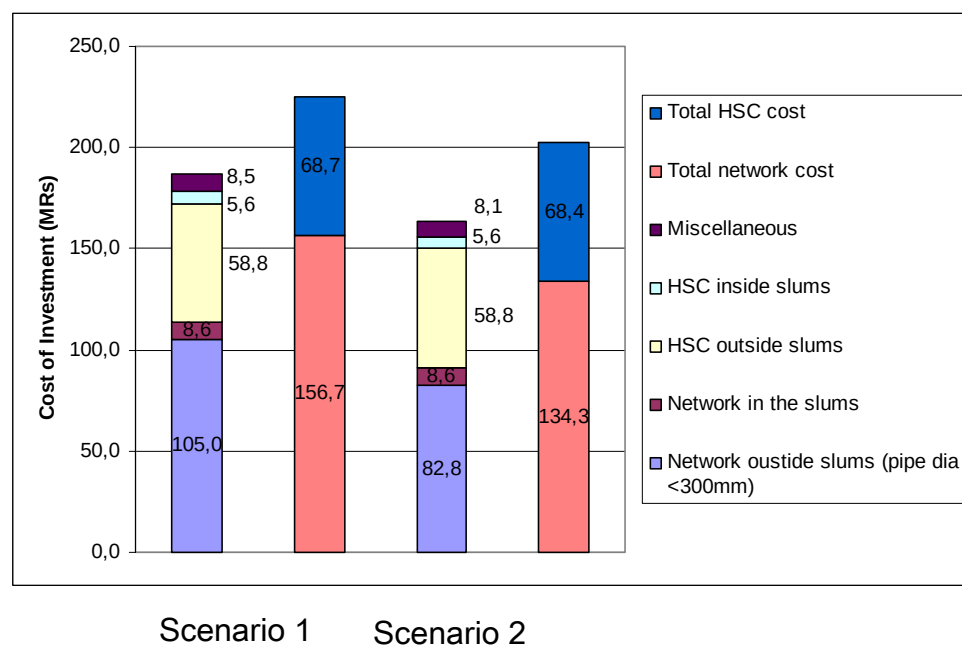
- 100% metering and replacement of House Service Connections
- Use of saddles with strap/ electro-fusion saddles instead of ferrule connections
- 56km of pipes to be replaced either with HDPE or DI pipes
- Unit Costs are based on the approved BoQ when item is included in the BoQ

Two options have been studied and compared in the investment plan :

- Scenario 1: the use of metallic pipes (CI/DI) for all new pipes to be laid outside the slums
- Scenario 2: the use of HDPE pipes for 100 & 150mm diameters wherever adequate outside the slums.

In the first scenario, the global investment plan amounted to 22,5 crores whilst in scenario 2 it was estimated at 20,3 crores, which means that 2,2 crores savings can be made choosing HDPE pipes for the rehabilitation of the network outside the slums excluding roads having width exceeding 12m.

Scenario 2 is our recommended option both for technical and financial reasons. The breakdown of costs for both scenarios is as shown below:



The calculations of the investments required per category gives the following results:

Category	Total HSC	Investment costs (MRs)	%	Investment cost/ HSC (Rs)
Slums	4 920	18,2	9%	3 703
Outside Slums	11 092	184,5	91%	16 636
Total	16 012	202,75	100%	12 662

The cost-benefit analysis has shown that the proposed investment is financially viable since the pay-back period is around 5,5 years on the basis of 18MLD of water saved at the official NMC rate of 5,54 Rs/m³ (FY 2006-07).

The implementation of the rehabilitation plan was started in April 2008 and to last 15 months. The various activities of the rehabilitation plan (HSC replacement, metering, pipes replacement, implementation of the billing application...) shall be carried out in parallel in order to optimise time. The implementation of 24x7 will be done in progressive mode for each hydraulic sub zone as and when rehabilitation completes.

24 x 7 Water supply started in Ramnagar



Municipal Commissioner Aseem Gupta interacting with water consumers while Corporator Parinay Fuke and Baba Maind look on. (Pic by Anil Futane)

The people residing in Bajiprabhu Nagar were happy because they are getting water for 24 hours from Nagpur Municipal Corporation (NMC) under its uninterrupted water supply scheme. The pilot project was launched in this area. Around 170 house holds are getting water round the clock.

Municipal Commissioner Aseem Gupta, on Sunday, interacted with consumers and discussed about the scheme. He got positive feed back from the consumers, the stake holders appreciated the scheme and stated that this had reduced their electric consumption. Earlier, they have to store water in sump and then lift it on third or fourth floor. After this scheme was implemented they are getting water with full force on third as well as fourth floor of the apartment. The residents are too happy that even they offered civic body to work as ambassador for the scheme.

Aseem Gupta while interacting with the people, stated that consumers will have to more cautious regarding uses of tap
(Contd on page 2)

FROM THE FRONT PAGE

24 x 7 Water supply started in...

water because if they use more water then they will get bill according to their consumption. He said that the water rates will be decided by the civic body while water supply will be managed by Viola Water Private Limited India. Corporator Parinay Fuke while appreciating the efforts of the civic body stated that water will not be monopoly of one company. NMC should take care of it. Corporator Baba Maind was also present in the function. Earlier, Bajiprabhu Nagar Nagrik Mandal office bearers felicitated Municipal Commissioner Aseem Gupta, Prakash Urade and Shashikant Hastak, Executive Engineers, Philips Telay, Viola Water Private Limited, Manager Rahul Lohbare, Rahul Kulkarni and consultant Dinesh Rathi were present on occasion.

2.2.2] Leak Detection :-

After water audit leak detection program with investment plan was presented to JNNURM and project of **Rs 339** lakhs was sanctioned for ACA.

The major components are

- a] Leak Detection in Bulk Water : Installation of 54 bulk meter at Raw water pumping station, Treated water pumping station, all outlets of master balancing reservoir and inlet of all Elevated service reservoir (ESR)
- b] Leak Detection in Distribution System : Creation of 100 District Meter Areas (DMA) for leak detections in all distribution and administrative zones of city including slums.

Installation of consumer meter to all authorized and unauthorized connections within selected DMA for unreported losses (Technical + Commercial).

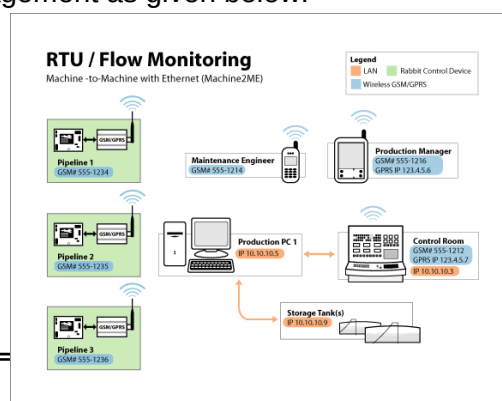
2.2.3] Leak Detection in Bulk Water :-

There was no measurement was carried out from Raw water to ESR. The non measurement of bulk water has forced NMC staff to make assumption and manage the water supply system like

- Payment for raw water was calculated based on rated capacity and working hours of pumps and were paying for 625 mld (220 mm³/year) to Water resource department while water treatment capacity was only 470 mld.
- The blame for not providing sufficient water at ESR's was always given to Pumping station, where as pumping station staff claims the normal pumping.
- Administration always asks for running extra pump but without desired result and hence, excess energy consumption.
- Unequal distribution of water between various ESR's against actual water demand.
- Assuming the higher water losses in transmission, the difference between assumptions of persons in charge for Pumping and ESR's.

NMC awarded the contract to Endress and Hausser (E&H) for multi path insertion type ultrasonic flow meters for design, supply, installation and O & M for 6 years. The work of about 50 flow meters was completed. The result benefitted the NMC financially and for water distribution management as given below.

- Saving in Raw water cost by Rs. 20 million/year as payment made as per measurement
- Better water distribution management system as online



flow data available for each area at HQ

- Better co-ordination and less dispute amongst the pumping and distribution team.
- Myth of higher transmission losses on pumping main was broken.
- Better accountability on water intake, distribution and billing for each water distribution zone.

As the UFW rate for treated Water is very high. The details of zone wise treated water UFW is as under.

Sr. No.	ZONE	QTY. SUPPLIED	QTY. BILLED		NET UFW (MLD)	
		IN MLD	IN MLD	BILLING %	MLD	% **
1	I DHARAMPETH	78.55	48.29	61.47	30.27	12.17
2	II LAXMI NAGAR	54.05	33.80	62.53	20.25	8.15
3	III HANUMAN NAGAR	27.91	11.08	39.69	16.83	6.77
4	IV DHANTOLI	36.16	19.21	53.13	16.95	6.82
5	V NEHARU NAGAR	27.22	16.99	62.44	10.22	4.11
6	VI SOKTA BHAWAN	61.03	25.74	42.18	35.29	14.19
7	VII SATRANJIPURA	91.98	22.14	24.07	69.84	28.09
8	VIII LAKHADGANJ	16.04	9.55	59.56	6.49	2.61
9	IX ASHI NAGAR	23.14	15.31	66.15	7.83	3.15
10	X MANGALWARI	44.26	39.27	88.72	4.99	2.01
11	PUMPING/FEEDER MAIN Dist.	29.65			29.65	11.93
TOTAL POP. FOR 10 ZONES		490.00	241.38	52.43	248.62	100.00
TOTAL UFW %						50.74

2.2.4] Leak Detection in Distribution System :-

The table above shows that UFW for treated water in distribution system is much higher. The distribution system downstream of ESR and up to consumer meter is more complex and difficult to detect the water losses from more than 2100 km of distribution network and appx 2500 km of service connection compare to less than 100 km of feeder mains and trunk mains in bulk water network. Therefore the water loss control program for network upstream of ESR taken up in phase-1 and leak detection in distribution program as per following methods have been taken up for preparation of rehabilitation of global intervention program.

Unaccounted For Water (UFW) :-

UFW is the difference between net production (the vol. of water delivered into the network) and consumption of water (vol. of water accounted). It includes Technical Losses or Real losses due to leakages and Commercial losses or Apparent Losses because of faulty meters, illegal connections etc.

a] Real Losses :-

The quantity of real losses in a given water systems is a good indicator of how efficient a water supplier is in managing its assets (the distribution network) and the product it delivers to its customers. Volumes of real losses that are significantly higher than what is economically justifiable indicate that action needs to be taken if the water supplier is to be viewed as water-efficient, customer-responsive, and a responsible steward of water resources.

Real losses are made up of three components.

Reported breaks and leaks : They typically have high flow rates, are visibly evident and disruptive, and have a short run time before they are reported to the NMC by customers or NMC personnel since they cause nuisance to the customer (pressure drop or supply interruption).

Unreported breaks and leaks : They are typically hidden from above-ground view, have moderate flow rates, and a long run time since NMC must seek out these leaks to become aware of them. They are difficult to locate through active leak detection.

Background Leakage : These are the weeps and seeps in pipe joints and connections. They run continuously until they gradually worsen to the point they affect the quality and quantity of water supply to consumers. The complaint of polluted water or absence of residual chlorine is one of the indicators that background seeps are increased and it converts in to a points of ingress during non supply hours in intermittent water supply.

a.1] Reported breaks and Leaks :-

Analysis of reported leaks, customer complaints and maintenance record of NMC is an effective tool for identify the most appropriate causes for water losses.

NMC has the strategy for repairs and maintenance which provide the insight in to the cause for leaks on area, size, material etc and it will be useful to prepare focused approach for global intervention to reduce water losses.

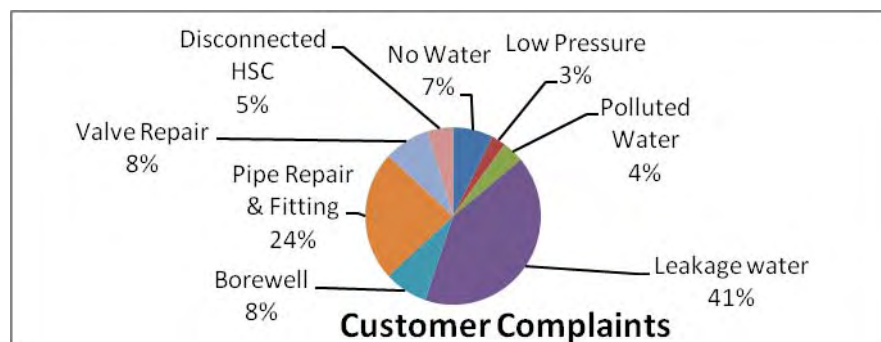
Present strategy for Maintenance and Repairs of Network

NMC has a adapted a strategy for pipe repairs and leak repair since 2003. As per strategy NMC has prepare the comprehensive list of works to be carried out to repair the pipe, fitting, valves or leaks. The items include excavation, labour, material and restoration etc. NMC had invited the tenders for fixing the rate for repair works to be carried out for each zone separately. About 15 contractors has shown interest in the work. The panel

of 2 to 5 contractors was given to each distribution zone. The power to provide repair work up to Rs 10000 given to Dy. Engineer of respective zone and for higher amount approval of Executive engineer of Water works Dept. is required. The Dy. Engineer may engage any contractor from panel for the work. NMC provide financial budget of Rs 1.5 million to each of the ten distribution zone for M&R.

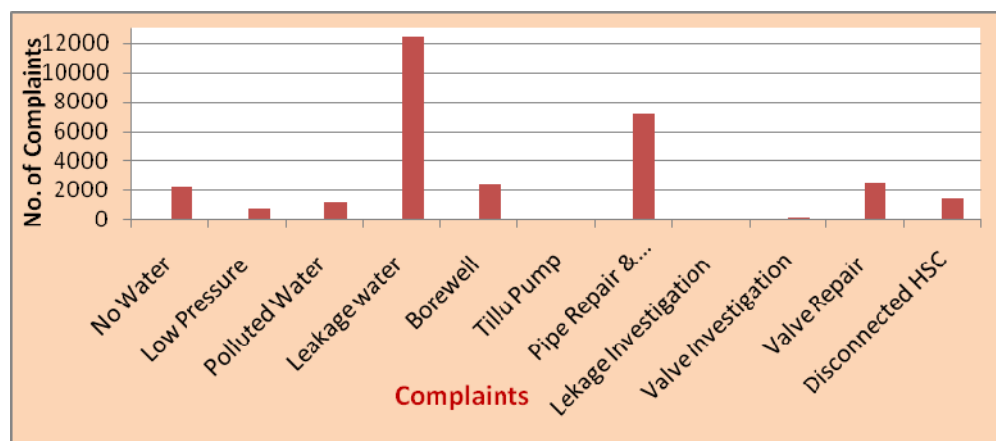
Information of Leaks

Existing mode of reporting the leaks are by Public complaint, NMC personnel, Contractor, Corporator though phone or written and some times news article of news paper



Recording of Complaints

The complaint register with receiver is available during office hours at Zonal office to record all the complaint received at zone office though phone, in person or written. The complaint register record the Date, Complaint number, Name and address of complainer, location of leak, type of leakage and complaint, closing date i.e. rectification of complaint.



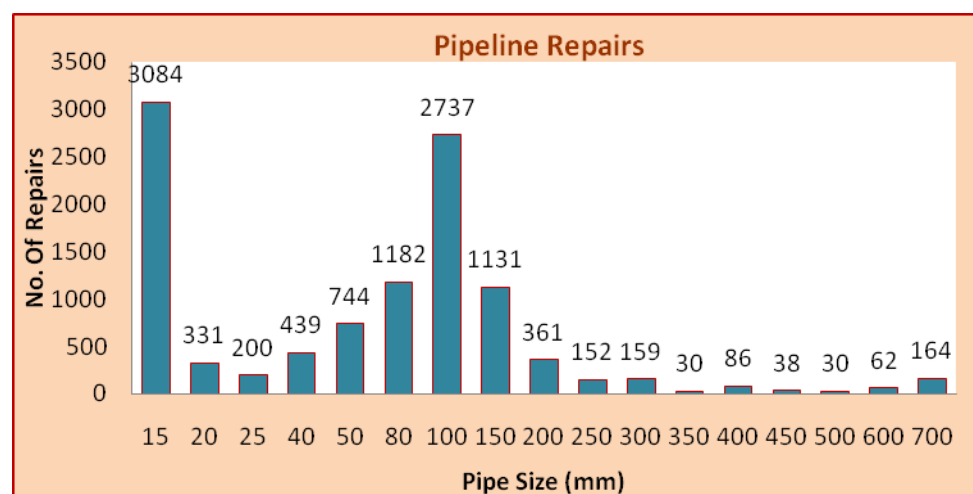
The above graph shows that out of 30000 customer complaint studied from all the ten zones, about 12000 complaints was for leaks i.e. 41% and about 7000 for pipes and fittings i.e. 24%. The other major complaints are low pressure or non receipt of water.

Action for Repairs

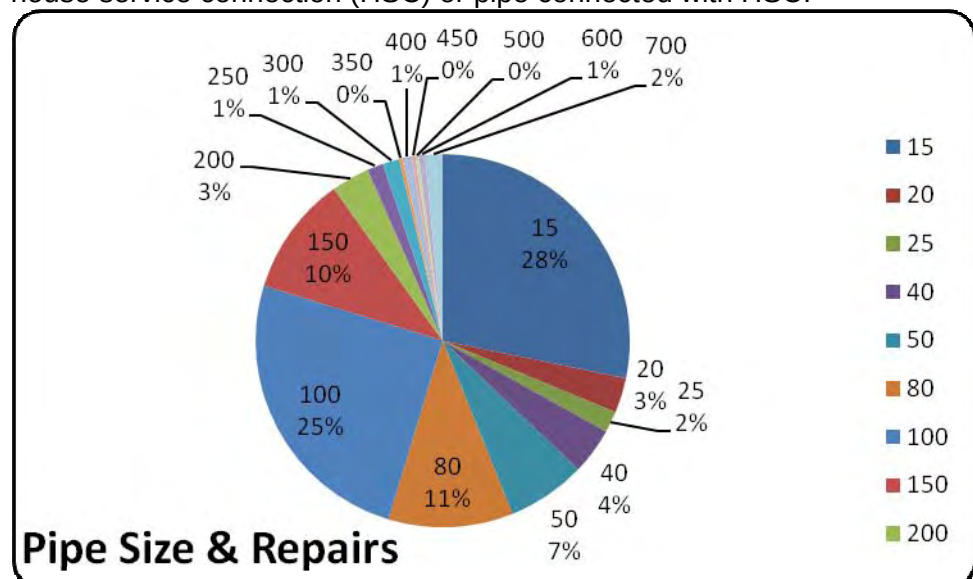
Complaint reported to concern Junior engineer and engineer fill up the maintenance slip in standard printed format with estimated expenditure and if estimated expenditure is less than Rs. 10000, one copy of slip given to any one contractor from panel and this also treated as work order to the contractor. Estimated expenditure above Rs.10000 approved by executive engineer. The actual repair work done by contractor recorded in measurement book for preparation of bill and payment.

Analysis of intervention for maintenance

Since all maintenance work is being done by operator and recorded in the measurement book, Hence measurement book data have been taken to analyze the interventions on network.



The more than 10000 network intervention have been checked and found that maximum intervention taken place on house service connection of 15 mm size and pipe size of 80,100 and 150 mm i.e. tertiary network from where the consumer connection provided. It concluded that more than 90% of reported leaks and complaint which need interventions are related to house service connection (HSC) or pipe connected with HSC.



The above graph suggest that 15mm to 150 mm pipe responsible for 92% of reported leaks. This analysis suggest that actual leaks are much higher in smaller sizes. The reporting of leaks done when there is a cut in water supply or pressure has dropped or complaint of polluted water reported to NMC. Background leak continuously running and resulting in to water loss. Hence the test zone flow measurement study done on tertiary distribution network under leak detection plan have been done and explained at following sections

a.2] Commercial Losses :-

Commercial losses as defined are measurement error, illegal use and errors in reading and billing.

Analysis of NMC initial customer database

The latest updated data in this database was dated on 31st March 2008.

The customer's data have to be analysed according to:

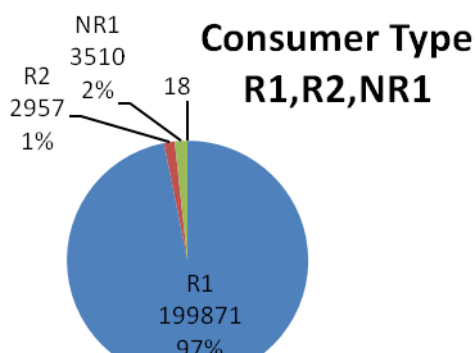
- The type of customers
- The location of customers
- The connection size and percentage of working meters
- The type of billing

As per the database provided by NMC, the total number of connections, each of them being characterised by a unique Customer Index Number (CIN), amounted to 206356 on 31st March 2008.

The section below presents the results of the analysis of NMC initial customer database as on 31st March 2008.

a.2.1]Type of Customers :-

As per NMC database, customers are classified into three categories:



- R1 : “Residential customers and the consumers in the non-residential buildings and structures i.e Gathai Kamgar, Cycle Repairing shops, General Stores, Kirana shops, Tailoring shops, Telephone Booths, Flour Mills, Medical Shops, Daily Needs, Furniture Shops, Fabrication, Vegetable Shops, True Copy Centres, Consulting Chambers, Laundries, Timber Marts, excluding colonies” these consumers are 97% of total registered consumers.
- R2 : Institutional customers : “Hospital attached with Educational Institutions, Sports Organisations, Colonies attached to Institutions, Air Force Maintenance Command, Military Engineering Services, Government Railways, Railway Electrification, Swimming pools, Public Sector Undertaking Colonies and Hostels and Hospitals without bed facility. These consumers are total 2957 only.
- NR1 : Commercial customers : “Wine Shops, Vanaspati Factories, Beauty Parlours, Brevardages, Pharmaceutical Works, Beer Bars, Country Liquor Shops, Cinema Houses, Theatres, Ice Factories, Cold Storage Plants, Photo studios, Aerated Water Plants, Bank buildings, Petrol Pumps, Automobile Service Centres, Food and Fruit Process Units, Air Conditioning plants, milk scheme, dairies. All Kind of factories, building constructions and beeded Hospitals. These consumers are 3510 in data base.

As per the bye-law, specific tariff applies to each of these categories as shown in **section**.

NMC has also defined three categories for operational purpose according to their estimated consumptions:

- The individual customers (mostly domestic) which are invoiced every quarter.
- The semi-bulk customers (both residential and non residential) invoiced monthly or bi-monthly
- The bulk customers, which could be both Domestic, Commercial and Institutional customers, billed every month also.

From the analysis of the database, it seems however that the billing frequencies are not always consistent throughout the year and high billing activity occurs during the 3 months preceding the end of the financial year.

It must be noted that bulk customers for the whole city are managed by a dedicated central department within NMC whilst individual and semi-bulk customers are managed by respective zonal office

The breakdown of customers by category's on 31st March'2008 was as follows:

Customer Category	No. Of Consumer	% of Consumer	Total Unit Billed in m3	Total Unit Billed in %	Total Bill Amount in Rs	% of Total Bill Amount
Bulk	1629	0.79	40635670	43.21	247549105	46.83
Regular + Semi bulk	157733	76.44	39736165	42.25	204118971	38.61
Illegal	31489	15.26	7932722.38	8.43	29549439	5.59
PWR	15505	7.51	5746982.09	6.11	47431950	8.97
Total	206356	100.00	94051539.47	100.00	528649465.00	100.00

From discussions with NMC, it appears that the actual number of NR1 customers is much higher than 3510 since many commercial customers are registered in the Residential category (R1) to reduce the cost of their water bill. However the total billing for 1639 bulk consumer i.e. less than 1% of total consumer make up for 46.21% of billed unit. Where as in Nagpur very few township exist within the city and most of the population resides on individual residential buildings. The 99.2% of consumers billed only 53% of billed volume. Total billed units are less than 50% of total supply of over 500mld.

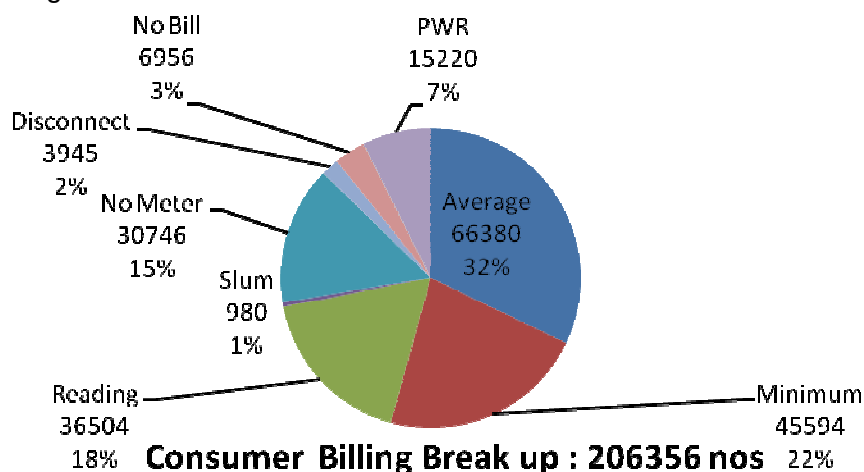
a.2.2] Connection Size :-

The analysis of NMC database at 31/03/2008 in terms of connection size and percentage of working meters provided the following results:

Connection Size (mm)	15	20	25	40	50	80	100	150	200	250	Total
No. of Connection	201892	2496	1239	309	252	62	53	35	15	3	206356
%	97.84	1.21	0.60	0.15	0.12	0.03	0.03	0.02	0.01	0.00	100.00

a.2.3] Type of Billing :-

NMC customer services department distinguishes four main types of billing:



- **Regular (REG)** – These customers are billed on volumetric basis on monthly or quarterly basis depending on their category. The consumption billed is the difference between the previous reading and the current reading. Only 18% of customers are provided as per working meters (??). This is a major cause, why NMC could not increase billed volume in spite of increase in water supply.
- **Average (AVG)** – A flat rate is billed to customers without working meters. In practice, the average amount is decided by the meter reader depending on the area to be billed, whereas the bye-law states that average amount should be equal to the highest amount of last six months in monthly billing or the last two quarters for quarterly billing. But in practice it uses as per meter reader's decision.
- **Minimum (MIN)** – A minimum amount is charged to the consumers with a consumption less than the minimum volume charged as per the bye-law (For example, for R1 customers, the minimum monthly charge is equal to Rs 50/- which corresponds to 15.71 m³ say 16 m³) or if the meter is working but the house is locked during a significant period of time. In practice even non working meter also charged with minimum billing.
- **Slum** – Authorised non metered connections in slums are charged on flat rate basis: 25 Rs / month as per bye-law for houses without slabs and 50 Rs / month for houses with concrete slabs.

NMC has also defined two categories for inactive connections and illegal connections:

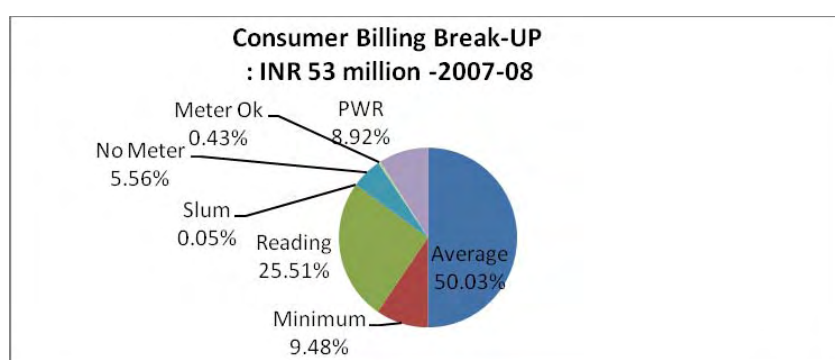
- **No Billing (NB)**
 - There is no billing in mainly two cases: for temporarily disconnected customers or if there is no resident for a significant period of time.
 - Reasons for temporarily disconnections includes mainly: arrears, leakages, road widening.
 - If a customer falls in NB category for a period of time, no bill is issued but when the customer request to be reconnected again, he has to pay not only the arrears, but also the minimum charges for the corresponding period. Bills are frozen, but not the billing amount.
- **Disconnected (DISS)** – Theoretically, a customer can become permanently disconnected only by applying to NMC. In some cases, it might happen that a customer with arrears is disconnected temporarily and classified as DISS instead of NB.
- **Illegal (IL)** – A customer found connected to the network without prior sanction to the corporation or any approval is

termed as illegal and hence charged. But in practice many of these bills are not distributed due to non availability of accurate address in data base.

Since the type of billing per customer may vary significantly throughout the year, it does not appear relevant to present over here statistics about the breakdown of connections according to the type of billing.

For example, the proportion of bulk customer billed on average basis was 49% in April 2006 whilst it was equal to 95% in March 2007.

However, statistics have been made on the percentage of type of billing over FY 2006-07.



a.3] Test Zone Study for Unreported Breaks and Leak Background Losses and Commercial Losses :-

The quantification of leaks and commercial losses is important to value the losses and its techno-economical feasible solution. The accurate break up of each commercial and technical losses are difficult as

- 1] The existing condition of customer meters where most of it are not working.
- 2] Difficulty in identification of illegal tapping or connection in the distribution network and
- 3] Limited application of acoustic equipment in low pressure distribution system where average pressure is 2 m at consumer Tap.

DMA or test zone flow measurement as explained in following section is adapted to identify the component of losses and more important the cause for more than 50% of UFW and prepare the rehabilitation plan.

The objective of DMA study is to quantify the Unaccounted for Water (UFW) in distribution system, downstream of ESR and identify the causes for Real (Technical) and Apparent (Commercial) losses.

The cost implications of real and apparent losses require that a careful assessment of each be undertaken to design the most appropriate and cost-effective water loss control program.

a.3.1]Methodology :-

The investigation of real losses is carried by using following methods.

Audible leak detection using accoustic equipment

Audible leak detection uses electronic listening equipments to detect the sounds of leakage. The pressurized water creates audible sound waves that can be sensed and amplified by electronic accoustic equipments. The sound waves are evaluated to determine exact location of leak with the help of advance correlator. But all these equipments are having limited application in typical Indian condition for following reasons

- Low water pressure in distribution system
- Other utilities are laid one over another like electric cables, telephone cables, sewer lines etc.
- Absence of accurate data and map of distribution network.
- Pipes are laid on middle of carriage way of road with full of traffic.

Zone Flow Measurement :-

Zone flow measurement is carried by isolating the section of the water system and water flow is allowed through a single pipe or multiple pipe fitted with bulk flow meter.

Actual flow rates are measured during normal course of operation and during test time when all connection are connected with EEC certified meters. The difference of flow quantum during the test time of minimum one week indicate the physical loss due to leaks and loss due to un identified illegal connections

Identification of leaks using audible leak detection is more useful for real losses due to underground leaks where water supply pressure is more than 25 meter. To estimate the apparent loss and major leakage, zone flow measurement is used. Therefore the methodology to study the UFW in distribution system is as follows:

Pre Test Activities :-

Selection of Test Zone :-

The test zone to be studied for UFW is selected with the help of zonal staff which includes the zonal office, Engineers and field staff.

Test Zone Selection Criteria :-

In each ESR command zone, test zone shall include following areas.

- Housing Category :-
 - 1) HIG

- 2) MIG
- 3) LIG
- 4) Slum zone with existing distribution system combination of Housing Category may also be selected.

■ No. of Consumer Connections :-

Along the length of the test zone, no. of service connections are restricted to minimum 50 to maximum 200 houses.

■ Availability of Isolation Valves :-

It is required to isolate the test zone from the distribution network. The lines with existing isolation valves avoids installation of valves.

■ Availability of Present Status of Test Zone :-

- Billing Status.
- Consumer Data.
- Existing Water Meter Details.



Pipe and Valve Survey :-

Pipe & Valve survey is required to identify and verify the alignment of mains, service connections, location of valves in distribution system, fixing of flow measurement and pressure recording points. If existing isolation valves are not available the location for isolation valves is decided during survey.

Consumer Survey :-

House to house survey is conducted in the test zone. The information regarding no. of connections, type of housing category, water meter details, condition of meters and stop tap details are collected during survey and compare with record of NMC for respective consumer index number.

Measurement of Input Flow :-

Checking of existing flow by installation of bulk flow meter and also using Ultrasonic Flow Meter in test zone during normal working hours. Also the flow rate in test zone will measured at consumer connection through EEC class-B meter installed for study purpose.

Checking of Isolation Valves :-

The existing valves were checked whether working or not. The valves were also checked for the no. of threads in normal operating conditions, so that it can be restored to its normal condition of during and after the test.

Leak Detection :-

Flow during test days is measured using flow meters and pressure are recorded on pre decided location. Test generally lasts for about 10 to 30 days depending on the size and zone selected and the success of this method involves effective co-ordination as multiple activities are required during test.

Working in smaller zones with about 50 to 60 house service connections helps to pay attention to each houses, communication is better and also the normal supply In selected ESR command area is not disrupted.

During the test if the flow recorded is high then additional investigation were conducted like.

- 01] Audible Leak Detection.
- 02] Multiple Pressure Recordings.
- 03] Visual Leak Detections.

During the test the leak points located by the team are marked to leak repair teams to carryout leak repairs. Zones with major leaks detected, the flow and pressure measurements are rechecked to calculate the benefits of repairs.

On completion of study the connection for pressure measurements are plugged.

Equipment Used :-

- a] Bulk Flow Meters.
- b] Consumer Meters.
- c] Pressure Gauges.

- d] Pipe Locators.
- e] Sounding Rods.
- f] Tanker and Pump unit (if required).

The detailed breakup of activities along with the respective responsibilities to be shared is given in following table.

Also the team composition of consultant and NMC office staff and time schedule is given for reference.

Calculation of Physical or Real Losses

The difference between water supplied to test zone (as recorded by sum of flow recorded by flow meters installed at inlet and out let points) and sum of water flow recorded by consumer meters with in the zone.

Calculation of Commercial Losses

The difference between the average bill to consumer per day (as per existing billing type for specific unit i.e. average billing, minimum billing, reading, illegal connection etc) and actual water consumption recorded per day by EEC meters installed for study period.

List of Test Zone in each administrative zone with consumer number is given below

Sr. No.	Zone Name	Test Zone Name	Total Consumer (No.)
1	Dharampeth	Ambazari (HIG)	63
2		Bajiprabhu Nagar (HIG/MIG)	79
3		Gajanan Nagar (MIG)	52
4		Kachipura(Slum)	46
5		Manohar Vihar (MIG)	131
6		Seva Nagar (Slum)	63
7		Trust Layout (Slum)	125
Total			559
8	Laxminagar	Adhyapak Layout	95
9		Bhamptee Village	61
10		Dhangarpura	36
11		Guddhe Layout	41
12		Milind Nagar	38
13		Nagbhoomi Layout	38
14		Nelco Society	40
15		Panchdeep Nagar	50
16		Prasad Nagar	74
17		Savitri Vihar	178
18		Takli Seem	57
19		Vijay Nagar	59
Total			767
20	Dhantoli	Ganesh Peth	48
21		Kurnel Bagh	34
22		PTS Colony	245
23		Rajabaksh	86
24		Rambagh Slum	29
25		Somwari Quarters	60
26		Vakil Peth (LIG)	59
			Total
27	Hanuman Nagar	Kukade Layout	40
28		Chandramani Nagar	35
29		Banerjee Layout	92
30		Bhimnagar	55
31		Vinkar Colony	196
32		Shivraj Nagar	77
33		Shiv Shakti Nagar	31
Total			526

34	Nehru Nagar	Ayodhya Nagar	28
35		Raghuji Nagar	63
36		Rajiv Gandhi Nagar	82
37		Sai Nagar	48
38		Dighori Village	226
39		Shri Krishna Nagar	124
40		Survey Nagar	82
Total			653
41	Lakkadganj	Gangabagh Paradi	181
42		Janki Nagar	63
43		Shikshak Colony	32
44		HB Town	29
45		Prajapati Nagar	93
46		Jalaram Nagar	23
47		Vinoba Bhave Nagar	125
48		Trimurti nagar	78
49		Bhandewadi	91
Total			715
50	Ashi Nagar	Devi Nagar	49
51		Siddharth Nagar	17
Total			66
52	Satranjipura	Kashmiri Gali	30
53		Tulsi Nagar	264
Total			294
Grand Total			4141

Total 4141 consumer were surveyed in 53 test zones for water loss study. The findings of report are summarized as follows

Consumer Survey : The 69% consumer were identified in the record of NMC and 17% detected as illegal connection and about 13% No bill connection are consumption in 'disconnected connection' as per record or untraceable at NMC record and were not receiving the bill even though consumer was in possession of connection papers of NMC or free connection given by NMC.

Total No. of Conn. (Studied)	Consumers Test Zone		
	Legal Conn.	No Bill Conn.	ILLegal Conn.
4141	2866	536	708
100%	69%	13%	17%

Water Consumption : The flow was recorded at all the connection mentioned above including illegal connection the average flow m3/day is observed at legal consumer was 72% and 13% was identified illegal consumption.

Flow (m3/Day)			
Legal Consumption	No Bill Consumption	ILLegal Conn.	Total Supply at Consumer End (m3/day)
1777	367	308	2451
72%	15%	13%	100%

Revenue Water : It is a difference between Total water supply in the test zones and total bill raised to consumers. The result from 53 test zone spread across the city shows that 46% of revenue water to NMC against 54% of non revenue water it includes authorized consumption without bill and un authorized consumption. It is confirming the water audit report for over 50% of non revenue water. This study has excluded the institutional and Bulk consumers and hence shows the little higher NRW in tertiary network.

Total Suply (m3/day) Bulk Meter	Recorded NMC Billing m3/Day
3794	1753
100%	46%

Non Revenue Water : Commercial Losses + Technical (Real) Losses

The total commercial losses are due to metering or estimating error, illegal consumption and no bill or free consumption is 36% of total supply. It is a difference between consumption recorded for all connection including legal, illegal, free consumption and actual billed quantity as per NMC record. Where as Technical losses is the difference of total water supply to the zone as recorded by bulk meters to total water consumption recorded by

consumer meters. This technical losses included the un identified illegal consumption within the test zone. The technical losses were recorded 18% of total supply. Hence, Total non revenue water calculated as 54%

Commercial Losses	Losses in Network Upto Consumer End (Physical Losses +un identified Illegal Conn.)	Total Losses
1373	674	2053
36%	18%	54%

Metering Error : The metering error is the difference between the average consumption recorded by working consumer meter as per billing record and average consumption recorded by new meter installed by NMC for study purpose. Only 1333 consumers out of 4141 consumers in test zones were issued the water bills as per meter readings. These consumers were installed the new EEC meters and observed the difference with actual billed unit. The average under billing was 18% . Where as the study suggest that difference was between -10% to + 54% for individual zone .

Summary of Metering Error For All Test Zones

Sr. No.	Zones	No. of Meters	Actual Study Working Flow Meters m ³ /Day	Recorded NMC Billing m ³ /Day	Difference	Percentage (%)
1	Dharampeth	191	151.01	92.58	58.43	38.69%
2	Laxminagar	431	345.66	276.11	69.54	20.12%
3	Dhantoli	103	90.20	81.06	9.14	10.13%
4	Hanuman Nagar	184	84.59	93.58	-8.99	-10.63%
5	Nehru Nagar	238	110.86	119.50	-8.64	-7.79%
6	Lakkadganj Zone	179	89.53	69.08	20.44	22.83%
7	Ashi Nagar	7	4.38	1.99	2.39	54.61%
8	Satranjipura (100% on avarage)	0	0.00	0.00	0.00	0.00%
Total		1333.00	876.22	733.90	142.32	18.28%

The water supply percapita to zones like Dharampeth and Laxminagar are better relatively higher compare to other zones and found to be under billing and added to NRW.

The zones like Nehru-nagar and Hanuman-nagar are relatively much less lpcd supply are being over billed. The negligible number of consumer's bill at Ashinagar and Satranjipura were observed with meter reading. There is more dissatisfaction amongst the consumers in these areas and very poor recovery of water charges from consumers.

2.3] Phase Three : Rehabilitation Plan :-

Rehabilitation Plan is an Investment Plan prepared with following objective

- Asset rehabilitation to reduce the Real Losses
- Infrastructure improvement to reduce commercial losses.

The rehabilitation plan is outcome of Phase One : Water Audit as described in section 2.1 and Phase Two of Pilot for 24x7 and DMA,s for leak detection as described in section 2.2, for global intervention to reduce water losses.

This rehabilitation plan does not include the expansion and up gradation of network to meet demand as per master plan. The ongoing projects described in Sec1.4 are being implemented and this includes hydraulic strengthening of distribution system.

The major Real losses reported from tertiary network as follows

- Pipe network of 150mm and below or the pipes directly connected with house service connection are responsible for 92% of reported leaks and bursts.
- House service connections are made up of GI pipe which corrodes within 20 years if laid above ground and corrodes within 5-10 years when laid under ground.
- Conservancy lane were the practice adapted by municipal services and water pipe line was provided from conservancy lane. Over the time there is no relevance of conservancy lane and conservancy passage were encroached by plot owner and constructed the buildings or garage. It become impossible to maintain the pipe line with construction above. The most of the conservancy lane pipe was GI and already over lived its life and need replacement
- GI pipes are subject to corrosion and have limited life when buried in to ground. Most of the service connection in Nagpur are of GI pipe and a major cause for water loss as per leak report 30% of total complaint
- PVC Pipes were laid by NIT in its layout are in very poor condition and become brittle. NMC has banned the use of PVC pipe in distribution since last 7-10 years. The old PVC pipe needs replacement
- Slum area with poor connectivity and low quality material and more number of holes on distribution pipe with illegal connection has made this pipe perforated for water loss and ingress point for pollutant.



House Service Connection

House service connection are number uno reason for water loss as per all three investigation methods adapted by NMC i.e. Pilot for 24x7 water supply, reported leaks and burst as per NMC record and DMA's leak detection study.

Existing Procedure for HSC

Whenever the consumer need a water connection, he has to contact the licensed plumber and licensed plumber to act as agent of consumer to NMC. The application need to submit at Zonal office along with documents related to property[DR1]. After submission of application the concern fitter shall scrutiny for feasibility of connection and need to verified by Junior Engineer and subsequently approval by appropriate authority. Dy. Engineer is authority to approve 15 mm residential connection and Executive Engineer is authority for approval of all other connection.

The approved specification for consumer meter is as follows

15mm consumer meter : Class A, BIS Once approval of connection by authority, consumer to procure the water flow meter, pay inspection fees, meter testing fees to NMC and if flow meter to supplied by NMC then meter deposit to be paid to NMC. For many years NMC has stopped procuring the meter and consumer (plumber) purchases the meter. Connection approved after consumer pay the water consumption deposit as per bylaws of NMC.

>15 mm: Class B, ISO

Once connection is approved plumber procure the pipe for service connection, ferrule as per available in the market and there is no material specifications set by NMC. The meter is tested with Master meter of NMC, if procured by plumber.

Plumber completes the work from consumer meter to NMC pipe. Junior engineer to inspect the work and date of connection will be decided by JE after approval from Dy Engineer.

Plumber is making ferrule connection on pipe in presence of fitter and work is completed.

Disadvantage of procedure

The material quality for service pipe and fittings are not specified and plumber/customer procures the cheap quality material and meter.

The inspection procedure is too cumbersome for customer and NMC engineers and in practice plumber complete the connection and then complete the procedure on paper and some times if any problem related to document arise, consumer remains unregistered with NMC and consumption added to NRW.

Material of service connection pipe : The GI pipe used for service connection of class –B instead of class –C as it is a cheaper pipe with less wall thickness; consumer is not aware and has no obligation as per NMC bylaws.

Ferrule : Ferrule is a connector between NMC pipe and house service pipe of customer. Ferrule is made up of gun metal and having good corrosion resistance

property. The fixing of ferrule need good workman ship. It is observed that plumber make oversize hole on NMC pipe with the help of chisel and hammer, damage the pipe and fix the ferrule with the help of jute-fiber a degradable material and once jute is degraded the leak starts from the joint.

Consumer Meter : The accuracy of flow meter is only checked before fitting to the consumer connection. The 15 mm consumer flow meters are available from Rs 300 to Rs.1700 to consumer depending on make, quality, protection level(IP55, IP67 or IP68 etc) and NMC has no role to select the instrument which is responsible for its revenue and financial health. The plumber obviously select meters which provide the maximum profit to him and quality becomes secondary. The market survey has found that quality meters like Elster, Actaris, Zenner etc. were not available at retail market as no buyer in the market and market is flooded with low cost meter. The average life of these meters is less than six months to work near accuracy. The intermittent water supply resulted in to water hammer and meter with low protection level get damaged and totalize unit filled up with water and stopped working. The low quality plastic, glass also makes meter not readable.

The DMA's study shows that many flow meters are located at backyard of house or in locked area and difficult for meter readers to reach to meter.

Hence HSC become source of water and revenue loss and ingress for pollutant. There are over two hundred thousand registered connections and about additional 20% unregistered connections in city needs complete renewal.

The rehabilitation plan the replacement of house service connection suggested as follows

HSC Rehabilitation Plan :-

Strategy

The strategy used to prepare the rehabilitation plan for the House Service Connections are as follows:

Outside the slums

- 100% of the connections outside the slums should be equipped with a brand new meter, which means that existing working meters as per record will be also replaced.
- The number of connections to be equipped with a meter is based on the results of the customer survey.
- 100% of the active House Service Connections shall be replaced with MDPE pipes.
- The new meter should be installed near the property boundary. In these conditions, the average length of HDPE pipes from the service pipe to the meter has been taken at 10 m.
- The connection of the service main shall be made with the use of
- Saddle with strap on existing metallic pipes and new DI pipes

- Electro-fusion saddle on HDPE pipes
- Lockable ball valve from shall be installed upstream the meter of all customers of 15 & 20 mm size connections with a past record of defaulters.
- In case of conservancy lines, the new connections to customers shall be given from a new pipes line to be laid in the appropriate street. It might happen that the existing sump of the customer is located at the opposite side of the street near to the conservancy lines. In these conditions, it is still proposed to install the meter near the boundary of the plot. However, it will be proposed to the customer to lay the internal pipe downstream the meter upto the sump or suitable internal pipe of the customer. In case of any dispute with the customer, a 30 days notice shall be given to him to realise the works at his own cost and the meter shall still be installed at the boundary of the premises. 5km of MDPE pipes (20mm) has been allocated in the proposed investment plan to cover this scenario.
- It has been proposed to install meter boxes where they are required for security and protection purpose.

Inside the slums

- As per NMC policy:
- No individual meter shall be installed on the existing and future House Service Connections
- 100% of the houses should have a House Service Connection with a tap.
- The average length of HSC is 5m and the HSC pipe material should be MDPE.
- 100% of the public stand post should be removed
- 50% of HSC will be connected to the main pipe through a saddle (75mm, 100mm, 150mm size) and various dia compression fittings.
- 50% of HSC will be connected to a 32 mm pipe. This pipe will be connected to the main network through a saddle. No more than 10 connections will be laid on a single 32 mm line.

Saddle vs ferrule

- In order to reduce drastically the risk of leakage and make the house service connections more sustainable, it is proposed to use an innovative product on metallic pipes – the saddle with strap – to replace the use of the ferrule in the metallic pipes.



- The several advantages of this product proven throughout the world (Casablanca – Morocco, Bucarest – Romania, France...) and demonstrative area of 24x7 where the replacement of HSC has resulted in to the improvement in pressure. One can mention in particular:
- Easiness of installation
- A single product whatever the outer diameter and nature of the pipe (PE, CI, DI ...).
- Good quality of materials which guarantees a life time equal to those of the pipes.
- Reduced risk of leakage
- Easier store management due to reduced number of different strap diameters (upto 175mm or 350mm dia).
- In addition, the operator has the opinion that under 24x7 and pressurized supply, ferrule connections must be completely abandoned since there is a strong risk of leakage at the ferrule point due to the difficulties to install them properly on the pipe.
- The use of the saddle with strap was demonstrated by the representative of operator to NMC and Municipal Commissioner in December 2007.
- On PE pipes, it is proposed to use electro-fusion saddles which are 100% leak proof and less expensive than saddle with strap.

Rehabilitation of Network

Strategy

The strategy used to prepare the rehabilitation & investment plan for the network are as follows:

Outside the slums

- Abandon of all conservancy lines as per NMC policy and replacement by HDPE pipes. These pipes are old and impossible to reach for maintenance.
- Minimum diameter for new pipes: 100mm

- Two options have been considered for 100 & 150 mm pipes for price comparison: HDPE and DI material. It is proposed to put HDPE pipes wherever possible to optimise the overall cost of the investment plan. It must be however noted that DI pipes might be installed in location where this material is more suitable to site conditions.
- Contingencies for pipes:
- 3% for 100 & 150 mm pipes
- 2% for pipes with a diameter higher than 200 mm
- Trenchless pipe laying: 50m
- Valves:
- Air valves: 1 per 2,5 km of new pipes
- Distribution valves: As per the zoning of the system
- Upstream bulk meter: As per the total number of bulk meters
- CI road box only for distribution valves. No new chamber construction since the valves will be buried
- Repair of valves chambers: 100% of existing chambers
- Road restoration:
- WBM & Tar Road: 80% of total proposed pipe length
- IRDP Road: 1m/m of pipe
- Repair work: 3 network interventions/kilometre of retained pipe

Inside the slums

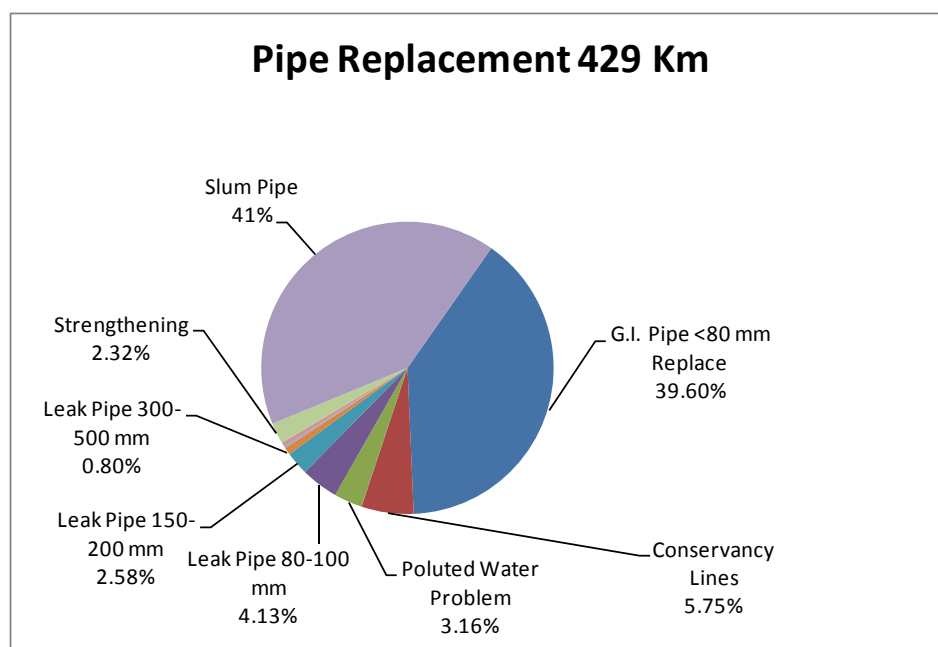
- All new pipes shall be in HDPE
- Installation of mechanical bulk meter with strainer and valve at the inlet and outlet (if any) of each slum.
- Contingencies for pipes :
- 110 & 160 mm: +3% on proposed quantity
- 75mm: +1.5km

Rehabilitation of network are mainly consist of following area

- Network renewal inside the slum area

- Replacement of GI, PVC pipes
- Replacement of conservancy lane
- Replacement of pipe with frequent complaint of polluted water
- Replacement of pipe with frequent complaint of leaks
- Rehabilitation or replacement for lead joint
- Interconnections for removal of discarded pipes from the network

Sr. No	Particulars	Length m	Length Km
1	G.I. Pipe <80 mm Replace	170107	170.1
2	Conservancy Lines	24711	24.7
3	Poluted Water Problem	13591	13.6
4	Leak Pipe 80-100 mm	17757	17.8
5	Leak Pipe 150-200 mm	11070	11.1
6	Leak Pipe 300-500 mm	3431	3.4
7	Leak Pipe >500 mm	910	0.9
8	Gorewada BPT Bypass	2065	2.1
9	Strengthening	9949	9.9
10	Slum Pipe Replacement	176000	176.0
	Total Length (Km)	429591	429.6



Water Supply to Urban Poor

There are about 430 identified slums are present within the NMC jurisdiction about 30% of population resides in these area and most of the slums within core city area i.e. inside the ring road are connected with network. Inside the slum area the network were laid in piece meal and mostly through ward fund of city fathers. The pipe size, material

and quality were based on budget allocated within the ward fund and not vice versa. The pipe inside the slums are either not adequate or of inferior material like GI pipe, PVC pipe or 80mm CI pipes at some places.

The density of illegal connection is very high inside the slums. The –nos of slums were covered under water leak detection test zone and it is observed that -----% of connections were illegal

There are about 6500 registered public stand post (PSP) and many more unregistered PSP are present in Nagpur and most of the PSP are in slums. NMC does not charge the water supply through PSP and all water supply added to NRW. Most of the PSP are without any Tap and once water demand is fulfilled the water flow in to the drain for hours and some of the slums water waste round the clock. Allotment of PSP is always a politically sensitive issue, the local corporator always demanding for additional PSP for the benefit of slum dwellers.

However the inadequate and faulty network with the slums are result in to uneven distribution of water and many slum dwellers are depending on tanker water supply which is provided by NMC at free of cost.

The inferior pipe, illegal connection and intermittent water supply make most of the slum venerable for water related decease

The inadequate network resulted in to irratic water supply resulted in to dissatisfaction for slum population and financial loss to both NMC and slum dwellers as productive man hours are lost in arranging the water.

NMC has formulated the policy of water supply to urban poor by providing the House Service connection at it's own cost and supply water to tap at each house and charge to slum dwellers at assured 70 lpcd of water supply against the charging the tariff of 35 to 80 as per the roof of slum i.e. house in slum area with roof other than concrete will be charged Rs 35/month, Roof without concrete (Hut) will be charged Rs 50/month and multi floor slum unit will be charged with Rs 80/month. The maximum subsidy is given to slum without roof (Hut) with assumption that hut doesn't have the facilities to consume water more than 55 lpcd as resident use the public toilet within the area and need much less water for other than personnel use.

Improvement to Physical Infrastructure : The proposed infrastructure improvements is to strengthening of network and replaces all pipes of GI and PVC pipe with PE pipes and remove all legal, illegal connections and Public Stand Post (PSP) and provide house service connection to each slum dwellers, provide the area meter at each inlet and outlet of slum to ensure 70 lpcd of water supply.

The proposed water supply policy of NMC has objective to pass the subsidy directly to urban poor and avoid the subsidy to section of society who consume much more water to pay at reduced tariff on the name of urban poor. The proposed policy has economic sense for city as the notional cost to slum dweller and direct cost to NMC is given in table below

No Water Supply to Slums (15 man day /month @ Rs. 50) loss of productive time 4 hrs / day	Rs. 750
Water Cost by tanker @ 25 lpcd + 7.5 man day/Month (loss of productive time 2 -3 Hrs / day)	Rs. 675
Water cost by Stand post to Slum @ 40 lpcd (loss of productive time 2 – 3 Hrs /day)	Rs. 342
Water Cost by individual connection @ 70 lpcd	Rs. 70
NMC Tariff / Slum dweller / Month in proposed slum policy	Rs. 35 – Rs 80 Rs. 1.20 to 2.70/day

When there is no water supply the notional cost is very high of Rs 750 per month as 50% of productive man month uses to arrange the water. The tanker water supply is cost to NMC at Rs 80 per 1000 ltr and when water supply through tankers, one of the family member to spend 2-3 hours in queue lose the productive time and often resulted in to quarrel with fellow slum dweller or tanker supplier. The annexure----- provide the list of slums with number of units, population and other details.

Sr.No	Rehabilitation Plan	Unit	Qty.	Amount Estimated Cost (In Crores.)
1	Inside Slum			
	i) Replacment of Pipeline inside Slum.	RMT	175933	44.09
	ii) House Sevice Connection (inside Slum)	No.s	124274	
2	Outside Slum			
	i) Replacment of Pipeline of different diameter.	RMT	253657	251.59
	ii) House Sevice Connection (Outside Slum)	No.s	206360	
3	Specials (Outside Slum & inside Slum)			15.88
4	Repairs of pipe & Specials			8.54
5	Electro magnetic Meter	No.s	100.00	7.64
6	Rehabilitation of ESRs	No.s	28.00	8.26
7	Rehabilitation of Pench II WTP	No.s	1.00	6.46
8	Replacment of Sluice Gates & Valves	No.s	28.00	3.59
9	Developing billing Software	No.s	1.00	2.00
10	Other Works			1.66
	Total			349.71
	Total BOQ (in RS) say			350.00
	Add @ 3% Contingencies			10.50
	Add @ 0.75% Project Prepration & Desgin Consultancy			2.63
	Add @ 3.5% Project Management Consultancy			12.25
	Grand Total RS.			375.38
	Say RS.			376.00

2.4] Environmental Compliance / Protection Measures / Improvement Measures :-

2.4.1] Environment & Social Impact Assessment Report (ESIAR) :-

An environmental and social impact assessment report is required for any infrastructure project to identify and assesses the environmental and social issues involved in the proposed project and ensures that they are taken care of adequately in the formulation and execution of the project and its day to-day operation. The ESIAR is also required to sensitise the would-be managers of the project to the various environmental and social issues attending the project.

2.4.2] Positive Impacts :-

Any Pipe water supply scheme will have overwhelming environmental benefits as briefly discussed below:

Waste water from Public stand post generally discharged into roadside drains or discharge directly in near by are creating stagnation of water. The filthy waters stagnate in the area giving rise to unsightly appearance; foul smell and breeding of culex mosquitoes (which are the vectors for filariasis), pollution of ground water, due to back-siphonage (which may lead to increased incidence of faecal-oral diseases such as diarrhoeas, enteric fevers and viral hepatitis). These environmental problems will largely get eliminated when proper pipe water system is provided in urban areas, which will be greatly beneficial to the community.

2.4.3] Potential adverse impacts and their mitigation :-

A pipe water supply scheme may pose some adverse environmental impacts during construction as also during O&M which require mitigation so as not to detract from the environmental benefits of the scheme.

The likely adverse impacts and the mitigatory measures that have to be incorporated in the project proposals are discussed below separately for the construction phase and for the O&M phase.

2.4.4] Adverse Impacts during Construction Period and their Mitigation :-

The adverse impacts anticipated are the same as for any major civil engineering project with the added disadvantage that pipe water supply project implementation will be interfacing with the public much more closely (and for longer duration). The likely adverse impacts and their mitigation requirements will be as follows:

- The trench work excavation for the pipe will may be deep and when the soil is loose the sides may cave in leading to damage to nearby structures. There is also a risk of workmen getting buried in the trenches during cave-ins. The project estimate should provide for shoring and strutting of the

sides of trenches when trench depths exceed 2.5 m except when the soil is rocky.

- There is a danger of accidental fall of pedestrians and vehicles into the trenches / pits. The project estimate should provide for barricading the trenches and pits to prevent such accidents. Also the specifications should provide for danger signals and danger lights. The workers are to use suitable safety appurtenances such as hard hats.
- The earth dug from trenches is generally deposited by the side of the trenches until it is used for refilling. In narrow streets this practice often leaves little space for pedestrian or vehicular movement causing lot of inconvenience to the public and even leading to accidents. As a mitigatory step when roads are narrow, the earth removed should be deposited away from the concerned roads at selected sites where there is adequate space and re-transported the earth back from there to the trench when required for refilling.
- Noise pollution may arise during the use of construction equipment. The special conditions of contract should require that the contractor restricts construction activity to daylight hours. Provision should be made for monitoring the noise levels if found necessary.
- Dust pollution may arise during earthwork excavation and other construction activities as well as during transport of construction debris. Similarly, exhaust gases from the construction vehicles may also pose problem. The special conditions of contract for the project should stipulate that the Contractor sprinkle water and cover transport vehicles carrying construction materials / wastes to reduce dust nuisance and maintain the transport vehicles properly to reduce gas emissions and noise.
- During trench work, the existing underground utilities may get disrupted causing considerable inconvenience to the public. It should be stipulated in the tender conditions for the project that when carrying out trench work, close contact should be maintained with the underground utility owners and that any damage should be rectified in a specified time period by the sewerage contractor at his cost.
- There may be traffic disruption during pipe laying in public roads. To avoid this works contractor should do trench work in roads in consultation with the Traffic Police and after making traffic diversions.
- Whenever pipe laying works are implemented, the road surfaces along the trench alignments are left un-restored for long periods until the trench refill settles down naturally. This leads to much hardship to the public. In order to avoid the problem, a time limit should be prescribed in the works contract for restoration of the road surfaces.

A "Special Conditions of Contract – Environmental Protection during Construction" should be included in the Bid Documents for the Project addressing all major adverse environmental impacts that may arise during the construction phase. The special conditions should propose payment for those mitigatory steps which are of a measurable nature. Further, penalties should also be provided for non-compliance with the environmental protection stipulations.

2.4.5] Adverse Impacts during Operation and their Mitigation :-

Pressure Mains :

When there are leaks through pipe joints, in air valves of pressure mains, leakages water may cause flooding in the area. This may damage the road surface, road pavement, depend upon the location of pipe line. Mitigation will require use of standard jointing material, special air valves which will not leak under design pressure during service life. Direct tapping should also be restricted from pressure pipe line.

2.4.6] Environment Management Plan (EMP) :-

A plan for the management of the environmental issues during Construction and Operation has been identified and developed into an EMP. All moderate to major issues are fully addressed to ensure that any residual impacts would be minor and confined to a short period. The Contractor shall comply with all aspects of the EMP. Table A (EMP – During Construction Phase) & Table B (EMP – During Operation Phase) summarises various impacts and the EMP in a format of issues, action to be taken as well as the responsible agency.

TABLE A: ENVIRONMENTAL MANAGEMENT PLAN CONSTRUCTION PHASE			
No.	Issues	Action to be Taken	Responsible Entity
1	Clearing of Vegetation	Minimize tree cutting during construction at sites and along the alignment route. Loss of tree cover to be mitigated in accordance with the compensatory measures & tree plantation schedule specified.	Contractor
2.	Dust contamination at construction sites & along haul roads	During construction at sites for facilities and at areas along the alignment route, such areas (actual areas of construction) shall be watered at least twice a day. Along haul roads, trucks carrying construction material shall be adequately covered	Contractor
3.	Air Pollution	Construction machinery & vehicles used during construction shall be adequately maintained in order to meet the relevant emission standards.	Contractor
		Monitoring of NO _x , HC, PM ₁₀ , SO _x & CO shall be carried out at residential /sensitive areas near major construction sites in accordance with the requirements specified to ensure compliance with relevant and applicable standards	Contractor
		In the event of violation of the 24-hourly averaged Indian Standards for any of the parameters, construction activities shall be restricted to between 6 a.m. to 9 p.m.	Contractor

4.	Noise Pollution and Vibrational impacts	Noisy construction operations in immediate vicinity of or within sensitive areas (residential locations) shall be restricted to between 6 a.m. to 9 p.m. Noise monitoring shall be performed at major construction sites and in sensitive areas/residential locations in accordance with the requirements to ensure compliance with the relevant and applicable standard	Contractor
		Ear Plugs shall be provided to operators of heavy machinery and other workers in the near vicinity	Contractor
		Transport of construction materials shall be organized and uniformly distributed to minimize noise impacts due to vehicular movements	Contractor
		Blasting at sites and along alignment route shall be performed in accordance with the Explosives Act, 1884 and Explosives Rules, 1983 Blasting shall be performed with prior intimation and with permission of local authorities, in the event of the blasting being significant magnitude or is to be conducted in close vicinity of sensitive receptor areas/residential locations	Contractor
5.	Disposal of Construction Debris	Daily inspection/supervision at sites and along haul routes shall be performed to ensure safe collection, transport and disposal at specified landfill areas by relevant agency engaged for disposal (contractor/subcontractor staff)	Contractor
		Refuse and debris generated during site clearance shall be collected and disposed in a safe manner at specified areas	Contractor
		Disposal of debris shall be minimized through balancing cut and fill requirements and only excess debris shall be disposed at specified areas	Contractor
6.	Diversion of Traffic and traffic congestion during transportation/laying of pipelines along alignment route	While selecting alternate routes, care shall be taken to minimize congestion and consideration of sensitive receptor areas such as schools and hospitals For minimizing traffic congestion in busy/narrow stretches, alternate routes for diversion of traffic shall be considered and planned in consultation with and permission of Traffic Authority and Highway (NH/SH) Authority Prior intimation shall be provided to authorities and necessary measures (e.g. provision of adequate signs, displays for movement, lights, flags) shall be undertaken to minimize disturbance to traffic movement	Contractor
			Contractor
		Works constructed along alternate routes for diversion of traffic, shall be dismantled after completion of construction activities in the respective area	Contractor

7.	Construction Labour	Labour camps shall be appropriately planned and adequate measures shall be undertaken to ensure adequate water supply to Labour staff, sanitation & drainage in conformity with the Indian Labour Laws	Contractor
8.	Procurement of Construction material	Construction materials such as soil, stone/gravel, for backfill/resurfacing shall be procured from notified and specified sites/quarries in the region and with prior permission from relevant authorities	Contractor
9.	Laying of Pipe lines.	Pipeline shall be laid and realigned wherever possible to minimize tree felling	Contractor
		Suitable external protection shall be provided on the pipelines to protect from infiltration while crossing effluent channels (natural drains and drains carrying sewage/industrial wastewater) and passing through areas prone to water logging	Contractor

**TABLE B: ENVIRONMENTAL MANAGEMENT PLAN
OPERATION & MAINTENANCE PHASE**

No.	Issues	Action to be Taken	Responsible Entity
1	Surface and Ground water contamination	Adequate precautions to be taken during the operations to avoid contamination of surface and ground waters due to spillage/ leakage.	Operator

2.5] Land :-

The Pipe lines and pumping mains involved in the project will be laid along or in the roads and will not require any procurement of land. Therefore, there will be no acquisition of homesteads involved in the project and no adverse impact is anticipated.

2.6] Rehabilitation and Resettlement :-

There will be no rehabilitation and resettlement.

2.7] Specialized Procured Services for Design, Independent Supervision & Quality Assurance :-

2.7.1] Project Management Consultancy :-

NMC has appointed the private project management consultancy services for all the project taken up under JNNURM. The appointment of PMC have been done for this project to avoid any delay after execution of project

2.7.2] Special Design Consultancy :-

NIT / NMC have appointed Consultant to Design & Prepare the Detailed Project Report (DPR) as per the toolkit & Guidelines of JNNURM. Hence there is no need of appointment of Special Design Consultant.

2.8] Other Information :-**2.8.1] List of Clearances :-**

Since the proposed project involves development of infrastructure within the layouts sanctioned by NIT in Nagpur Municipal corporation limits, the clearances required are only at limited locations where laying of pipe lines along roads & crossing of roads for interconnectivity is required.

Sr. No.	Components	Clearances required	Authority	Present status
1.0	Water Pipeline	Laying along Ring Road	MSRDC / NMC PWD	In process
		Laying along State High ways	State PWD	In process

CHAPTER-3: PROJECT COMPONENT AND COST

Sr. No	Project Component				Amount (Rs. In crore)
3.1	Land Acquisition/Site Development				0.00
3.2	Physical Infrastructure				350.00
	Infrastructure Rehabilitation Plan	Unit	Qty.	Amount in Rs.(Crore)	
1	Inside Slum			44.09	
	i) Replacment of Pipeline inside Slum.	RMT	175933		
	ii) House Sevice Connection (inside Slum)	No.s	124274		
2	Outside Slum			251.59	
	i) Replacment of Pipeline of different diameter.	RMT	253657		
	ii) House Sevice Connection (Outside Slum)	No.s	206360		
3	Specials (Outside Slum & inside Slum)			15.88	
4	Repairs of pipe & Specials			8.54	
5	Electro magnetic Meter	No.s	100.00	7.64	
6	Rehabilitation of ESRs	No.s	28.00	8.26	
7	Rehabilitation of Pench II WTP	No.s	1.00	6.46	
8	Replacment of Sluice Gates & Valves	No.s	28.00	3.59	
9	Developing billing Software	No.s	1.00	2.00	
10	Other Works			1.66	
3.3	Environment Compliance cost				0.00
3.4	Rehabilitation & resettlement cost				0.00
3.5	Cost of Surveys and investigations (included in design)				0.00
3.6	Cost shifting Utilities (No major shifting)				0.00
3.7	Cost of consultancy services				14.88
a	Design + Survey+ PPP transaction			2.63	
b	Supervision + Quality Assurance			12.25	
3.8	Other statutory compliance cost (if applicable)				0.00
3.9	Finance/Interest Cost during construction (Operator to finance)				
3.10	Contingency	3%	on 3.2		10.50
	Total				375.38
	Grand Total				376.00

CHAPTER-4: PROJECT INSTITUTION FRAME WORK

4.1] Role of Different Institution Involved in Construction Phase :-

4.1.1 Pre-Implementation :-

- Nagpur Municipal Corporation is responsible for completion of all the projects under taken in JNNURM phase-I as **section ---**
- Nagpur Municipal Corporation has passed the resolution for long term O & M contract with private operator for better efficiency in water sector.
- Nagpur Municipal Corporation has revised the tariff for full cost recovery.
- Funding
 - Share of Govt. aid received to NMC under JNNURM funding for this project shall be made available for initial rehabilitation work
 - NMC's share in project shall be financed by Operator.
- NMC appointed the Consulting Agency for Project Management.
- Proposed component under this project will be executed by operator as per BOQ
- Operator shall be selected as per necessary expertise and desired past experience of undertaking project of similar nature & magnitude.
- EOI for Request for Qualification (RFQ) was issued in the month of July 2008. Ten agencies has shown interest and submitted the RFQ on 20th Sep'2008.

4.1.2 Post-Implementation :-

- After implementation, assets will be managed by Operator who will undertake the Operation & maintenance.
- Collection of the Water tariff from the consumer will be the responsibility of Operator on behalf of NMC.
- Operator will attend to the complaints & extend services to consumer for rectification of fault, if any in basic infrastructural services.

4.1.3 Responsibility Matrix :-

Sr. No.	Responsibility	State / Central Govt.	NMC	Operator	Project Management Consultant
1	Statutory Permissions	✗	✗		
2	Funding	✗	✗	✗	
3	Project Drawing / Specification.			✗	✗
4	Patented design of component			✗	
5	Execution of work			✗	
6	Supervision & Quality Monitoring		✗		✗
7	Operation & Management			✗	
8	Revenue Collection (Water Tariff)			✗	

4.2] Manner of undertaking Construction Work :-

As stated in Para 4.1, All Infrastructural development work will be undertaken by operator appointed by NMC through ongoing tendering process. The work shall be executed under supervision of Project Management Consultant and NMC. All the proposed works under this project of water supply sector shall be under taken simultaneously in each division and shall be completed within specified time frame.

4.3] Involvement of the construction entity in the subsequent O & M :-

O & M responsibility of the operator for the 25 years up to the end of O & M contract as discussed in following **section-----**

4.4] Areas of Involvement of Private Sector :-

1.	Project Feasibility Studies	√
2.	Project Engineering Design	√
3.	Specialized Survey	√
4.	Construction Works	√
5.	Supervision Consultant	√

6.	Quality Assurance	√
----	-------------------	---

4.5] Construction “Packages” for works Construction :-

Total Infrastructural Development work under this project will be implemented by the operator and operator make the planning however, NMC has make the 10 main packages and can be divided in to sub packages.

CHAPTER-5: PROJECT FINANCIAL STRUCTURING :-

5.1] Overall Financial Structuring of the Project :-

Sr. No.	Govt.	Project contribution source	Amount (Rs. Lakhs)	% share by Specific Source	% share by Govt. Entity	Remarks on when and how state and ULB shares would arranged
1	2	3	4	5	6	7
1	Central	ACA Grant	18800.00	50.00	50.00%	
2	State	Grant towards its share in project	7520.00	20.00	20.00%	State Authorities to specifically highlight the category of there share
3		Govt. towards its share				
4	ULB / Parastatal	Devolved funds	0.00		30.00%	
5		Own surplus resource	0.00			
6		Debt/Term Loan taken from Stale govt.				
7		Debt/Term Loan taken from bank / FI				
8		Debt: from accessing capital market				
9		Private equity / community resource funding/ others	11280.00	30.00		Operator to finance the project with lease agreement of 25 years
Total amount			37600.00	100.00	100%	

5.2] Review for Institutional Debt & Private Sector Participation :-

5.2.1] Financing Strategies for the Project :-

NMC to raise resources and fund the project by:

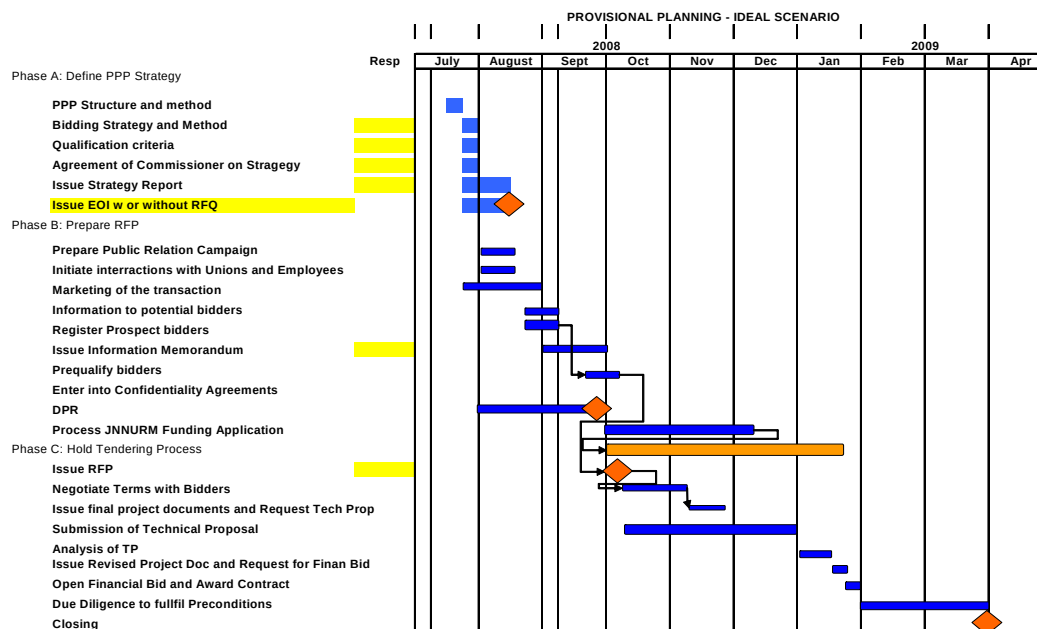
- Accessing the grants available under the JNNURM framework,
- Own Contribution of ULB (NIT/NMC) (Ref. Chapter -1 Para.1.6) to be finance by operator.
- Arranging the ADB loan or from other financial institutions for ongoing capital projects
- Water Tariff
 - Collection of water tariff from consumers
 - Revenue from bulk water sold to operators to recover the capex and opex .
 - Increasing revenue by improving technical and commercial efficiency,
 - Increasing revenues from water supply by reducing non-revenue water & rationalization of tariffs by NMC.
 - Operator rate included the replacement of assets to upkeep the efficiency

5.2.2] Other funding Options with Developing Authority :-

The expansion of piping network within NIT jurisdiction will arrange by plot owner as development charges.

CHAPTER-6: PROJECT PHASING

6.1] Schedule of Tendering / Selection for Procurement of Services :-



6.2] Schedule of Bringing in State & ULB level Contribution to Project :-

Schedule of Financial Contribution and Sources Table (in Rs. Lakhs)																
Sr. No.	Sources		Total Cost	FY 2009-10				FY 2010-11				FY 2011-12				Total
	Agency	%		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q5	Q6	Q7	Q8	
				April-June	July-Sept	Oct-Dec.	Jan-March	April-June	July-Sept	Oct-Dec.	Jan-March	April-June	July-Sept	Oct-Dec.	Jan-March	
1	Govt. of India	50.00	18800	4700				4700			4700				4700	18800.00
				25%				25%			25%				25%	100%
2	Govt. of Maharashtra	20.00	7520	1880				1880			1880				1880	7520.00
				25%				25%			25%				25%	100%
3	ULB (Finance by Operator)	30.00	11280	1692	2820			1128	1128		1128		1128	1128	1128	11280.00
				15%	25%			10%	10%		10%		10%	10%	10%	100%
Total (Net Cost)			37600.00	8272	2820			7708	1128		7708		1128	1128	7708	37600.00
Cumulative			0	8272	11092			18800	19928		27636		1128	2256	9964	

6.3] Schedule for Obtaining Clearances :-

All the development work will be carried out within city limits in layouts sanctioned by City Development Authority i.e. NIT/NMC. Hence except for following few works, no other clearances are necessary for implementation of Project.

Sr. No.	Clearances Required	Present status	Schedule Date of
1.0	For laying pipe line along Ring Road & Crossing the Major District road	Process will be start immediately	Three Months
2.0	For Crossing for laying pipe line through State High portion within the city limit. For this clearance from MSRTC required who has develop these road Under IRDP	Process will be start immediately	Three Months

6.4] Schedule of Shifting Utilities :-

Not applicable for this project.

6.5] Project Infrastructure Component-wise Implementation Plan : Bar-Chart for Key Activities :-

Operator to submit the proposal along with Bar chart to complete the rehabilitation work before 2012. The component type bar chart is given below which will be provided to Operator as to provide detailed break up and resource planning to complete the activities within time limit given in bar chart.

6.6] CPM/PERT Chart :-

Different major activities in each sectors and there time frame in implementation planning, is already indicated through Bar chart.

Phase Four : Operations and Maintenance

It is essential for NMC to improve upon the existing strategy of managing the water system. The steps taken by NMC like Tariff revision for full cost recovery, Infrastructure improvement under JNNURM grant bench marking of services through water audit and Pilot 24x7.

NMC has draft the ongoing maintenance of the loss control mechanism by Implementation of 24x7 water supply program through long term performance based Rehabilitate, Finance, Operations and Maintenance contract by Public Private Partnership mode for sustainability as described in following chapters.

6.7] PPP Strategic Approach :-

CHAPTER-7: PROJECT O&M PLANNING

7.1] Nagpur Full City 24X7 Water Supply Project Background :-

In order to encourage ULBs to improve the efficiency of their water supply systems, the State Government provides incentives of capital grants and guarantees for loans for water supply schemes. The most recent financing pattern of the Incentives Grant set up for the period 2002-2005 was declared in November 2001. the State Government provided a grant for conducting a water audit, energy audit and leak detection survey. In Nagpur, this process resulted in developing a 2009-2014 action plan aiming at achieving Full City Uninterrupted Water Supply Service.

Water from the source, either dams or rivers, is transported through canals to reservoirs or tanks. From the storage tanks, the water is filtered, tested for quality and supplied through a network of pipelines. The distribution system consists of private connections and stand posts. Since the water is supplied for a few hours during the day, most households store water, both in over-head tanks and in large cans for domestic use, and in vessels for drinking purposes.

Some of the constraints in the delivery mechanism and infrastructure are:

- Illegal connections
- Faulty meters and non-functional meters
- High water losses
- Insufficient staff

NMC regularly hires consulting firms through an open bidding process for jobs such as water audit, energy audit and routine repairs and maintenance jobs so that they are done with a much more professional approach and save time and public money. The leakage detection work has been also sourced out to a consulting firm and NMC also has a contract with a private firm for conducting repairs.

While Private Sector Participation is generally criticised for the fear of commercial and more intensive exploitation of natural resources, PSP experiences in Nagpur have shown that the efficiency of existing systems can be increased considerably by contracting or leasing out certain functions like O&M, billing and collection, water treatment, conducting repairs and also upgrading of infrastructure.

NMC sources 470 MLD mainly from surface sources. Currently, it meets demand, but with population growth it may face a deficit situation by 2011. NMC has already started making plans for augmenting the sources. Though no figures are available for actual supply at household level, it is discussed in earlier section that treatment and transmission and distribution losses are very high. Supply is also dissatisfactory in terms of the number of hours of water supply and water pressure. Overall, the water quality of piped supply is good but that of ground water sources is unacceptable in terms of hardness, pH and nitrates. The operational expenses for water supply services have been exceeding the revenues each year.

The General Objective of NMC related to City Development Plan (CDP) mission statement for water supply services is "Water for all and 24 x 7 supplies with focus on

safety, equity, and reliability". To achieve this target, additional schemes need to be designed in order to source more surface water. In the interests of reducing transmission and distribution losses, NMC needs to refurbish the old distribution system, conduct leak detection studies, identify illegal water connections and discourage using public stand posts. All households need to be provided with metered connections to increase coverage to 100% and volumetric billing should be introduced to discourage wastage.

The National Common Minimum Program attaches the highest priority to the development and expansion of physical infrastructure. As a part of its commitment to meet the Millennium Development Goals, the Government of India proposes to: (i) facilitate investments in the urban sector; and (ii) strengthen the existing policies in order to achieve these goals. In FY 2005-06, The Government of India has launched the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) in order to support "Reforms driven, fast track, planned development of identified cities (amongst which Nagpur) with focus on efficiency in urban infrastructure/services delivery mechanism, community participation and accountability of Urban Local Bodies (ULBs)/Parastatals towards citizens". Projects with private sector participation are given priority over projects to be executed by ULBs/Parastatals themselves, in order to help leverage private capital and bring in efficiencies.

Under JNNURM policies, Mandatory Reforms are required at ULB level: reasonable user charges must be levied with the objective of ensuring full collection of cost of operation and maintenance. Currently NMC recovers only partial user charges in water supply. NMC is establishing new tariff setting, which will increase the water supply operating with a view to collecting full cost of operation and maintenance by March 2011. NMC plans to collect full user charges for assets created under JNNURM.

Providing adequate supply of water to the city is an obligatory function for Nagpur Municipal Corporation. The process involves obtaining raw water from available sources, filtering, treating and distributing it to the consumers. Apart from these physical processes, NMC also has to manage other aspects of the supply system such as attending to complaints, charging customers for services and making investments to ensure sustained supplies.

7.2] PPP Strategy and Logical Framework :-

In June 2001, the State Government issued guidelines for private sector participation in urban water supply and sewerage. The guidelines indicate that many aspects of the existing schemes can be managed more efficiently with PSP such as metering, billing, collection, and O&M. The guidelines suggest that the most suitable of the following three types of contracts may be considered by the ULB:

- **Management Contract** : This contract is for a period of 3-5 years. The private operator is expected to manage the existing water supply system and employees and payments are linked to performance. The ULB is responsible for making investments and rehabilitating the system.
- **Lease Contract** : This contract is for a period of 6-10 years. The private operator incurs expenses for O&M, repairs, collection of water charges and minor equipment and pipeline replacements. The ULB is expected to fix the tariff before entering into the contract. The operator pays a lease fee for operating the water supply system. New investments are made by the ULB.

- **Concession Contract** : This contract is for a period of 20-30 years. The private operator is responsible for new investments and O&M. The mechanism for setting the tariff is laid out in the contract.

By Decision 107 (Water Works Department), NMC defined its PPP strategy for implementing water supply improvement as follows:

- Overall objective of NMC is to provide all customers located in the city of Nagpur with uninterrupted (24x7) supply of drinking water of improved quality.
- Specific objectives of the general body mandate is to establish long-term partnership with an expert private operator committed to improve financial sustainability and operational efficiency of the whole water supply system operation from raw water intake to delivery to end customers over the whole service area assigned to NMC.
- The expected results from PPP are defined as follows:
 1. A suitable model of PPP is set up conforming to circular of Mah' State NapaPu-1001/PraKra 503/PaPu22.
 2. PPP provides improved project management skills and enable NMC to implement successfully the Investment programme established by NMC to improve and expand water supply infrastructure.
 3. PPP provides funding resources and ensure achieving improved operational efficiency, including full cost recovery of water supply systems operation, So that NMC can access JNNURM and State Grants.

7.3] Key Issues :-

The key issues related to implementing Full City Uninterrupted Water Supply Project through a PPP concession scheme are defined as follows:

- **Legal Basis** (i) of the delegation, (ii) of authorizing the operator to collect revenue from the customers for services that have been entrusted to the local authorities through State legislation based of the Amendment 74 to the Constitution of India. This issue is to be addressed by NMC under the Act of Constitution of Nagpur Municipal Corporation. The Commissioner agrees to support this arrangement. Would the operating revenues have to be shared by NMC and PPP contractor, then the revenues collected by the Operator would be deposited in an escrow account opened in the name of the Operator.
- **Ownership of Assets** : Who is legally owner of the infrastructure and of the operational assets? NMC has, and will retain, the ownership of all the public assets; a Private Operator will be granted an exclusive right of use for specific purposes. The operator may register the right of use of NMC assets in its balance sheet (transfer of assets management financial risks); in counterpart the operator is liable to return all public assets to NMC at the end of the contract Specific rules regarding depreciation of assets will need to be included in the PPP agreement in accordance with the scope of responsibilities granted to the Operator regarding assets maintenance and renewal.

- **Allocation of Responsibility Over Assets Management :-** Classification of assets (infrastructure, operational) with a view to reflect in the accounting system the limit of responsibility of the operator regarding capital expenditure 'the Municipality is deemed to bear solely the responsibility of investment planning and financing for service expansion needs due to urban development profile.
- **Pack-back Conditions** for operating water supply infrastructure to reflect the actual grade of responsibility of the operator/NMC on investment planning and financing.
- **Tax Regulations :** The main issue is related to the attraction of service taxes. The existing management and O&M contractors had to include 12,36% in they bills. Service taxes do not apply to Water transport and distribution through pipeline works.
- **Rationale of PPP Strategy :** The transaction needs to address 2 main objectives of the Municipality: a) to ensure that service improvement programme towards 7x24 water supply in the entire City of Nagpur remains affordable for all categories of customers, b) to ensure that operational improvement programmes will provide for increased efficiency of utilities operation, c) to optimise using JNNURM grants and to arrange financing of infrastructure improvement and development without subsidies from Municipal Budget. At the same time, the Municipal Government is not ready to enter into a full concession agreement with a private operator as NMC may intend to keep arm-length control on service expansion and on improving service to the poor.
- **Preferred PPP Structuring Options :-**
 - NMC Commissioner was intending to "concession" the whole water supply services to one or two private Operators, based on the model developed for the privatisation of Manila Water Supply and Sewerage.
 - PPP Operator would be required to provide for financing 30% of a 350 crore rupees investment programme 2009-2014 defined by NMC as required to meet the 24x7 service levels in the whole City of Nagpur.
- **Regulatory Mechanisms :** Well balanced transaction should generate internal incentives to both parties to collaborate in achieving the global objectives of water supply utilities: NMC and the Operator will enter into a performance contract. A built-in incentive shall be included in the calculation of the remuneration of the Operator. This remuneration shall relate to the volume of water supplied, billed and thus paid by the customers according to the level of service.
- **Attracting Most Experienced Operators :** The NMC needs to ensure that at least four bids are submitted. The procurement method needs to be transparent and based in tangible criteria: The bidders and the customers should feel comfortable in this regard. Existing PPP do not address this issues. Since the tender process shall require full understanding agreement of all the bidders prior to bids submission, NMC will expect a limited number of bidders are qualified.

7.4] Agreed PPP Transaction Structure :-

NMC will establish 25-Year Performance Contract with a Special Purpose Company (SPC) formed by private firms with recognized experience in improving O&M of source-to-delivery water supply systems, and in implementing infrastructure investment projects. NMC intends to retain ownership of all fixed assets required to provide water supply services. The SPC will operate, maintain, repair, refurbish and provide for replacing facilities from source to connexion plots and will deliver water supply to customers according to service levels targets.

As part of this transaction, the SPC will realise, as NMC contractor, and co-finance a 5-year investment programme estimated in current price by 350 crores Rps. This programme is being designed by NMC on the basis of the on-going pilot project of "24x7". It will aim at reducing leakage of water distribution pipe works in the whole City in order to provide for efficient use of increased water supply resources, which result from JNNURM-1 implementation. NMC intends to apply for additional JNNURM and State grants to pay 70% of estimated cost. The Operator shall be requested to provide for financing the remaining investment cost from operating revenues generated over a 25-year O&M contract.

Under the proposed arrangement, the SPC formed by qualified consortium of private companies shall be paid a fee (referred to as the "operator's fee"), which is the price (expressed in Rs per cu.m) paid for the volume of water delivered to and sold (paid) by eligible customers, that the operator requires to cover all his costs for running the system and in maintaining NMC's water supply infrastructure in adequate condition of functioning. This price is the parameter that the bidders will compete on. The operator's payment is calculated according to a formula set out in the PPP contract, which shall contain factors designed to reward operational efficiency in certain areas. The operator will collect revenue from consumers on behalf of NMC, according to the tariffs set by NMC, will retain the amount of his fee, and shall transfer the difference to NMC, With a view to provide for financing the investments that the public authority has made to develop the capacity of the infrastructure in accordance with the demand generated by the urban development.

The NMC buys raw water from the Irrigation Department for a particular price and after treatment of that water the water is supplied to the citizens. In the proposed model the NMC intends to make available the raw water so received by it to the Operator at the same cost price, and the operator will be entrusted with the duty of treating the water and supplying it to the citizens through the NMC's pipe network which shall be leased out to the operator.

The operator will raise the bills directly on the customer and collect the water charges. The amount so collected will be deposited in a bank account in the name of the operator and in respect of this account an escrow arrangement could be put in place.

The major advantage of such arrangement is that the operator will be directly responsible and accountable to the customer for service delivery. Apart from this, the arrangement does not conflict with any of the provisions of the NMC Act. Moreover, the tax liabilities could also be avoided/minimised.

The transaction structure agreed with the Commissioner is summarised in the table below:

Type of Contract	- Rehabilitate-Finance-Operate-Maintain Contract of NMC's Water treatment and distribution pipe works. - NMC to retain ownership of fixed assets - NMC granting exclusive operational responsibility for public assets maintenance and service delivery to private SPC.
Contracting Authority	NMC represented by the Commissioner. Under the provisions of the NMC Act,
Scope of Contract	- NMC to grant the exclusive rights and obligations of distributing potable water to eligible customers within NMC territorial jurisdiction through municipal water supply facilities. - SPC to provide for delivering piped drinking water supply services to eligible customers in NMC service area according to applicable regulation and in compliance with specific service levels targets, over a determined period. - The SPC to operate, maintain, repair, refurbish, and decommission and/or replace worn-out granted facilities at its own risks and peril. - Private operator to implement and co-finance first 5-year 350 crores Rs investment programme while JNNURM provides for 70% funding with grants (Up to 245 crores)
Duration and possible extension	25 years. - Extension possible according to the provisions of the PPP Agreement, subject to approval from General Body.
Service Area	- NMC limits: SPC is required to connect any new customer within an agreed period of time, whenever the connection plot is located within a Service Perimeter which is defined in reference to a distance from granted distribution pipe works. - SPC may be requested to sell bulk water to townships beyond NMC limits: On NMC request and for a special rate of service (bulk to communal meter outside the Service Area)

Exclusivity	The SPC is granted the exclusive right of using identified municipal assets and to provide water supply services within the boundaries of NMC administrative limits.
Governing Law	SPC must comply with all Indian laws, regulations, orders and directives that may affect the realization of Granted Services.
Mechanisms for enforcement	- Penalties to be applied to the operator in the event of breach of its obligations. - Performance bond in favour of NMC to cover the performance failures with respect to the operator obligations - Power of attorney to be given to SPC to act against illegal connections and disconnect bad payers.
Resolving disputes	- Procedures & time table shall be strictly regulated under applicable Indian Law by the lease agreement. - To Establish mechanisms of arbitration. - Court of Law will be next step (Mumbai)
Remuneration of the SPC	3-slab O&M fee would be applicable according to service level
	Standard service level to metered connections meeting Contract service performance targets
	Social service level to connections in slum areas for delivery of 70 lpcd for a fixed monthly rate
	Bulk supply to townships outside the boundary of NMC.
Transition Period	Special arrangement to be set up during transition period until Full JNNURM investment programmes are completed:
	service performance targets would not be required in specific zones
	Purchase agreement to be established between the operator and NMC for the supply of treated water from active DBFO projects at a preferential price. Full O&M cost recovery targeted by 2014.

Financial equilibrium is reached through adjusting operator's fees escalation and treated water price escalation.

7.4] Operational Performance :-

7.4.1] Current NMC Performance :-

Sources of data

The assessment of the current situation is based in the following sources of data:

- Municipal City Development Plan, under JnNURM: spring 2006, including 590 Rs.crs for water improvements within 2006-2011
- Master Plan for Water Supply – TCE September 2000, for period 2001 - 2031
- Water Audit, leak detection & leak reduction for NMC – STC March 2005. A set of operational data was provided by NMC. It is attached in annex 1.

Current service performance review

Water Balance at beginning of the project (2007-08) is as follows:

- Volumes produced:..... 490 Mld
- Volumes lost through leaks in distribution network: 90 Mld
- Volumes delivered but non billed (illegal and non-metered): 130 Mld
- Volumes delivered and billed: 270 Mld

of which 90% (in value) through metered connections billed on a quarterly basis and 10% through non-metered (based on monthly fee)

The present situation regarding water service is an average time service for water supply of 5 hours per day.

Population is estimated by 2.54 Million in 2007, including 910,000 population living in slums (437 slum areas identified).

Water supply facilities consist of:

- Irrigation PRB canal, conveying water from Pench river (Pench Dam), with a raw water catchment at Mahadula, and pumping station for raw water
- Gorewada old plant, with a raw water intake from Lake Gorewada
- 3 additional plants near old Gorewada, receiving raw water from Mahadula: Pench 1, 2, 3
- Kanhan old plant, with a raw water intake from river Kanhan

The existing capacities are :

- Old Gorewada : 16 to 20 Mld
- Pench 1: 113 Mld
- Pench 2: 133 Mld
- Pench 3: 100 Mld
- Old Kanhan: 108 Mld

Total theoretical capacity: 470 Mld, currently overloaded up to 490 Mld

This capacity is nearly fully mobilized at present.

Water supply is delivered through 231,200 connections, of which:

- 154,000 metered connections (including 148,400 domestics (R1), 2,900 Institutional (R2), 2,700 Commercial & Industrial (NR1))
- 15,550 non-metered legal connections (14,800 domestic connections and 750 Institutional)
- 31,500 illegal connections
- 30,150 connections in slum areas (and, in addition, around 320,000 people in slums served through stand pipes)

The length of distribution network is around 2,050 km, of which 300km feeders and main network, 1,750 tertiary network. Although metering is deficient, physical losses are estimated by 20% of water supplied, of which 70% is lost in connection facilities.

Billing efficiency is based on figures developed in the NMC Master Plan, as well as on feasibility studies for 24 by 7 pilot projects.

According to figures provided by NMC, the amount of (annual) “arrears” are stabilized over the period 2001-02 to 2006-07, and the amounts actually collected in the year of billing are more or less equivalent to the total amounts received during the year. The collection represents 72% of the annual billing.

Financial Performance

Accounting system

The day to day operation of water supply utilities is managed by Nagpur Municipal Corporation. It is a local authority as referred to in clause (e) of article 243P of the Constitution of India.

The accounting method followed is a Single Entry System. The assessment and valuation of Fixed Assets owned by NMC is consequently inaccurate. According to new Mah' State policies, NMC is requested to set Double Entry System for public utilities operations; the assets inventory is on-going, however, comprehensive data are not available so far. For the purpose of this assessment,

current value of the fixed assets in operation for water supply was estimated on the basis of book value by 300 crores.

Regarding the Financial Statements, NMC only prepares annual Financial Budgets and compares these budgets with the actual budget after completion of the accounting / fiscal year. However, revenues and expenditure related to water supply utilities are clearly identified in the accounting system.

Tariff Setting

NMC collects water supply fees in compliance with NMC Act as per the tariff regulation applicable for water supplied to the different categories of customers. The current tariff had not been changed for years.

NMC - Existing Tariff Scheme (2007/08)		
(a) Residential R1		
- Metered	Rs/m3	3.0
- No meter - legal	Rs/month	75.0
- No meter - illegal	Rs/month	50.0
(b) Institutional R2		
- Metered	Rs/m3	12.0
- No meter - legal	Rs/month	300.0
(c) Commercial NR1		
- Metered	Rs/m3	20.0
- No meter - legal	Rs/month	300.0

Population in slum areas is supplied for free through stand pipes and uncovered slums area supplied by Tankers at free of cost.

New tariff setting was approved by the General Body of NMC in December 2007. The process of implementation of the new regulation is still requiring the approval of MJP. New tariff setting is expected to be implemented by the end of 2008.

Catagory	Old Tariff /1000 Ltrs	New Tariff	Remark
Residential	Rs 3 to 4	Rs. 8 to 15 for > 8 units per month as per telescopic consumption	Minimum charges Replaced by Monthly access charges (Rs 56 for 15mm)
Semi Residential	NA	Rs 8 to 18 >8 units	Min access charges are Rs 100
Institutional	Rs 12	Rs. 15 to 20	
Commercial-1	Rs 20	Rs. 25 to 100	

Commercial-2	NA	Rs 60 to 540	Mineral water + Cold drink
Slum	Rs 25 PM	Rs. 30 to 80 PM	Kaccha, Concrete, Multifloor
Indexation	NA	Energy + Raw water	Directly passing to consumer as surcharge
Annual Revision	NA	5% to MC and 10% to 25% to SC	No need to approval from GOM

New tariffs will be adjusted to changes in prices applicable to power supply and raw water supply. In addition there is also collection of Meter Deposit for new connections. NMC supply depressed areas with trucks. The operation cost for tanker supply is considered to be compensated by grant funds from government.

Details of the new tariff setting regulation are presented in Annex 2.

Operation and Maintenance Costs

They consist of raw water supply, energy cost, staff cost, consumables, repairs & maintenance of assets, outsourced services, general administration and revenue collection costs. Depreciation on fixed assets is not accounted for as an operating cost. NMC is exempt from income tax under section 10 (20) of the Income Tax Act, 1961. Service Tax and VAT are not applicable to piped water supply services.

Tentative Profit & Loss (P&L) Statement of NMC operation for the years 2006/07 and 2007/08 is presented in table hereafter. It is based on the figures and data provided by NMC from its cash accounting system. The figures provided by NMC are attached in Annex-3 and Annex-4.

NMC - Profit and Loss Statement

		Unit	2006/07	2007/08	2007/08
1	Revenues				%
2	Operating revenues - water supply	Million Rs	630.0	759.6	
3	Revenues from connection fees	Million Rs			
4	Other revenues	Million Rs			
5	Total Revenues	Million Rs	630.0	759.6	
1	Operation and maintenance cost				
2	Purchase of raw water	Million Rs	-90.2	-125.1	19.6%
3	Energy	Million Rs	-277.1	-326.5	51.0%
4	Consumables (materials, chemicals, etc)	Million Rs	-10.7	-15.0	2.3%
5	Staff	Million Rs	-65.9	-63.5	9.9%
6	Services from outside (outsourced)	Million Rs	-27.5	-38.5	6.0%
7	Maintenance and repair (internal)	Million Rs	-0.7	-0.9	0.1%
8	Other cost (transport, etc)	Million Rs	-38.9	-63.2	9.9%
9	NMC administration	Million Rs	-7.3	-7.1	1.1%
10	General contract management administration	Million Rs	0.0	0.0	0.0%
11	Total O&M cost	Million Rs	-518.2	-639.7	100.0%
	EBITDA	Mill. RON	111.8	119.9	
1	Depreciation existing assets	Million Rs	-120.0	-120.0	
2	Depreciation main / civil works	Million Rs			
3	Depreciation Plant and machinery / E&M	Million Rs			
2	Depreciation new assets				
3	Main / civil works	Million Rs		-0.5	
4	Plant and machinery / E&M	Million Rs		-0.5	
5	Mid-term assets / others	Million Rs		-1.4	
6	Op-capex (Lease Operator)	Million Rs			
7	Deduction for DOB / BOT Projects	Million Rs			
8	Total depreciatio new assets	Million Rs	0.0	-2.4	
9	Total depreciation	Million Rs	-120.0	-122.4	
	EBIT	Million Rs	-8.2	-2.6	
1	Interest - existing and new loans				
2	Interest - existing loans (2001-2005)	Million Rs	-51.5	-56.9	
3	Interest - new ADB loan	Million Rs			
4	Interest - new commercial bank loan	Million Rs			
5	Total interest	Million Rs	-51.5	-56.9	
	EBT	Million Rs	-59.6	-59.5	
1	Income tax	Million Rs	0.0	0.0	
2	Service tax	Million Rs	0.0	0.0	
	Net income	Million Rs	-59.6	-59.5	

The figures of this preliminary P&L Statement indicate that NMC water supply utilities operation is subsidized. The annual billed revenues are not sufficient to cover O&M cost, depreciation and interest payment for the repayment of existing loans.

Cash Flow Analysis

A tentative Cash Flow Statement for the year 2007/08 was prepared on the basis of data provided by NMC.

NMC - Cash Flow Statement					
		Unit	2006/07	2007/08	
1	EBITDA	Million Rs		119.9	
2	Decrease / (Increase) in working capital	Million Rs		-172.1	
3					
4	Funds from operation	Million Rs		-52.2	
5	Capital expenditures	Million Rs		0.0	
6					
7	Free cash flow	Million Rs		-52.2	
8	Cash inflow				
9	JNNURM (1) grant funds	Million Rs		0.0	
10	NMC funds to (JNNMUR 1) - committed	Million Rs		0.0	
11	ADB loan for JNNUMR (1)	Million Rs		0.0	
12	JNNURM (2) grant funds	Million Rs		0.0	
13	LO funds to JNNUMR (2)	Million Rs		0.0	
14	LO funds for replacement	Million Rs		0.0	
15	NMC funds for expansion	Million Rs		0.0	
16	NIT funds for expansion	Million Rs		0.0	
17	LO funds for op-capex	Million Rs		0.0	
18	Total inflow	Million Rs		0.0	
19	Cash outflow				
20	Income tax payment	Million Rs		0.0	
21	Service tax payment	Million Rs		0.0	
22	Total Cash outflow	Million Rs		0.0	
23					
24	Cash flow before debt service	Million Rs		-52.2	
25					
26	Principal payment - ADB loan	Million Rs		0.0	
27	Interest payments . ADB loan	Million Rs		0.0	
28	Financial fees - ADB loan	Million Rs		0.0	
29	Principle repayment - other loans	Million Rs		-128.2	
30	Interest payments - other loans	Million Rs		-56.9	
31	Repayments revolving credit	Million Rs		0.0	
32	Total debt service	Million Rs		-185.1	
33					
34	Surplus / deficit for the year	Million Rs		-237.4	
35					
36	Drawdowns revolving credit	Million Rs		0.0	
37	Interest on cash balance	Million Rs		0.0	
38					
39	Net cash flow	Million Rs		-237.4	
40					
41	Cash in hand at the end of the year	Million Rs		0.5	

For the fiscal year 2007/08, accounts receivable were estimated by Rs 222 Million, and accounts payable were estimated by 41 Million.

Other liabilities relate to Meter Deposits from the customers, and to Security Deposits and Earnest Money Deposits of Contractors.

NMC contracted as well various outstanding loans. As on 31/03/2008 the total amount of outstanding loan was Rs. 583 Million. The entire loans will be repaid until 2013/14.

The entire collection of water charges is deposited in NMC bank account together with other departments revenues. Hence it is not really possible to segregate cash in hand / bank for the water department.

Taking into account the considerable amount of accounts receivables and debt service for existing loans, NMC generates a significant cash deficit estimated by RS 237 Million in 2007/08.

Based on the data provided by the Municipal Corporation, NMC is currently not at all in the position to generate a balanced cash flow.

Balance Sheet

Current Assets consists of Stocks, Accounts Receivable & Cash & Bank Balance.

Stock consists of: (1) stock of raw water in process and finished water in storage, in distribution channel and water distributed until it is billed; (2) Stock of chemicals, and (3) Stock of spares and other consumables.

The approximate figures as at 31/03/2008 are compiled in the following table.

	Category	Million Rs
1	Stocks	14.7
	- Raw water in progress	11.2
	- Chlorine	0.5
	- Alum / PAC	0.2
	- Spares & Other Consumables	2.9
2	Accounts Receivable	221.2
3	Cash & Bank Balance	0.5

Liabilities are accounts payable and other liabilities. Other liabilities consist of Meter Deposits of consumers and Security Deposits of Contractors. The approximate figures as at 31/03/2008 are:

	Category	Million Rs
1	Accounts Payable	41.2
2	Other Current Liabilities	22.7
	- Meter Deposit	18.7
	- MD & SD	4.0

As on 31/03/2008 the total amount outstanding against loan is Rs. 5,831.00 lacks. The entire loan will be repaid up to 2013-2014.

The balance sheet presented in the following table should be considered very preliminary. It reflects the information provided by NMC. It will need to be updated and carefully re-validated before PPP arrangement closing.

NMC - Balance Sheet

		Unit	2006/07	2007/08	
1	Gross fixet assets (existing assets)	Million Rs		6000.0	
2	less depreciation (existing assets)	Million Rs		-3000.0	
3	Gross fixet assets (new)	Million Rs		0.0	
4	less depreciation (new)	Million Rs		0.0	
5	Gross fixet assets (others)	Million Rs		0.0	
6	less depreciation (others)	Million Rs		0.0	
7	Net fixed assets	Million Rs		3000.0	
8					
9	Stocks	Million Rs		14.8	
10	Accounts receivable and other current assets	Million Rs		221.2	
11	Cash in hand	Million Rs		0.5	
12	Current assets	Million Rs		236.5	
13					
14	Total Assets	Million Rs		3236.5	
15					
16	Owners contributions (existing assets)	Million Rs		0.0	
17	Owners contributions (JNNMUR 1)	Million Rs		0.0	
18	Owners contributions (further extention)	Million Rs		0.0	
19	Retained earnings	Million Rs		-59.5	
20	Equity	Million Rs		-59.5	
21					
22	Government grant	Million Rs		2649.0	
23	ADB loan (JNNUMR 1)	Million Rs		0.0	
24	Government Infrastructure grant (JNNURM 2)	Million Rs		0.0	
25	Private operator contributions (JNNMUR 2)	Million Rs		0.0	
26	Private operator contributions (further replacement)	Million Rs		0.0	
27	NIT funds for expansion	Million Rs		0.0	
28	Private operator (Op-capex)	Million Rs		0.0	
29	Other loans	Million Rs		583.1	
30	Bank overdraft	Million Rs		0.0	
31	Accounts payable and other current liabilites	Million Rs		63.9	
32	Taxes and dividends	Million Rs		0.0	
33	Liabilities	Million Rs		3296.0	
34					
35	Total Equity and Liabilities	Million Rs		3236.5	

The financial performance is summarised in the table of indicators hereafter

NMC - Financial performance ratios		2006/07	2007/08
Labour costs / O&M costs	%	0.13	0.10
Energy costs / O&M costs	%	0.53	0.51
Revenues (billed) / O&M costs	Factor	1.22	1.19
Revenues (billed) / O&M costs + depreciation	Factor	0.99	1.00
Revenues (billed) / O&M costs + depreciation + debt service	Factor	0.00	0.80
Collection ratio [Collections / Revenues]	%	72%	75%
Revenues (collected) / O&M costs	Factor	0.88	0.88
Revenues (collected) / O&M costs + depreciation	Factor	0.71	0.74
Revenues (collected) / O&M costs + depreciation + debt service	Factor	0.00	0.60
Debt service cover ratio (DSCR) [EBITDA / DS]	Factor	0.00	0.00

The financial performance indicators show clearly that, since the new tariff setting is not implemented, even the full amount of revenues billed was not full cost covering. Due to the low collection rate collected revenue has not been sufficient to cover all O&M expenditure and not sufficient to provide furthermore for debt servicing and depreciation of fixed assets.

NMC is processing new tariff setting, which shall be applicable by the end of 2008. The new tariff setting shall be adjusted annually according to variations in electricity and raw water prices.

CHAPTER-8: PROJECT FINANCIAL VIABILITY & SUSTAINABILITY

8.1] Overall Project Perspective :-

Calculation NPV and IRR for O & M viability in prescribed format is enclosed here with.

IRR for the recovery of O & M cost is works out as 14%. This shows that project is self-sustainable to recover the O & M cost.

Operation Forecast

A financial forecast model has been developed by DRA. It covers the 5-year period from 2008-09 until 2034-35, with year 2007-08 used as a comparison basis. The model targets service performance improvement objective as defined by NMC; it aims “to provide all customers located in the city of Nagpur with uninterrupted (24x7) supply of drinking water of improved quality”.

Population :

The increase of population is in compliance with the forecast of Master Plan 2001-2031 for Nagpur (figures updated in 2005), based on the population density per ward (169 wards), and is expected to double over 25 years.

Population in Slums (437 slum areas identified) is expected to remain constant over the whole period, around 910,000 people (no new slums are envisaged by NMC). This assumption may have a considerable impact on NMC's revenue forecast since new tariff setting is subsidizing water supply services to slums areas: customers in slums areas shall be supplied water through back-yard tap for a monthly lump sum.

Water supply through stand posts is not billed to customers.

Population Evolution (people)	2007	2008	2013	2018	2028	2033
Domestic population	1 653 482	1 708 686	2 112 212	2 520 901	3 527 175	4 174 119
population in slums	887 274	910 254	910 254	910 254	910 254	910 254
of which on stand post supply	318 905	318 905	35 058	0	0	0

Water Demand

Water demand will expected to increase over years according to population growth. Water demand forecast is based on the urban planning assumptions contained in the CDP.

The daily water consumption per capita is currently estimated to average 117 litres per day for domestic customers (R1), 70 litres per day for slums served by house connections, and 40 litres per day for slums served from stand pipes.

For modelling purposes, the water demand forecast is based on the following assumptions:

- Water demand for domestic population is calculated for to average consumption of 135 litres/capita/day in 2033.

- The water demand per capita for slum populations will not change over the period (70 lpcd).
- The water consumption of institutional customers (R2) and commercial / industrial (NR1) will remain with the same proportions towards the domestic demand.

The demand forecast includes provisions for bulk water delivery to communities located outside NMC jurisdiction. Bulk water supply was estimated by 3% of NMC water consumption.

Water Consumption (in Cu.m per day)	2007	2008	2013	2018	2028	2033
Domestic customers (R1)	193 324	201 291	257 838	318 999	478 574	585 645
slums	52542	54151	62666	63718	63718	63718
of which on stand post supply	12 756	12 756	1 402	0	0	0
Institutional (R2)	81 873	85 062	106 728	127 445	180 583	216 238
Commercial & Industrial (NR1)	7 745	8 046	10 096	12 056	17 082	20 455
Bulk water sales	0	0	13 120	15 667	22 199	26 582
Total	348 240	361 307	451 850	537 884	762 156	912 637

Production Capacities :

Through the on-going JnNURM (Jawahar Lal Nehru National Urban Renewal Mission) investment facility, the following evolution in the production facilities operated by NMC is planned:

Production of water, in Cu.m per day	2007	2008	2013	2018	2028	2033
Gorewada WTP	20 000	20 000	0	0	0	0
Pensh 1 WTP	100 000	136 000	136 000	136 000	136 000	136 000
Pensh 2 WTP	135 000	135 000	135 000	135 000	135 000	135 000
Pensh 3 WTP	120 000	120 000	120 000	120 000	120 000	120 000
Pensh 4 WTP	0	0	70 000	115 000	115 000	115 000
Kanhan WTP	95 000	95 000	180 000	180 000	180 000	180 000
Rhahari WTP 1	0	0	0	50 000	175 000	175 000
Rhahari WTP 2	0	0	0	0	175 000	175 000
Other WTP 1	0	0	0	0	0	120 000
Other WTP 2	0	0	0	0	0	120 000
Total	470 000	506 000	641 000	736 000	1 036 000	1 276 000

Achieving 24*7 water supply in 2012 shall require that Kanhan production capacity is increased up to 180,000 cu.m per day by 2011

Operation of Plants:

The model takes into account the implementation of the following on-going performance contracts:

O&M Contracts :

- Old Gorewada: 3 years, 2008-09 until 2010-11, annual value of 1.8 MRs/year (energy and raw water not included)

- Mahadula raw water pumping station: 3 years, 2008-09 until 2010-11, annual value of 2.8 MRs/year (energy non included)
- Old Kanhan: contract of 3 years, until commissioning of new plant (2008-09 to 2010-11); the global value for 3 years is 19.4 MRs, and excludes chemical (8.5 MRs per year) and spare parts (4.2 MRs per year)
- Pench 2: 3 years, 2008-09 to 2010-11, annual value of 3.5 MRs/yr excluding chemicals, energy and raw water
- Pench 3: 3 years, 2008-09 to 2010-11, annual value of 5.5 MRs/yr, excluding energy and raw water
- BO contracts:
- New Kanhan: investment phase from mid 2008 until end 2010, for an estimated value of 650 MRs; beginning in 2011, 15 years of O&M, until 2026, for a contractual value of 35 MRs per year, excluding energy and raw water
- Pench 1 & 3: investment phase until May 2008, for a global value of 625 MRs, followed by 5 years of O&M, for a value of 12.4 MRs/year, excluding energy and raw water
- Pench 4: investment phase from 2009 to end of 2011, for a total of 315 MRs; from 2012 until 2021, O&M phase for an amount of 13 MRs/year, excluding energy and raw water
- Other similar plants can be implemented / mobilized in the future, for addressing the evolution of water demand, and related costs (investment and operation-maintenance) are included in the model accordingly.

At the expiration date of these above contracts, the facilities are expected to be handed over to NMC.

Distribution Network

A strong investment plan is anticipated (through JnNURM 1 and 2 programmes – see after), which aims a complete modernization of water distribution network, with:

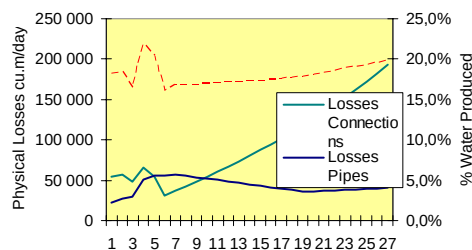
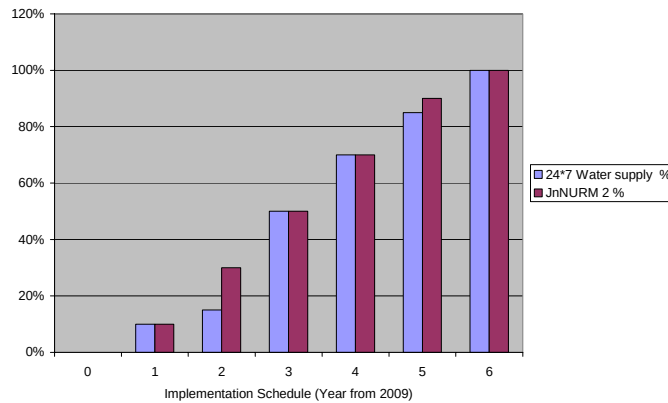
- all connections changed within 3 years, and equipped with meters
- one-third of tertiary network replaced during the same period
- all slums equipped with individual connections and meters

Meters are considered with a life time of 12 years, which means that they have to be replaced regularly during the period studied

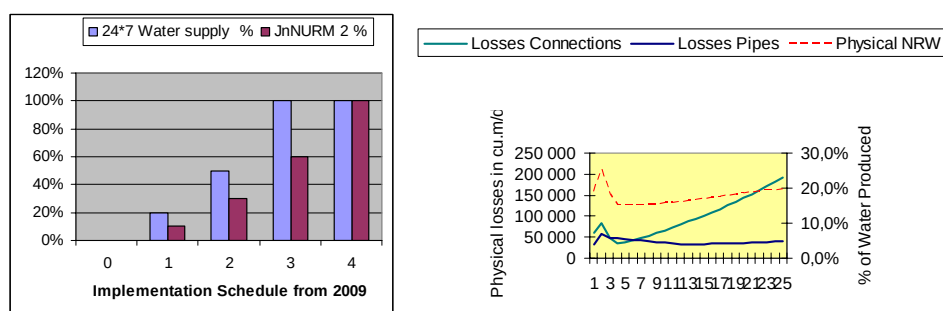
As a consequence, Non Revenue Water is drastically reduced for its physical component, which balances the “negative” impact of full 24 x 7 distribution, expected by 2012-2014:

The physical losses in water supply distribution system have been estimated with considering 2 implementation options:

- 1] The initial Improvement Program under JNNURM-2 is completed in 5 years from 2009 to 2014 and 24*7 water supply is operating in the entire city by 2014:



- 2] The Initial Improvement Program under JNNURM-2 is completed in 4 years from 2009 to 2013 and 24*7 water supply is operating in the entire city by 2012 :



In this case, the accelerated implementation of 7x24 water supply shall increase losses in the pipe works and in the connections, which will not have been all replaced. On-time commissioning of on-going projects in Kanhan and Pench-4 is required in order to provide for sufficient water available.

Cost estimates

The estimate of cost evolution, based on a option with all operation and maintenance tasks sub-contracted through mid-term assignments (3 to 5 years) to various operators (O&M of plants, network, reservoirs, billing system), is as follows:

Cost evolution for Operation & Maintenance (without inflation)	2007	2008	2013	2018	2028	2033
Raw water purchase	145	183	137	214	422	621
Energy	396	426	455	522	767	963
other costs	195	233	436	520	700	829
Total	736	841	1 029	1 256	1 889	2 414

This does not include any inflation on direct costs, as well as no salary re-evaluation

Capital Investment Costs :

Initial Capex program is essentially determined by the two JnNURM 1 and 2 investment programmes, including the following components:

Investments under JnNURM1 (MRs/yr)	<2007	2007	2008	2009	2010
1 - Leak Detection Project	7	13	13	0	0
2 - Water Audit Project	0	38	150	63	0
3 - Energy Audit Project	28	110	138	0	0
4 - Expansion & Upgrade Water Supply	21	63	169	254	0
5 - Kanhan Augmentation Scheme	0	0	361	361	180
6 - Pench IV	0	0	2 089	2 089	1 045
Total JnNURM1	55	224	2 920	2 766	1 225
7191 MRs					

Investments under JnNURM2 (MRs/yr)	2009	2010	2011	2012	2013	2014
1 - Slum Policy	58	116	116	116	116	58
2 - 200.000 Connections upgrading	143	286	286	286	286	143
3 - Replacement of 150 km Tertiary Network	28	56	56	56	56	28
4 - BPR Bypass Gorewada	14	28	28	28	28	14
5 - Reservoirs Rehabilitation	7	14	14	14	14	7
6 - Rehabilitation of Gorewada Gates	3	7	7	7	7	3
7 - Additional IT Investments	38	76	76	76	76	38
SCADA						
GIS						
CCIS						
Rehabilitation Pench2						
District Metering Zones / Hydraulics + Others						
Total JnNURM2	291	582	582	582	582	291
2909 MRs						

In addition, extensions of network not covered by JnNURM remain identified, as they should be funded by NTI programme.

As a whole, the investment strategy can be summarized, in present value, according to the below table:

Project -Water Sector		Total Cost in Rs Crore	Grant in Rs crore	PPP in Rs Crore	Loan in Rs crore
JNNURM-1		724.22	395.66	26.6	302
JNNURM-2		376	263.2	112.8	
Total		1100.22	658.86	139.4	302
Repayment Period				15	15
Interest / IRR				10.00	10.00
				18.32744	39.70508
Total Repayment				58.03	

Customer Billing

NMC envisages to develop complementary investment program, which will target 24*7 uninterrupted water supply is achieved by 2012-2014. All service connections shall be equipped (or re-equipped) with meters during period 2008 to 2015.

Customer billing would follow the above trends. UFW is expected to drop from 38% as estimated in 2007 while water is supply in average 5 hour per day, to remaining below 25% from 2013 to 2034 with full city uninterrupted water supply 24X7.

Customer Billing (Cu.m per day)		2007	2008		2018	2028	2033
Metered connections:							
Residential R1							
metered connections		163 983	177 976	264 766	313 546	486 146	590 986
metered slums		16 709	20 124	32 877	32 153	33 348	33 171
Institutional R2							
metered connections		57 509	62 416	92 854	109 961	170 492	207 260
Industrial NR1							
metered connections		6 867	7 453	11 088	13 130	20 358	24 749
Non-metered connections:							
Equivalent of volumes billed through monthly fees		24 396	20 612	0	0	0	0
For non-metered connections, nb of connections :							
Residential R1	m3/month equiv.to the fee:						
non metered legal	25	14 807	12 339	0	0	0	0
non metered illegal	0	6 302	5 252	0	0	0	0
slums	14	25 209	21 007	0	0	0	0
Institutional R2							
non metered legal	25	758	632	0	0	0	0
Industrial NR1							
non metered legal	15	0	0	0	0	0	0
Total billed equivalent volumes		269 465	288 581	401 585	468 790	710 344	856 165
(bulk water not included)							

8.2] Risk Analysis :-

Objectives

At this stage, the assessment of risks is carried out in order to:

- Evaluate the attractiveness of the proposed transaction for potential bidders
- Help establishing qualification criteria
- Develop appropriate structure and content of required technical proposal

- d) define appropriate risk allocation and risk mitigation provisions to be considered in developing Draft PPP agreement.

Identification of Transaction Risks

During Preparation Phase

- Decision making and RFP approval process
 - Decision making process
 - Political concerns of NMC General Body
 - Political concerns at Mah' State level
- Litigation related to PPP structure: capacity of private service provider to bill directly eligible customers on the basis of tariff setting established by NMC, as well as other provisions included in the draft RFP could be questioned in Courts by stakeholders, opposed to this transaction.
- Resolution of labour issues. Clear resolution needs to be agreed by the Unions and by NMC regarding the conditions of the transfer of NMC personnel to new private operator. This may be determinant for bids preparation.
- Opposition of local contractors of NMC. They may fear that the new global operator may expect to terminate or may not be interested to renew current service contracts.
- JNNURM does not provide grants for complementary network improvement project. Co-financing 300 crores investment is part of the PPP assignment. JNNURM (not)granting 70% of this investment plan may impact significantly on the contract structure and on the bid preparation.
- EOI delayed
 - Late approval of DRA assignment
 - IFC take over PPP preparation
 - Early election process

During Bidding Process

- Number of potential bidders: Successful competitive bidding should involve not less than 3 qualified bidders. Involving too many bidders may reduce the interest of potential stronger bidders; bidding process includes separate pre-bid meetings with each bidder in order to ascertain that final RFP conditions are accepted by several qualified bidders, therefore, more than five bidders may require considerable increase in the time necessary to develop final RFP version.
- Controversial discussions may arise regarding
 - the cost estimate and the appropriateness of the investment programme to be carried out by the operator.
 - Operational performance targets

- Adjustment rules applicable to treated water price adjustment
- Governance provisions on escrow account operation.
- SPC set up requirements

During Transition Period

- Unforeseen defect risk: Higher cost of maintaining granted assets in operation leads to change considerably the basis of the bid: grounds for difficult rebasing.
- New tariff not fully implemented before commencement of the contract.
- High elasticity of demand to new tariff setting

RFP needs to define precedent conditions and transitory provisions as required to adjust the bid to actual environment contract implementation. The bids will refer to standard adjustment parameters to be clearly defined in the RFP documents.

During Implementation Phase

- Delay in commissioning Water supply projects scheduled under JNNURM-1: lack of water resources to address 24x7 demand targets.: the time-frame for JNNURM (2) program implementation is considered VERY ambitious. It will be subject to number of contextual conditions, which will keep standing out of both parties' hands. The transaction may include a 3-year transition period; the operator would be required to review implementation planning and to propose adjustments of targets schedule in accordance to actual implementation conditions. Mechanisms of adjustments should be clearly identified in the RFP documentation in order to ensure fair bid proposals and to avoid conflictive situations
- Construction risks: higher costs, additional engineering and planning activities are required, delays in executing the investment programme. The private operator, as contractor for the execution of the works described in the RFP under JNNURM arrangements, will be expected to undertake all due diligence activities as required to provide for timely and effective implementation of this critical investment program.
- Demand risk (illegal connections are under/over estimated). While this parameter may have significant impact on financial equilibrium of operator's operation, RFP should include the definition of appropriate adjustment mechanisms; RFP would include reasonable assumption of key parameters; would some of them result to be notably different from RFP assumptions, a rebasing procedure could be envisaged in compliance with provisions to be included in the RFP., .
- Financial risks: lack of funding resources unable NMC debt-servicing or result. Would the efficiency of NMC tariff setting be inappropriate to provide to NMC sufficient resources to ensure effective debt servicing, both parties would need to adjust timely either the tariff setting regulation and/or the schedule of remuneration of the private operator with a view to strengthen the position of NMC.
- Industrial relations risk: change management cost for involving NMC water supply staff and subcontractors is resulting higher as a result of employment market

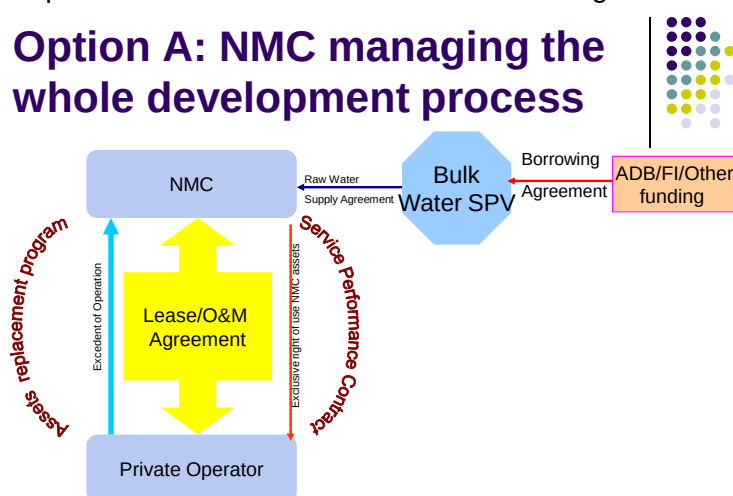
stress. The technical proposal should include a clear presentation of operator's strategy to deal with NMC staff employment and with existing outsourcing local providers

- Operating risk: increased operating cost or reduced revenue generation: this risk is largely under private operator unique care.
- Performance risk: cost of failing to comply with performance targets and appropriateness of incentives mechanisms. This is a key issue that the strategy should rely on.
- Change in law: tax attraction, sector regulation, water quality requirement. These aspects are clearly generating grounds for rebasing the operator's fee.
- Residual value risk: lower realisable value for underlying assets at the end of the project, controversies respecting assets replacement schedule. RFP should include appropriate provisions in order to ensure that assets return and optional pay-back conditions are fair, balanced and easy to implement.
- Technology obsolescence or inadequacy: The operator is deemed to operate water facilities developed by other contractors appointed by NMC or by land developers authorized by NMC. Higher cost of taking over these new facilities. RFP will establish regular and exceptional investment planning mechanisms.
- Force Majeure
- Political intervention
- Change in capital market
- Inflation environment.

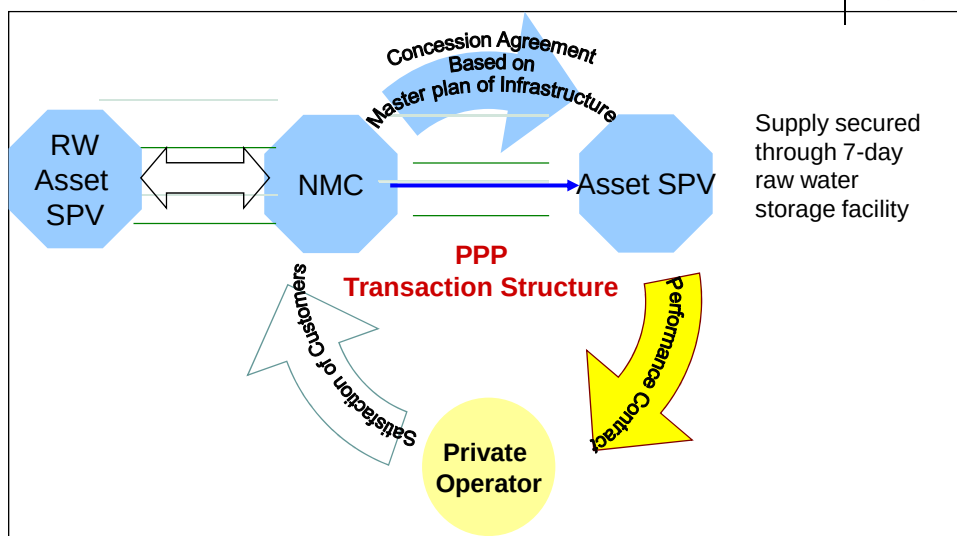
Transaction Structure

Two options have been considered for structuring the PPP arrangement :

Option A: NMC managing the whole development process

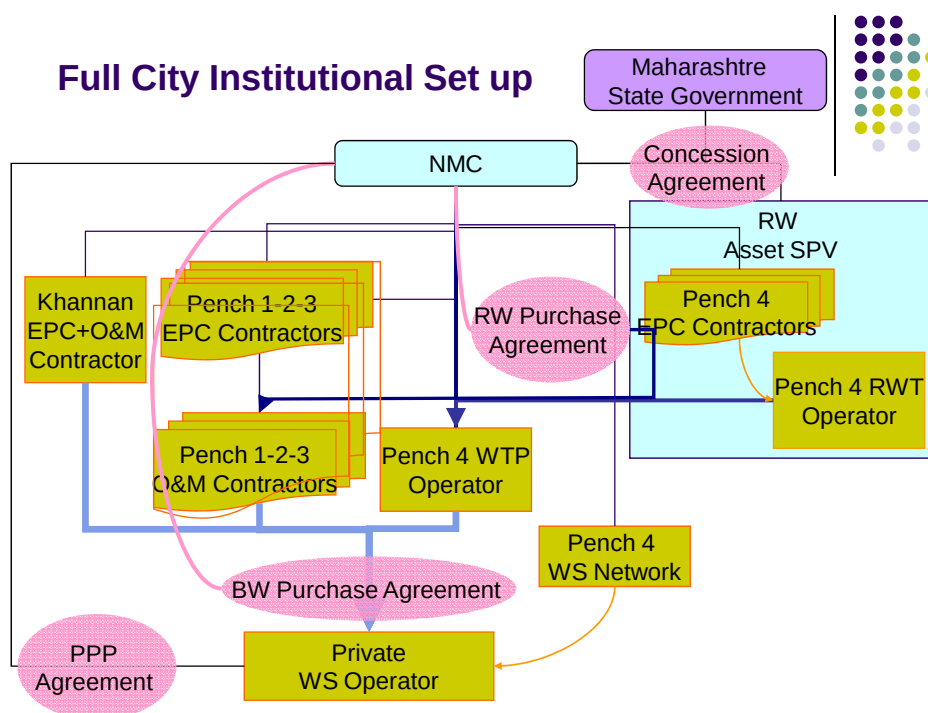


Option B: Creating public owned Asset Management SPV



In a first stage, NMC envisages to start with implementing the PPP transaction for water supply distribution in the entire city of Nagpur by structuring the transaction according to Option 1. In further stages, NMC envisages to undertake a more comprehensive water sector reform by implementing Option 2 structure with including wastewater and storm water collection and disposal.

In the first stage, NMC will deal with multiple ongoing O&M contracts as follows:



NMC envisages to create an asset SPV limited to Raw Water transmission systems which is developed from Pench sources. This SPV shall have access to ADB funding to complement financing of the raw water transmission works undertaken under JNNURM arrangements. The SPV would be granted a 15-year concession for the delivery of raw water from this scheme to the treatment plants in operation.

At the expiration date of the concession and of the ongoing O&M contracts related to the operation of treatment plants, these facilities shall be added to the facilities granted to the Operator of the Distribution System. Meanwhile, NMC shall provide to the Operator of the Distribution Systems, treated water produced from the treatment plants operated under ongoing O&M contracts, through a Bulk Water Agreement which shall be attached to the PPP Agreement.

Service Performance Objectives

NMC intends to enter into a PPP agreement with a private Operator for a period of 25 years.

Uninterrupted 24x7 water supply is adequately delivered in the entire city of Nagpur from 1st of April 2012 onward.

The selected private Operator shall operate, maintain and repair NMC's water supply infrastructure at its own risks and perils in return of an Operator's Fee which shall be valued in respect to the compliance with the project objectives.

The Operator shall realise and finance at its own risks and peril any capital expenditure as required to ensure that NMC's infrastructure is in appropriate conditions to operate with a level of efficiency, which is established under the PPP Agreement.

NMC shall provide financing of the investment packages identified in the PPP Agreement as to be realised by the Operator during the period 2009-2014 under JNNURM finance agreement.

NMC shall grant to the Operator the exclusive rights of using all water supply infrastructure as required to achieve the objectives of the service performance.

The Performance Targets refer to three (3) levels of service which could be defined as follows:

The Standard Water Service refers to water supply services which comply to the service regulation set forth by NMC under NMC Act.

Social Water Service refers to services rendered in slum areas to customers through Slum Connection facilities in accordance with applicable NMC regulation and with the service levels required by the PPP Arrangement. The Delivery Point for these customers shall be the tap installed by the Operator in the premise of the Slum's dwelling. The Operator shall install at its own expenses metering devices at the inlets and outlets of the slum areas. The Operator shall provide 70 litres per capita per day. Slums connections shall be billed on a lumpsum basis in accordance with NMC regulation.

Bulk Water Supply refers to bulk water supply provided by the Operator upon specific request of the Regulatory Office, through Bulk Water Supply Connections, to communities outside the administrative boundaries of Nagpur Municipality. The delivery

point for these Bulk Water Services shall be the meter installed by the Operator at the Bulk Water Supply Connection. The pipe systems located downstream this meter are not included in the Service Area.

Remuneration of the Operator

Under this Contract, the Operator shall charge the customers for water supply services rendered in compliance with this Agreement according to tariff rates established by NMC, all taxes included. The Operator shall issue the corresponding water supply bills at its own name, in accordance with the Regulation set force by NMC, collect the revenue, retain the Operator's fee and return the excedent to NMC.

The Operator's fee shall include built-in incentives (i) to targeted operational efficiency levels and (ii) to ensure equitable water supply services to the poor in slums areas.

The Operator's Fee is deemed to cover all eligible costs as required to meet the objectives of the Project. The Eligible Costs comprise two components corresponding to O&M costs and to capital expenditure incurred by the Private operator.

The amount to be paid by the operator to NMC in each year (n) is the average tariff minus the average Operator's Rate, multiplied by the volume of water provided by NMC to the Operator in accordance with a Bulk Water Sale/Purchase Agreement established under the PPP Agreement, and by the targets for operational efficiency and collection in that year on the basis of performance targets indicated in the PPP Agreement.

$$GIn = (T_{avg,n} - OR_{avg,n}) Vp_n \times CTE_n \times CCE_n \quad (1)$$

GIn: Amount to paid by the Operator to NMC's account for Water Supply Services rendered by the Operator to Customers during the Charging Year "n"

$OR_{avg,n}$ = Weighted average operator's water supply rate in Rs./cu.m defined as the sum of the amounts chargeable in respect to the Service Levels according to Section 6.3, divided by the total volume of water billed to and paid by the respective customers.

$$OR_{avg,n} = \{OR.V + SOR.VS + OBWR.BWV\} \quad (2)$$

Where OR, SOR and OBWR refer to the Operator's rates applicable to the service levels (standard, slum and bulk water) established by the PPP Agreement, and V/VS/BWV refer to the volumes of water supplied according to these service levels respectively.

Vp_n = Drinking water produced and put into supply (volume of water supplied by NMC at the Delivery points in cu.m, after discounting eligible losses in raw water transmission and in treatment facilities).

CTE_n = Contractual Technical Efficiency is the targets indicated in the PPP Agreement for volume of water billed (Vb) divided by the volume of water supplied (Vp) produced and put into supply in the Charging Year "n".

$CCE_n =$ Contractual Commercial (bills collection) Efficiency is the target indicated in the PPP Agreement for the collected amount of water paid for divided by the amount of water billed.

$T_{avg, n} =$ Weighted average tariff ; sum, along the year “n”) of the amounts of Rupees billed to each tariff category divided by the total overall volume billed for in cubic meters: this is the weighted average of all tariffs (tax included) expressed “Rupees per cubic meter” (Rs/cu.m),

The amount shall be paid to NMC by the Operator from an Operator's Escrow Account for Services to be open by the operator in compliance with the PPP Agreement; all the revenue collected for water supply services shall be deposited in this Escrow Account.

The methods on the application of this formula are provided in this Schedule N of the Contract on the financial processing and control of Non Revenue Water.

The payment of the amounts due to NMC for a given month shall have to be effective at the latest the 15th of the month following the term for which they are due..

Built-in Incentive towards improving operational efficiency

The amount collected in each year by the operator is the average tariff multiplied by the volume produced and the actual technical and collections efficiencies:

$$\text{Amount collected} = T_{avg,n} \times V_{pn} \times ATE_n \times ACE_n \quad (3)$$

ATE_n is the Actual Technical Efficiency of the water supply systems operated by the Operator in Year « n », and ACE_n is the Actual Commercial Efficiency in Year “n”;

The amount that the operator makes in each year is thus the amount collected minus the amount to be paid to NMC. Rearranging the formulas we get :

Operator's remuneration =

$$OR_n (V_{pn} \times CTE_n \times CCE_n) + T_{avg,n} V_{pn} \{ (ATE_n \times ACE_n) - (CTE_n \times CCE_n) \} \quad (4)$$

The prime/penalty for the compliance with the operational performance targeted by NMC is clearly identified in the above formula.

The Operator's rates are set in the Operator's Bid, in reference to Performance Indicators Targets (KPIs), which are indicated in the RFP. The KPIs express the objectives of NMC in respect to expected improvement of the operational efficiency over the Contract period. Variations respecting the targeted operational efficiency shall have notable impact on operator's net revenues but should not affect seriously expected NMC's effective income.

In return to this clear risks allocation, the Operator should be able to undertake any appropriate action as it may consider necessary to improve the operational efficiency.

Built-in incentive to address the needs of the Poor

Here the Operator's remuneration for one cu-m of water supplied to and paid by the customers is equivalent for all the categories of customers. This mechanism aims at ensuring equitable access to water supply services.

While the applicable NMC's regulation establishes that customers in slum areas shall be billed on a lump sum basis provided that they are effectively supplied with an average of 70 litres per capita per day (lpcd), the Operator can be remunerated for each bill effectively paid by slum communities on this basis of 70 lpcd, provided that the supply to the community is measured and that the volume of water supply comply with NMC regulation.

NMC may establish a discount on the standard Operator's rate which would be applicable to slum connections; such discount shall establish the actual prime for supplying slums population.

The rules applicable to calculate the remuneration of the Operator include an incentive to provide that the operator shall take appropriate measure to prevent from wastage of water in slums areas while the slum population would pay the same rate for whichever the actual volume of water is supplied over 70 lpcd. While the Actual Volume of Water Supply to slums shall be calculated with considering a lumpsum 70 lpcd in slums which have paid their bill, delivering more than 70 lpcd shall result in reducing the Actual Technical Efficiency. This reduction of the ATE shall result in reducing the global built-in prime for improving the operational efficiency (see Formula 4)

CHAPTER-9: PROJECT BENEFITS ASSESSMENT (Social Cost Benefit Assessment)

The specific objectives of the project are (i) to improve the conditions of operation of the water supply systems of Nagpur City, (ii) to achieve uninterrupted water supply services before April 2012 including for population living in slum areas, and (iii) to ensure project's sustainability based in long-term full cost recovery of water supply operations,

Expected results of the project are:

- a private Operator is appointed by NMC to operate, maintain, commission/de-commission and refurbish NMC related infrastructure and equipments as required to operate efficiently i water supply infrastructure for a period of 25 years.
- 24x7 uninterrupted water supply is implemented in the entire city of Nagpur before April 2012 without exceptional tariff increase.
- All population of slum areas in Nagpur city can access water supply services from the municipal network.
- The reliable water supply to slum will save productive man hours to poor slum dwellers. The notional cost to economy is given below

No Water Supply to Slums (15 man day /month @ Rs. 50) loss of productive time 4 hrs / day	Rs. 750
Water Cost by tanker @ 25 lpcd + 7.5 man day/Month (loss of productive time 2 -3 Hrs / day)	Rs. 675
Water cost by Stand post to Slum @ 40 lpcd (loss of productive time 2 – 3 Hrs /day)	Rs. 342
Water Cost by individual connection @ 70 lpcd	Rs. 70
NMC Tariff / Slum dweller / Month in proposed slum policy	Rs. 35 – Rs 80 Rs. 1.20 to 2.70/day

When there is no water supply the notional cost is very high of Rs 750 per month as 50% of productive man month waste in arranging the water. The tanker water supply is cost to NMC at Rs 80 per 1000 ltr and when water supply through tankers, one of the family member to spend 2-3 hours in queue lose the productive time and often resulted in to quarrel with fellow slum dweller or tanker supplier. The annexure----- provide the list of slums with number of units, population and other details.

- NMC does not required to allocate municipal budget resources to cover eligible water supply service costs, including debt service, for infrastructure's expansion.
- All investment projects committed under JNNURM arrangements for water supply improvement in Nagpur City are fully implemented in accordance with the corresponding Financing Memoranda.
- Municipal budget can be utilized for social, health and education and other civic infrastructure instead of making up losses in water supply.

- Continuous pressurized water supply will reduce the risk of water born diseases like Jaundice, diarrhea etc.

9.1] Service Performance Objectives :-

Service performance targets aim at achieving 24/7 water supply to 100% of potential customers in the whole city since 1st of April 2012. Uninterrupted water supply services should be metered, which ever the applicable tariff setting establishes, and comply with applicable Indian Regulations.

NMC recognizes three applicable service levels:

- Full uninterrupted 24x7 open access to drinking water supply through legal metered connections.
- Uninterrupted 24x7 access to drinking water supply through legal slum connections billed on a lump sum basis for not less than 70 litre per capita per day.
- Bulk water supply to communities outside the jurisdiction of NMC through community metered connections located in the right of way of the transmission mains.
- The operational efficiency targeted expected by NMC are expressed by two key contract parameters:
- Technical Efficiency (TE), which represents the volume of water billed to eligible customers expressed as a percentage of the volume of water supplied to the distribution systems: is expected to increase from 62% to 75% while the hours of service increase from 5 hours per day to 24 hours per day.
- Commercial Efficiency (CE), which represents the amounts collected from eligible customers expressed as a percentage of the amounts billed to these customers, is expected to increase from 76% to 98%.

CHAPTER-10: PROCUREMENT STRATEGY

The contract will be awarded through a transparent international competitive bidding process (ICB) conforming to applicable Indian regulation and to international best procurement practices.

It is worth underlining that the tender involve binding 2 assignments:

- (a) To provide specific goods and works in compliance with the scope of work , technical specifications and BoQ established by NMC, in accordance with the DPR approved by JNNURM.
- (b) To manage, operate, repair, decommission and refurbish granted facilities and delivering water supply services to customers within the Service Area, including billing and collecting for granted services in compliance with NMC regulation.

The bidders will be requested to submit their bid for both assignment. The two components of the bid and bound

A pre-qualification process is envisaged, with a view to select small group of highly qualified bidders in order to help involving them in finalising RFP documentation. It would start with the call for EOI to be issued as soon as NMC approves the Strategy Report to be prepared by DRA.

Qualification criteria and requirements would include:

- (a) Eligibility (essentially related to Conflict of Interest)
- (b) Historical contract non-performance (Failure to sign contract, pending litigation)
- (c) Financial performance (profitability, cash flow, minimum turn over...
- (d) Experience in similar projects
 - 1] Completion of Infrastructure projects in India under BOT/ DBFO scheme involving co-financing and commissioning public infrastructure with O&M component during the repayment of co-financing component. (minimum investment value of 200 crores might be required.
 - 2] Long-term operation of water supply and distribution systems for towns of more than 1 Million population, under concession, lease or "Affermage" contract involving at own risks operation and maintenance of infrastructure, billing and collection of operating revenue, and customer management.

This qualification procedure may be carried out as part of the first Stage of the tender process. In this case, potential bidders having expressed interest would be invited to attend a pre-bid conference with a view to clarifying the qualification criteria and the objectives of the procurement process.

A Two Stage bidding procedure will be adopted and will proceed as follows:

- (a) The first stage bid will consist of a technical bid only, without any reference to prices, and a list of any deviations to the technical and commercial conditions set forth in the

bidding documents or any alternative technical solutions a Bidder wishes to offer, and a justification therefore, always provided that such deviations or alternative solutions do not change the basic objectives of the Project. Following evaluation by NMC of the first stage bids, NMC will invite each Bidder who meets the minimum acceptable qualification criteria and who has submitted a technically responsive first stage bid (the "Qualified Bidder") to a clarification meeting, during which the Qualified Bidder's bid will be reviewed and a Final Draft Management Contract, including a Standard Roll Out Plan attached as a Schedule thereto prepared. Only Qualified Bidders will be invited to submit a second stage bid.

- (b) The second stage bid will consist of (i) an updated technical bid incorporating all changes required by NMC as recorded during the clarification meeting and reflected in the Final Draft Management Contract, including a Standard Roll Out Plan attached as a Schedule thereto, and (ii) the commercial bid.

First Stage Bids must be delivered within 2-month period. The bidders will be entitled to access all documents available in the data room. A Site Visit and a Clarification Meeting with all interested bidders will be held within 3 weeks after closing sale of tender documents. The clarification meeting will be held separately with each bidder after 2-week evaluation period. Within not more than one month after submission of the technical proposal, NMC will invite qualified bidders to submit their financial bid on the basis of revised RFP. All second stage bids must be accompanied by a Bid security.

Action Plan and Time schedule

- Strategy Report approval July-08
- Information Memorandum September-08
- EOI August-08
- Presentations to Potential Bidders Aug-Sept-08
- RFP Sept-08
- Pre-negotiation Oct-08
- Technical Proposal Nov-08
- Evaluation of TP and RFB Dec-08
- Financial Bids Jan-09
- Closing Jan/Mar-09

Annex 1: Operational Data

Ref	Data Item	Comment	Unit	2004	2005	2006	2007	Source of data	Confidence Grade
Utility Information									
1a	Name of the Utility	Long name – up to 50 characters		Nagpur Municipal Corporation					
		Short name – up to 20 characters		NMC					
2a	Country	State country in which utility located		India					
2b	Region ¹	State region within country		Maharashtra					
3	Extent of private sector involvement	A = none; B = service contract(s); C = management contract(s); D1 = affermage; D2 = lease contract(s); E = concession contract(s); F = build, lease, operate	A-G	B	B	B	B		
3a	Type of service provider	A. Local or National Government Water Department - Not ring fenced; (ie finances for water/wastewater function are not reported separately from other government activities) B. Local or National Government Water Department - Ring fenced; (ie finances for)	A-G	A	A	A	A		
32a	Type of services provided:		A-C	C	C	C	C		
	A:Provides water service								
	B:Provides sewerage service								
	C:Provides other services								
32b	Nature of service area	1 = urban, 2 = rural, 3 = urban and rural	1-3	1	1	1	1		
P1	What best describes the utility's planning process?	A = setting budgets for the next year, B = a multi-year plan that identifies targets and resources for change and improvement, C = other (please enter description)	A-C	A	A	A	A		
R1	Who has general oversight of the utility's services and prices?	A = local, regional or national government department, B = independent board of stakeholders, C = independent service and price regulator, D = other (please enter description)	A-D	A	A	A	A		

Contact Information (1)				2004	2005	2006	2007		
1b	Contact Name, Address, Tel. #, Fax #, e-mail	Full contact details to allow communication with the node manager and peer utilities		Nagpur Municipal Corporation Water Works Department Behind Bhole Petrol Pump, Near Dik Dispensary, East High Court Road, Dharampeth, Nagpur-440010 Ph:- 0712-2565589 FAX:- 0712-2561584					
General Information (2)				2004	2005	2006	2007		
9	Month in which fiscal year starts	1 = January, 2 = February, 3 = March, 4 = April, 5 = May, 6 = June, 7 = July, 8 = August, 9 = September, 10 = October, 11 = November, 12 = December	1 - 12	4	4	4	4		
Service Area				2004	2005	2006	2007		
30	Total population in area of responsibility - water supply	Total population under notional responsibility of the utility for water supply, irrespective of whether they receive service	lack inhabitants	22,65	23,45	24,27	25,12		
30a	Total urban population of the City as per Population Statistics Yearbook		lack inhabitants	22,65	23,45	24,27	25,12		
30b	Total population in slum areas		lack inhabitants	7,14	7,39	7,65	7,92		
30c	Total number of urban households		lack connections	3,84	3,92	4	4,17		
34	Number of Towns served with Water ¹	Total number of towns, including the main city under responsibility of the utility irrespective of their service coverage.		1	1	1	1		
Staff				2004	2005	2006	2007		
36a	Total Number of Staff – Water	Total number of staff working at the utility, on water supply. Report in terms of Full Time Equivalent staff numbers (FTEs).	nos.	856	856	856	856	Crisil data book	
36b	Total Number of employees from contractors	Total number of employees working for contractors of NMC in water supply activities	nos.	96	96	96	96	Crisil data book	
36c	Total number of administrative staff		nos.	108	108	108	108	Crisil data book	
36d	Total number of staff with University grade		nos.						
36e	Total number of staff receiving training during the reported fiscal year		nos.		2			Crisil data book	

Annexe 1: Operational Data (Cont.)

Public utilities management			2004	2005	2006	2007		
HR1	Has skills and training strategy for all staff?	Yes/no	No	No	No	No		
HR2	Has an annual evaluation and performance target setting system for managers?	Yes/no	No	No	No	No		
HR3	Has an annual evaluation and performance target setting system for all staff?	Yes/no	No	No	No	No		
HR4	Has a reward and recognition programme for all staff?	Yes/no	No	No	No	No		
HR5	Has the ability to recruit and dismiss staff (within an agreed plan)?	Yes/no	No	No	No	No		
Water service (1)			2004	2005	2006	2007		
40	Population served	Population under responsibility of the utility with access to water through house connections, yard taps and public water points (either with direct service connection or within 200m of a standpost). Any population outside the utility's area of responsibility	lacks inhabitants	23,5	23,5	24,9	24,9	
40a	Population served – direct supply	Population under responsibility of the utility with access to water through house connections .	lacks inhabitants	21,15	21,15	22,41	22,41	
40b	Population served – stand pipes (Slum areas)	Population under responsibility of the utility with access to water through public water points.	lacks inhabitants	5,712	5,912	6,119	6,333	
41	Number of water connections	Number of active water connections at year-end. All active connections should be counted – residential, non-residential etc. inactive connections and connections to vacant buildings should be excluded.	lacks connections	1,91	1,98	2,02	2,07	model + cricil
41a	Number of water service connections for regular domestic users (HSC1)		lacks connections	1,42	1,42	1,44	1,98	model
41b	Number of water service connections for commercial users		nos. connections	2827	2841,000	2856	3884	Model
41c	Number of water service connections (HSC2) for slums		lacks connections	0,286431	0,2968695	0,302634	0,309753	model
41d	Number of stand pipe connections in slum areas		Nos connections	6500	6500	6500	6500	model
53	Service Connections with an operating meter	Total number of active water connections with operating meter at year end	lacks connections	1,48	1,48	1,50	1,55	cricil
53a	Service Connections for regular domestic user with an operating meter	Total number of active water connections with operating meter at year end	lacks connections	1,42	1,42	1,44	1,48	cricil
53b	Service Connections for commercial user with an operating meter	Total number of active water connections with operating meter at year end	lacks connections	0,286431	0,2968695	0,302634	0,309753	Model
53c	Service Connections for domestic user in slum with an operating meter (HSC2)	Total number of active water connections with operating meter at year end	lacks connections					
54	Length of water supply pipelines	Total length of pipes operated by the water utility including raw water and treated water, transmission and distribution lines	Km	1900,00	1950,00	2000,00	2051,00	From Crisil & Veolia
54a	Length of water distribution network	Total length of the distribution network (excluding transmission lines and service pipes.	Km	1800,00	1850,00	1900,00	1951,00	From Veolia
54b	Length of service pipes (DN<75mm)		km	140	140	140	140	From Veolia
54c	Average diameter of water distribution network	$\Sigma (\text{Length} \times \text{Diameter}) / \text{Total length}$	mm	163	163	163	163	From Veolia
54d	Length of water distribution network replaced during the fiscal year		Km	5	5	5	5	To be confirmed
54e	Number of meters replaced during the reported year		nos.					
55	Volume of water produced	Total volume of water produced for the service area, i.e. supplied by treatment works operated by the Utility and purchased treated water, if any. This is excluding volume of bulk treated water exported for services out of the service area under the respo	Million m3/year	178850000	178850000	178850000	178850000	NMC Water Audit Report
55a	Volume of water produced from groundwater		Million m3/year	NA	NA	NA	NA	
55b	Volume of water delivered with simple disinfection		Million m3/year	NA	NA	NA	NA	
55c	Number of treatment plants		nos.	5	5	5	5	NMC Water Audit Report
55d	Total design capacity of water production units		m3/day	473500	473500	473500	473500	NMC Water Audit Report
55e	Actual operating capacity of drinking water production units	Average daily flow rate supplied to the distribution networks.	m3/day	491000	491000	491000	491000	NMC Water Audit Report
55f	Number of days with treatment facilities operating at more than 90% of design capacity		days	350	350	350	350	NMC Water Audit Report
55h	Max day supply (production facilities)		m3/day	518500	518500	518500	518500	NMC Water Audit Report

Annexe-1: Operational Data (Cont.)

Water Service (2)				2004	2005	2006	2007		
58	Volume of water delivered to end user & metered	Total volume of water billed that was metered, irrespective of whether the bill is paid or not.	Million m3/year	88103700	88103700	88103700	89790000	NMC Water Audit Report	
59	Volume of water billed	Total volume of water billed (metered and unmetered) irrespective of whether the bill is paid or not. Clearly any unmetered volume must be estimated from other information about the water users.	Million m3/year	95995000	95995000	95995000	95995000	NMC Water Audit Report	
59a	Total volume of water billed to residential customers	Total volume of water billed to residential customers, split into direct supplies and public water points. The split is the same as for 40 above.	Million m3/year	63922450	63922450	63922450	63922450	NMC Water Audit Report	
59a1	Total volume of water billed to domestic customers		Million m3/year	63922450	63922450	63922450	63922450	NMC Water Audit Report	
59a2	Total volume of water delivered through public water points		Million m3/year	NA	NA	NA	NA	NMC Water Audit Report	
59b	Volume of water sold to commercial customers		Total volume of water billed, split between three types of non-residential customer.	Million m3/year	6467800	6467800	6467800	6467800	NMC Water Audit Report
59c	Total volume of water billed to institutions and others	Million m3/year		6467800	6467800	6467800	6467800	NMC Water Audit Report	
59d	Total volume of drinkable water sold in bulk	Million m3/year		3650000	3650000	3650000	3650000	NMC Water Audit Report	
Water Service (3)				2004	2005	2006	2007		
60	Number of Pipe Breaks	Total number of water pipe breaks in the distribution network during the year. Failures that require repair of mains, connections, valves and fittings that are the Utility's responsibility, are included. Repairs from active leakage control are excluded.	Lacks repairs/year	2091	2133	2175	2219	NMC Water Audit Report	
60a	Repairs from active leakage control		lacks	5471	5580	5692	5806	NMC Water Audit Report	
60b	Repairs of pipe breaks on mains,		lacks	1191	1215	1239	1264	NMC Water Audit Report	
60c	Repairs of service connections,		lacks	900	918	936	955	NMC Water Audit Report	
60d	Repairs of valves and fittings		lacks	3380	3448	3517	3587	NMC Water Audit Report	
61	Duration of supply	Average hours of service /day. This indicator measures intermittent supply systems; interruptions due to unplanned failures or rehabilitation work should be excluded.	Hrs/day	2 to 8	2 to 8	2 to 8	2 to 8	NMC Water Audit Report	
61a	Number of customers receiving an intermittent supply	residential customers who do not normally receive a 24hr/day supply.	crore inhabitants	95%	95%	95%	95%		
62	Clasification of Raw water (inflow to WTP)	A:ground water B:river water C:lake water D:reservoir water	A-D	B-D	B-D	B-D	B-D		
62a	Turbidity max in the reporting year	Turbidity max registered in the inlet of the WTP	NTU	8000-250	8000-250	8000-250	8000-250	Kanhan - Pench	
62b	Turbidity Mini in the year	Turbidity mini registered in the inet of the WTP	NTU	5	5	5	5	Kanhan - Pench	
63	Required number of tests of treated water for residual chlorine	The number of samples of potable water that are required by law/regulation to be taken from the distribution system to be tested for residual chlorine	times/year	77198	77198	81797	81797	crisil-adb	
64	Number of tests of treated water for residual chlorine carried out	The number of samples of potable water actually taken from the distribution system , that have been tested for residual chlorine	times/year	182500	182500	182500	182500	EE	
65	Number of tests of treated water for residual chlorine that passed the relevant standard	The number of samples of potable water taken from the distribution system, that have been tested for residual chlorine and comply with the standard	times/year	164250	164250	164250	164250	EE	
65a	Number of samples of water taken from the distribution network analysed for compliance with drinking water regulations			18250	18250	18250	18250	EE	
65b	Number of analysis carried out	Analysis of regulated parameters on samples taken from the distribution network		12	12	12	12	To be confirmd	
65c	Number of analysis uncompliant	id		7300	7300	7300	7300	Appx 40% of samle without chlorine	

Annexe 1: Operational Data (Cont.)

Financial Information (1)				2004	2005	2006	2007		
90c	Total W operating revenues	Total billing of water and wastewater services, connection fees, well abstraction fees, reconnection fees and other operational revenues including subsidies, but excluding all taxes and penalties.	crore Rs/year				63	model	
90e	Total W billings to regular residential customers	Water supply services. Include fixed and volumetric charges only.	crore Rs/year				24,21	model	
90f	Total W billings to institutions & commercial customers		crore Rs/year			34,85	model		
90g	Total W billings to slum users		crore Rs/year			2,07	model		
90h	Total W billings for bulk supplies of drinking water		crore Rs/year				included in commercial		
Financial Information (2)				2004	2005	2006	2007		
91	Total W (cash) income	Income actually received for water supply excluding taxes	Crore Rs/year	48,91	51,46	48,4	50,5	NMC Budget Book	
94	Total W operational expenses	Total operational expenses excluding depreciation, financing charges (interest and capital repayments) and taxes.	Crore Rs/year	45,37	42,96	48,91	57,18	NMC Budget Book	
96	Labor costs	All costs within (94) that are labour related (salaries, wages, pensions, other benefits, etc.).	Crore Rs/year	5,01	5,74	6,23	6,4	NMC Budget Book	
97	Electrical energy costs	All electrical energy costs within (94)	Crore Rs/year	21,86	21,22	20,45	28,66	NMC Budget Book	
99	Contracted out services costs	Costs of all services within Item (94) provided by private firms.	Crore Rs/year	4,8	3,97	6,79	6,76	Inclusive of M & R	
Financial Information (3)				2004	2005	2006	2007		
112a	Total Gross Fixed Assets Including Work in Progress – Water	Gross Book Value of fixed assets at year end, including work in progress	Rs	NA	NA	NA	NA	Value of assets not available	
114	Total Debt Service	Total debt service costs (Including interest and repayment of capital)	Rs Crore/year	32,08	21,11	37,11	44,51	NMC Budget Book	
120	Year end accounts receivable	Total of all accounts receivable at year end including water billings, and all other outstanding invoices.	Rs Lakhs/ year	5021	5765	6700		To be collect ffrom NMC	
Financial Information (4)				2004	2005	2006	2007		
	What are the main sources of finance for investment?			Interal reserves	Interal reserves	Interal reserves	Interal reserves		
F1	Grants or government transfers to the utility?	Yes/no		No	No	Yes (JnNurm)	Yes (JnNurm)		
F2	Borrowing from international financial agencies (multi or bi laterals)?	Yes/no		No	No	No	No		
F3	Government owned banks?	Yes/no		No	No	No	No		
F4	Commercial banks or bond holders?	Yes/no		No	No	No	No		
F5	State-owned capital	Yes/no							
F6	others	If 'other', please give details.							
Tariff Information				2004	2005	2006	2007		
The information to be provided in this section is also self-explanatory. This information									
146a	Fixed charge per month for W services for regular domestic customers	The fixed component of the bill (if any) for the provision of water services. Indicate no fixed charge with a Zero	Rs/month	50	50	50	50	Crisil	
147	Connection charges – Water	Lump sum cost for domestic HSC water connection	Rs/meter	1675	1675	1675	1675	crisil	
149a	Raw water price		Rs/m3						
149b	Comprehensive water price		Rs/m3						
149c	average Domestic water price	Applicable rate of water charges tohousholds residences	Rs/m3	3,5	3,5	3,5	3,5	R-1	
149d	average commercial water price	Applicable rate of water charges to industries and non residential units. (If more tariff categories exist, please provide related categories under codes 149e, 149f.. And subsequent	Rs/m3	20	20	20	20	NR-1	
149e	other	Institutional	Rs/m3	12,00	12,00	12,00	12,00	R-2	
149f									
149g									
				2004	2005	2006	2007		
C1	Does the utilities offer more than one level of service for household or shared water supplies (excluding free standpipes)?	Yes/no		yes	yes	yes	yes		
C3	Does the utility offer a flexible/ amortized repayment option to spread the costs of connection to the water supply network?	Yes/no		NO	NO	NO	NO		
C4	What would be the monthly water bill for a household consuming 30 m ³ of water per month through a HSC or a shared yard tap (but excluding the use of standposts)?	Monthly water bill for a household consuming 30 m ³ of water per month through a household or shared yard tap	Rs/month	97,5	97,5	97,5	97,5	Tariif	
Customer Relations				2004	2005	2006	2007		
37	Means by which customers can make a recorded complaint	A:Tick any of: letter,B: telephone, C:in person, D:email, E:other	A-E	A-C	A-C	A-C	A-C		
37a	Number of complaints – total	Total number of customer complaints during the year. Depending on the Utility's methods of recording complaints, they may have been made by letter, telephone, in person, or in	times/year		15900			only 2005 data available balance data to be collected	

Annexe 2
New Tariff Setting implemented by NMC – to be applied from April 2009 onwards

Tariff Code	Category	Unit	Average Tariff	Monthly Access charge	Tariff
			Rs per m3	Rs per month	Rs per m3
6(b)(i)	Connections without meter	Rs / tenement / month			
6(b)(i)	Residential Tariff	Rs / tenement / month			224.00
6(b)(i)	Semi Residential Tariff	Rs / tenement / month			400.00
	Institutional Tariff				1500.00
	Commercial-1				3600.00
6(b)(ii)	Slums Tariff				
	House without Slab	Rs / tenement / month			4.00
	House with Slab	Rs / tenement / month			6.00
	Multistoreyed buildings	Rs / tenement / month			9.00
9(a)	Residential Tariff				
	Upto 8 Cum	Rs / tenement / month	7.00	56.00	7.00
	Above 8 Cum and upto 15 Cum		7.47		8.00
	Above 15 Cum and upto 80 Cum		10.60		11.00
	Above 80 Cum		15.00		15.00
9(b)	Semi Residential Tariff				
	Upto 8 Cum	Rs / tenement / month	12.50	100.00	12.00
	Above 8 Cum and upto 15 Cum		12.73		13.00
	Above 15 Cum and upto 80 Cum		14.75		15.00
	Above 80 Cum		18.00		18.00
9(c)	Institutional Tariff				
	Upto 15 Cum		15.00		15.00
	Above 15 Cum and upto 80 Cum		16.63		17.00
	Above 80 Cum		20.00		20.00
	Commercial Tariff-1				
9(d)	Upto 15 Cum	Rs / connection / month	25.00		25.00
	Above 15 Cum and upto 80 Cum		45.31		50.00
	Above 80 Cum		100.00		100.00
	Commercial Tariff-2				
9 (e)	Upto 15 Cum	Rs / connection / month	60.00		60.00
	Above 15 Cum and upto 80 Cum		157.50		180.00
	Above 80 Cum		540.00		540.00

Annex 3:
NMC – Water Supply Department Nagpur – Income and Expenditures

NMC Water Supply Department Nagpur - Income and Expenditures A/c					
PARTICULARS	ACTUAL 31/03/2005	ACTUAL 31/03/2006	ACTUAL 31/03/2007	PROJECTION 31/03/2008	PROJECTION 31/03/2009
	Rs in Lakhs	Rs in Lakhs	Rs in Lakhs	Rs in Lakhs	Rs in Lakhs
Water tax as per Meter reading	5146.01	4840.70	5011.43	5500.00	7900.00
Deferred Income					
Meter Deposit	97.35	63.18	16.08	10.00	10.00
Deposit Work	26.90	0.30	7.91	5.00	5.00
SUB-TOTAL	124.25	63.48	23.99	15.00	15.00
Total Income	5270.26	4904.18	5035.42	5515.00	7915.00
Revenue Expenses					
Salary & Operating Ex.	490.92	551.97	654.30	605.00	620.00
Meter Deppt. Asthapana Ex.	83.93	71.89	77.74	100.00	110.00
Purchase of chemicals	111.58	103.81	106.94	150.00	125.00
Electricity Expenses	2110.02	2040.01	2770.71	3265.00	3000.00
License & Inspection Fee	2.38	2.39	2.26	2.25	3.00
Expenses for bringing water from Wena Project	24.23	40.64	32.68	26.00	30.00
Expenses for bringing water from Pench Project	939.35	1356.12	852.29	1200.00	1300.00
Bills preparation & Distribution Expenses	12.14	19.70	14.39	23.00	50.00
Water pollution control Board	50.16	0.00	50.00	200.00	200.00
Sample testing expenses	7.00	0.00	0.00	25.00	3.00
Misc. Expenses related to dept.	1.00	0.85	4.85	1.00	1.00
Misc. Expenses related to pench project & NURM	66.34	24.36	32.63	5.00	40.00
People awareness ex.	0.00	0.00	0.00	1.00	1.00
SUB-TOTAL	3899.05	4211.74	4598.79	5603.25	5483.00
Repair & Maintenance					
Supply system	222.86	263.45	214.24	270.00	200.00
Kanhan, Gorewada & Mahadula Project	30.85	67.08	61.12	115.00	110.00
Water Storage Expenses at Kanhan	0.55	3.90	5.40	8.00	5.00
Vehicle repairs expenses	4.53	0.16	1.27	1.00	1.00
Repairs & Maint.of building of Water Supply Depart	0.10	0.00	0.00	0.00	0.00
Water supply through Tanker	126.87	260.73	227.63	325.00	300.00
Water supply through Tanker(Minority)	11.70	84.21	73.05	75.00	75.00
SUB-TOTAL	397.46	679.53	582.71	794.00	691.00
Nilambit Expenses					
Purchase of Meter	0.00	0.06	16.08	10.00	10.00
Deposit work	38.63	10.36	7.91	5.00	5.00
Sundry Purchases for Water supply deppt.	0.83	0.21	0.00	0.00	0.00
SUB-TOTAL	39.46	10.63	23.99	15.00	15.00
Total Expenses	4335.97	4901.90	5205.49	6412.25	6189.00
SURPLUS/DEFICIT	934.29	2.28	-170.07	-897.25	1726.00

Annex 4:
NMC – Water Supply Department Nagpur – Capital Expenses

NMC Water Supply Department Nagpur - Capital Expenses					
PARTICULARS	ACTUAL 31/03/2005	ACTUAL 31/03/2006	ACTUAL 31/03/2007	PROJECTION 31/03/2008	PROJECTION 31/03/2009
	Rs in Lakhs	Rs in Lakhs	Rs in Lakhs	Rs in Lakhs	Rs in Lakhs
Capital Expenses					
Repairs in Distribution system	170.47	162.51	218.16	300.00	300.00
Bore well	20.18	14.19	33.34	50.00	75.00
Computerisation in Water supply Deptt.	10.42	0.72	3.42	5.00	5.00
New pipe line (for contaminated water)	34.40	53.65	38.06	150.00	200.00
Main new Pipe lines	0.00	60.64	306.84	350.00	400.00
Improvement in distribution of water in rural area	5.50	0.00	0.00	5.00	5.00
Supply of water in drought area	25.98	34.75	11.64	50.00	50.00
Emergency supply of water(summer season)	13.96	0.00	10.04	5.00	5.00
Water storage & water supply	14.06	15.87	0.11	1.00	1.00
Repairs at Ambazari Lake	0.00	0.00	0.00	5.00	35.00
Repairs of water tanks.	24.20	14.08	24.05	30.00	50.00
SUB TOTAL	319.17	356.41	645.66	951.00	1126.00
JNNURM					
Rahari Project	0.00	0.00	11.00	50.00	100.00
Water & Energy Audit	0.00	6.00	16.91	10.00	5.00
ICLIE	0.00	0.00	0.86	5.00	2.00
Pench project 4	10.00	35.20	38.06	60.00	100.00
Master plan for Nagpur	0.00	27.31	0.00	90.00	200.00
pench Stage 3	164.28	275.25	161.32	50.00	100.00
Repairs for kanhan project	1.22	0.00	23.56	40.00	50.00
Civil development plan	0.00	0.00	0.00	5.00	10.00
SUB TOTAL	175.50	343.76	251.71	310.00	567.00
From provision of Minority					
Improvement in Distribution system	33.24	20.70	30.87	300.00	400.00
TOTAL	527.91	720.87	928.24	1561.00	2093.00

Annexure 4 : Project Cash Flow
Annexure 4A

PROJECT CASH FLOW FOR JNNURM (All values in Rs. Crore)

Particulars	Block 1 - JNNURM Duration						Block 2 - Beyond JNNURM Duration																					
			2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
Year (O&M)	0.00		0.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00	25.00
Cash. Flow during Construction phase																												
Inflows			Construction Period 3.0 Years																									
Central Government Grant - JNNURM (50%)			188.00	47.00	47.00	47.00																						
State Government Grant (20%)			75.20	18.80	18.80	18.80																						
ULB's own contribution (30%)																												
Loans from banks/ FIs																												
Others (PPP) (30%)			112.80		28.20	56.40	28.20																					
Debentures/ Bonds																												
Beneficiary contribution																												
Sub Total (A)			376.00	65.80	94.00	122.20	94.00																					
Outflows																												
Capital expenditure (Note 1)				125.33	125.33	125.33																						
Interest during construction	12%				3.38	6.77																						
Project related Establishment charges																												
Others																												
Sub Total (B)	386.15			125.33	128.72	132.10																						
Net cash flow during Construction phase (A-B)(C)	-10.15		65.80	-31.33	-6.52	-38.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cash flow during O&M phase																												
Inflows																												
User charges (Revenue from Water bill)				114.20	146.28	168.56	204.28	235.28	248.56	264.34	276.54	298.35	318.62	337.41	358.11	386.43	408.82	434.42	398.27	433.24	469.99	518.57	563.35	616.28	676.21	730.82	803.95	885.36
Revenue grant from State Government																												
Other income (Please specify)																												
Income earmarked for the Project etc. (Note 2)																												
Others (Please specify)																												
Sub Total (D)	10296.22			114.20	146.28	168.56	204.28	235.28	248.56	264.34	276.54	298.35	318.62	337.41	358.11	386.43	408.82	434.42	398.27	433.24	469.99	518.57	563.35	616.28	676.21	730.82	803.95	885.36
Present Value	2684.00	10.00		103.81	120.89	126.64	139.52	146.09	140.31	135.65	129.01	126.53	122.84	118.26	114.10	111.94	107.65	104.00	86.67	85.71	84.53	84.79	83.74	83.28	83.07	81.62	81.62	81.72
Outflows																												
O&M charges																												
Energy Charges				38.08	41.13	44.42	47.97	51.81	55.96	60.43	65.27	70.49	76.13	82.22	88.80	95.90	103.57	111.86	120.81	130.47	143.52	157.87	173.66	191.02	210.12	231.14	254.25	279.67
Chemical & Consumables				1.70	1.84	1.98	2.14	2.31	2.50	2.70	2.91	3.15	3.40	3.67	3.97	4.28	4.63	5.00	5.39	5.83	6.29	6.80	7.34	7.93	8.56	9.25	9.99	10.78
Establishment charges				8.84	9.90	11.09	12.42	13.92	15.59	17.46	19.55	21.90	24.52	27.47	30.76	34.45	38.59	43.22	48.41	54.21	60.72	68.01	76.17	85.31	95.54	107.01	119.85	134.23
Repairs & Maintainance				9.26	10.00	10.80	11.67	12.60	13.61	14.70	15.87	17.14	18.51	19.99	21.59	23.32	25.19	27.20	29.38	31.73	34.27	37.01	39.97	43.17	46.62	50.35	54.38	58.73
Raw water charges				14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
Loan repayments (Principal)				58.03	58.03	58.03	58.03	58.03	58.03	58.03	58.03	58.03	58.03	58.03	58.03	58.03	58.03	58.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest																												
Others																												
Sub Total (E)	6127.48			129.92	134.90	140.33	146.24	152.67	159.68	167.31	175.63	184.70	194.59	205.38	217.15	229.99	244.00	259.30	217.98	236.24	258.79	283.68	311.13	341.42	374.84	411.74	452.46	497.41
Present Value	1738.47	10.00		118.11	111.49	105.43	99.88	94.80	90.13	85.86	81.93	78.33	75.02	71.98	69.19	66.62	64.25	62.07	47.44	46.74	46.55	46.38	46.25	46.14	46.05	45.98	45.94	45.91
Net cash Surplus (O&M)	4168.74		0.00	-15.72	11.38	28.23	58.04	82.61	88.88	97.03	100.91	113.64	124.03	132.03	140.96	156.44	164.82	175.11	180.28	197.00	211.20	234.89	252.23	274.86	301.37	319.09	351.49	387.95
NPV and IRR (O&M)	945.52	10.00	0.00	-14.29	9.40	21.21	39.64	51.29	50.17	49.79	47.07	48.20	47.82	46.28	44.92	45.32	43.40	41.92	39.24	38.98	37.99	38.41	37.49	37.14	37.02	35.64	35.68	35.81
Net cash flow during O&M phase (D-E) (F) (Note 4)	5039.23			42.31	69.41	86.27	116.07	140.64	146.92	155.06	158.94	171.68	182.06	190.06	199.00	214.48	222.85	233.15	180.28	197.00	211.20	234.89	252.23	274.86	301.37	319.09	351.49	387.95
IRR (O & M)	945.60	14.08		37.09	53.34	58.11	68.54	72.80	66.67	61.68	55.43	52.48	48.79	44.65	40.98	38.72	35.27	32.34	21.92	21.00	19.74	19.24	18.11	17.30	16.63	15.44	14.91	14.42
Net cash flow during Construction and O&M phase (C+F) (G)	5029.08		65.80	10.98	62.89	48.17	116.07	140.64	146.92	155.06	158.94	171.68	182.06	190.06	199.00	214.48	222.85	233.15	180.28	197.00	211.20	234.89	252.23	274.86	301.37	319.09	351.49	387.95
NPV and Project IRR (overall)	945.52	12.55	65.80	9.75	49.65	33.78	72.34	77.87	72.28	67.78	61.73	59.24	55.82	51.77	48.16	46.12	42.58	39.58	27.19	26.40	25.15	24.85	23.71	22.95	22.36	21.04	20.59	20.19

Note:

1. Provide details in Annexure 4B (optional)
2. Income earmarked for the project includes those own sources of income for the organization which is earmarked for O&M or loan repayment of the Project etc.
3. Provide details in Annexure 4C (optional)
4. NPV and IRR (O&M) should be calculated after adding back the amount of Loan repayments (Principal)

Operation & Maintenance Cost																														
Assumptions		Base	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Item	Unit	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
General Inflation	%		8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	
Inflation - Electricity	%		8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	10%	10%	10%	10%	10%	10%	10%	10%
Inflation - Establishment	%		12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%
Population growth	%		3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Residential connection growth	%		3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Other connection growth	%		0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
Revenue water	%		46%	46%	50%	54%	56%	60%	65%	67%	70%	72%	74%	75%	76%	77%	78%	79%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
Collection efficiency	%		72%	74%	77%	80%	83%	86%	88%	89%	90%	92%	92%	93%	94%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Annual Costs																														
Raw water charges to Irrigation Dep	Rs. Cr	13.6	8.5	12.0	13.0	14.0	15.1	16.3	17.6	19.0	20.6	22.2	24.0	25.9	28.0	30.2	32.6	35.2	38.1	41.1	44.4	48.0	51.8	55.9	60.4	65.2	70.5	76.1	82.2	88.8
Power	Rs. Cr	20.4	27.7	32.7	35.3	38.1	41.1	44.4	48.0	51.8	56.0	60.4	65.3	70.5	76.1	82.2	88.8	95.9	103.6	111.9	120.8	130.5	143.5	157.9	173.7	191.0	210.1	231.1	254.2	279.7
Establishment	Rs. Cr	6.2	7.0	7.1	7.9	8.8	9.9	11.1	12.4	13.9	15.6	17.5	19.6	21.9	24.5	27.5	30.8	34.5	38.6	43.2	48.4	54.2	60.7	68.0	76.2	85.3	95.5	107.0	119.9	134.2
Chemicals	Rs. Cr	1.3	1.4	1.5	1.6	1.7	1.8	2.0	2.1	2.3	2.5	2.7	2.9	3.1	3.4	3.7	4.0	4.3	4.6	5.0	5.4	5.8	6.3	6.8	7.3	7.9	8.6	9.2	10.0	10.8
Repairs and Maintenance	Rs. Cr	6.8	5.8	7.9	8.6	9.3	10.0	10.8	11.7	12.6	13.6	14.7	15.9	17.1	18.5	20.0	21.6	23.3	25.2	27.2	29.4	31.7	34.3	37.0	40.0	43.2	46.6	50.3	54.4	58.7
Depreciation	Rs. Cr	15.0	16.2	17.5	18.9	20.4	22.0	23.8	25.7	27.8	30.0	32.4	35.0	37.8	40.8	44.1	47.6	51.4	55.5	59.9	64.7	69.9	75.5	81.5	88.1	95.1	102.7	110.9	119.8	129.4
Debt service JNNURM	Rs. Cr	31.0	31.0	31.0	31.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0										
Total O&M cost	Rs. Cr	94.3	97.6	109.6	116.2	150.3	158.1	166.5	175.6	185.5	196.2	207.9	220.6	234.4	249.4	265.7	283.4	302.6	323.6	346.4	313.1	340.1	372.1	407.2	445.6	487.8	534.0	584.8	640.5	701.6

	2003-04 Actual	2004-05 Actual	2005-06 Actual	2006-07 Actual	2007-08 (BUDGET)
Establishment Expenses	501.96	574.85	623.86	640	705
Energy	2186.32	2110.02	2040.02	2770	3265
Raw water	1173.25	939.35	1356.12	852.29	1200
Other expenses	195.9	274.85	191.74	346	439
M & R	480.2	397.46	679.53	582.71	794
Total Operating Expenses	4537.63	4296.51	4891.27	5181.5	6397
Water Charges recovery	4891.2	5146.01	4840.7	5011	5500

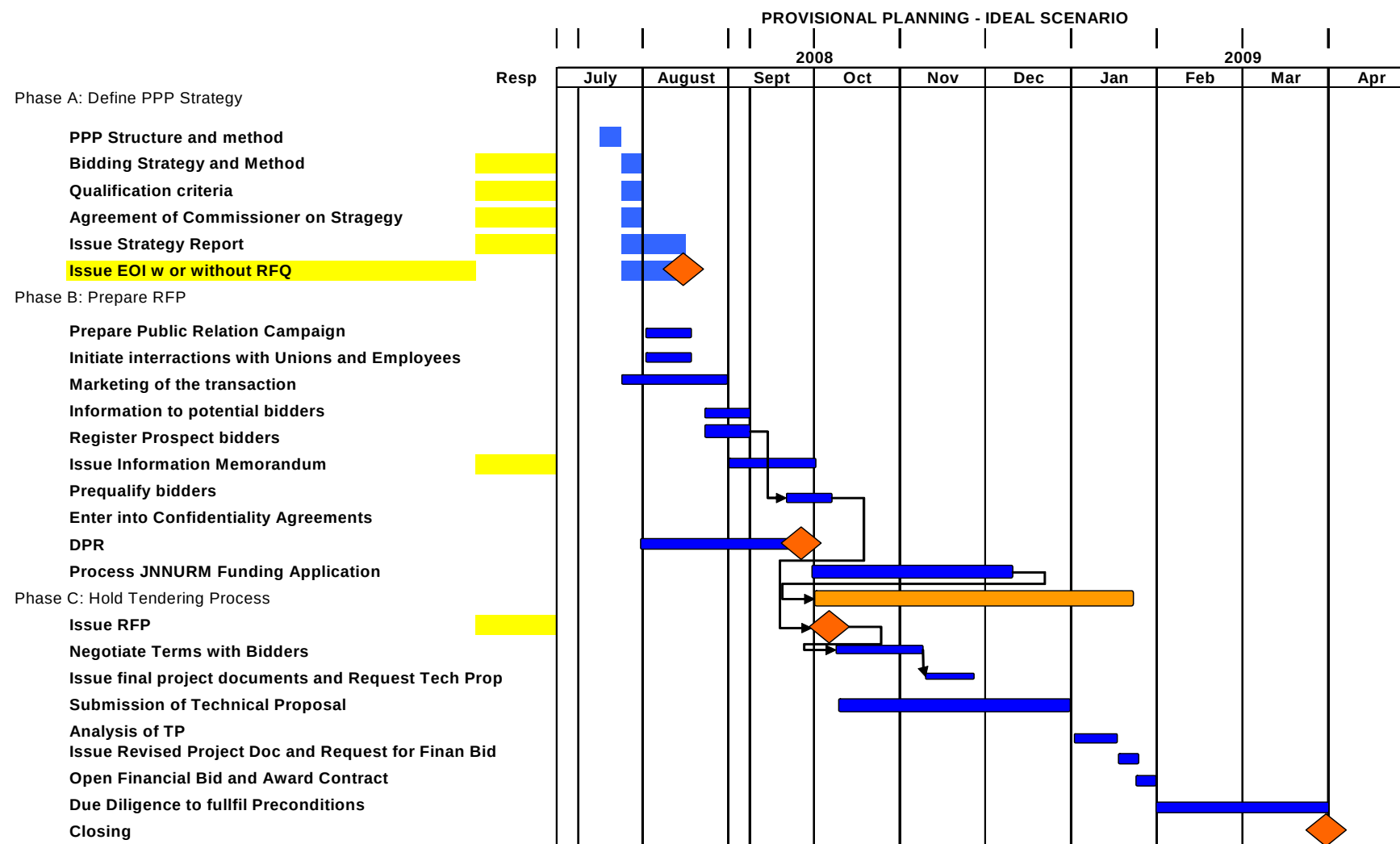
Assumptions						
Demand growth 2007 - 12						
Residential and slums 15mm	6.00%	2010- 2014			2.5%	2015 - 34
Residential and slums > 15mm	5.00%	2010- 2014			2.50%	
Institutional 15mm	2.00%	2010- 2014			1.50%	2015 - 34
Institutional >15mm	2.00%	2010- 2014				
Commercial 15mm	5.00%	2010- 2014			3%	2015 - 34
Commercial > 15mm	5.000%	2010- 2014				
Total volumetric billing		5 years by 2014				
Billing Losses	10.00%	Upto 2010			5%	up to 2012
Consumption slabs						
Residential						
Lifeline supply	8	Cum				
Second slab	15	Cum				
Thirdslab	80	Cum				
Subsidy to life line supply	-25%					
Subsidy to slums	-60%					
Surcharge for Slab and Multistoreys	50%					
Add on between 8 and 15 cum	-20%					
Above 15 cum and below 80cum	10%					
Above 80 cum	50%					
Partial Residential proportion	70%					
Surcharge for no meter	300%					
Institutional						
Upto 15cum	50%					
Above 15 cum and below 80cum	75%					
Above 80 cum	100%					
Commercial-1	150%					
Upto 30 cum						
upto 15cum						
Commercial-2	500%					
Cost recovery during 2006-07	40%					
Full cost recovery period	7	years				
Collection efficiency 2006-07	72%					
Collection efficiency by 2012	80%					

Connections															9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Category	Size	Avg Month Consump	Base 2006-07	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
Slums	15	19	30157	30157	31966	33884	35917	38073	40357	42778	45345	46479	47641	48832	50052	51304	52586	53901	55248	56630	58045	59497	60984	62509	64071	65673	67315	68998	70723	72491	74303
Metered Residential R1	15	31	191544	191544	203037	215219	228132	241820	256329	271709	288011	295212	302592	310157	317911	325858	334005	342355	350914	359687	368679	377896	387343	397027	406953	417126	427554	438243	449199	460429	471940
Metered Residential R1	20	119	1941	1941	2038	2140	2247	2359	2477	2601	2731	2868	3011	3162	3320	3486	3660	3843	4035	4237	4449	4671	4905	5150	5408	5678	5962	6260	6573	6902	7247
Metered Residential R1	25	395	884	884	928	975	1023	1075	1128	1185	1244	1306	1371	1440	1512	1588	1667	1750	1838	1930	2026	2127	2234	2346	2463	2586	2715	2851	2994	3143	3300
Metered Residential R1	40	776	197	197	207	217	228	239	251	264	277	291	306	321	337	354	371	390	410	430	452	474	498	523	549	576	605	635	667	700	735
Metered Residential R1	50	1272	131	131	138	144	152	159	167	176	184	194	203	213	224	235	247	259	272	286	300	315	331	348	365	383	402	422	444	466	489
Metered Residential R1	80	3270	20	20	21	22	23	24	26	27	28	30	31	33	34	36	38	40	42	44	46	48	51	53	56	59	61	65	68	71	75
Metered Residential R1	100	4957	12	12	13	13	14	15	15	16	17	18	19	20	21	22	23	24	25	26	28	29	30	32	33	35	37	39	41	43	45
Metered Residential R1	150	24148	4	4	4	4	5	5	5	5	6	6	6	7	7	7	8	8	8	9	9	10	10	11	11	12	12	13	14	14	15
Metered Residential R1	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metered Residential R1	250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total			194733	194733	206385	218735	231824	245696	260399	275982	292499	299923	307539	315351	323365	331585	340018	348669	357544	366648	375988	385571	395402	405488	415837	426455	437350	448528	459999	471768	483846
Metered Institutional R2	15	43	2146	2146	2189	2233	2277	2323	2369	2417	2465	2502	2540	2578	2616	2656	2695	2736	2777	2819	2861	2904	2947	2992	3036	3082	3128	3175	3223	3271	3320
Metered Institutional R2	20	104	281	281	287	292	298	304	310	316	323	329	336	343	349	356	364	371	378	386	393	401	409	418	426	434	443	452	461	470	480
Metered Institutional R2	25	321	167	170	174	177	181	184	188	192	196	200	204	208	212	216	220	225	229	234	239	243	248	253	258	263	269	274	279	285	
Metered Institutional R2	40	1968	68	68	69	71	72	74	75	77	78	80	81	83	85	86	88	90	92	93	95	97	99	101	103	105	107	109	112	114	116
Metered Institutional R2	50	2074	100	100	102	104	106	108	110	113	115	117	120	122	124	127	129	132	135	137	140	143	146	149	152	155	158	161	164	167	171
Metered Institutional R2	80	3727	36	36	37	37	38	39	40	41	41	42	43	44	45	46	47	48	48	49	50	51	52	53	55	56	57	58	59	60	61
Metered Institutional R2	100	6428	38	38	39	40	40	41	42	43	44	45	45	46	47	48	49	50	51	52	53	54	55	56	58	59	60	61	62	64	65
Metered Institutional R2	150	15971	28	28	29	29	30	30	31	32	32	33	33	34	35	36	36	37	38	38	39	40	41	42	42	43	44	45	46	47	48
Metered Institutional R2	200	42518	14	14	14	15	15	15	15	16	16	16	17	17	17	18	18	18	19	19	20	20	20	21	21	22	22	23	23	23	24
Metered Institutional R2	250	16470	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Total		89624	2880	2880	2938	2996	3056	3117	3180	3243	3308	3362	3417	3472	3529	3586	3645	3704	3765	3826	3889	3952	4017	4082	4149	4217	4286	4356	4427	4499	4573
Metered Commercial NR1	15	60	3191	3191	3351	3518	3694	3879	4073	4276	4490	4625	4764	4906	5054	5205	5361	5522	5688	5859	6034	6215	6402	6594	6792	6995	7205	7421	7644	7873	8110
Metered Commercial NR1	20	88	148	148	155	163	171	180	189	198	208	219	230	241	253	266	279	293	308	323	339	356	374	393	412	433	455	477	501	526	553
Metered Commercial NR1	25	219	83	83	87	92	96	101	106	111	117	123	129	135	142	149	157	164	173	181	190	200	210	220	231	243	255	268	281	295	310
Metered Commercial NR1	40	847	26	26	27	29	30	32	33	35	37	38	40	42	44	47	49	51	54	57	60	63	66	69	72	76	80	84	88	92	97
Metered Commercial NR1	50	868	17	17	18	19	20	21	22	23	24	25	26	28	29	31	32	34	35	37	39	41	43	45	47	50	52	55	58	60	63
Metered Commercial NR1	80	1581	4	4	4	4	5	5	5	5	6	6	6	7	7	7	8	8	8	9	9	10	10	11	11	12	12	13	14	14	15
Metered Commercial NR1	100	2017	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	4	4
Metered Commercial NR1	150	4221	2	2	2	2	2	2	3	3	3	3	3	3	3	4	4	4	4	4	5	5	5	5	6	6	6	6	7	7	7
Metered Commercial NR1	200	4893	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	4	4
Metered Commercial NR1	250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		14795	3473	3473	3647	3829	4020	4221	4433	4654	4887	5041	5201	5366	5536	5712	5893	6081	6274	6474	6681	6894	7114	7342	7577	7820	8071	8331	8599	8876	9162
Grand Total			201086	201086	212969	225560	238900	253035	268011	283880	300694	308327	316157	324189	332430	340884	349556	358454	367582	376948	386557	396417	406533	416912	427563	438492	449707	461215	473024	485144	497581

Monthly consumption Recorded																9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Category	Size	Avg Mon Consump	Base	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	
Slums	15	19	577297	577297	611935	648651	687570	728825	772554	818907	868042	889743	911986	934786	958156	982110	1006662	1031829	1057625	1084065	1111167	1138946	1167420	1196605	1226520	1257183	1288613	1320828	1353849	1387695	1422387	
Metered Residential R1	15	31	5945131	5945131	6301839	6679950	7080747	7505592	7955927	8433283	8939280	9162762	9391831	9626626	9867292	10113974	10366824	10625994	10891644	11163935	11443034	11729109	12022337	12322896	12630968	12946742	13270411	13602171	13942225	14290781	14648051	
Metered Residential R1	20	119	230413	230413	241933	254030	266731	280068	294071	308775	324214	340424	357446	375318	394084	413788	434477	456201	479011	502962	528110	554515	582241	611353	641921	674017	707718	743104	780259	819272	860235	
Metered Residential R1	25	395	348912	348912	366357	384675	403909	424104	445310	467575	490954	515502	541277	568341	596758	626595	657925	690822	725363	761631	799712	839698	881683	925767	972055	1020658	1071691	1125275	1181539	1240616	1302647	
Metered Residential R1	40	776	152927	152927	160573	168602	177032	185883	195177	204936	215183	225942	237239	249101	261556	274634	288366	302784	317923	333820	350511	368036	386438	405760	426048	447350	469718	493204	517864	543757	570945	
Metered Residential R1	50	1272	166655	166655	174988	183738	192924	202571	212699	223334	234501	246226	258537	271464	285037	299289	314254	329966	346465	363788	381977	401076	421130	442186	464296	487511	511886	537480	564354	592572	622201	
Metered Residential R1	80	3270	65401	65401	68671	72104	75710	79495	83470	87643	92026	96627	101458	106531	111858	117450	123323	129489	135964	142762	149900	157395	165265	173528	182204	191314	200880	210924	221470	232544	244171	
Metered Residential R1	100	4957	59490	59490	62464	65587	68867	72310	75926	79722	83708	87893	92288	96902	101748	106835	112177	117785	123675	129858	136351	143169	150327	157844	165736	174023	182724	191860	201453	211526	222102	
Metered Residential R1	150	24148	96591	96591	101420	106491	111816	117406	123277	129441	135913	142708	149844	157336	165203	173463	182136	191243	200805	210845	221387	232457	244079	256283	269098	282552	296680	311514	327090	343444	360616	
Metered Residential R1	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Metered Residential R1	250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total			7065519	7065519	7478246	7915177	8377735	8867429	9385857	9934709	10515777	10818084	11129919	11451619	11783535	12126029	12479481	12844285	13220849	13609601	14010982	14425455	14853501	15295617	15752326	16224168	16711707	17215533	17736255	18274512	18830968	
Metered Institutional R2	15	43	92510	92510	94361	96248	98173	100136	102139	104182	106265	107859	109477	111119	112786	114478	116195	117938	119707	121503	123325	125175	127053	128959	130893	132856	134849	136872	138925	141009	143124	
Metered Institutional R2	20	104	29177	29177	29761	30356	30963	31583	32214	32858	33516	34186	34870	35567	36278	37004	37744	38499	39269	40054	40855	41672	42506	43356	44223	45108	46010	46930	47869	48826	49802	
Metered Institutional R2	25	321	53555	53555	54626	55719	56833	57970	59129	60312	61518	62748	64003	65283	66589	67921	69279	70665	72078	73520	74990	76490	78020	79580	81172	82795	84451	86140	87863	89620	91412	
Metered Institutional R2	40	1968	133818	133818	136494	139224	142008	144848	147745	150700	153714	156789	159924	163123	166385	169713	173107	176569	180101	183703	187377	191124	194947	198846	202823	206879	211017	215237	219542	223933	228411	
Metered Institutional R2	50	2074	207366	207366	211513	215744	220059	224460	228949	233528	238198	242962	247822	252778	257834	262990	268250	273615	279087	284669	290363	296170	302093	308135	314298	320584	326995	333535	340206	347010	353950	
Metered Institutional R2	80	3727	134178	134178	136862	139599	142391	145239	148144	151107	154129	157211	160355	163563	166834	170171	173574	177045	180586	184198	187882	191640	195472	199382	203370	207437	211586	215817	220134	224536	229027	
Metered Institutional R2	100	6428	244278	244278	249164	254147	259230	264415	269703	275097	280599	286211	291935	297774	303729	309804	316000	322320	328766	335342	342048	348889	355867	362984	370244	377649	385202	392906	400764	408779	416955	
Metered Institutional R2	150	15971	447185	447185	456129	465251	474556	484048	493728	503603	513675	523949	534428	545116	556018	567139	578482	590051	601852	613889	626167	638690	651464	664494	677783	691339	705166	719269	733655	748328	763294	
Metered Institutional R2	200	42518	595253	595253	607158	619301	631687	644321	657208	670352	683759	697434	711383	725610	740122	754925	770023	785424	801132	817155	833498	850168	867171	884515	902205	920249	938654	957427	976576	996107	1016030	
Metered Institutional R2	250	16470	32940	32940	33599	34271	34956	35655	36368	37096	37838	38594	39366	40154	40957	41776	42611	43464	44333	45219	46124	47046	47987	48947	49926	50924	51943	52982	54041	55122	56225	
Total			1970261	1970261	2009666	2049860	2090857	2132674	2175328	2218834	2263211	2307944	2353563	2400087	2447533	2495920	2545266	2595590	2646912	2699252	2752630	2807066	2862581	2919197	2976937	3035821	3095873	3157116	3219574	3283271	3348231	
Metered Commercial NR1	15	60	191877	191877	201471	211544	222122	233228	244889	257133	269990	278090	286432	295025	303876	312992	322382	332054	342015	352276	362844	373729	384941	396490	408384	420636	433255	446252	459640	473429	487632	
Metered Commercial NR1	20	88	13020	13020	13671	14355	15072	15826	16617	17448	18321	19237	20198	21208	22269	23382	24551	25779	27068	28421	29842	31334	32901	34546	36273	38087	39991	41991	44091	46295	48610	
Metered Commercial NR1	25	219	18206	18206	19116	20072	21075	22129	23236	24397	25617	26898	28243	29655	31138	32695	34329	36046	37848	39741	41728	43814	46005	48305	50720	53256	55919	58715	61651	64733	67970	
Metered Commercial NR1	40	847	22030	22030	23131	24288	25502	26778	28116	29522	30998	32548	34176	35884	37679	39563	41541	43618	45799	48089	50493	53018	55669	58452	61375	64443	67665	71049	74601	78331	82248	
Metered Commercial NR1	50	868	14764	14764	15502	16277	17091	17945	18842	19785	20774	21813	22903	24048	25251	26513	27839	29231	30692	32227	33838	35530	37307	39172	41131	43187	45347	47614	49995	52494	55119	
Metered Commercial NR1	80	1581	6325	6325	6642	6974	7322	7689	8073	8477	8900	9346	9813	10303	10819	11360	11928	12524	13150	13808	14498	15223	15984	16783	17622	18503	19429	20400	21420	22491	23616	
Metered Commercial NR1	100	2017	2017	2017	2118	2224	2335	2452	2574	2703	2838	2980	3129	3286	3450	3622	3804	3994	4193	4403	4623	4854	5097	5352	5620	5900	6196	6505	6831	7172	7531	
Metered Commercial NR1	150	4221	8442	8442	8864	9307	9772	10261	10774	11313	11879	12472	13096	13751	14438	15160	15918	16714	17550	18427	19349	20316	21332	22399	23519	24695	25929	27226	28587	30016	31517	
Metered Commercial NR1	200	4893	4893	4893	5137	5394	5664	5947	6245	6557	6885	7229	7590	7970	8368	8787	9226	9687	10172	10680	11214	11775	12364	12982	13631	14313	15028	15780	16569	17397	18267	
Metered Commercial NR1	250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0		281573	281573	295652	310435	325956	342254	359367	377335	396202	410612	425581	441131	457287	474074	491518	509646	528488	548072	568430	589594	611600	634481	658275	683021	708759	735532	763384	792360	822510	
Grand Total in Cum per month			9317353	9317353	9783564	10275471	10794548	11342358	11920551	12530878	13175190	13536640	13909063	14292838	14688355	15096023	15516265	15949521	16396249	16856924	17332042	17822115	18327681	18849295	19387537	19943009	20516340	21108181	21719213	22350143	23001709	
Daily average Billed volume in in MLD			306	306	322	338	355	373	392	412	433	445	457	470	483	496																

DINESH RATHI & ASSOCIATES, Nagpur

		Year	Base 2006-07	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
Tariff calculations																															
O&M Costs+meter costs	Rs. Cr		97.58	97.58	114.54	121.40	155.87	163.93	172.68	182.17	192.46	203.39	215.25	228.13	242.11	257.29	273.78	291.69	311.16	332.33	355.34	322.33	349.55	381.78	417.10	455.80	498.24	544.76	595.78	651.75	713.16
Cost recovery ratio	%		40%	40%	49%	57%	66%	74%	83%	91%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Collection efficiency	%		72%	72%	73%	75%	77%	78%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
Average tariff required	Rs./Cum		4.87	4.87	6.46	7.50	10.32	11.42	12.50	13.85	15.22	15.65	16.12	16.63	17.17	17.75	18.38	19.05	19.77	20.54	21.36	18.84	19.87	21.10	22.41	23.81	25.30	26.88	28.57	30.38	32.30
Tariff for slums	Rs./Cum		2.00	2.00	3.00	3.00	4.00	5.00	5.00	6.00	6.00	6.00	6.00	7.00	7.00	7.00	7.00	8.00	8.00	8.00	9.00	8.00	8.00	8.00	9.00	10.00	10.00	11.00	11.00	12.00	13.00
Monthly flat charge for slums	Rs./month		16.00	16.00	24.00	24.00	32.00	40.00	40.00	48.00	48.00	48.00	48.00	56.00	56.00	56.00	56.00	64.00	64.00	64.00	72.00	64.00	64.00	64.00	72.00	80.00	80.00	88.00	88.00	96.00	104.00
Residential Lifetime 8 cum	Rs./Cum		4.00	4.00	5.00	6.00	8.00	9.00	9.00	10.00	11.00	12.00	12.00	12.00	13.00	13.00	14.00	14.00	15.00	15.00	16.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	23.00	24.00
Residential above 8 -upto 15 cum	Rs./Cum		4.00	4.00	5.00	6.00	8.00	9.00	10.00	11.00	12.00	13.00	13.00	13.00	14.00	14.00	15.00	15.00	16.00	16.00	17.00	15.00	16.00	17.00	18.00	19.00	20.00	22.00	23.00	24.00	26.00
Residential above 15 - upto 80cum	Rs./Cum		5.00	5.00	7.00	8.00	11.00	13.00	14.00	15.00	17.00	17.00	18.00	18.00	19.00	20.00	20.00	21.00	22.00	23.00	23.00	21.00	22.00	23.00	25.00	26.00	28.00	30.00	31.00	33.00	36.00
Residential above 80cum	Rs./Cum		7.00	7.00	10.00	11.00	15.00	17.00	19.00	21.00	23.00	23.00	24.00	25.00	26.00	27.00	28.00	29.00	30.00	31.00	32.00	28.00	30.00	32.00	34.00	36.00	38.00	40.00	43.00	46.00	48.00
Institutional upto 15 cum	Rs./Cum		7.00	7.00	10.00	11.00	15.00	17.00	19.00	21.00	23.00	23.00	24.00	25.00	26.00	27.00	28.00	29.00	30.00	31.00	32.00	28.00	30.00	32.00	34.00	36.00	38.00	40.00	43.00	46.00	48.00
Institutional above 15 upto 80 cum	Rs./Cum		9.00	9.00	11.00	13.00	18.00	20.00	22.00	24.00	27.00	27.00	28.00	29.00	30.00	31.00	32.00	33.00	35.00	36.00	37.00	33.00	35.00	37.00	39.00	42.00	44.00	47.00	50.00	53.00	57.00
Institutional above 80 cum	Rs./Cum		10.00	10.00	13.00	15.00	21.00	23.00	25.00	28.00	30.00	31.00	32.00	33.00	34.00	36.00	37.00	38.00	40.00	41.00	43.00	38.00	40.00	42.00	45.00	48.00	51.00	54.00	57.00	61.00	65.00
Commercial-1	Rs./Cum		12.00	12.00	16.00	19.00	26.00	29.00	31.00	35.00	38.00	39.00	40.00	42.00	43.00	44.00	46.00	48.00	49.00	51.00	53.00	47.00	50.00	53.00	56.00	60.00	63.00	67.00	71.00	76.00	81.00
Commercial-2	Rs./Cum		29.00	29.00	39.00	45.00	62.00	69.00	75.00	83.00	91.00	94.00	97.00	100.00	103.00	107.00	110.00	114.00	119.00	123.00	128.00	113.00	119.00	127.00	134.00	143.00	152.00	161.00	171.00	182.00	194.00
Check for income billed	Size MM	Cum/month	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores	Rs. Crores
Slums	15	19	0.58	0.58	0.92	0.98	1.38	1.83	1.94	2.46	2.61	2.68	2.74	3.28	3.36	3.45	3.53	4.14	4.24	4.35	5.02	4.57	4.68	4.80	5.54	6.30	6.46	7.29	7.47	8.35	9.27
Metered Residential R1	15	31	32.22	32.22	45.63	56.38	81.15	99.68	112.74	129.63	153.68	162.83	172.73	177.04	193.31	204.41	215.54	227.51	246.27	259.35	272.47	251.13	271.84	293.42	323.75	347.38	380.21	418.16	445.34	486.91	538.79
Metered Residential R1	20	119	1.53	1.53	2.24	2.66	3.82	4.64	5.31	6.07	7.10	7.51	8.26	8.82	9.73	10.65	11.42	12.47	13.67	14.88	15.91	14.94	16.62	18.42	20.78	22.90	25.63	28.64	31.62	35.43	39.76
Metered Residential R1	25	395	2.75	2.75	4.10	4.76	6.82	8.16	9.52	11.00	12.71	13.37	14.66	15.94	17.45	19.05	20.66	22.49	24.49	26.59	28.72	26.53	29.76	33.25	37.20	41.26	45.85	50.81	57.03	64.02	70.57
Metered Residential R1	40	776	1.24	1.24	1.86	2.16	3.09	3.68	4.31	4.99	5.75	6.04	6.63	7.23	7.90	8.62	9.37	10.19	11.08	12.03	13.02	11.99	13.47	15.07	16.83	18.69	20.75	22.96	25.84	29.02	31.89
Metered Residential R1	50	1272	1.37	1.37	2.06	2.38	3.41	4.06	4.76	5.51	6.35	6.67	7.31	7.98	8.72	9.51	10.34	11.25	12.23	13.27	14.37	13.23	14.87	16.64	18.58	20.64	22.89	25.32	28.54	32.05	35.18
Metered Residential R1	80	3270	0.55	0.55	0.82	0.94	1.35	1.61	1.89	2.19	2.52	2.65	2.90	3.17	3.46	3.78	4.11	4.47	4.86	5.27	5.71	5.25	5.90	6.61	7.38	8.20	9.09	10.05	11.34	12.74	13.96
Metered Residential R1	100	4957	0.50	0.50	0.75	0.86	1.23	1.47	1.72	2.00	2.30	2.41	2.65	2.89	3.16	3.44	3.75	4.08	4.43	4.81	5.21	4.79	5.38	6.03	6.73	7.48	8.29	9.17	10.34	11.62	12.73
Metered Residential R1	150	24148	0.81	0.81	1.22	1.40	2.01	2.39	2.81	3.26	3.75	3.93	4.31	4.72	5.15	5.61	6.11	6.65	7.22	7.84	8.49	7.80	8.78	9.83	10.97	12.19	13.51	14.94	16.86	18.94	20.75
Metered Residential R1	200	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Metered Residential R1	250	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0	0	41.54	41.54	59.58	72.52	104.25	127.52	145.00	167.12	196.77	208.10	222.18	231.07	252.25	268.53	284.84	303.26	328.50	348.39	368.92	340.24	371.31	404.07	447.75	485.04	532.69	587.33	634.38	699.06	772.91
Metered Institutional R2	15	43	0.92	0.92	1.21	1.42	2.00	2.28	2.57	2.87	3.27	3.31	3.50	3.68	3.87	4.07	4.27	4.47	4.78	5.00	5.22	4.70	5.07	5.46	5.85	6.36	6.78	7.32	7.93	8.56	9.25
Metered Institutional R2	20	104	0.31	0.31	0.40	0.48	0.68	0.77	0.86	0.97	1.09	1.12	1.19	1.25	1.32	1.															





24 x 7 Water Supply Project For Nagpur City

Jin Nurm

6, Tatyatope Nagar, West High Court Road, Nagpur – 440 015 [M.S.] India
Ph. : 0712-2225566, 2241911/21/22, 2223813, Fax : 0712-2241912,
E-mail : dra.nagpur@gmail.com; dra.municipal@gmail.com
Website : www.dineshrathi.com



ABSTRACT FOR ESTIMATED PROJECT COST

Name of Work :- 24x7 Water Supply Project Nagpur

Estimated Project Cost

Sr.No	Name of Particulars	Unit	Qty.		Amount Estimated Cost (In Rs.)
1	Inside Slum				
	i) Replacment of Pipeline inside Slum.	RMT	175933	220037269.60	440074539.20
	ii) House Sevice Connection (inside Slum)	No.s	124274	220037269.60	
2	Outside Slum				
	i) Replacment of Pipeline of different diameter.	RMT	298914	876032211.88	2555764284.59
	ii) House Sevice Connection (Outside Slum)	No.s	196360	1679732072.71	
3	Specials (Outside Slum & inside Slum)				160561144.40
4	Repairs of pipe & Specials				85396691.78
5	Electro magnetic Meter	No.s	100.00		76424960.00
6	Rehabilitation of ESRs	No.s	28.00		82628000.00
7	Rehabilitation of Pench II WTP	No.s	1.00		64590000.00
8	Replacment of Sluice Gates & Valves	No.s	28.00		35926905.36
9	Developing billing Software	No.s	1.00		20000000.00
10	Other Works				16844120.60
	Total				3538210645.93
	Total BOQ (in RS) say				3539000000.00
	Add @ 3% Contingencies				106170000.00
	Add @ 0.75% Project Prepration & Desgin Consultancy				26542500.00
	Add @ 3.5% Project Management Consultancy				123865000.00
	Grand Total RS.				3795577500.00
	Say RS.				3800000000.00

Project Financing (Under JnNURM)					
1	Govt. of India (Central Govt.share under Projecct)			50%	1900000000.00
2	Govt. of Maharashtra (state Govt. share under project)			20%	760000000.00
3	Operator's Finance (ULB i.e NMC's share under project)			30%	1140000000.00
	Total			100%	3800000000.00

**DETAILED ESTIMATE FOR 24X7 WATER
SUPPLY PROJECT NAGPUR**

PACKAGE A - Rehabilitation cost of Nagpur City**Name of work :- 24 X 7, Water Supply Project for Nagpur City**

Estimated Cost Rs.				3,538,881,188	
Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
01]	Excavation for pipeline trenches in all classification of soil as directed including cutting road surface of all types (Asphalt, WBM, concrete, B.S. Slabs) and disposing the excavation stuff with all lead and lift, danger lighting and use of sight rails, boning rods shoring & strutting wherever required including excavation in watery situation or foul condition including bailing out of water from the trench and its surrounding for replacement of section of damaged pipe/ laying new or parallel pipe, replacement of consumer connections, laying distribution network in slums, repairs using pipe pieces & / or specials, repairs using only by field welding, repairs of lead joints by new lead joints only, repairs of joints by leak repair clamps & repairs of valves and appurtenance etc as detailed in A to K below. The cost shall be inclusive of all taxes inspection charges, insurance, transportation including loading, unloading, stacking, rolling and lowering into trenches, laying true to line and level with a minimum cover of one meter from top of socket of the pipe and perfect jointing including cost of jointing				
	including cost of jointing, material, and refilling the pipe line trenches with selected available earth obtained from trench excavation or from borrow pit with all lead and lift including watering and consolidation in layers of 150 mm thick and disposing of the surplus earth as directed for the following pipes/joints.				
A]	Replacement of CI pipeline of different dia. with CI LA class pipes confirming to IS 1536:1989 with latest amendments. The replaced pipe / materials may be shifted to the site as directed by the Engineer. (Item includes cost of pipe but excluding cost of specials)				
ii)	100 mm dia	Rmtr	2140	2623.52	5614280.33
iii)	150 mm dia	Rmtr	1715	3658.47	6272446.82
B]	Replacement of CI/D.I./M.S pipeline of different dia. with D.I. pipes confirming to IS 8329 with latest amendments. The replaced pipe / materials may be shifted to the site as directed by the Engineer. (Item includes cost of pipe but excluding cost of specials)				
i)	100 mm dia	Rmtr	213998	2072.92	443600734.2
ii)	150 mm dia	Rmtr	45281	2884.37	130607158
iii)	200 mm dia	Rmtr	15122	3184.07	48149506.54
iv)	250 mm dia	Rmtr	10153	4166.94	42306941.82
v)	300 mm dia	Rmtr	2599	5218.31	13562387.69
vi)	350 mm dia	Rmtr	1614	6407.16	10341156.24
vii)	400 mm dia	Rmtr	1718	7689.82	13211110.76
viii)	450 mm dia	Rmtr	500	9133.57	4566785
ix)	500 mm dia	Rmtr	500	10653.44	5326720
x)	600 mm dia	Rmtr	100	14000.81	1400081
xi)	700 mm dia	Rmtr	910	17741.11	16144410.1

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
C]	Replacement of MS pipe line of different dia with MS pipes conforming to suitable IS with latest amendments. The replaced pipe / materials may be shifted to the stores as directed by the Engineer. (Item includes cost of pipe but excluding cost of specials)				
i)	400 mm dia	Rmtr	100	8070.31	807031
ii)	450 mm dia	Rmtr	100	8891.31	889131
iii)	500 mm dia	Rmtr	100	9686.74	968674
iv)	600 mm dia	Rmtr	100	11516.62	1151662
v)	700 mm dia	Rmtr	100	13286.05	1328605
vi)	2000 mm dia	Rmtr	2065	43614.09	90063095.85
D]	Replacement of G.I/PVC pipeline of different dia. with MDPE pipes (Medium class) for replacement of consumer connections. The replaced pipe / materials may be shifted to the site as directed by the Engineer.(Item includes cost of pipe & specials)				
	Assumption: pipe length=10m for outside the slum				
	Dia 15 mm	Rmtr	1009470	135.00	136278450
	Dia 20 mm	Rmtr	12480	145.00	1809600
	Dia 25 mm	Rmtr	6190	167.00	1033730
	Dia 40 mm	Rmtr	1545	287.00	443415
	Dia 50 mm	Rmtr	2490	390.00	971100
	Dia 75 mm	Rmtr	620	571.00	354020
	Assumption: pipe length=5m for inside the slum				
	Dia 15 mm	Rmtr	372820	135.00	50330700
	Dia 20 mm	Rmtr	124275	145.00	18019875
	Dia 25 mm	Rmtr	24855	167.00	4150785
	Dia 40 mm	Rmtr	6215	287.00	1783705
E]	Replacement of G.I/PVC pipeline of different dia. with HDPE pipes (PE-100) for distribution network in slums. The replaced pipe / materials may be shifted to the site as directed by the Engineer.(Item includes cost of pipe & specials)				
	Dia 75 mm	Rmtr	2099	528.83	1110126.31
	Dia 110 mm	Rmtr	69974	839.10	58715183.4
	Dia 140 mm	Rmtr	50561	1243.88	62892018.92
	Dia 160 mm	Rmtr	50561	1536.55	77689605.67
	Dia 200 mm	Rmtr	2738	2272.54	6222339.1
F]	Repair of CI/ D.I pipe line using CI/DI pipe pieces and /or specials like bends, collars, tees, sockets, reducers, etc., using necessary materials, cutting, complete (including lead jointing) but excluding cost of pipes & specials.				
i)	80 mm dia	Each	702	2332.80	1637688.7
ii)	100 mm dia	Each	959	2332.80	2236872.86
iii)	150 mm dia	Each	317	2335.80	739722.61
iv)	200 mm dia	Each	156	3518.80	548578.26
v)	250 mm dia	Each	101	3527.80	357285.08
vi)	300 mm dia	Each	110	4944.60	545626.99
vii)	350 mm dia	Each	107	5306.60	569242.17
viii)	400 mm dia	Each	94	7638.41	716395.32
ix)	450 mm dia	Each	48	7656.06	366333.07
x)	500 mm dia	Each	42	8162.20	339733.13
xi)	600 mm dia	Each	41	13048.00	532524.27
xii)	700 mm dia	Each	35	14078.00	491280.25

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
G]	Repair of leakages MS pipe line of different dia including excavation, dewatering, testing & refilling etc complete including cost of piece of pipe upto 2 m length or special.				
I)	150 mm dia.	Each	1	7461.54	7461.54
ii)	200 mm dia	Each	1	8939.54	8939.54
iii)	250 mm dia	Each	1	10572.23	10572.23
iv)	300 mm dia.	Each	1	13155.72	13155.72
v)	400 mm dia	Each	1	18773.69	18773.69
vi)	450 mm dia	Each	1	20290.37	20290.37
vii)	500 mm dia	Each	1	21923.06	21923.06
viii)	600 mm dia	Each	1	29622.23	29622.23
ix)	700 mm dia	Each	1	32891.60	32891.6
x)	2000 mm Dia	Each	1		
H]	Repair of leakages MS pipe line of different dia only by field welding including excavation, dewatering, testing & refilling etc complete excluding cost of pipe and special.				
I)	150 mm dia.	Each	1	2900.00	2900
ii)	200 mm dia	Each	1	2984.46	2984.46
iii)	250 mm dia	Each	1	3068.93	3068.93
iv)	300 mm dia.	Each	1	3153.40	3153.4
v)	400 mm dia	Each	1	5493.93	5493.93
vi)	450 mm dia	Each	1	5578.39	5578.39
vii)	500 mm dia	Each	1	5662.86	5662.86
viii)	600 mm dia	Each	1	7267.59	7267.59
ix)	700 mm dia	Each	1	7436.52	7436.52
I]	Plugging / repairing of leakages in lead joints of CI/MS pipe line of different dia. by making new lead joint. without removing the pipe.				
i)	80 mm dia	Each	1404	1360.80	1910636.82
ii)	100 mm dia	Each	1726	1360.80	2348716.5
iii)	150 mm dia	Each	633	1360.80	861901.29
iv)	200 mm dia	Each	312	1935.80	603579.51
v)	250 mm dia	Each	203	1935.80	392104.12
vi)	300 mm dia	Each	221	3317.80	732225.55
vii)	350 mm dia	Each	322	3667.80	1180341.32
viii)	400 mm dia	Each	563	6018.20	3386629.15
ix)	450 mm dia	Each	239	6018.20	1439817.4
x)	500 mm dia	Each	208	6518.20	1356526.72
xi)	600 mm dia	Each	301	11990.00	3609399.22
xii)	700 mm dia	Each	136	12990.00	1760979.74

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
J]	Plugging / repairing of leakages in joints of CI/DI/MS pipe line of different dia. by using Leak Repair Clamps without removing the pipe.				
i)	80 mm dia	Each	1404	660.40	927237.33
ii)	100 mm dia	Each	1726	660.40	1139838.61
iii)	150 mm dia	Each	633	660.40	418283.08
iv)	200 mm dia	Each	312	950.40	296333.28
v)	250 mm dia	Each	203	950.40	192507.37
vi)	300 mm dia	Each	221	1655.80	365428.62
vii)	350 mm dia	Each	322	1853.30	596413.81
viii)	400 mm dia	Each	563	2964.10	1667991.67
ix)	450 mm dia	Each	239	2964.10	709142.73
x)	500 mm dia	Each	208	3259.10	678263.36
xi)	600 mm dia	Each	301	5815.00	1750513.47
K]	Repairing of valves and appurtenance . The repalced pipe/ material may be shifted to the stores as directed by the Engineer.				
	a) Without spares but including jointing materials.				
	Scour valve:				
i)	80 mm dia	Each	1	2243.96	2243.96
ii)	100 mm dia	Each	1	2698.96	2698.96
iii)	150 mm dia	Each	1	3475.06	3475.06
iv)	200 mm dia	Each	1	5937.35	5937.35
v)	250 mm dia	Each	1	7893.85	7893.85
vi)	300 mm dia	Each	1	8013.45	8013.45

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
	Air valves:				
i)	15 mm dia	Each	1	864.92	864.92
ii)	20 mm dia	Each	1	864.92	864.92
iii)	25 mm dia	Each	1	864.92	864.92
iv)	40 mm dia	Each	1	864.92	864.92
v)	80 mm dia	Each	1	1161.32	1161.32
vi)	100 mm dia	Each	1	1161.32	1161.32
vii)	150 mm dia	Each	1	1274.36	1274.36
	Butterfly valves:				
i)	Dia.400 mm	Each	1	11249.45	11249.45
iii)	Dia.450 mm	Each	1	13272.95	13272.95
iv)	Dia.500 mm	Each	1	15467.45	15467.45
v)	Dia.600 mm	Each	1	18617.45	18617.45
vi)	Dia.700 mm	Each	1	22434.20	22434.2
	Sluice valves:				
i)	Dia.80 mm	Each	1	2243.96	2243.96
ii)	Dia.100 mm	Each	1	2698.96	2698.96
iii)	Dia.150 mm	Each	1	3475.06	3475.06
iv)	Dia.200 mm	Each	1	5412.35	5412.35
v)	Dia.250 mm	Each	1	7368.85	7368.85
vi)	Dia.300 mm	Each	1	7488.45	7488.45
vii)	Dia.350 mm	Each	1	9893.45	9893.45
viii)	Dia.400 mm	Each	1	11249.45	11249.45
ix)	Dia.450 mm	Each	1	13272.95	13272.95
x)	Dia.500 mm	Each	1	15467.45	15467.45
xi)	Dia.600 mm	Each	1	18617.45	18617.45
xii)	Dia.700 mm	Each	1	22434.20	22434.2
	Pressure relief valves				
i)	Dia.80 mm	Each	1	2243.96	2243.96
ii)	Dia.100 mm	Each	1	2698.96	2698.96
iii)	Dia.150 mm	Each	1	3475.06	3475.06
iv)	Dia.200 mm	Each	1	5412.35	5412.35
v)	Dia.250 mm	Each	1	7368.85	7368.85
vi)	Dia.300 mm	Each	1	7488.45	7488.45
vii)	Dia.350 mm	Each	1	9893.45	9893.45
viii)	Dia.400 mm	Each	1	11249.45	11249.45
	b) Including spare parts.				
	Scour valve:				
i)	80 mm dia	Each	1	2843.96	2843.96
ii)	100 mm dia	Each	1	3298.96	3298.96
iii)	150 mm dia	Each	1	4175.06	4175.06
iv)	200 mm dia	Each	1	6637.35	6637.35
v)	250 mm dia	Each	1	8793.85	8793.85
vi)	300 mm dia	Each	1	8913.45	8913.45
	Air valves:				
i)	15 mm dia	Each	1	1364.92	1364.92
ii)	20 mm dia	Each	1	1364.92	1364.92
iii)	25 mm dia	Each	1	1564.92	1564.92
iv)	40 mm dia	Each	1	1864.92	1864.92
v)	80 mm dia	Each	1	2361.32	2361.32
vi)	100 mm dia	Each	1	2661.32	2661.32
vii)	150 mm dia	Each	1	3074.36	3074.36
	Butterfly valves:				
i)	Dia.400 mm	Each	1	12749.45	12749.45
iii)	Dia.450 mm	Each	1	14772.95	14772.95
iv)	Dia.500 mm	Each	1	16967.45	16967.45
v)	Dia.600 mm	Each	1	20617.45	20617.45
vi)	Dia.700 mm	Each	1	24434.20	24434.2

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
	Sluice valves:				
i)	Dia.80 mm	Each	1	2843.96	2843.96
ii)	Dia.100 mm	Each	1	3298.96	3298.96
iii)	Dia.150 mm	Each	1	4175.06	4175.06
iv)	Dia.200 mm	Each	1	6112.35	6112.35
v)	Dia.250 mm	Each	1	8268.85	8268.85
vi)	Dia.300 mm	Each	1	8388.45	8388.45
vii)	Dia.350 mm	Each	1	10593.45	10593.45
viii)	Dia.400 mm	Each	1	12749.45	12749.45
ix)	Dia.450 mm	Each	1	14772.95	14772.95
x)	Dia.500 mm	Each	1	16967.45	16967.45
xi)	Dia.600 mm	Each	1	20617.45	20617.45
xii)	Dia.700 mm	Each	1	24434.20	24434.2
	Pressure relief valves				
i)	Dia.80 mm	Each	1	2843.96	2843.96
ii)	Dia.100 mm	Each	1	3298.96	3298.96
iii)	Dia.150 mm	Each	1	4175.06	4175.06
iv)	Dia.200 mm	Each	1	6287.35	6287.35
v)	Dia.250 mm	Each	1	8443.85	8443.85
vi)	Dia.300 mm	Each	1	8563.45	8563.45
vii)	Dia.350 mm	Each	1	11318.45	11318.45
viii)	Dia.400 mm	Each	1	13274.45	13274.45
02]	Proving D.I.Pipes with internal cement mortar lining including all taxes, insurance, railway freight, unloading from railway wagon, loading into truck, transport to departmental stores / sites loading / unloading, stacking, etc, complete. (For repair work)				
	Dia.150 mm	Rmtr	500	2518.80	1259400
	Dia.200 mm	Rmtr	500	2763.60	1381800
	Dia.250 mm	Rmtr	500	3711.00	1855500
	Dia.300 mm	Rmtr	500	4710.70	2355350
	Dia.350 mm	Rmtr	500	5816.10	2908050
	Dia.400 mm	Rmtr	500	6935.50	3467750
	Dia.450 mm	Rmtr	500	8361.60	4180800
	Dia.500 mm	Rmtr	500	9736.30	4868150
	Dia.600 mm	Rmtr	500	12860.20	6430100
	Dia.700 mm	Rmtr	500	16411.70	8205850
03]	Providing and supplying ISI mark C.I./S pipes of following class and diameter including all taxes (Central and Local) insurance, railway freight, unloading from railway wagon, loading into trucks,, unloading stacking etc. complete. (For repair work)				
	Dia.80 mm	Rmtr	500	1191.80	595900
	Dia.100 mm	Rmtr	500	1456.70	728350
	Dia.150 mm	Rmtr	500	2279.70	1139850
	Dia.200 mm	Rmtr	500	3292.90	1646450
04]	Providing and Supplying ISI Standard D.I.specials & fitting with sealing rubber gasket of SBR,complete with cast iron follower gland and Mild Steel Nut Bolt coated or otherwise protected from rusting and suitable for D.I. pipe including transportation to store / site, loading and unloading including all taxes etc. complete. (For all types of specials, bends, tees etc.).				
	80 mm to 300 mm	MT	308	80880.80	24903198.32
	350 mm to 700 mm	MT	204	75628.80	15405586.56

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
05]	Providing and supplying ISI standard CI flanged / S&S specials including all taxes (Central and Local), railway freight, insurance, unloading from railway wagon, loading into truck transport to departmental store site, unloading stacking etc. complete.				
	i) Upto and including 150 mm dia (C.I.S/S)	MT	390	6512.48	2539867.2
	ii) Above 150 mm dia (C.I.S/S)	MT	95	6932.64	658600.8
	i) Upto and including 150 mm dia(C.I.Flanged)	MT	92	7352.80	676457.6
	ii) Above 150 mm dia. (C.I.Flanged)	MT	298	6302.40	1878115.2
06]	Providing C.I. Mechanical joint Double Socket Reducers as described in Table-21 of I.S.13382/1992 complete with sealing rubber gasket of SBR dimensionally described in IS-12820/1989 with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I./D.I. pipes.				
	100 X 80	Each	1	2311.93	2311.93
	150 X 100	Each	453	3638.59	1648281.27
	200 X 100	Each	1	3851.82	3851.82
	200 X 150	Each	55	4432.69	245571.03
	250 X 150	Each	45	4847.60	218142
	250 X 200	Each	38	6624.87	251745.06
	300 X 150	Each	25	6464.16	161604
	300 X 200	Each	44	8146.90	358463.6
	300 X 250	Each	17	8160.56	138729.52
	350 X 200	Each	13	8301.31	107917.03
	350 X 250	Each	24	11728.77	281490.48
	350 X 300	Each	36	11765.53	423559.08
	400 X 250	Each	11	11626.88	127895.68
	400 X 300	Each	15	17716.05	265740.75
	400 X 350	Each	11	15694.03	172634.33
	450 X 300	Each	2	15799.07	31598.14
	450 X 350	Each	3	19618.32	58854.96
	450 X 400	Each	4	19605.72	78422.88
	500 X 350	Each	2	19362.02	38724.04
	500 X 400	Each	4	23584.63	94338.52
	500 X 450	Each	5	23224.34	116121.7
	600 X 400	Each	1	22638.22	22638.22
	600 X 450	Each	1	34246.19	34246.19
	600 X 500	Each	1	33329.19	33329.19
07]	Supply of CI Mechanical joints C.I.Flanged Socket Tail Pieces as described in Table-11 of IS-13382/1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820) complete with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I. pipes & D.I. Pipes				
	Dia.80 mm	Each	264	1218.46	321186.06
	Dia.100 mm	Each	1318	1327.71	1749921.78
	Dia.150 mm	Each	394	2389.66	941526.04
	Dia.200 mm	Each	56	3095.53	173349.68
	Dia.250 mm	Each	40	4669.03	186761.2
	Dia.300 mm	Each	47	5226.79	245659.13
	Dia.350 mm	Each	28	6893.78	193025.84
	Dia.400 mm	Each	20	8998.78	179975.6
	Dia.450 mm	Each	1	10561.77	10561.77
	Dia.500 mm	Each	1	13272.85	13272.85
	Dia.600 mm	Each	1	17020.68	17020.68
	Dia.700 mm	Each	3	23213.84	69641.52

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
08]	Supply of CI Mechanical joint Collars suitable for C.I.Spun Pipes & dimensionally described in Table-13 of IS-13382/1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/1989) with follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I. pipes & D.I. Pipes				
	Dia.80 mm	Each	228	952.71	217027.34
	Dia.100 mm	Each	1139	1023.09	1165299.51
	Dia.150 mm	Each	793	1838.20	1457692.6
	Dia.200 mm	Each	112	2097.65	234936.8
	Dia.250 mm	Each	66	3363.38	221983.08
	Dia.300 mm	Each	60	4305.59	258335.4
	Dia.350 mm	Each	39	5305.57	206917.23
	Dia.400 mm	Each	30	8257.19	247715.7
	Dia.450 mm	Each	2	9270.83	18541.66
	Dia.500 mm	Each	3	12669.92	38009.76
	Dia.600 mm	Each	1	15804.32	15804.32
	Dia.700 mm	Each	4	20648.76	82595.04
09]	Providing and Supplying C.I Mechanical joint All Socket Tees as dimensionally described in Table -18-13382/1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/1989) with cast iron Iron Follower gland and Mild Steel Nut Bolt coated or otherwise protected from rusting and suitable for C.I./D.I pipe.				
	100X100X80 mm dia	Each	8	3585.02	27963.16
	100X100X100 mm dia	Each	147	3974.71	584282.37
	150X150X100 mm dia	Each	320	5645.90	1806688
	150X150X150 mm dia	Each	41	7001.97	287080.77
	200X200X80 mm dia	Each	1	6714.16	6714.16
	200X200X100 mm dia	Each	54	6788.74	366591.96
	200X200X150 mm dia	Each	25	8085.98	202149.5
	200X200X200 mm dia	Each	46	8896.89	409256.94
	250X250X80 mm dia	Each	1	9454.65	9454.65
	250X250X100 mm dia	Each	41	9663.68	396210.88
	250X250X150 mm dia	Each	22	11532.34	253711.48
	250X250X200 mm dia	Each	29	12184.64	353354.56
	250X250X250 mm dia	Each	24	13667.80	328027.2
	300X300X80 mm dia	Each	1	10367.45	10367.45
	300X300X100 mm dia	Each	11	10600.64	116607.04
	300X300X150 mm dia	Each	15	13596.38	203945.7
	300X300X200 mm dia	Each	29	14045.95	407332.55
	300X300X250 mm dia	Each	25	14869.46	371736.5
	300X300X300 mm dia	Each	15	16411.45	246171.75

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
10]	Providing and Supplying C.I Mechanical joint Double Socket Tees with Flanged Tees dimensionally described in Table -19-13382/1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/1989) with cast iron Iron Follower gland and Mild Steel Nut Bolt coated or otherwise protected from rusting and suitable for C.I./D.I pipe.				
	100X100X80 mm dia	Each	1	3581.86	3581.86
	100X100X100 mm dia	Each	116	3789.84	441137.38
	150X150X100 mm dia	Each	270	5540.86	1496032.2
	150X150X150 mm dia	Each	25	6598.61	161665.95
	200X200X80 mm dia	Each	1	6345.47	6345.47
	200X200X100 mm dia	Each	7	6768.78	49412.09
	200X200X150 mm dia	Each	33	7796.07	257270.31
	200X200X200 mm dia	Each	24	8937.85	214508.4
	250X250X80 mm dia	Each	1	8960.96	8960.96
	250X250X100 mm dia	Each	21	9429.44	198018.24
	250X250X150 mm dia	Each	23	11190.96	257392.08
	250X250X200 mm dia	Each	2	11708.81	23417.62
	250X250X250 mm dia	Each	21	12123.72	254598.12
	300X300X80 mm dia	Each	1	10520.81	10520.81
	300X300X100 mm dia	Each	31	10725.63	332494.53
	300X300X150 mm dia	Each	17	12384.22	210531.74
	300X300X200 mm dia	Each	18	12489.26	224806.68
	300X300X250 mm dia	Each	2	13782.30	27564.6
	300X300X300 mm dia	Each	1	16891.48	16891.48
	350X350X80 mm dia	Each	1	14715.05	14715.05
	350X350X150 mm dia	Each	1	16837.91	16837.91
	350X350X200 mm dia	Each	1	11216.17	11216.17
	350X350X300 mm dia	Each	1	20100.45	20100.45
	350X350X350 mm dia	Each	1	23001.66	23001.66
	400X400X80 mm dia	Each	1	19235.98	19235.98
	400X400X100 mm dia	Each	1	20389.31	20389.31
	400X400X150 mm dia	Each	2	22702.30	45404.6
	400X400X200 mm dia	Each	1	23160.27	23160.27
	400X400X300 mm dia	Each	3	27909.13	83727.39
	400X400X400 mm dia	Each	2	31957.37	63914.74
	450X450X100 mm dia	Each	2	24099.33	48198.66
	450X450X200 mm dia	Each	2	28264.16	56528.32
	450X450X300 mm dia	Each	1	35665.28	35665.28
	450X450X400 mm dia	Each	1	37631.63	37631.63
	450X450X450 mm dia	Each	1	40875.27	40875.27
	500X500X100 mm dia	Each	1	25812.53	25812.53
	500X500X250 mm dia	Each	2	35295.54	70591.08
	500X500X300 mm dia	Each	1	36567.58	36567.58
	500X500X400 mm dia	Each	2	44089.49	88178.98
	500X500X500 mm dia	Each	1	53229.02	53229.02
	600X600X100 mm dia	Each	1	36887.95	36887.95
	600X600X300 mm dia	Each	1	50653.44	50653.44
	600X600X400 mm dia	Each	1	57708.98	57708.98
	600X600X500 mm dia	Each	1	62450.48	62450.48

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
	600X600X600 mm dia	Each	1	76677.10	76677.1
	700X700X100 mm dia	Each	1	48888.77	48888.77
	700X700X350 mm dia	Each	1	68437.76	68437.76
	700X700X400 mm dia	Each	1	73525.90	73525.9
11]	Supply of CI Mechanical joint Double Socket 90° (1/4) bends as dimensionally described in Table-14 of IS-13382/1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/1989) with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I. pipes & D.I. Pipes				
	Dia.100 mm	Each	971	2859.19	2776273.49
	Dia.150 mm	Each	201	5250.95	1055440.95
	Dia.200 mm	Each	91	6968.35	634119.85
	Dia.250 mm	Each	82	10372.70	850561.4
	Dia.300 mm	Each	77	12623.71	972025.67
	Dia.350 mm	Each	72	20900.86	1504861.92
	Dia.400 mm	Each	68	28487.90	1937177.2
	Dia.450 mm	Each	1	36359.60	36359.6
	Dia.500 mm	Each	1	45247.03	45247.03
	Dia.600 mm	Each	1	63950.45	63950.45
	Dia.700 mm	Each	2	100943.44	201886.88
12]	Supply of CI Mechanical joint Double Socket 45° (1/8) bends as dimensionally described in Table-14 of IS-13382/1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/1989) with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I. pipes & D.I. Pipes				
	Dia.100 mm	Each	972	2548.27	2476918.44
	Dia.150 mm	Each	201	4423.23	889069.23
	Dia.200 mm	Each	91	5825.52	530122.32
	Dia.250 mm	Each	82	8546.05	700776.1
	Dia.300 mm	Each	77	10311.78	794007.06
	Dia.350 mm	Each	72	17201.35	1238497.2
	Dia.400 mm	Each	68	21224.38	1443257.84
	Dia.450 mm	Each	1	29606.57	29606.57
	Dia.500 mm	Each	1	32984.66	32984.66
	Dia.600 mm	Each	1	45672.44	45672.44
	Dia.700 mm	Each	2	96596.88	193193.76

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
13]	Supply of CI Mechanical joint Double Socket 22.5 ⁰ (1/3 bends as dimensionally described in Table-14 of IS-13382/1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/1989) with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I. pipes & D.I. Pipes				
	Dia.100 mm	Each	763	2445.33	1865786.79
	Dia.150 mm	Each	145	4153.28	602225.6
	Dia.200 mm	Each	84	5206.83	437373.72
	Dia.250 mm	Each	76	7872.75	598329
	Dia.300 mm	Each	71	9504.02	674785.42
	Dia.350 mm	Each	66	15003.91	990258.06
	Dia.400 mm	Each	62	19235.98	1192630.76
	Dia.450 mm	Each	1	24332.52	24332.52
	Dia.500 mm	Each	1	28356.60	28356.6
	Dia.600 mm	Each	1	37575.96	37575.96
	Dia.700 mm	Each	1	56524.12	56524.12
14]	Supply of CI Mechanical joint Double Socket 11.25 ⁰ (1/3 bends as dimensionally described in Table-14 of IS-13382/1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/1989) with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I. pipes & D.I. Pipes				
	Dia.100 mm	Each	763	2389.66	1823310.58
	Dia.150 mm	Each	145	4058.75	588518.75
	Dia.200 mm	Each	84	4997.80	419815.2
	Dia.250 mm	Each	73	7388.51	539361.23
	Dia.300 mm	Each	71	8186.82	581264.22
	Dia.350 mm	Each	67	12918.87	865564.29
	Dia.400 mm	Each	63	17499.66	1102478.58
	Dia.450 mm	Each	1	22087.81	22087.81
	Dia.500 mm	Each	1	24075.17	24075.17
	Dia.600 mm	Each	1	33005.67	33005.67
	Dia.700 mm	Each	1	44493.89	44493.89
15]	Providing and supplying ISI standard MS specials of required thickness with 3 coats of approved make epoxy paint (Shalimar, Ciba or Mahindra & Mahindra make) from inside and outside including all taxes (Central and Local), octroi, inspection charges, transportation to stores / site, and stacking, etc. complete.				
	Flanged / plain specials of all dia.	MT	336	54620.80	18352588.8

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
16]	Providing, supplying, lowering, laying, fixing in proper position & alignment the double flanged short body pattern type manually operated Sluce Valve having body, disk and end cover in graded cast iron to IS-210 Gr.CF 200 generally conforming in BS 5155, Synthetic rubber faced ring secured on disk by retaining ring with stainless steel screw stub shaft of stainless steel riding in teflon bearing excluding C.C foundation/structural steel support conforming to IS-14846 of 2000 including cost of all labour excavation, refilling, jointing material, including nut bolts and giving satisfactory hydraulic testing etc.				
	Scour Valves - PN-1				
	100 mm Dia.	Each	63	6273.98	392123.75
	Sluice Valves - PN-1				
	100 mm Dia.	Each	324	6273.98	2032770
	150 mm Dia.	Each	74	9395.76	695286
	200 mm Dia.	Each	45	15678.55	705535
	250 mm Dia.	Each	27	23166.18	625487
	300 mm Dia.	Each	39	28192.98	1099526
	350 mm Dia.	Each	40	48573.59	1942944
	400 mm Dia.	Each	38	59619.20	2265530
	450 mm Dia.	Each	1	84478.27	84478
	500 mm Dia.	Each	1	105708.79	105709
	600 mm Dia.	Each	1	147538.30	147538
	700 mm Dia.	Each	1	299961.42	299961
17]	Providing, Lowering, laying and fixing in proper alignment and position Kinetic Double Orifice type Air Valves as per standard specifications having small orifice elastic ball resting on a gun metal orifice nipple, large orifice vulcanite ball seating on moulded seat ring,with built-in Kinetic features, isolating sluice valve mounted in horizontal position and operated by wheel gearing, inlet face and drilled, including all taxes (Central and local), insurance, third party inspection charges, loading, unloading, transportation upto departmental stores / site, giving satisfactory hydraulic testing, including excavation & refilling etc. complete.				
	a) Kinetic Air Valve Flanged Type - PN -1				
	50 mm Dia.	Each	150	9666.88	1450032
	100 mm Dia	Each	33	19110.61	630650.13
	150 mm Dia	Each	2	30028.47	60056.94
	200 mm Dia	Each	4	44849.25	179397
18]	Providing & supplying ISI MARK CIDF reflux valves (non-return valves) of following dia. including all taxes (central & local) railway freight inspection charges unloading from railway wagon, loading into truck, transportation upto departmental stores / site, unloading, stacking etc. complete without bypass arrangement -- PN-1)				
	100	Each	10	5337.03	53370.3
	150	Each	10	8022.96	80229.6
	200	Each	10	15210.55	152105.5
	250	Each	10	24596.18	245961.8
	300	Each	10	36321.62	363216.2
	350	Each	10	43527.51	435275.1
	400	Each	10	55129.52	551295.2
	450	Each	10	90706.83	907068.3
	500	Each	10	109062.79	1090627.9

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
19]	Providing, supplying, lowering, laying, fixing in proper position & alignment CI D/F angle type spring loaded pressure relief valve of approved make and quality including all taxes ('central and Local) Octroi, inspection charges transportation to departmental stores/ site etc. Complete.				
	50 mm Dia.	Each	10	3486.33	34863.3
	80 mm Dia.	Each	10	5183.09	51830.9
	100 mm Dia.	Each	10	7190.38	71903.8
	150 mm Dia.	Each	10	11205.11	112051.1
	200 mm Dia.	Each	10	24333.88	243338.8
	250 mm Dia.	Each	10	34110.60	341106
	300 mm Dia.	Each	10	44902.29	449022.9
20]	Providing and making Ferrule connections on pipeline including cost of ferrule, saddle piece, specials, excavation & refilling of pit etc. complete.				
	a) on HDEP Pipeline				
	Dia 15 mm	Each	109361	430.50	47079910.5
	Dia 20 mm	Each	6214	573.60	3564350.4
	Dia 25 mm	Each	8699	621.00	5402079
	Dia 40 mm	Each	1	711.20	711.2
	Dia 50 mm	Each	1	898.20	898.2
	b) on CI/DI/MS Pipeline				
	Dia 15 mm	Each	32151	519.50	16702184.75
	Dia 20 mm	Each	38142	773.60	29506651.2
	Dia 25 mm	Each	21058	921.00	19394418
	Dia 40 mm	Each	7948	1211.20	9626617.6
	Dia 50 mm	Each	250	1498.20	374550
21]	Providing and fixing ball valve of required dia. including necessary sockets, union, nut, testing etc. complete.(Prior approval of sample and brand by Ex. Engineer is necessary before use.)				
	Dia 15 mm	No.s	201894	208.00	41993952
	Dia 20 mm	No.s	2496	228.00	569088
	Dia 25 mm	No.s	1238	302.00	373876
	Dia 40 mm	No.s	309	426.00	131634
	Dia 50 mm	No.s	249	807.00	200943
	lockable ball valve	No.s			
	15 mm	No.s	46994	1000	46994000
	20 mm	No.s	23497	1000	23497000
22]	Providing installing and giving satisfactory field test of flanged ends Bulk type water meter of following type and as mentioned below (Removable Mechanism Type) with FGI-250 cast iron body, class 'B' conforming to ISO-4064, marked to read in metric system, along with manufacturer's test and guarantee certificate including cost of all materials and labour, with EEC mark and C.I Strainer 'T' (Basket) type with flanged ends and with stainless steel or Brass mesh with; openings of 2.5 mm to 3 mm and suitable for operating pressure of 16 Kg/cm ² and test pressure of 24 Kg/cm ² including necessary excavation & refilling.				
	BULK METERS WITH STRAINER				
	Dia 50 mm	Nos.	249	25120.00	6254880
	Dia 80 mm	Nos.	62	29042.00	1800604
	Dia 100 mm	Nos.	53	33754.00	1788962
	Dia 150 mm	Nos.	35	51054.00	1786890

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
	Dia 200 mm	Nos.	15	68200.00	1023000
	Dia 250 mm	Nos.	3	95060.00	285180
	Dia 300 mm	Nos.	4	221315.00	885260
	Dia 400 mm	Nos.	1	416023.00	416023
	Dia 500 mm	Nos.	1	640436.00	640436
	BULK METERS WITH STRAINER (For Slum inlet & outlet)				
	Dia 100 mm		452	33754.00	15256808
	Dia 150 mm		323	51054.00	16490442
	Dia 200 mm		258	68200.00	17595600
	Dia 250 mm		129	95060.00	12262740
	Dia300 mm		65	221315.00	14385475
	Dia400 mm		63	416023.00	26209449
23]	Providing installing and giving satisfactory field test of Domestic water meter horizontal inferential, single jet or multi-jet, dry dial, suitable for 500 C temperature, duly sealed against tampering, complete with couplings on both ends conforming to class -B as per ISO-4064, marked to read in metric system, along with manufacturers test and guarantee certificate, including cost of all materials and labour with EEC mark and Providing and fixing C.I. Strainers for water meters including cost of all labour, materials and necessary excavation & refilling.				
	DOMESTIC WATER METERS WITH STRAINERS				
	Dia 15 mm	Nos.	201894	1287.00	259837578
	Dia 20 mm	Nos.	2496	2465.00	6152640
	Dia 25 mm	Nos.	1238	3653.00	4522414
	Dia 40 mm	Nos.	309	6100.00	1884900
24]	Manufacture supply and commission of Electromagnetic flow meter (EMF) for row/ pure water with accuracy 0.5% of measured value and protection as per given specifications for size 10mm - 1000mm. Including sensor, trasmitter, surge arrestor, 25mtere sensor/ transmitter cable, GI duct of suitable size for 25 mtrs/ each flow meter including pipe cutting, levelling and installation of flow meter in pipe lines with necessary tool tackles cranes etc. as may be required at site and based on technical specification etc. as per attached with 6 years battery back-up.				
	Electromagnetic water meter				
	Dia 150 mm	Each	20	598564.00	11971280
	Dia 200 mm	Each	20	673621.00	13472420
	Dia 300 mm	Each	20	715909.00	14318180
	Dia 400 mm	Each	20	758192.00	15163840
	Dia 450 mm	Each	20	1040470.00	20809400
25]	Providing and constructing R.C.C. valve chamber in M-200 mix. including excavation in all types of strata, foundation concrete, R.C.C. roof cover, with 15 cm thick M-100 PCC bedding, etc. complete as directed by Engineer-in-charge.				
	For Valves				
	Chamber size 0.9 X 1 X 1.65 m deep	Each	379	21800.00	8251300
	Chamber size 1.2 X 1.2 X 1.85 m deep	Each	238	28900.00	6878200

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
26]	Providing and constructing B.B.masonry chamber for water meter & strainer in C.M.1:4 mix. including excavation in all types of strata, foundation concrete R.C.C. roof cover, with 15 cm thick M-100 PCC bedding, etc. complete as directed by Engineer-in-charge				
	For Water meter				
	Chamber size 0.9 X 0.6 X 0.6 m deep	Each	155	4500.00	695250
	Chamber size 0.9 X 0.6 X 0.9 m deep	Each	155	5500.00	849750
	Chamber size 1.2 X 0.9 X 1.0 m deep	Each	309	8100.00	2502900
	Chamber size 1.5 X 1.0 X 1.5 m deep	Each	125	12700.00	1581150
	Chamber size 2 X 0.9 X 1.50 m deep	Each	249	14200.00	3535800
	Chamber size 2.50 X 0.9 X 1.50 m deep	Each	62	16600.00	1029200
	Chamber size 2.80 X 0.9 X 1.50 m deep	Each	53	17900.00	948700
	Chamber size 3.80 X 0.9 X 1.50 m deep	Each	487	22400.00	10908800
	Chamber size 4.60 X 0.9 X 1.50 m deep	Each	338	26000.00	8788000
	Chamber size 5.6 X 0.9 X 1.50 m deep	Each	132	30400.00	4012800
	Chamber size 6.4 X 0.9 X 1.70 m deep	Each	69	37100.00	2559900
	Chamber size 7.9 X 2 X 1.50 m deep	Each	65	60200.00	3913000
27]	Providing and fixing C.I. road box including loading, unloading and carting to site of work including all necessary excavation in all types of strata and fixing in murrum packing etc.complete.				
	225x300 mm (20 Kg)	Each	398	1504.85	598930
28]	Reinstating the road surface with excavation, 30 cm soling, murrum blindage, 40 mm size metal, 25 mm thick premixed bitumen, carpet with hot mixed seal coat/cement concrete, including compacting at all stages etc.complete.				
	For WBM & Tar road (other than IRDP) 100-250 mm	sqm	45367	438.00	19870746
	IRDP & PWD/ corp cement roads reinstating	Rmt	5030	1250.00	6287500
29]	Providing and casting in situ following grades of C.C of trap / granite / quartzite / gneiss metal for foundation and bedding including dewatering, form work, compacting and curing, finishing, etc. complete.				
	a) 1:2:4 (M-150) grade	cum	155614	3452.14	537202255
	b) 1:1.5:3 Mix.(Road surface)	cum	10224	3766.47	38506628

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
30]	Providing and laying in situ Cement concrete of trap/granite/quartzite/ gneiss metal of approved quality for RCC work as per detailed drawing and designs, or as directed by Engineer - In - Charge including normal dewatering, form work, compaction, finishing the formed surfaces with CM 1:3 of sufficient minimum thickness to give a smooth and even surface wherever necessary or roughening if special finish is to be provided and curing, etc. complete. (By weight batching and mix design for M-250 and M-300 only. Use of L & T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted. Excluding M.S. or Tor reinforcement). In RCC M-300				
	M-200 (RCC casing in box for pipe dia. 300 mm & above	cum	47	3412.44	159975
31]	Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pargies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete. (including cost of binding wire) M.S.bars				
		M.T	10	64135.91	633765.4083
32]	Detecting under ground services such as telephone, electric cables, water & sewer pipe line by advance technology including all operations such as installation of system, etc. complete along the route of pipe line.				
		K.M	596	5000.00	2982440

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
33]	Making cross connection to existing distribution main of any type including excavation, breaking and removing existing pipes, lowering, laying of specials and pipes in their position, refilling, closing the water supply in that area, dewatering and restarting the water supply, etc. complete as directed by Engineer-in-charge for following diameters of existing pipeline, irrespective of diameter of branch line (the number of joints involved will be paid separately depending upon the nature of joints and required pipes, excluding cost of valves and specials)				
	Dia 80 mm		1	978.29	978
	Dia 100 mm	No.	266	1097.41	291911
	Dia 150 mm	No.	416	1469.09	611141
	Dia 200 mm	No.	220	1574.97	346493
	Dia 250 mm	No.	133	1900.33	252744
	Dia 300 mm	No.	177	2395.55	424012
	Dia 350 mm	No.	112	2969.06	332535
	Dia 400 mm	No.	105	3356.18	352399
	Dia 450 mm	No.	87	3987.06	346874
	Dia 500 mm	No.	94	4849.54	455857
	Dia 600 mm	No.	4	7612.35	30449
	Dia 700 mm	No.	1	9407.91	9408
	Dia 750 mm	No.	1	11788.00	11788
	Dia 800 mm	No.	1	14844.20	14844
	Dia 900 mm	No.	1	19743.37	19743
34]	Providing, fabricating and fixing expansion joints for pipelines as per the drawing. The rate to include machining the strakes and steel ring as shown in the drawing and welding on either automatic welding machine or manually. Rate includes plates and flats required for expansion joint and all othr materials such as synthetic rubber, rubber ring, etc. complete. including packing as per specifications, grease, bolts and nuts, etc. including local handling, all types of taxes and duties etc. complete. Expansion joints suitable for pipe diameters.				
	400 mm dia.	each	1	22985.30	22985.2975
	500 mm dia.	each	1	29898.70	29898.697
	600 mm dia.	each	1	47092.58	47092.5835
	700 mm dia.	each	1	64603.56	64603.5595
	750 mm dia.	each	1	64603.56	64603.5595
	800 mm dia.	each	1	75184.17	75184.168
	850 mm dia.	each	1	75184.17	75184.168
	900 mm dia.	each	1	87294.02	87294.0175
	950 mm dia.	each	1	87294.02	87294.0175
	1000 mm dia.	each	1	104523.96	104523.961
35]	Laying of M.S pipes, minimum 2.00 m below IRDP Roads, cement concrete and major roads by horizontal directional drilling method / push through method including cost of cover pipe but excluding cost of carrier pipe, with all operations such as making pits for installation of machine, excavation starting and end point for laying of pipes etc.				
	700 mm dia, 12 mm thk. (100 to 250)	Rmt	330	32059.42	10579609
36]	Providing & fixing Box for water meter including necessary excavation, fixing & refiling etc. complete.				
	15 mm to 40 mm	Each	205937	845.00	174016765

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
37]	Removal of public stand posts, including excavation, dismentling, cutting & plugging of pipe, cleaning the site etc. complete.				
		Each	3010	930.00	2799300
38]	Disconnection of illegal connections, including necessary excavation, cutting of pipe, dismentling pipe, plugging of pipeline etc. complete.				
		Each	46994	989.76	46512781
39]	Providing, constructing & fixing in position meter display box of suitable size of M.S. fabricated body with anticorrosive treatment and cover with necessary locking arrangement, connections, fittings, etc. complete for electromagnetic water meter and modem with protection as per IC-55.				
		Nos.	80	8623.00	689840
40]	Repairs to brick Masonry/RCC chambers of walls including dismentling damaged portion, curing etc. complete.				
	a) Brick Masonry in Cement Mortar 1:4	Cu.M.	1000	2897.29	2897289.5
	b) RCC M-200	Cu.M.	1000	3245.13	3245130
41]	Providing & fixing precast chamber covers in Cement Concrete in M-200 and 150 mm thk.				
		Sq.M.	200	4727.00	945400
42)	Providing,lowering & Laying Double flanges cast iron sluice valves with EPDM fully covered wedge and epoxy coating internal and external.				
	Dia 80 mm	Nos.	1	12281.23	12281
	Dia 100 mm	Nos.	1	14774.24	14774
	Dia 150 mm	Nos.	1	26367.99	26368
	Dia 200 mm	Nos.	1	45435.62	45436
	Dia 250 mm	Nos.	1	76109.14	76109
	Dia 300 mm	Nos.	1	98749.43	98749
43)	Double flange Ductile Iron Flange adaptor for CI,DI & PVC/HDPE pipes to allow an easy dismentling of the valves				
	Dia 80 mm	Nos.	258	2500.00	645000
	Dia 100 mm	Nos.	178	2900.00	516200
	Dia 150 mm	Nos.	40	4700.00	188000
44)	Ductile Iron flanged Dismantling joint to install main equipment on existing pipe				
	300mm	Nos.	100	55300	5530000
	400mm	Nos.	100	87300	8730000
45)	Electrofusion saddle with coupler for HDPE for Slum				
	Saddle dia 32x20mm	Nos.	8,285	864.00	7158240
	Saddle dia 75x20mm	Nos.	10,356	1034.00	10708104
	Saddle dia 75x32mm	Nos.	2,900	1034.00	2998600
	Saddle dia 110x20mm	Nos.	12,427	1034.00	12849518
	Saddle dia 110x25mm	Nos.	828	1034.00	856152
	Saddle dia 110x32mm	Nos.	2,900	1034.00	2998600
	Saddle dia 160x20mm	Nos.	2,485	1034.00	2569490
	Saddle dia 160x25mm	Nos.	828	1034.00	856152
	Saddle dia 160x32mm	Nos.	414	1034.00	428076
46)	Supply & Laying blue plastic in trenches				
	For inside Slum	Rmt	175,933	60.00	10555996

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
47)	Providing and installation Pipe ends and slip on flange (PE				
	Dia 75 mm	Nos.	258	1120.00	288960
	Dia 110 mm	Nos.	178	1440.00	256320
	Dia 160 mm	Nos.	40	1700.00	68000
48)	Providing,lowering,laying & Connecting double flanged short body pattern type manually operated butterfly valve having body,disc and end cover in graded cast iron to IS 210 Gr.CF 200 generally conforming in BS 5155, Synthetic rubber faced ring secured on disc by retaining ring with stainless steel screw stub shaft of stainless steel riding in teflon bearings excluding C.C. foundation/structural steel support confirming to IS 13095-1991				
	400 mm	Nos.	1	54707.00	54707
	450 mm	Nos.	1	64599.00	64599
	500 mm	Nos.	1	76784.00	76784
	600 mm	Nos.	1	102357.00	102357
	700 mm	Nos.	1	144971.00	144971
	750 mm	Nos.	1	173721.00	173721
	800 mm	Nos.	1	193471.00	193471
	900 mm	Nos.	1	238673.00	238673
	1000 mm	Nos.	1	298160.00	298160
49)	Providing and making flanged joints to flanged C.I. / M.S. pipes of all classes / specials etc. including cost of all				
	Dia 100 mm		1298	187.50	243375
	Dia 150 mm		394	381.61	150354
	Dia 200 mm		53	398.15	21102
	Dia 250 mm		5	572.42	2862
	Dia 300 mm		9	595.58	5360
	Dia.400 mm		3	977.18	2932
	Dia.450 mm		5	1194.46	5972
	Dia.500 mm		1	1236.37	1236
	Dia.600 mm		1	1324.61	1325
	Dia.700 mm		1	2010.62	2011
50)	Ductile Iron saddle for house service connection to replace the ferrules on Cast and Ductile iron pipes for different diameters of pipes and house service connection.				
	for pipe of 80 mm	Nos.	11,921	1600.00	19072800
	for pipe of 100 mm	Nos.	35,762	1600.00	57219200
	for pipe of 150 mm	Nos.	19,868	2200.00	43709600
	for pipe of 200 mm	Nos.	7,947	2500.00	19867500
	for pipe of 250 mm	Nos.	3,974	3200.00	12715200
51)	Data logger				
		Nos.	80	100000.00	8000000
52)	Providing and fixing of interlocking Blocks				
		Sqm	1,000	650.00	650000
53)	Fabrication of structural steel sections				
		MT	10	75000.00	750000
54)	Extension rods to operate Sluice valve				
	80mm - 100 mm	Nos.	388	1200.00	465000
	150mm - 250mm	Nos.	147	1400.00	205800
	300mm	Nos.	80	1600.00	128000

Item No.	Description of work	Unit	Qty	Rate in (Rs.)	Total Amount
55)	Providing and installation of 1 KVA UPS with SMF batteries for 2 hrs. back-up for 100% full load including providing and installation of MS wall mountable prefabricated cabinet for accommodating UPS & batteries with locking arrangement with electrical wire				
		Nos.	95	51644.00	4906180
56)	Providing and laying of following Dia.Galvanised iron (GI) light duty/ Concrete (NP) pipe as a casing pipe for HDPE/MDPE pipe at crossing major roads, natural/side/cross drains.				
	Dia 25 mm (GI, Light duty)	Rmt	1000.00	270.00	270000
	Dia 40 mm (GI, Light duty)	Rmt	1000.00	432.00	432000
	Dia 100 mm (GI, Light duty)	Rmt	1000.00	1120.00	1120000
	Dia 150 mm (NP- 2)	Rmt	1000.00	440.00	440000
	Dia 200 mm (NP- 2)	Rmt	1000.00	590.00	590000
57]	Rehabilitation for old ESR including repairs to leakages in container gy grouting, plastering outside & inside with water proof compound, Painting to fron outside of whole structure ,paint with epoxy paint double coat to inside of container, repair of spiral stair case ,repairs of chambers & providing slab cover Etc. Complete				
		Nos.	28	2951000	82628000
58]	Rehabilitation for Pench-II WTP	Nos.	1	64590000.00	64590000
59]	Replacment of Sluice Gates including desmentalling of old gate, providing & fixing M.S .Sluice gates in position as per specification,including Civil work,testing refilling & pipe fittings.etc The replaced materials may be shifted to the site as directed by the Engineer.				
	1.35m X 1.35m	Nos.	4	112000.00	448000
	Gorewada Sluice Gate	Nos.	4		30000000
60]	Replacment of Sluice Valves & Butterfly Valves including excavation,desmentalling, providing & fixing Sluice /Butterfly Valves in position as per specification, dewatering, testing & refilling with specials.etc The replaced materials may be shifted to the site as directed by the Engineer.				
Sluice Valves	450 mm	Nos.	1	86895.72	86896
	500 mm	Nos.	1	108126.24	108126
	600 mm	Nos.	3	149955.75	449867
	700 mm	Nos.	8	302378.87	2419031
Butterfly Valves	900 mm	Nos.	3	241404.17	724213
	1200 mm	Nos.	4	422693.17	1690773
61]	Developing suitable software for water billing				
		L.S.	1	20000000.00	20000000
Total BOQ (in RS)				3538881188.00	
Total BOQ (in RS) say				3539000000.00	
	Add @ 3% Contingencies				106170000.00
	Add @0.75% Project Prepration & Desgin Consultancy				26542500.00
	Add @ 3.5% Project Management Consultancy				123865000.00
	Grand Total RS.				3800000000.00

**DETAILED HSC & PIPE REPLACEMENT
FOR SLUM AS PER LOCATION**

Details of Slum Area as per House Service Connection & Pipe Replacement for 24x7 Water Supply Project Nagpur

Sr. No.	Identity Code	Name of slums	Old Code no.	Constituency	10-Zone 2002	Prop.Water Dist. Zone (Pench-IV)	ESR Command	Ward No.	Population	No. of structures	Status	Prabhag 2002	Also in Prabhag 2002	PTS map available	House List available	HSC Connection for Slum (Nos.)	Replacement of Pipe (m)
1	NW2302	Gaddigudam(1)	322	C	10	NC	Govt. House	87	4970	903	Notified	14	30			903	1182.93
2	NW2303	East of Gaddigudam (1)	924	C	10				520	94	Not in Masterlist '98	14				94	123.14
3	NW2404	Khalasi Line (1)	314	C	10	NC	Govt. House	108/87	2282	415	Notified	30		Yes	Yes	415	543.65
4	NW2403	Lala Garden	323	C	10	NC	Govt. House	108	440	80	Notified	30		Yes	Yes	80	104.80
5	NW2401	Harijan Basti	324	C	10	NC	Govt. House	108/87	555	100	Notified	30				100	131.00
6	NE2604	Kostipura	319	C	9	NC	Indora Tapping	90	1014	184	Notified	31				184	241.04
7	CE0401	Zangripura	303	C	6	NC	Indora Tapping	112	1085	197	Notified	32				197	258.07
8	CE0402	Bhankheda	309	C	6				12755	2319	In Masterlist but not notified	32		Yes		2319	3037.89
9	CE0403	Bansod Mohalla	310	C	6	NC	Govt. House	111	2131	387	In Masterlist but not notified	32		Yes		387	506.97
10	CE0202	Boriyapura part(II) (North of Crrodach road)	311	C	6	NC	Govt. House	110	1853	337	Notified	32		Yes		337	441.47
11	CE0201	Boriyapura(2)	312	C	6	NC	Govt. House	109	5413	984	Notified	32		Yes	Yes	984	1289.04
12	CE0101	Dobi Nagar	321	C	6				4919	394	Notified	32		Yes		394	516.14
13	CE0102	East of Dobi Nagar	926	C	6				210	38	Not in Masterlist '98	32		Yes		38	49.78
14	CE0704	Kumbharpura, Lodpura	299	C	7				2144	390	Notified	33				390	510.90
15	CE0601	Chimabaipeth	301	C	7				1726	314	Notified	33		Yes	Yes	314	411.34
16	CE0501	Kosaripura	304	C	7	NC	Indora Tapping	112	2170	394	Notified	33				394	516.14
17	CE0502	Shobhakhet	306	C	7				3340	607	Notified	33		Yes	Yes	607	795.17
18	CE0602	Jagnath Budhwari Kumbharpura	317	C	7				1241	225	Notified	33				225	294.75
19	CE0603	Koshthipura, Bangali Panja	298	C	7				877	159	Notified	35				159	208.29
20	CE2503	Bhaldarpura(2)	290	C	6	C	Sita Buldi Fort	128	4438	807	Notified	43				807	1057.17
21	CE2501	Nayapura,Bhoipura	295	C	6	C	Sita Buldi Fort	129	3041	553	Notified	43	44			553	724.43
22	CE2301	Lodhipura,Bajeria	297	C	6	C	Sita Buldi Fort	123	2703	491	Notified	44				491	643.21
23	CE0302	Diwanshah Takiya	300	C	6	C	Boriyapura	129/124	3250	591	Notified	44	33	Yes		591	774.21
24	CE0301	Mominpura Takiya	307	C	6				4341	789	Notified	44		Yes		789	1033.59
25	CE0203	Boriyapura part(I) (South of Crrodach road)	311	C	6	NC/C	Govt. House	124	6043	1098	Notified	44		Yes		1098	1438.38
26	CE030102	Panaipeth Mochipura	320	C	6				750	145	In Masterlist but not notified	44		Yes		145	189.95
27	CE2302	Lodhipura	326	C	6	C	Sita Buldi Fort	108/123	3340	609	Notified	44				609	797.79
28	NW2301	Gaddigudam (2)	313	C	10	NC	Govt. House	108/87	2550	463	Notified	14	30			463	601.90
29	NW2402	Khalasi Line(2)	315	C	10	NC	Govt. House	87	150	27	Notified	30		Yes	Yes	27	34.99
30	NE2605	Kuraipura	305	C	9	NC	Indora Tapping	90	839	152	Notified	31				152	199.12
31	CE2502	Bhaldarpura(1)	296	C	6	C	Sita Buldi Fort	128	3250	591	Notified	43				591	774.21
32	CE3001	Khapri Mohalla	291	C	6	NC	Indora Tapping	115	2703	491	Notified	45				491	643.21
33	CE3002	Kumbharpura Itwari	292	C	6	C	Sita Buldi Fort	115	2261	411	Notified	45				411	538.41
34	CE2901	Budhukhan Minara	293	C	6	C	Sita Buldi Fort	116	3249	591	Notified	45				591	774.21
									77551	13604							
1	CE1901	Minimata Nagar	027	E	8	E	Minimata Nagar	31	9532	1733	In Masterlist but not notified	4				1733	2096.93
2	CE1601	Dy. Signal	036	E	8	E	Minimata Nagar	30	11249	1729	Notified	4		Yes	Yes	1729	1711.71
3	CE2201	Punapur Village	067	E	8	E	Subhan Nagar	6	812	148	Notified	4				148	193.88
4	CE2101	Bharatwada Village	068	E	8	E	Subhan Nagar	6	988	180	Notified	4				180	235.80
5	CE1602	Sakharam Wadi	078	E	8	E	Minimata Nagar	31	1144	189	Notified	4		Yes	Yes	189	247.59
6	CE1801	Chikhali	087	E	8	E	Minimata Nagar	5	540	98	Notified	4				98	128.38
7	CE1604	East of Deputy Signal	957	E	8				3189	563	Not in Masterlist '98	4		Yes	Yes	563	737.53

Sr. No.	Identity Code	Name of slums	Old Code no.	Constituency	10-Zone 2002	Prop.Water Dist. Zone (Pench-V)	ESR Command	Ward No.	Population	No. of structures	Status	Prabhag 2002	Also in Prabhag 2002	PTS map available	House List available	HSC Connection for Slum (Nos.)	Replacement of Pipe (m)
8	CE1902	Panch Zopada (Minimata Nagar)	978	E	8						Not in Masterlist '98	4		Yes	Yes	0	0.00
9	CE1605	Gopal Nagar (East of Dy. Signal)	979	E	8				716	144	Not in Masterlist '98	4				144	188.64
10	CE1606	Santoshi Nagar (S-E of Dy. Siganl)	980	E	8				432	93	Not in Masterlist '98	4				93	121.83
11	CE5001	Wathoda	022	E	8	E	Bharatwadi	8	1950	354	Notified	5				354	463.74
12	CE4901	Bhandewadi-2	026	E	8	E	Subhan Nagar	7	4100	745	Notified	5		Yes		745	975.95
13	CE4501	Hasanbag 1&2	055	E	8	E	Nandanvan	36	8180	1236	Notified	5	21	Yes	Yes	1236	1112.40
14	CE4601	Sonbaji Nagar	060	E	8	E	Minimata Nagar	6	786	142	Notified	5				142	186.02
15	CE4802	Old Pardi	062	E	8	E	Subhan Nagar	7	909	164	Notified	5				164	214.84
16	CE4404	Hiwari Nagar	064	E	8	E	Lakadgunj / Bharatwadi	33/34	4028	742	Notified	5		Yes		742	972.02
17	CE4406	New Panther Ngr.	328	E	8	E	Bharatwadi	33	2500	454	Notified	5				454	594.74
18	CE4701	Adarsha Nagar (West of ring road)	329	E	8	E	Bharatwadi	7	550	100	Notified	5				100	131.00
19	CE4702	Adarsha Nagar (East of ring road)	329	E	8	E	Bharatwadi	7	210	38	Notified	5				38	49.78
20	CE4704	Nehru Nagar	330	E	8				1350	245	Notified	5				245	320.95
21	CE4401	Jai Bajrang Nagar	332	E	8	C	Killa Mahal	72	660	120	Notified	5		Yes	Yes	120	157.20
22	CE4405	Hiwari Nagar, Padole Nagar-2	351	E	8	E	Bharatwadi	33	2100	382	Notified	5				382	500.42
23	CE5101	Sangharsh Nagar	353	E	8	E	Bharatwadi	8	2000	364	Notified	5				364	476.84
24	CE5201	Shivankar Nagar	354	E	8	E	Nandanvan	8	1800	327	Notified	5				327	428.37
25	CE4801	NITE12:Chandra Nagar Near Nallah	367	E	8	E	Minimata Nagar	7	468	85	In Masterlist but not notified	5				85	111.35
26	CE4703	Prajapati Nagar	400	E	8	E	Bharatwadi	7	1378	250	In Masterlist but not notified	5				250	327.50
27	CE5002	North of Wathoda (Along Road)	932	E	8	E	Bharatwadi	8	200	36	Not in Masterlist '98	5				36	47.16
28	CE4903	East of Hanuman Nagar on old Pathway	933	E	8				460	83	Not in Masterlist '98	5		Yes		83	108.73
29	SE1503	Tajbagh	002	E	5	E	Nandanvan	9	9000	1636	Notified	6				1636	1472.40
30	SE1301	Bidipeth	003	E	5	E	Dighori	39	1500	272	Notified	6				272	356.32
31	SE1502	Sindiban	005	E	5	E	Nandanvan	38	800	145	Notified	6				145	189.95
32	CE5301	Dighori	021	E	5	E	Dighori	9	1040	189	Notified	6				189	247.59
33	SE1601	Yaseen Plot	054	E	5	E	Nandanvan	9	1800	327	Notified	6				327	428.37
34	SE1202	Sewadal Nagar	065	E	5	E	Sakkardara	38	4737	861	Notified	6		Yes		861	1127.91
35	CE5401	Harpur Nagar	082	E	5	E	Nandanvan	37	1105	200	Notified	6				200	262.00
36	SE1501	Tajamma Colony	083	E	5	E	Nandanvan	38	500	91	Notified	6				91	119.21
37	SE1602	Nirala (Gausia Plot)	085	E	5	E	Nandanvan	9	1000	182	Notified	6				182	238.42
38	SE1603	Azad colony	953	E	5	E	Nandanvan	9	2500	454	Not in Masterlist '98	6				454	594.74
39	SE1504	Auwaliya Nagar	964	E	5	E	Nandanvan	38	400	73	Not in Masterlist '98	6				73	95.63
40	SE1505	NW of sindiban	965	E	5	E	Nandanvan	38	400	70	Not in Masterlist '98	6				70	91.70
41	SE1801	Sanjay Nagar (North of ring road)	007	E	3	E	Dighori	40	918	167	Notified	7				167	218.77
42	SE1402	NITE40: Kh.No. 82/2 Mz.Sakkardara	396	E	3	E	Dighori	40	975	177	In Masterlist but not notified	7				177	231.87
43	SE1802	Sanjay Gandhi Nagar (South of ring road)	402	E	3	E	Hudkeshwar	10	1606	292	Notified	7				292	382.52
44	SE1803	New Nehru Nagar	927	E	3	E	Dighori	10	3000	545	Not in Masterlist '98	7				545	713.95
45	CE1509	Shanti Nagar-1	029	E	7	E	Kalamna	29	9883	1796	Notified	19				1796	1616.40
46	CE1510	Shanti Nagar-2	030	E	7				1430	122	Notified	19		Yes	Yes	122	159.82
47	CE1503	Shanti Nagar-3	031	E	7	E	Kalamna	29	1410	114	Notified	19		Yes	Yes	114	149.34
48	CE1504	Shanti Nagar-4	032	E	7	E	Kalamna	29	539	98	Notified	19				98	128.38
49	CE1505	Shanti Nagar-5	033	E	7	E	Kalamna	29	2112	384	Notified	19				384	503.04

Sr. No.	Identity Code	Name of slums	Old Code no.	Constituency	10-Zone 2002	Prop.Water Dist. Zone (Pench-V)	ESR Command	Ward No.	Population	No. of structures	Status	Prabag 2002	Also in Prabag 2002	PTS map available	House List available	HSC Connection for Slum (Nos.)	Replacement of Pipe (m)
50	CE1506	Shanti Nagar CRPR colony	034	E	7	E	Kalamna	29	546	99	Notified	19				99	129.69
51	CE1508	Jagruti Nagar	035	E	7	E	Kalamna	29	1085	197	Notified	19				197	258.07
52	CE1507	Shanti Nagar	057	E	7	E	Kalamna	29	2112	384	In Masterlist but not notified	19				384	503.04
53	CE1502	Zopadpatti near Kuttewala B. M.	069	E	7	E	Kalamna	29	90	16	In Masterlist but not notified	19				16	20.96
54	CE4402	Gorakumbharpura	024	E	8	E	Lakadgunj	34	2975	475	Notified	20		Yes	Yes	475	622.25
55	CE1701	Mehatarpura	038	E	8	E	Lakadgunj	70	1092	198	Notified	20		Yes	Yes	198	259.38
56	CE1702	Sudarshan Nagar	039	E	8	E	Lakadgunj	70	754	137	Notified	20		Yes	Yes	137	179.47
57	CE1703	NITE16: Plot No.50, Small factory area	371	E	8	E	Lakadgunj	70	1000	182	In Masterlist but not notified	20				182	238.42
58	CE4301	Nandanvan-1	023	E	5	E	Nandanvan	34 / 36	14420	2403	Notified	21		Yes	Yes	2403	2162.70
59	CE4302	Nandanvan - 2	056	E	5	E	Nandanvan	34 / 36			In Masterlist but not notified	21		Yes	Yes	0	0.00
60	CE4003	Juni Shukrawari	018	E	5	E	Reshimbagh	99	1715	311	Notified	22				311	407.41
61	CE4001	Kunbipura	019	E	5	E	Reshimbagh	100	3898	709	In Masterlist but not notified	22				709	928.79
62	CE4201	Gayatri Nagar	079	E	5	E	Reshimbagh	73	1070	185	Notified	22		Yes	Yes	185	242.35
63	SE1203	Sakkardara	001	E	5	E	Sakkardara	38	2703	491	Notified	23		Yes	Yes	491	643.21
64	SE1201	NITE39: Kh.No.25,36/2 Mz.Sakkardara	395	E	5	E	Sakkardara	38	1650	350	In Masterlist but not notified	23				350	458.50
65	SE1303	East of Rajeev Nagar	934	E	5	E	Dighori	39	100	18	Not in Masterlist '98	23				18	23.58
66	CE4202	Along Nagnallah side of Keshav Nagar	943	E	5				40	7	Not in Masterlist '98	23		Yes	Yes	7	9.17
67	CE1301	Telpura-1	050	E	7				1949	354	Notified	35				354	463.74
68	CE1304	Bhamti pura	086	E	7	NC	Govt. House-2	94	1325	241	Notified	35				241	315.71
69	CE1303	Slum Near Tumaniya Masjid	327	E	7				700	127	Notified	35				127	166.37
70	CE1302	Boudhapura	408	E	7	NC	Govt. House-2	94	1100	200	Notified	35				200	262.00
71	CE4104	Gujar Nagar	028	E	8	C	Killa Mahal	72	916	123	Notified	36		Yes	Yes	123	161.13
72	CE3401	Garoba Maidan -1	041	E	8	C	Killa Mahal	71	845	154	Notified	36		Yes	Yes	154	201.74
73	CE3103	Chinteshwar	047	E	8	E	Lakadgunj	95	3249	591	Notified	36				591	774.21
74	CE3101	Bairagipura	048	E	8	E	Lakadgunj	95	2976	541	Notified	36				541	708.71
75	CE3003	Ganga Jamuna,Koshthipura	052	E	8	C	Sita Buldi Fort	94	221	40	Notified	36				40	52.40
76	CE1401	Satranjipura-1	053	E	8	E	Lakadgunj	69	3249	591	Notified	36				591	774.21
77	CE3104	Rampeth	059	E	8	E	Lakadgunj	95	1332	242	Notified	36				242	317.02
78	CE4105	Shivaji Nagar	010	E	8	C	Killa Mahal	72	5471	995	In Masterlist but not notified	37	38			995	1004.95
79	CE4103	Bhuteswar colony	011	E	8	C	Killa Mahal	98	9162	1666	Notified	37		Yes	Yes	1666	1499.40
80	CE4102	Nandaji Nagar	012	E	8	C	Killa Mahal	98	1066	194	Notified	37				194	254.14
81	CE4101	Gondapura, Shivaji	013	E	8	C	Killa Mahal	117	2274	413	Notified	37				413	541.03
82	CE3302	Hattinallah-1	044	E	8	C	Killa Mahal	116/ 96	9552	1736	Notified	37		Yes	Yes	1736	2274.16
83	CE3301	Hattinallah-2	045	E	8	C	Killa Mahal	116	7648	1390	Notified	37		Yes	Yes	1390	1820.90
84	CE3303	Dhivarpura	058	E	8	C	Killa Mahal	97	2372	431	Notified	37		Yes	Yes	431	564.61
85	CE3201	Deoghare(Mataghare) Mohalla	071	E	8	C	Killa Mahal	96	2600	472	Notified	37				472	618.32
86	CE3304	Boudha Mohalla	081	E	8	C	Killa Mahal	96	1995	363	Notified	37		Yes	Yes	363	475.53
87	CE3901	Killa	009	E	6	C	Killa Mahal	117	4873	886	Notified	38				886	1072.06
88	CE3902	Alimia Chawl	014	E	6	C	Killa Mahal	117	2007	364	Notified	38				364	476.84
89	CE3703	Tulsibagh	015	E	6	C	Sita Buldi Fort	118/ 119	3249	591	Notified	38		Yes		591	774.21
90	CE3701	Rahatekar wadi	016	E	6	C	Sita Buldi Fort	118	1852	337	Notified	38	42	Yes		337	441.47
91	CE4002	Malipura	020	E	6	SE	Reshimbagh	99	3249	591	In Masterlist but not notified	38				591	774.21

Sr. No.	Identity Code	Name of slums	Old Code no.	Constituency	10-Zone 2002	Prop.Water Dist. Zone (Pench-IV)	ESR Command	Ward No.	Population	No. of structures	Status	Prabhag 2002	Also in Prabhag 2002	PTS map available	House List available	HSC Connection for Slum (Nos.)	Replacement of Pipe (m)
92	CE3903	Zopadatti on Shukrawari road	075	E	6	SE	Reshimbagh	117	442	80	In Masterlist but not notified	38				80	104.80
93	CE3702	Chandani Mohalla	017	E	4	C	Sita Buldi Fort	118	632	115	In Masterlist but not notified	42		Yes		115	150.65
94	CE3502	Habeeb ka akhada	008	E	6	C	Sita Buldi Fort	108	1592	290	Notified	45				290	379.90
95	CE4403	Kumbhartoli-2	331	E	8	E	Lakadgunj	34	340	62	Notified	20		Yes	Yes	62	81.22
96	SE1302	Rajiv Nagar	006	E	5	E	Dighori	39	260	47	Notified	23				47	61.57
97	CE3102	Kumbharpura GangaJamuna	046	E	8	E	Lakadgunj	95	1358	247	Notified	36				247	323.57
98	CE3305	Chinchpura	042	E	8	C	Killa Mahal	96/97	1520	276	Notified	37		Yes	Yes	276	361.56
99	CE2001	Bhandewadi-3	061	E	8	E	Subhan Nagar	6 / 7	2313	421	Notified	4				421	551.51
100	CE1603	Punjaram wadi	077	E	8	E	Minimata Nagar	31	1265	250	Notified	4		Yes	Yes	250	327.50
101	CE3004	Koshthipura, Hamalpura	049	E	6	C	Sita Buldi Fort	115	2170	394	Notified	45				394	516.14
102	CE4902	Hanuman Nagar	084	E	8	E	Subhan Nagar	7	3132	569	Notified	5		Yes		569	745.39
103	SE1401	Adiwasi Nagar	004	E	3	E	Sakkardara	41	1500	272	Notified	7				272	356.32
									219331	38728							
1	NW2101	Bhim Nagar	909	N	10	NW	Gittikhadan	21	815	148	Not in Masterlist '98	1				148	193.88
2	NE0601	Indora (3)	195	N	9	NC	Jaripatka / Nari	23	1557	253	Notified	2		Yes	Yes	253	331.43
3	NE0603	Indora (4)	196	N	9				4561	776	Notified	2	15	Yes	Yes	776	938.96
4	NE0604	New Indora Zopda	197	N	9	NC	Jaripatka	23 / 62	433	64	Notified	2		Yes	Yes	64	83.84
5	NE0102	Nara village	212	N	9	NC	Nara	2	1989	362	Notified	2		Yes	Yes	362	474.22
6	NE0201	Nari village	213	N	9	NC	Jaripatka / Nari	3	1352	246	Notified	2				246	322.26
7	NE0401	Kasturba Nagar	218	N	9	NC	Jaripatka / Nari	2	943	171	Notified	2		Yes	Yes	171	224.01
8	NE1002	Pili Nadi (2)	219	N	9	NC	Nara	3	722	131	Notified	2				131	171.61
9	NE1001	Bh.Anand Kausalyayan Nagar	337	N	9	NC	Jaripatka / Nari	3	2340	425	Notified	2				425	556.75
10	NE0202	Takshashila	338	N	9	NC	Jaripatka / Nari	3	828	168	Notified	2				168	220.08
11	NE0801	Ramaai Nagar	339	N	9	NC	Jaripatka / Nari	3	962	175	Notified	2	16			175	229.25
12	NE0402	NITE 36: Kh.No.57,58/2 Mz.-Mankapur	392	N	9	NC	Jaripatka / Nari	2	1748	318	In Masterlist but not notified	2				318	416.58
13	NE0301	Mz.-Indora) / Martin Nagar	393	N	9	NC	Jaripatka / Nari	2	431	128	In Masterlist but not notified	2		Yes	Yes	128	167.68
14	NE0302	Indira Nagar	410	N	9	NC	Jaripatka / Nari		1323	367	In Masterlist but not notified	2		Yes	Yes	367	480.77
15	NE0101	East of Nara Village	901	N	9	NC	Nara	2	150	27	Not in Masterlist '98	2				27	35.37
16	NE0204	South of Taxshashila (Along Nari Road)	902	N	9	NC	Jaripatka / Nari	3	140	20	Not in Masterlist '98	2				20	26.20
17	NE0203	South of Nari Village (Along Nari Road)	903	N	9	NC	Jaripatka / Nari	3	50	6	Not in Masterlist '98	2				6	7.86
18	NE1003	Between Old & New Kamptee Road	911	N	9	NC	Jaripatka / Nari	3	610	87	Not in Masterlist '98	2				87	113.97
19	NE2001	Sanjay Nagar	182	N	9	E	Binaki	26	2631	470	Notified	3		Yes	Yes	470	615.70
20	NE2007	Dhammadeep Nagar	211	N	9	E	Binaki	26	1950	373	Notified	3		Yes	Yes	373	488.63
21	NE1101	Pili Nadi (1)	214	N	9				2626	477	Notified	3				477	624.87
22	NE2101	Kalamna Village	215	N	9	E	Wanjari	5	990	141	Notified	3				141	184.71
23	NE1202	Wanjara (wasti) village	222	N	9	E	Wanjari	3	657	119	Notified	3		Yes	Yes	119	155.89
24	NE1401	Wanjri	229	N	9	E	Kalamna	3	884	160	In Masterlist but not notified	3				160	209.60
25	NE2004	Anand Nagar, Gondpura	237	N	9	E	Binki	26	761	138	Notified	3		Yes	Yes	138	180.78
26	NE2005	Indira Mata Nagar	241	N	9	E	Binki	26	1709	310	Notified	3		Yes	Yes	310	406.10
27	NE2010	Dhammadeep Nagar - 2	345	N	9	E	Binki	26	1209	215	Notified	3		Yes	Yes	215	281.65
28	NE2008	NITE 31: Kh.No. 92/1-2-3 Mz.-Binaki	386	N	9	E	Binki	26	0	0	In Masterlist but not notified	3				0	0.00
29	NE1501	Santosh Nagar (NIT Land)	387	N	9	E	Kalamna	5	1800	253	Notified	3				253	331.43

Sr. No.	Identity Code	Name of slums	Old Code no.	Constituency	10-Zone 2002	Prop.Water Dist. Zone (Pench-IV)	ESR Command	Ward No.	Population	No of structures	Status	Prabhag 2002	Also in Prabhag 2002	PTS map available	House List available	HSC Connection for Slum (Nos.)	Replacement of Pipe (m)
30	NE1301	Garib Nawaz Nagar (NIT Land)	389	N	9	E	Binki	4	6460	1174	Notified	3				1174	1056.60
31	NE1302	NITE34: b)Kh.No.Abdul Hameed Nagar	390	N	9	E	Binki	4	600	109	In Masterlist but not notified	3				109	142.79
32	NE1201	Wanjra (North Along Road)	912	N	9	E	Binki	3	750	105	Not in Masterlist '98	3				105	137.55
33	NE2003	North of Chamar Nallah/Sanjay Nagar	913	N	9	E	Binki	4	399	72	Not in Masterlist '98	3				72	94.32
34	NE2009	South of Dhammadeep Nagar	914	N	9	E	Binki	26	550	78	Not in Masterlist '98	3				78	102.18
35	NE2006	South of Indira Mata Nagar	930	N	9	E	Binki	26	651	93	Not in Masterlist '98	3				93	121.83
36	NE1102	South of pili nadi (1)	961	N	9	E	Binki	3	325	59	Not in Masterlist '98	3				59	77.29
37	NE1103	Matoshree Ramai Nagar	962	N	9	E	Binki	3	639	115	Not in Masterlist '98	3				115	150.65
38	NE1104	Bhimwadi	963	N	9	E	Binki	3	750	136	Not in Masterlist '98	3				136	178.16
39	NE2102	Nagraj Nagar (NE of Kalamna)	970	N	9	E	Wanjari	5	250	45	Not in Masterlist '98	3				45	58.95
40	NE3302	Aayasha Nagar	975	N	9	E	Kalamna	5	674	122	Not in Masterlist '98	3				122	159.82
41	NE2201	Bezanbagh (2)	201	N	10	NC	Indora Tapping	60 / 61	1900	271	Notified	14				271	355.01
42	NW2102	Adiwasi Nagar (2)	203	N	10	NC	Govt. House	21	1955	355	Notified	14				355	465.05
43	NE2202	Mekosabagh	204	N	10	NC	Indora Tapping	60	581	83	In Masterlist but not notified	14				83	108.73
44	NW2201	Gadheghat chhawani	205	N	10	NC	Govt. House	21	920	167	Notified	14		Yes	Yes	167	218.77
45	NW2204	Goa Colony	221	N	10	NC	Govt. House	59	1135	206	Notified	14				206	269.86
46	NE2205	Dilip Nagar, Mukund Nagar	224	N	10	NC	Indora Tapping	60	868	124	Notified	14				124	162.44
47	NE2204	Lumbini Nagar	239	N	10	NC	G.H. + Indora Tap.	66 / 61	2919	417	Notified	14				417	546.27
48	NE2203	Angulimal Nagar	240	N	10	NC	Govt. House	60	560	80	In Masterlist but not notified	14				80	104.80
49	NW2202	Navin Basti Chhawani	407	N	10	NC	Govt. House	59	2825	513	Notified	14				513	672.03
50	NE2504	West of Noga Factory	955	N	10	NC	Govt. House	60	770	110	Not in Masterlist '98	14				110	144.10
51	NE2506	South of Punjabi Line (Near hanuman Temple)	967	N	10	NC	Govt. House	60	345	62	Not in Masterlist '98	14				62	81.22
52	NE0605	Indora (2)	194	N	10	NC	Indora Tapping	62	4269	780	Notified	15		Yes	Yes	780	1021.80
53	NE0501	Jaripatka	199	N	10	NC	Indora Tapping	22	3249	590	Notified	15				590	772.90
54	NE2301	Bezanbag (1)	200	N	10	NC	Indora Tapping	61	1521	276	Notified	15		Yes	Yes	276	361.56
55	NE0606	South of Indora (2) Triangular Portion	908	N	10	NC	Indora Tapping	62	150	27	Not in Masterlist '98	15		Yes	Yes	27	35.37
56	NE3401	Old Jaripatka & Matoshree Ramai Nagar	954	N	10	NC	Bezanbagh	22	1939	212	Not in Masterlist '98	15				212	277.72
57	NE3402	Zopadpatti (East of Mahavir Nagar,Jaripatka)	968	N	10	NC	Bezanbagh	23	300	54	Not in Masterlist '98	15				54	70.74
58	NE1602	Rahul Nagar, Azad Nagar	180	N	9				3899	710	Notified	16		Yes	Yes	710	930.10
59	NE1601	Habib Nagar	210	N	9	NC	Indora Tapping	25	2925	531	Notified	16		Yes	Yes	531	695.61
60	NE0901	Manav Nagar	243	N	9	NC	Jaripatka / Nari	24	2255	410	Notified	16		Yes		410	537.10
61	NE0903	Shende Nagar	340	N	9	NC	Jaripatka / Nari	24	2405	437	Notified	16				437	572.47
62	NE0902	N-W Corner of Shende Nagar	910	N	9	NC	Jaripatka / Nari	24	150	27	Not in Masterlist '98	16				27	35.37
63	NE1904	(North of Khobragade Nagar)	956	N	9	E	Binaki	26	42	6	Not in Masterlist '98	16				6	7.86
64	NE1901	Panchsheel Nagar (1)	175	N	9	NC	Jaripatka	25	3697	617	Notified	17		Yes	Yes	617	808.27
65	NE3003	Binaki (1)	176	N	9				4614	838	Notified	17				838	1013.98
66	NE3002	Binaki (2)	177	N	9	E	Binaki	26	689	125	Notified	17				125	163.75
67	NE3004	New Mangalwari	178	N	9	E	Binaki	26	1410	201	Notified	17				201	263.31
68	NE1801	Panchsheel Nagar (2)	207	N	9	E	Kalamna	65	1073	195	Notified	17		Yes	Yes	195	255.45
69	NE1701	BabaBoudha Nagar,Taj Nagar	208	N	9	E	Kalamna	64	5199	945	Notified	17		Yes	Yes	945	1237.95
70	NE1903	Khobragade Nagar	220	N	9	E	Kalamna	65	1300	236	Notified	17		Yes	Yes	236	309.16
71	NE3001	Binaki (3)	228	N	9	E	Binaki	26	533	97	In Masterlist but not notified	17				97	127.07

Sr. No.	Identity Code	Name of slums	Old Code no.	Constituency	10-Zone 2002	Prop.Water Dist. Zone (Pench-IV)	ESR Command	Ward No.	Population	No. of structures	Status	Prabhag 2002	Also in Prabhag 2002	PTS map available	House List available	HSC Connection for Slum (Nos.)	Replacement of Pipe (m)
72	NE2901	Panchakua Kumbhar Basti	232	N	9	E	Kalamna	65	1151	209	Notified	17				209	273.79
73	NE2802	Bapukuti	238	N	9	NC	Indora Tapping	91	660	120	Notified	17				120	157.20
74	NE2002	NITE17: Kh. No. 21/1 Mz. - Binaki	372	N	9	E	Binaki	26	1000	182	In Masterlist but not notified	17				182	238.42
75	NE1902	Chamarnallah & Panchsheel nagar	929	N	9	E	Kalamna	65	700	129	Not in Masterlist '98	17		Yes	Yes	129	168.99
76	NE2803	South of Vaishali Nagar along Calcutta Rly. Line	971	N	9	NC	Indora Tapping	64	1000	182	Not in Masterlist '98	17				182	238.42
77	CE1102	Bahuli Vihir	165	N	7	E	Kalamna	28 / 67	2274	413	In Masterlist but not notified	18				413	541.03
78	CE1101	Gondpura,Prem Nagar (1)	170	N	7	E	Kalamna	29 / 67	4808	874	Notified	18				874	1057.54
79	NE3102	Bokade Mohalla	171	N	7	E	Kalamna	27	1110	160	In Masterlist but not notified	18				160	209.60
80	NE2903	Joshipura	179	N	7				839	152	Notified	18				152	199.12
81	NE2904	Binaki Tekada	209	N	7				572	104	Notified	18				104	136.24
82	NE2902	Sonartoli	216	N	7	E	Binaki	65	1631	296	Notified	18		Yes	Yes	296	387.76
83	NE3202	Kundanlal Gupta Nagar	227	N	7	E	Kalamna	27	5420	774	Notified	18				774	1013.94
84	NE3201	Indira Nagar	235	N	7	E	Kalamna	27	2184	311	In Masterlist but not notified	18				311	407.41
85	NE3103	Janta Nagar(Jamdarwadi)	344	N	7	E	Kalamna	27	665	95	Notified	18				95	124.45
86	NE3101	North of Bokade Mohalla	931	N	7	E	Kalamna	27	1368	194	Not in Masterlist '98	18				194	254.14
87	CE1201	Gujri Lalganj	161	N	7				988	180	Notified	19				180	235.80
88	CE1202	Kumbharpura,Musalman pura	162	N	7	E	Kalamna	68	2600	473	Notified	19				473	619.63
89	CE1501	Kawarapeth	172	N	7	E	Kalamna	28	1780	323	Notified	19				323	423.13
90	CE1203	Kumbharpura, Musalmanpura	174	N	7				1689	307	In Masterlist but not notified	19				307	402.17
91	NE2501	Bhoslewadi-1	188	N	9	NC	Govt. House	109/ 110	4049	736	Notified	31				736	964.16
92	NE2603	Lashkaribagh-1	189	N	9	NC	Indora Tapping	90	1638	298	Notified	31				298	390.38
93	NE2602	Lashkaribagh-2	234	N	9	NC	Indora Tapping	90	1424	259	Notified	31				259	339.29
94	NE2401	Indira Jyoti Nagar	242	N	9	NC	Indora Tapping	88	865	159	Notified	31				159	208.29
95	NE2701	NITE 25: Unit No.2	380	N	9	NC	Indora Tapping	63	293	53	In Masterlist but not notified	31				53	69.43
96	NE2601	NITE39: Unit 1	394	N	9	NC	Indora Tapping	90	0	0	In Masterlist but not notified	31				0	0.00
97	NE2502	Slum Near Noga Factory	406	N	9	NC	Govt. House	88	806	146	Notified	31				146	191.26
98	NE2503	South of Noga Factory	925	N	9				700	100	Not in Masterlist '98	31				100	131.00
99	NE2505	Matatoli (Motibagh) Basor Basti	966	N	9	NC	Govt. House	60	110	20	Not in Masterlist '98	31				20	26.20
100	NE2606	South of Lashkaribagh (Calcutta Rly.Line)	976	N	10	NC	Indora Tapping	90	500	70	Not in Masterlist '98	31				70	91.70
101	CE1004	Bairagipura	166	N	7				1520	276	Notified	34				276	361.56
102	CE0801	Tandapeth	167	N	7				16245	2953	Notified	34				2953	2657.70
103	CE1003	Khairipura	168	N	7	E	Kalamna	66 / 67	2938	716	Notified	34				716	937.96
104	CE0901	Naikwadi, Lendi Talao	183	N	7				2599	472	Notified	34				472	618.32
105	CE0902	Ram Nagar	184	N	7	NC	Indora Tapping	93 / 113	1053	191	Notified	34				191	250.21
106	NE2801	Balabhaupteth	190	N	9	E	Kalamna	64	5017	912	In Masterlist but not notified	34		Yes	Yes	912	1103.52
107	CE0701	Thakkargram (1)	191	N	7	NC	Indora Tapping	113	1657	301	Notified	34	33	Yes	Yes	301	394.31
108	CE0702	Thakkargram (2)	192	N	7	NC	Indora Tapping	91	1703	310	Notified	34		Yes	Yes	310	406.10
109	CE0802	Chandrabhaga Nagar	206	N	7	NC	Indora Tapping	66	5211	947	Notified	34				947	1051.17
110	CE1005	Bairagipura (2)	231	N	7	NC	Indora Tapping	92	5075	992	In Masterlist but not notified	34		Yes		992	1101.12
111	CE0703	East of Thakkargram	928	N	7	NC	Indora Tapping	92	900	163	Not in Masterlist '98	34				163	213.53
112	NE0502	Bada Indora	198	N	10	NC	Indora Tapping	22	806	146	Notified	15				146	191.26
113	NE0904	Devi Nagar	336	N	9				592	107	Notified	16				107	140.17

Sr. No.	Identity Code	Name of slums	Old Code no.	Constituency	10-Zone 2002	Prop.Water Dist. Zone (Pench-IV)	ESR Command	Ward No.	Population	No. of structures	Status	Prabhag 2002	Also in Prabhag 2002	PTS map available	House List available	HSC Connection for Slum (Nos.)	Replacement of Pipe (m)
114	NE0602	Shravasti Nagar	217	N	9	NC	Jaripatka	23	1707	287	Notified	2		Yes	Yes	287	375.97
115	NE3301	Rajeev Gandhi Nagar	181	N	9	E	Kalamna	5	2150	307	Notified	3				307	402.17
116	CE1002	Bangla Desh (1)	225	N	7				7150	1300	Notified	34		Yes	Yes	1300	1703.00
117	CE1001	Bangla Desh (2)	226	N	7				637	115	Notified	34		Yes	Yes	115	150.65
									193065	33890							
1	SE1701	Manewada village	280	S	3	SE	Hudkeshwar	11	1700	309	Notified	7	8	Yes	Yes	309	404.79
2	SE0703	Jogi Nagar	271	S	3	SE	Onkar nagar	12	5000	910	Notified	8				910	1192.10
3	SE2001	Mang Garodi Toli	281	S	3	SE	Onkar nagar	12	1800	327	Notified	8				327	428.37
4	SE0701	Dhadiwal Nagar	288	S	3	SE	Onkar nagar	12	1500	273	Notified	8				273	357.63
5	SE1102	Rahul Nagar	405	S	3	SE	Onkar nagar	11	300	55	Notified	8				55	72.05
6	SE2002	Rahate Nagar	945	S	3	SE	Onkar nagar	12	1200	218	Not in Masterlist '98	8				218	285.58
7	SE2003	Ramteke Nagar	946	S	3	SE	Onkar nagar	12	2200	400	Not in Masterlist '98	8				400	524.00
8	SE2201	Sonaji Kaikadi Nagar	973	S	3	SW	Chinch Bhuvan	13	1000	182	Not in Masterlist '98	8				182	238.42
9	SE0609	Babulkheda	245	S	3	SE	Wanjari Nagar	77	5426	986	In Masterlist but not notified	24				986	1094.46
10	SE0607	Ambedkar Nagar	268	S	3	SE	Wanjari Nagar	77	169	35	Notified	24				35	45.85
11	SE1002	Savatribai Fuley Nagar	276	S	3	SE	Wanjari Nagar	76	4500	818	Notified	24		Yes	Yes	818	1071.58
12	SE0608	Kunjilal Peth	283	S	3	SE	Wanjari Nagar	77	3000	545	Notified	24				545	713.95
13	SE1101	Vasant Nagar	284	S	3	SE	Onkar nagar	42	1832	333	In Masterlist but not notified	24				333	436.23
14	SE1001	Ramamai Nagar	346	S	3	SE	Wanjari Nagar	76 & 77	400	73	Notified	24				73	95.63
15	SE1003	Bajrang Nagar	347	S	3	SE	Wanjari Nagar	76	300	55	Notified	24				55	72.05
16	SE0603	New Babulkheda	255	S	4	SE	Wanjari Nagar	78	1845	329	Notified	25		Yes	Yes	329	430.99
17	SE0605	Joshiwadi	262	S	4	SE	Onkar nagar	43	650	118	Notified	25				118	154.58
18	SE0702	Bhim Nagar	264	S	4	SE	Onkar nagar	12 & 43	1925	350	Notified	25				350	458.50
19	SE0606	Jaibhim Nagar	289	S	4	SE	Onkar nagar	43	10000	1818	Notified	25				1818	1999.80
20	SE0602	Kausalya Nagar	404	S	4	SE	Wanjari Nagar	78	2708	492	Notified	25		Yes	Yes	492	644.52
21	SE0501	Sayyad Baba Dargah	941	S	4	SE	Wanjari Nagar	100	350	64	Not in Masterlist '98	25		Yes	Yes	64	83.84
22	CE3704	Gulab baba Zopadpatti	270	S	6				364	66	Notified	38				66	86.46
23	SE0801	Vakilpeth	265	S	3	SE	Wanjari Nagar	119	3000	545	Notified	39		Yes	Yes	545	713.95
24	SE0902	Adiwasi Gondtoli	269	S	3	SE	Wanjari Nagar	101	500	90	Notified	39				90	117.90
25	SE0302	Rambagh	244	S	3	C	Sita Buldi Fort	79	2805	510	Notified	40		Yes	Yes	510	668.10
26	SE0201	Kafala Basti	267	S	3	C	Sita Buldi Fort	79	600	74	Notified	40		Yes	Yes	74	96.94
27	SE0403	Jattarodi	272	S	3	C	Sita Buldi Fort	104/79	3802	725	Notified	40		Yes	Yes	725	949.75
28	SE0401	Borkar Nagar,Basod Mahalla	274	S	3	C	Sita Buldi Fort	104	1500	117	Notified	40		Yes	Yes	117	153.27
29	SE0303	Imamwada - 1	282	S	3	C	Sita Buldi Fort	79	2177	396	In Masterlist but not notified	40		Yes	Yes	396	518.76
30	SE0402	Indira Nagar Jattarodi (2)	348	S	3	C	Sita Buldi Fort	104	3600	283	Notified	40		Yes	Yes	283	370.73
31	SE0202	Jat Tarodi Behind Kundanlal Lib.	349	S	3	C	Sita Buldi Fort	104	230	42	Notified	40				42	55.02
32	SE0404	Jat Tarodi - 2	350	S	3	C	Sita Buldi Fort	104	2000	255	Notified	40		Yes	Yes	255	334.05
33	SE0101	Timber Market Sweeper Colony	398	S	3	C	Sita Buldi Fort	104	1052	191	In Masterlist but not notified	40				191	250.21
34	SE0203	East of Kafala Bastee	958	S	3	C	Sita Buldi Fort	79	231	47	Not in Masterlist '98	40		Yes	Yes	47	61.57
35	SE0405	North of Borkar Nagar	977	S	3				736	99	Not in Masterlist '98	40		Yes	Yes	99	129.69
36	SW0904	Takiya Dhantoli	246	S	4	SW	Dhantoli	105	707	128	Notified	41		Yes	Yes	128	167.68
37	SW0601	Kumbhartoli (1)	249	S	4	NC	Govt. House	106	2247	408	Notified	41		Yes	Yes	408	534.48

Sr. No.	Identity Code	Name of slums	Old Code no.	Constituency	10-Zone 2002	Prop.Water Dist. Zone (pench-IV)	ESR Command	Ward No.	Population	No. of structures	Status	Prabhag 2002	Also in Prabhag 2002	PTS map available	House List available	HSC Connection for Slum (Nos.)	Replacement of Pipe (m)
38	SW0301	Gavalipura Tekadi	250	S	4	NC	Govt. House	107	4669	850	Notified	41				850	1113.50
39	SW0401	Anand Nagar	252	S	4	NC	Govt. House	106	1001	181	Notified	41		Yes		181	237.11
40	SW0901	Dhantoli(2)Saraswati Nagar	258	S	4	SW	Dhantoli	105	1430	260	Notified	41		Yes	Yes	260	340.60
41	SW0902	Takiya Dhantoli (3) Saraswati Nagar	259	S	4	SW	Dhantoli	105	2380	386	Notified	41		Yes	Yes	386	505.66
42	SW3501	Choti Dhantoli	260	S	4	SW	Dhantoli	105	546	100	Notified	41				100	131.00
43	SW0503	Netaji Market	266	S	4	NC	Govt. House	106	392	70	Notified	41		Yes		70	91.70
44	SW0501	Zopadpatti near Yeshwant Stadium	286	S	4	SW	Dhantoli	106	952	173	In Masterlist but not notified	41		Yes		173	226.63
45	SW0602	North of Kumbhartoli Toli (Chandani Nagar)	938	S	4	NC	Govt. House	106	532	97	Not in Masterlist '98	41		Yes		97	127.07
46	SW0903	S-E of Takiya Dhantoli (3)	939	S	4	SW	Dhantoli	105	70	12	Not in Masterlist '98	41		Yes		12	15.72
47	SW0502	Sangam	950	S	4	NC	Govt. House	106	308	56	Not in Masterlist '98	41		Yes		56	73.36
48	CE3501	Gadikhana	248	S	4	C	Sita Buldi Fort	122	3847	700	Notified	42		Yes		700	917.00
49	CE2801	Zopadpatti near new S.T. stand	275	S	4	C	Sita Buldi Fort	104	364	66	Notified	42				66	86.46
50	CE3601	Karnalbagh - 2	279	S	4	C	Sita Buldi Fort	121	143	26	In Masterlist but not notified	42				26	34.06
51	CE2401	Adarsh Indiramata Nagar	409	S	6	C	Sita Buldi Fort	122	526	96	In Masterlist but not notified	43				96	125.76
52	SE0601	Kukde Layout	253	S	4	SE	Wanjari Nagar	78	2068	376	Notified	25		Yes	Yes	376	492.56
53	SE0604	Chaudhari Mohalla	261	S	4	SE	Wanjari Nagar	78 & 77	1500	196	Notified	25		Yes	Yes	196	256.76
54	CE3801	Siraspath,Saraipeth	247	S	6	SE	Reshimbagh	119	7810	1420	Notified	38				1420	1576.20
55	SE0901	Somwaripeth (2)	251	S	3	SE	Wanjari Nagar	101	968	158	Notified	39		Yes	Yes	158	206.98
56	SE0301	Imamwada-1	254	S	3	C	Sita Buldi Fort	103	1100	162	Notified	40		Yes	Yes	162	212.22
57	CE3602	Karnalbagh	257	S	4	C	Sita Buldi Fort	121	4224	768	Notified	42				768	844.80
58	CE2601	Sindikhana, Mangpura	263	S	4	C	Sita Buldi Fort	122	2495	454	Notified	42				454	594.74
59	CE2701	Gujarwadi	277	S	4	C	Sita Buldi Fort	104	1657	301	Notified	42				301	394.31
									85516	14829							
1	NW0401	Borgaon Gittikhadan	091	W	10	NW	Gittikhadan	18	1725	313	Notified	1		Yes	Yes	313	410.03
2	NW0701	Zingabai Takli	132	W	10	NW	Gittikhadan	1	910	165	Notified	1		Yes	Yes	165	216.15
3	NW0101	Gorewada Village	133	W	10	NW	Gittikhadan	1	1745	317	Notified	1				317	415.27
4	NW0901	Mankapura Village	134	W	10	NW	Gittikhadan	20	260	47	In Masterlist but not notified	1				47	61.57
5	NW0402	Adiwasinagar(Borgaon)	152	W	10	NW	Gittikhadan	18	430	78	Notified	1		Yes	Yes	78	102.18
6	NW1101	Mankapur Zopadpatti	399	W	10	NW	Gittikhadan	20	3210	583	Notified	1				583	763.73
7	NW0801	South of Zingabai Takli	904	W	10	NW	Gittikhadan	18	365	66	Not in Masterlist '98	1				66	86.46
8	NW0102	North of Gorewada Village	905	W	10	NW	Gittikhadan	1	630	114	Not in Masterlist '98	1				114	149.34
9	NW1001	North of Mankapur Zopadpatti	906	W	10	NW	Gittikhadan	20	550	101	Not in Masterlist '98	1				101	132.31
10	NW0602	Sonpur Village	907	W	10				266	36	Not in Masterlist '98	1				36	47.16
11	NW1801	North of Raj Nagar	920	W	10	NW	Gittikhadan	20	1795	326	Not in Masterlist '98	1				326	427.06
12	NW0702	Zingabai Takli (North)	952	W	10	NW	Gittikhadan	1	3000	545	Not in Masterlist '98	1		Yes	Yes	545	713.95
13	SW3101	Somalwada-1	109	W	2	SW	Khamala	14	4396	571	Notified	9		Yes	Yes	571	748.01
14	SW2702	Ramabai Ambedkar Nagar	127	W	2	SW	Takliseem	15	3458	628	Notified	9				628	822.68
15	SW3401	Shivangaon Village	140	W	2	SW	Takliseem	15	3402	618	In Masterlist but not notified	9				618	809.58
16	SW3001	Sonegaon	141	W	2	SW	Takliseem	14	1162	211	In Masterlist but not notified	9				211	276.41
17	SE1901	Chinchbhawan	142	W	2	SW	Chinchbhuwan	13	1500	272	In Masterlist but not notified	9				272	356.32
18	SW2701	Jaitala Village	145	W	2	SW	Takliseem	15	6013	1093	In Masterlist but not notified	9				1093	1202.30
19	SW2601	Ekatmata Nagar	343	W	2	SW	Takliseem	15	4564	586	Notified	9		Yes	Yes	586	767.66

Sr. No.	Identity Code	Name of slums	Old Code no.	Constituency	10-Zone 2002	Prop. Water Dist. Zone (Pench-IV)	ESR Command	Ward No.	Population	No. of structures	Status	Prabhag 2002	Also in Prabhag 2002	PTS map available	House List available	HSC Connection for Slum (Nos.)	Replacment of Pipe (m)
20	SW3601	Shivpuri	923	W	2				266	48	Not in Masterlist '98	9				48	62.88
21	SW3002	Rahmat Nagar	942	W	2	SW	Takliseem	14	231	42	Not in Masterlist '98	9				42	55.02
22	SE2101	New Vaishali Nagar	949	W	2	SW	Chinchbhuwan	13	488	111	Not in Masterlist '98	9		Yes	Yes	111	145.41
23	SW2703	South West of Jaitala Village	959	W	2	SW	Takliseem	15	168	31	Not in Masterlist '98	9				31	40.61
24	SW2601	East of Ekatmata Nagar	960	W	2				26	6	Not in Masterlist '98	9		Yes		6	7.86
25	SE1902	Shantiniketan Nagar (West of Chinchbhavan)	969	W	2	SW	Chinchbhuwan	13	285	59	Not in Masterlist '98	9		Yes	Yes	59	77.29
26	SW1503	Kamgar Nagar	107	W	2	SW	Gayatri Nagar	49	4060	503	Notified	10		Yes	Yes	503	658.93
27	SW1502	Tukdoji Nagar	108	W	2	SW	Gayatri Nagar	49	3689	440	Notified	10		Yes	Yes	440	576.40
28	SW1701	Gopal Nagar, Vijay Nagar	111	W	2	SW	Gayatri Nagar	50	511	55	Notified	10		Yes	Yes	55	72.05
29	SW1501	Subhash Nagar	137	W	2	SW	Gayatri Nagar	49	1295	235	In Masterlist but not notified	10				235	307.85
30	SW1601	Parsodi Village	138	W	2	SW	Gayatri Nagar	50	959	174	In Masterlist but not notified	10				174	227.94
31	SW2801	Bhamti	143	W	2	SW	Laxmi Nagar	48	700	127	Notified	10				127	166.37
32	SW1301	Takli Seem	144	W	2	SW	Takliseem	16	1638	298	In Masterlist but not notified	10				298	390.38
33	SW1401	NITE4: Kh.No.42/3Takliseem	359	W	2	SW	Takliseem	16	105	20	In Masterlist but not notified	10				20	26.20
34	SW1505	Ambedkar Nagar	403	W	2	SW	Gayatri Nagar	49	245	45	Notified	10		Yes	Yes	45	58.95
35	SW1504	East of Kamgar Colony	940	W	2	SW	Gayatri Nagar	49	455	62	Not in Masterlist '98	10				62	81.22
36	NW2504	Futala Basti Juni	096	W	1	SW	Ram Nagar	54	2045	253	Notified	11		Yes	Yes	253	331.43
37	NW2502	New Futala Basti-1	098	W	1	NW	Dabha	16	2513	457	Notified	11		Yes	Yes	457	598.67
38	NW2503	New Futala Basti	101	W	1	NW	Dabha	16	990	180	Notified	11		Yes	Yes	180	235.80
39	SW1107	Ambazari Pandharabodi	105	W	1	SW	Ram Nagar	53	5040	591	Notified	11		Yes	Yes	591	774.21
40	SW1201	(West of Gandhinagar layout)	105	W	1	SW	Ram Nagar	53	5397	981	Notified	11				981	1187.01
41	SW1101	New Pandhrabodi	116	W	1	SW	Ram Nagar	52	1995	249	Notified	11		Yes	Yes	249	326.19
42	SW1106	Sewa Nagar	123	W	1	SW	Ram Nagar	52	1133	261	Notified	11		Yes	Yes	261	341.91
43	SW1003	Sanjay Nagar	136	W	1	SW	Ram Nagar	53	4123	586	Notified	11		Yes	Yes	586	767.66
44	SW1104	Sudamnagri	157	W	1	SW	Ram Nagar	53	3185	579	In Masterlist but not notified	11				579	758.49
45	SW1108	Jyoti Nagar	158	W	1	SW	Ram Nagar	53	434	78	In Masterlist but not notified	11				78	102.18
46	SW1702	Joshiwadi	160	W	1	SW	Ram Nagar	50	273	50	Notified	11				50	65.50
47	SW1105	NITE5: Kh.No.53/1J Mz.- Ambazari	360	W	1	SW	Ram Nagar	51	252	46	In Masterlist but not notified	11				46	60.26
48	SW1103	NITE 11: Kh. No. 49 Mz.- Pandhrabodi	366	W	1	SW	Ram Nagar	52	0	0	In Masterlist but not notified	11				0	0.00
49	SW1001	Along University Campus Compound Wall	947	W	1	SW	Ram Nagar	53	28	9	Not in Masterlist '98	11		Yes		9	11.79
50	SW1002	Along LIT Compound Wall	948	W	1	SW	Ram Nagar	53	91	17	Not in Masterlist '98	11		Yes		17	22.27
51	NW1601	Gittikhadan	090	W	1	NW	Seminary Hill	17	3445	626	Notified	12	13	Yes	Yes	626	820.06
52	NW1201	Dabha Basti	097	W	1	NW	Dabha	17	1065	193	Notified	12		Yes	Yes	193	252.83
53	NW2701	Kachimet Wadi (Village Abadi)	099	W	1	NW	Dabha	17	1205	219	Notified	12		Yes	Yes	219	286.89
54	NW1402	Hajari Pahad	100	W	1	NW	Dabha / Sem. Hill	56	1585	288	Notified	12		Yes	Yes	288	377.28
55	NW1602	Rajeev Gandhi Nagar	113	W	1	NW	Seminary Hill	56	1015	184	Notified	12		Yes	Yes	184	241.04
56	NW1501	Surendragarh	112	W	1	NW	Seminary Hill	56	7690	1398	Notified	12		Yes	Yes	1398	1831.38
57	NW1603	Vishwas Nagar	114	W	1	NW	Seminary Hill	56	1225	223	Notified	12		Yes	Yes	223	292.13
58	NW0202	Makardhokda	124	W	1	NW	Gittikhadan / Seminary Hill	1 / 17	575	104	Notified	12		Yes	Yes	104	136
59	NW1701	Manavta Nagar	153	W	1	NW	Seminary Hill	56	1935	352	Notified	12				352	461
60	NW0201	Jagadish Nagar	333	W	1	NW	Dabha	17	2260	410	Notified	12				410	537
61	NW0301	Bornala	334	W	1	NW	Gittikhadan	17	190	34	Notified	12				34	45
62	NW1502	Pannalal Deshraj Nagar	341	W	1	NW	Seminary Hill	56	3335	606	Notified	12		Yes	Yes	606	794
63	NW1702	Vikas Nagar	355	W	1	NW	Seminary Hill	56	295	53	Notified	12		Yes	Yes	53	69

Sr. No.	Identity Code	Name of slums	Old Code no.	Constituency	10- Zone 2002	Prop. Water Dist. Zone (Pench-IV)	ESR Command	Ward No.	Population	No. of structures	Status	Prabhag 2002	Also in Prabhag 2002	PTS map available	House List available	HSC Connection for Slum (Nos.)	Replacment of Pipe (m)
64	NW1202	West of Bhivsenkhori Notified Area	915	W	1	NW	Dabha	17	2345	426	Not in Masterlist '98	12		Yes	Yes	426	558
65	NW1301	Ganga Nagar	916	W	1	NW	Dabha	17	1820	330	Not in Masterlist '98	12				330	432
66	NW1401	North of Hazari Pahad	917	W	1	NW	Dabha / Sem. Hill	56	525	95	Not in Masterlist '98	12		Yes	Yes	95	124
67	NW1403	South of Hazari Pahad	918	W	1	NW	Dabha / Sem. Hill	56	1220	221	Not in Masterlist '98	12		Yes	Yes	221	290
68	NW1604	South of Rajeev Nagar	919	W	1	NW	Seminary Hill	56	85	15	Not in Masterlist '98	12				15	20
69	NW2501	North of New Futala Basti	935	W	1	NW	Dabha	17	645	117	Not in Masterlist '98	12		Yes	Yes	117	153
70	NW1703	Ramgiri Zopadpatti	972	W	1	NW	Seminary Hill	55	300	54	Not in Masterlist '98	12				54	71
71	NW0502	Gittikhadan	092	W	10	NW	Gittikhadan	19	2144	362	In Masterlist but not notified	13		Yes	Yes	362	474
72	NW1605	Krishna Nagar, Azad Nagar	093	W	10	NW	Seminary Hill	57	5950	1082	Notified	13		Yes	Yes	1082	1309
73	NW2002	Sadar Mahapura	094	W	10	NC	Govt. House-4	58	2660	483	In Masterlist but not notified	13		Yes	Yes	483	633
74	NW2001	Sadar Dhoipuda	095	W	10	NC	Govt. House-5	58	1310	238	Notified	13		Yes	Yes	238	312
75	NW1903	Gondpura Tiger Gap	115	W	10	NC	Govt. House-6	57	1715	312	Notified	13		Yes	Yes	312	409
76	NW0501	Dashrath Nagar	147	W	10	NW	Gittikhadan	19	1570	257	Notified	13		Yes	Yes	257	337
77	NW0601	Police Line Takli	159	W	10	NW	Gittikhadan	20	455	82	Notified	13				82	107
78	NW1902	(Tigergap) Adjoining School	921	W	10	NC	Govt. House-4	57	130	23	Not in Masterlist '98	13		Yes	Yes	23	30
79	NW1901	(Tigergap) Around Ground	922	W	10	NC	Govt. House-5	57	995	181	Not in Masterlist '98	13		Yes	Yes	181	237
80	NW0503	Adiwasi Nagar (south of yogendra Nagar)	974	W	10	NW	Gittikhadan	19	400	79	Not in Masterlist '98	13		Yes	Yes	79	103
81	NW2203	Mangalwari Bazar Zopadpatti	230	W	10	NC	Govt. House-1	59	380	69	In Masterlist but not notified	14				69	90
82	SW2303	Ajani Old Abadi	088	W	2	SW	Dhantoli	45	1820	330	Notified	26		Yes	Yes	330	432
83	SW2301	Ajani Chuna Bhatti	089	W	2	SW	Dhantoli	45	1113	202	In Masterlist but not notified	26				202	265
84	SW2302	Ambika Nagar	118	W	2	SW	Dhantoli	45	448	61	Notified	26		Yes	Yes	61	80
85	SW2402	Sahakar Nagar	119	W	2	SW	Laxmi Nagar	45	1043	141	Notified	26		Yes	Yes	141	185
86	SW2401	Rajeev Nagar	128	W	2	SW	Laxmi Nagar	45	805	107	Notified	26		Yes	Yes	107	140
87	SW2502	Priyanka wadi	150	W	2	SW	Laxmi Nagar	45	525	95	Notified	26		Yes	Yes	95	124
88	SW3201	Mahatma Phule Nagar	335	W	2	SW	Khamala	3	301	55	Notified	26				55	72
89	SW2501	Rahul Nagar	352	W	2	SW	Laxmi Nagar	45	1064	158	Notified	26		Yes	Yes	158	207
21	SW3301	Panchadeep Nagar	944	W	2	SW	Khamala	13	287	52	Not in Masterlist '98	26				52	68
90	SW2903	Khamla	106	W	2	SW	Khamala	47	1512	275	In Masterlist but not notified	27				275	360
91	SW2001	Shiv Nagar	110	W	2	SW	Khamala	47	616	76	Notified	27		Yes	Yes	76	100
92	SW2901	Changdeo Nagar	126	W	2	SW	Khamala	47	217	27	Notified	27		Yes	Yes	27	35
93	SW1901	Shyam Nagar	129	W	2	SW	Khamala	47	693	97	Notified	27		Yes	Yes	97	127
94	SW2002	Gautam Nagar (Khamla)	130	W	2	SW	Khamala	47	308	40	Notified	27		Yes	Yes	40	52
95	SW2101	Danteshwari	131	W	2	SW	Laxmi Nagar	81	2072	178	Notified	27		Yes	Yes	178	233
96	SW2902	Khamla Zopadpatti	139	W	2	SW	Khamala	47	2198	400	In Masterlist but not notified	27				400	524
97	SW2201	Kaikadi Nagar	149	W	2	SW	Laxmi Nagar	80	287	35	Notified	27		Yes	Yes	35	46
98	SW2102	Danteshwari	342	W	2	SW	Laxmi Nagar	81	371	68	Notified	27		Yes	Yes	68	89
99	SW2103	Dalpetshah Nagar	401	W	2				581	61	Notified	27		Yes	Yes	61	80
100	SW0701	Kachipura-1	103	W	2	SW	Laxmi Nagar	83	1400	254	Notified	28				254	333
101	SW0801	Kachipura-2	104	W	2	SW	Laxmi Nagar	83	1862	338	Notified	28		Yes	Yes	338	443
102	SW1801	Laxmi Nagar Zopadpatti	125	W	2	SW	Laxmi Nagar	82	644	103	Notified	28		Yes	Yes	103	135
103	SW0702	Central Part of Kachipura	936	W	2	SW	Laxmi Nagar	83	406	74	Not in Masterlist '98	28				74	97
104	SW0802	West of Kachipura - 2	951	W	2	SW	Laxmi Nagar	83	210	38	Not in Masterlist '98	28		Yes	Yes	38	50
105	SW0101	Gond Toli, Marar Toli	102	W	1	SW	Ram Nagar	54	3325	600	Notified	29		Yes	Yes	600	786
106	SW0202	Gadga Zopadpatti	155	W	1	SW	Ram Nagar	85	742	135	In Masterlist but not notified	29				135	177

Sr. No.	Identity Code	Name of slums	Old Code no.	Constituency	10-Zone 2002	Prop.Water Dist. Zone (Pench-IV)	ESR Command	Ward No.	Population	No. of structures	Status	Prabhag 2002	Also in Prabhag 2002	PTS map available	House List available	HSC Connection for Slum (Nos.)	Replacment of Pipe (m)
107	SW0201	Zopadpatti (Dr. Ambedkar Nagar)	937	W	1	SW	Ram Nagar	85	195	35	Not in Masterlist '98	29				35	46
108	NW2601	Mariyam Nagar	122	W	10				1085	197	Notified	30				197	257
109	SW0203	Gaulipura behind Dick Dispensary	135	W	10	SW	Ram Nagar	86	525	95	In Masterlist but not notified	30				95	124
110	SW0204	Indira Nagar(near football ground)	154	W	10	SW	Ram Nagar	86	1827	332	In Masterlist but not notified	30				332	435
									138962	23223.00							
Total									714425	124274						124274	175933

**DESIGN FOR 2000 MM DIAMETER PIPE
FROM
(BPT TO PENCH WTP-1,2,3)**

B R A N C H

Version 3.0

Branched Water Distribution Network Design Program

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Echoing Input Variables

```

-----
Title of the Project           : BPT TO WTP PENCH i TO iii
Name of the User               : DRA
Number of Pipes                : 1
Number of Nodes                : 2
Number of Commercial Diameters : 5
Peak Design Factor             : 1
Minimum Headloss in           m/km : .001
Maximum Headloss in           m/km : 10
Minimum Residual Pressure      m    : 4
Type of Formula                : Hazen's

```

Pipe Data

```

=====
Pipe  From  To    Length  Diameter  Hazen's  Status
No.   Node  Node      m         mm    Const   (E/P)
-----
   1    1    2      2000.00   2000.0   130.00000
=====

```

Node Data

```

=====
Node   Peak    Flow    Elevation  Res. Press  Meet Res.
No.    Factor    lps        m           m           Pres (Y/N)?
-----
   1    1.00      0.000      317.00      4.00
   2    1.00    -4630.000    311.50      4.00
=====

```

Reference Node Data

```

=====
Node   Grade Line
No.      m
-----
   1     317.00
=====

```

Commercial Diameter Data

Pipe Dia. Int. (mm)	Hazen's Const	Unit Cost RS /m length
1800.0	130.00000	2539.00
1900.0	130.00000	3067.00
2000.0	130.00000	3554.00
2100.0	130.00000	4711.00
2200.0	130.00000	6202.00

Branched Water Distribution Network Design OutPut

Pipe Details

=====								
===								
Pipe Status	From No.	To Node	Peak Flow (lps)	Diam (mm)	Hazen's Const	HL (m)	HL/1000 (m)	Length (m)

1	1	2	4630.000	2000.0	130.00000	1.52	0.76	2000.00
=====								
===								

Node Details

Node Res	Peak Flow (lps)	Elevation (m)	H G L (m)	Cal Pres (m)	Spc Pres (m)	Meet Pres.
1 S	4630.000	317.00	317.00	0.00	4.00	
2 T	-4630.000	311.50	315.48	3.98 *	4.00	

RATE ANALYSIS

Name of work :- 24 X 7, Water Supply Project for Nagpur City

RATE ANALYSIS		
Add Vat @	4.0%	% Excluding CI,DI pipes
Added for work in city	5	% Excluding CI,DI pipes
Add for excavation in city	10	%
Excise duty applicable	16.32	% For pipes below 200 mm & Nil for 200 mm & above
Class of valves	PN-1	PN-1 or
Rate for steel plate for pipe	34.5	Kg
Insurance	1	% Excluding pipes
Reference to CSR	As per MJP/NMC-CSR-2007-08	

Item No.1

1)	Item of work	CSR Rates	Add for corp limit	Total	Insurance	Finished rate	
	1)						
	Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 M and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding back filling, etc. complete.	(CSR 2007-08 I.No.1 , Page No.31)	Add for corp limit@5%			adding 4%@ Vat	
	0 to 1.5 m lift	67	6.70	73.70	0.74	77.42	
	1.5 to 3.0 m lift	72	7.20	79.20	0.79	83.19	
	3.0 to 4.50 m lift	77	7.70	84.70	0.85	88.97	

	2						
	Excavation for foundation / pipe trenches in hard murum including removing the excavated material upto a distance of 50 M and lifts as below, stacking and spreading as directed by Engineer-in-charge, normal dewatering, preparing the bed for foundation and excluding back filling, etc. complete.	(CSR 2007-08 I.No.2 , Page No.31)	Add for corp limit@ 5%				
	0 to 1.5 m lift	75	7.50	82.50	0.83	86.66	
	1.5 to 3.0 m lift	80	8.00	88.00	0.88	92.44	
	3.0 to 4.50 m lift	85	8.50	93.50	0.94	98.22	
	3						
	Excavation for foundation / pipe trenches in hard murum and boulders, W.B.M. road including removing the excavated material upto a distance of 50 M beyond the area and lifts as below, stacking and spreading as directed by Engineer-in-charge, normal dewatering, preparing the bed for foundation and excluding back filling, etc. complete.	(CSR 2007-08 I.No.3 , Page No.31)	Add for corp limit@ 10%				
	0 to 1.5 m lift	84	8.40	92.40	0.92	97.05	
	1.5 to 3.0 m lift	89	8.90	97.90	0.98	102.84	
	1.5 to 3.0 m lift	94	9.40	103.40	1.03	108.61	

	4						
	Excavation for foundation / pipe trenches in soft rock and old cement and lime masonry foundation asphalt road including removing the excavated material upto a distance of 50 M beyond area and lifts as below, stacking as directed by Engineer-in-charges, normal dewatering, preparing the bed for foundation and excluding back filling, etc. complete.	(CSR 2007-08 I.No.5 , Page No.31)	Add for corp limit@10 %				
	0 to 1.5 m lift	242	24.20	266.20	2.66	279.61	
	1.5 to 3.0 m lift	251	25.10	276.10	2.76	290.01	
	1.5 to 3.0 m lift	260	26.00	286.00	2.86	300.41	
	5						
	Excavation for foundation / pipe trenches in hard rock by controlled blasting, including trimming and levelling the bed by chiselling where necessary and removing the excavated material and stacking it in measurable heaps within a distance of 50 metres from the area and lifts as below, normal dewatering, excluding backfilling, etc. complete. Lift 0 to 1.5 M	(CSR 2007-08, I.No.6 , Page No.32)	Add for corp limit@ 10%				
	0 to 1.5 m lift	320	32.00	352.00	3.52	369.74	
	1.5 to 3.0 m lift	329	32.90	361.90	3.62	380.14	
	1.5 to 3.0 m lift	338	33.80	371.80	3.72	390.54	

	6						
	Excavation for foundation / pipe trenches in hard rock and concrete road by chiselling, wedging, line drilling, by mechanical means or by any other means other than blasting including trimming and levelling the bed, removing the excavated material upto a distance of 50 M beyond the area and lifts as below, stacking as directed by Engineer-in-charge, normal dewatering, excluding back filling, etc. complete.	(CSR 2007-08, I.No.7 , Page No.32)	Add for corp limit@ 10%				
	0 to 1.5 m lift	523	52.30	575.30	5.75	604.29	
	1.5 to 3.0 m lift	532	53.20	585.20	5.85	614.69	
	1.5 to 3.0 m lift	541	54.10	595.10	5.95	625.09	
2)	Desmentaling dead pipeline of M.S/R.C.C/C.I/P.S.C and G.I/A.C/P.V.C./S.W/H.D.P.E	(CSR 2007-08, I.No.10 , Page No.50)	5% Corp.	1% Insurace	4% Vat	Total Rate	
	100	65	68	68.93	71.69	72	
	150	68	71	72.11	74.99	75	
	200	75	79	79.54	82.72	83	
	250	83	87	88.02	91.54	92	
	300	89	93	94.38	98.16	98	
	350	100	105	106.05	110.29	110	
	400	109	114	115.59	120.21	120	
	450	125	131	132.56	137.86	138	
	500	131	138	138.93	144.49	144	
	600	161	169	170.74	177.57	178	
	700	189	198	200.43	208.45	208	
	750	211	222	223.77	232.72	233	

3)	Refilling the trenches with available excavated stuff with soft material first over pipeline and then hard material in 15 cm layers with all leads and lifts including consolidation, surcharging, etc. complete.	(CSR 2007-08, I.No15 , Page No.34)	Add for work in corp limit@5%	Total	Add4 % Vat	Finished rate	
		22	1.10	23.10	0.23	24.26	
4)	Cutting and champhering of pipes of following diameters including cost of all materials and labour involved, etc. complete as directed by Engineer-in-charge.	(CSR 2007-08, I.No. 19, P.No. 146)	Add for work in corp limit@5%	Total	Insurance	Finished rate	
	100 mm dia	22	1.10	23.10	0.23	24.26	
	150 mm dia	33	1.65	34.65	0.35	36.40	
	200 mm dia	42	2.10	44.10	0.44	46.32	
	250 mm dia	61	3.05	64.05	0.64	67.28	
	300 mm dia	71	3.55	74.55	0.75	78.31	
	350 mm dia	73	3.65	76.65	0.77	80.52	
	400 mm dia	93	4.65	97.65	0.98	102.58	
	450 mm dia	108	5.40	113.40	1.13	119.11	
	500 mm dia	129	6.45	135.45	1.35	142.27	
	600 mm dia	127	6.35	133.35	1.33	140.07	
	700 mm dia	185	9.25	194.25	1.94	204.04	

5)	Welding in all positions with required number of runs, for M.S. pipes internally and / or externally including gausing wherever necessary, fixing appurtenances and other accessories in connection with pipe laying work as per specification. Butt joints with convex fillet welds Lag Lengths		(CSR 2007-08, I.No.7 , Page No.198)	Thick	Rate adding for work in corp limit@5%	Rate adding Ins @1%	Rate adding for work in corp limit@5%	Rate adding Ins @1%
	But	Plate thickness in mm	10	12	For 10	10	For 12 mm	12
			507	543	532.35	537.67	570.15	575.85
	Lap jt.	Plate thickness in mm	10	12	For 10	10	For 12 mm	12
			220	330	231.00	233.31	346.50	349.97
6)	Dewatering the excavated trenches and pools of water in the building trenches / pipeline trenches, well works by using pumps and other devices including disposing off water to safe distance as directed by Engineer-in-charge (including cost of machinery, labour, fuel), etc. complete.		(CSR 2007-08 I.No.14 , Page No.34)	Add for work in corp limit@5%	Total	Insurance	Finished rate	
			32	1.60	33.60	0.34	35.30	

Reference to CSR/ Item of work		As per MJP-CSR-2007-08 / NMC CSR						
1(A)	ITEM No.	1(A)						
		Replacement of CI pipeline of different dia. with CI LA class pipes confirming to IS 1536:1989 with latest amendments. The replaced pipe / materials may be shifted to the site as directed by the Engineer. (Item includes cost of pipe but excluding cost of specials)	Excavation & Rifilling	Dismantling Page no.50 & 10	Providing	Lowering, laying (MJP CSR-06-07)	Total	
	i)	80 mm dia	227.70	72.00	1457	44.12	1800.52	
	ii)	100 mm dia	227.70	72.00	2280	44.12	2623.52	
	iii)	150 mm dia	227.70	75.00	3293	62.87	3658.47	
1(B)	ITEM No.	1(B)						
		Replacement of CI/D.I./M.S pipeline damaged / bursted (including lead joint & specials) with D.I. pipes confirming to IS 8329 with latest amendments. The replaced pipe / materials may be shifted to the site as directed by the Engineer.						
		Dia100 mm	227.70	72.00	1729.10	44.12	2072.92	
		Excav=(1*1.2*0.75* Av rate incl refilling(((77+87+97+280+604)/5)+24=Rs228)						

Reference to CSR/ Item of work		As per MJP-CSR-2007-08 / NMC CSR						
	Dia150 mm	227.70	75.00	2518.80	62.87	2884.37		
	Excav=(1*1.2*0.75* Av rate incl refilling(((77+87+97+280+604)/5)+24=Rs228)							
	Dia200 mm	258.06	83.00	2763.60	79.41	3184.07		
	Excav=(1.0*1.2*0.85* Av rate incl refilling(((77+87+97+280+604)/5)+24=Rs259)							
	Dia250 mm	258.06	92.00	3711.00	105.88	4166.94		
	Excav=(1.0*1.2*0.85* Av rate incl refilling(((77+87+97+280+604)/5)+24=Rs259)							
	Dia300 mm	296.01	98.00	4710.70	113.6	5218.31		
	Excav=(0.9*1.3*1* Av rate incl refilling(((77+87+97+280+604)/5)+24=Rs296)							
	Dia350 mm	342.10	110.00	5816.10	138.96	6407.16		
	Excav=(0.95*1.3*1* Av rate incl refilling(((77+87+97+280+604)/5)+24=Rs342)							
	Dia400 mm	465.36	120.21	6935.50	168.75	7689.82		
	Excav=(1.2*1.4*1* Av rate incl refilling(((77+87+97+280+604)/5)+24=Rs465)							
	Dia450 mm	465.36	137.86	8361.60	168.75	9133.57		
	Excav=(1.2*1.4*1* Av rate incl refilling(((77+87+97+280+604)/5)+24=Rs465)							
	Dia500 mm	571.31	144	9736.30	201.83	10653.44		
	Excav=(1.25*1.5*1.1* Av rate incl refilling(((77+87+97+280+604)/5)+48=Rs571)							
	Dia600 mm	693.50	178	12860.20	269.11	14000.81		
	Excav=(1.2*1.2*1.6* Av rate incl refilling(((77+87+97+280+604)/5)+72=Rs694)							
	Dia700 mm	798.25	208	16411.70	323.16	17741.11		
	Excav=(1.2*1.7*1.3* Av rate incl refilling(((77+87+97+280+604)/5)+72=Rs798)							

Reference to CSR/		As per MJP-CSR-2007-08 / NMC CSR						
1(c)	ITEM No.	Item of work						
		Replacement of MS pipe line damaged/burst (including lead joint & specials) with MS conforming to suitable IS with latest amendments. The replaced pipe / materials may be shifted to the stores as directed by	Excavation & Rifilling	Dismantling	Providing	Lowering, laying	Welding/cutting/guniting/lining/e-paint	Total
		400 mm dia	465.36	120	6026.00	294	1164.74	8070.31
		450 mm dia	465.36	138	6706.00	339	1243.09	8891.31
		500 mm dia	571.31	144	7444.00	206	1321.43	9686.74
		600 mm dia	693.50	178	8940.00	227	1478.12	11516.62
		700 mm dia	798.25	208	10418.00	227	1634.8	13286.05
		2000 mm dia	2519.37		36847.00	576	3671.72	43614.09
1(D)	ITEM No.	1(D)						
		Replacement of G.I/PVC pipeline damaged / burst (including lead joint & specials) with MDPE pipes (Medium class). The replaced pipe / materials may be shifted to the site as directed by the Engineer.	Excavation & Rifilling (97*0.6*1*1)+24	Market Rates R.A OF KEMPLAS	Specials (0.2 % of Pipe Rate)+Vat 4%	Total		
		Dia 15 mm	89.64	30.00	15.6	135.00		
		Dia 20 mm	89.64	36.66	19.06	145.00		
		Dia 25 mm	89.64	51.11	26.58	167.00		
		Dia 40 mm	89.64	129.99	67.59	287.00		
		Dia 50 mm	89.64	197.76	102.84	390.00		
		Dia 63 mm	89.64	233.31	121.32	444.00		
		Dia 75 mm	89.64	316.64	164.65	571.00		
1(E)	ITEM No.	1(E)						
		Replacement of G.I/PVC pipeline damaged / burst (including lead joint & specials) with HDPE pipes (PE-100). The replaced pipe / materials may be shifted to the site as directed by the Engineer.	Excav=(0.75*1*1* Av rate incl refilling(((77+87+97+280+604)/5)+24=Rs196	Dismantling	Market Rates R.A OF KEMPLAS	Specials + Jointing	lowering & Laying MJP CSR PAGE NO.76	Total
		Dia 75 mm	179.28	72.00	231.29	46.26	11.25	528.83
		Dia 110 mm	179.28	72.00	489.85	97.97	14.09	839.10
		Dia 140 mm	224.10	72.00	789.82	157.96	16.82	1243.88
		Dia 160 mm	224.10	75.00	1031.21	206.24	18.24	1536.55
		Dia 200 mm	253.98	83.00	1612.97	322.59	22.17	2272.54

Reference to CSR/ Item of work		As per MJP-CSR-2007-08 / NMC CSR						
1(F)	ITEM No.	1(F)						
		Repair of CI/ D.I pipe line using CI specials like bends, collars, tees, sockets, reducers, etc., using necessary materials, cutting, complete (including lead jointing) but excluding cost of pipes & specials	Exca.& refilling	Dismantling	Dewatering	Repairs	Total	
		A) Without Hydraulic Ramp						
		80 mm dia	910.80	72.00	350.00	1000	2332.80	
		100 mm dia	910.80	72.00	350.00	1000	2332.80	
		150 mm dia	910.80	75.00	350.00	1000	2335.80	
		200 mm dia	910.80	83.00	525.00	2000	3518.80	
		250 mm dia	910.80	92.00	525.00	2000	3527.80	
		300 mm dia	1821.60	98.00	525.00	2500	4944.60	
		350 mm dia	1821.60	110.00	875.00	2500	5306.60	
		400 mm dia	3643.20	120.21	875.00	3000	7638.41	
		450 mm dia	3643.20	137.86	875.00	3000	7656.06	
		500 mm dia	3643.20	144.00	875.00	3500	8162.20	
		600 mm dia	7470.00	178.00	1400.00	4000	13048.00	
		700 mm dia	7470.00	208.00	1400.00	5000	14078.00	
1(G)	ITEM No.	1(G)						
		Repair of leakages MS pipe line / welded joint expansion joint, etc.	Excavation & Rifilling	Dewatering	Jointing,testing	Welding/cutting/epoxy paint	cost of 2 M m.s pipe	Total
		150 mm dia.	910.80	350.00	374	1164.74	4662	7461.54
		200 mm dia	910.80	350.00	374	1164.74	6140	8939.54
		250 mm dia	910.80	350.00	374	1321.43	7616	10572.23
		300 mm dia.	1821.60	350.00	412	1478.12	9094	13155.72
		400 mm dia	3643.20	875.00	412	1791.49	12052	18773.69
		450 mm dia	3643.20	875.00	412	1948.17	13412	20290.37
		500 mm dia	3643.20	875.00	412	2104.86	14888	21923.06
		600 mm dia	7470.00	1400.00	454	2418.23	17880	29622.23
		700 mm dia	7470.00	1400.00	454	2731.6	20836.00	32891.60

Reference to CSR/ Item of work		As per MJP-CSR-2007-08 / NMC CSR							
1(H)	ITEM No.	1(H)							
		Repair of leakages MS pipe line of different dia only by field welding including excavation, dewatering,	Exca.& refilling	Dewatering	Repairs	Welding	Total		
		150 mm dia	1821.60	525.00	300	253.4	2900.00		
		200 mm dia	1821.60	525.00	300	337.86	2984.46		
		250 mm dia	1821.60	525.00	300	422.33	3068.93		
		300 mm dia	1821.60	525.00	300	506.8	3153.40		
		400 mm dia	3643.20	875.00	300	675.73	5493.93		
		450 mm dia	3643.20	875.00	300	760.19	5578.39		
		500 mm dia	3643.20	875.00	300	844.66	5662.86		
		600 mm dia	4554.00	1400.00	300	1013.59	7267.59		
		700 mm dia	4554.00	1400.00	300	1182.52	7436.52		
1(i)	ITEM No.	1(i)							
		Plugging / repairing of leakages in D.I./C.I./M.S pipe line either at joint or in the barrel without removing the pipe,,excluding cost of pipe & specials but including cost of jointing materials.	Exca.& refilling	Dewatering	Repairs	Total			
		80 mm dia	910.80	350.00	100	1360.80			
		100 mm dia	910.80	350.00	100	1360.80			
		150 mm dia	910.80	350.00	100	1360.80			
		200 mm dia	910.80	525.00	500	1935.80			
		250 mm dia	910.80	525.00	500	1935.80			
		300 mm dia	1792.80	525.00	1000	3317.80			
		350 mm dia	1792.80	875.00	1000	3667.80			
		400 mm dia	3643.20	875.00	1500	6018.20			
		450 mm dia	3643.20	875.00	1500	6018.20			
		500 mm dia	3643.20	875.00	2000	6518.20			
		600 mm dia	7590.00	1400.00	3000	11990.00			
		700 mm dia	7590.00	1400.00	4000	12990.00			

Reference to CSR/ Item of work		As per MJP-CSR-2007-08 / NMC CSR							
1(j)	ITEM No.	1(j)							
		Plugging / repairing of leakages in D.I./C.I./M.S pipe line with leak repairing clamp	Exca.& refilling	Dewatering	Repairs	Total			
		80 mm dia	455.40	95.00	110	660.40			
		100 mm dia	455.40	95.00	110	660.40			
		150 mm dia	455.40	95.00	110	660.40			
		200 mm dia	455.40	95.00	400	950.40			
		250 mm dia	455.40	95.00	400	950.40			
		300 mm dia	910.80	95.00	650	1655.80			
		350 mm dia	910.80	142.50	800	1853.30			
		400 mm dia	1821.60	142.50	1000	2964.10			
		450 mm dia	1821.60	142.50	1000	2964.10			
		500 mm dia	1821.60	237.50	1200	3259.10			
		600 mm dia	3735.00	380.00	1700	5815.00			
		700 mm dia	3735.00	408.50	2200	6343.50			
1(K)	ITEM No.	1(K)							
		Repairing of valves and appurtenance . The repalced pipe/ material may be shifted to the stores as directed by the Engineer.	Excavation & Rifilling	Dewatering	As Per NMC CSRRepairs	Jointing	Total		
		Excluding spare parts							
		Scour valve:							
		80 mm dia	333.96	350.00	1560		2243.96		
		100 mm dia	333.96	350.00	2015		2698.96		
		150 mm dia	333.96	350.00	2791.1		3475.06		
		200 mm dia	417.45	875.00	4644.9		5937.35		
		250 mm dia	417.45	875.00	6601.4		7893.85		
		300 mm dia	417.45	875.00	6721		8013.45		
		Air valves:							
		15 mm dia	151.80		713.12		864.92		
		20 mm dia	151.80		713.12		864.92		
		25 mm dia	151.80		713.12		864.92		
		40 mm dia	151.80		713.12		864.92		
		80 mm dia	448.20		713.12		1161.32		
		100 mm dia	448.20		713.12		1161.32		
		150 mm dia	448.20		826.16		1274.36		

Reference to CSR/	As per	MJP-CSR-2007-08 / NMC CSR					
Item of work							
Butterfly valves:							
Dia.400 mm	417.45	350.00	10482.00			11249.45	
Dia.450 mm	417.45	350.00	12505.50			13272.95	
Dia.500 mm	417.45	350.00	14700.00			15467.45	
Dia.600 mm	417.45	350.00	17850.00			18617.45	
Dia.700 mm	417.45	350.00	21666.75			22434.20	
Sluice valves:							
Dia.80 mm	333.96	350.00	1560.00			2243.96	
Dia.100 mm	333.96	350.00	2015.00			2698.96	
Dia.150 mm	333.96	350.00	2791.10			3475.06	
Dia.200 mm	417.45	350.00	4644.90			5412.35	
Dia.250 mm	417.45	350.00	6601.40			7368.85	
Dia.300 mm	417.45	350.00	6721.00			7488.45	
Dia.350 mm	417.45	350.00	9126.00			9893.45	
Dia.400 mm	417.45	350.00	10482.00			11249.45	
Dia.450 mm	417.45	350.00	12505.50			13272.95	
Dia.500 mm	417.45	350.00	14700.00			15467.45	
Dia.600 mm	417.45	350.00	17850.00			18617.45	
Dia.700 mm	417.45	350.00	21666.75			22434.20	
Pressure relief valves							
Dia.80 mm	333.96	350.00	1560.00			2243.96	
Dia.100 mm	333.96	350.00	2015.00			2698.96	
Dia.150 mm	333.96	350.00	2791.10			3475.06	
Dia.200 mm	417.45	350.00	4644.90			5412.35	
Dia.250 mm	417.45	350.00	6601.40			7368.85	
Dia.300 mm	417.45	350.00	6721.00			7488.45	
Dia.350 mm	417.45	350.00	9126.00			9893.45	
Dia.400 mm	417.45	350.00	10482.00			11249.45	
Including spare parts							
Scour valve:							
80 mm dia	333.96	350.00	1560	600		2843.96	
100 mm dia	333.96	350.00	2015	600		3298.96	
150 mm dia	333.96	350.00	2791.1	700		4175.06	
200 mm dia	417.45	875.00	4644.9	700		6637.35	
250 mm dia	417.45	875.00	6601.4	900		8793.85	
300 mm dia	417.45	875.00	6721	900		8913.45	

Reference to CSR/	As per MJP-CSR-2007-08 / NMC CSR							
Item of work								
Air valves:								
15 mm dia	151.80		713.12	500	1364.92			
20 mm dia	151.80		713.12	500	1364.92			
25 mm dia	151.80		713.12	700	1564.92			
40 mm dia	151.80		713.12	1000	1864.92			
80 mm dia	448.20		713.12	1200	2361.32			
100 mm dia	448.20		713.12	1500	2661.32			
150 mm dia	448.20		826.16	1800	3074.36			
Butterfly valves:								
Dia.400 mm	417.45	350.00	10482.00	1500	12749.45			
Dia.450 mm	417.45	350.00	12505.50	1500	14772.95			
Dia.500 mm	417.45	350.00	14700.00	1500	16967.45			
Dia.600 mm	417.45	350.00	17850.00	2000	20617.45			
Dia.700 mm	417.45	350.00	21666.75	2000	24434.20			
Sluice valves:								
Dia.80 mm	333.96	350.00	1560.00	600	2843.96			
Dia.100 mm	333.96	350.00	2015.00	600	3298.96			
Dia.150 mm	333.96	350.00	2791.10	700	4175.06			
Dia.200 mm	417.45	350.00	4644.90	700	6112.35			
Dia.250 mm	417.45	350.00	6601.40	900	8268.85			
Dia.300 mm	417.45	350.00	6721.00	900	8388.45			
Dia.350 mm	417.45	350.00	9126.00	700	10593.45			
Dia.400 mm	417.45	350.00	10482.00	1500	12749.45			
Dia.450 mm	417.45	350.00	12505.50	1500	14772.95			
Dia.500 mm	417.45	350.00	14700.00	1500	16967.45			
Dia.600 mm	417.45	350.00	17850.00	2000	20617.45			
Dia.700 mm	417.45	350.00	21666.75	2000	24434.20			
Pressure relief valves								
Dia.80 mm	333.96	350.00	1560.00	600	2843.96			
Dia.100 mm	333.96	350.00	2015.00	600	3298.96			
Dia.150 mm	333.96	350.00	2791.10	700	4175.06			
Dia.200 mm	417.45	525.00	4644.90	700	6287.35			
Dia.250 mm	417.45	525.00	6601.40	900	8443.85			
Dia.300 mm	417.45	525.00	6721.00	900	8563.45			
Dia.350 mm	417.45	875.00	9126.00	900	11318.45			
Dia.400 mm	417.45	875.00	10482.00	1500	13274.45			

Reference to CSR/ Item of work		As per MJP-CSR-2007-08 / NMC CSR							
2	ITEM No. 2								
	Providing D.I.Pipes with internal cement mortar lining including all taxes, insurance, railway freight, unloading from railway wagon, loading into truck, transport to departmental stores / sites loading / unloading, stacking, etc, complete.	As per NMC rate analysis							
	(IS-8329 / 2000 latest Version)								
	Dia.150 mm	2518.80							
	Dia.200 mm	2763.60							
	Dia.250 mm	3711.00							
	Dia.300 mm	4710.70							
	Dia.350 mm	5816.10							
	Dia.400 mm	6935.50							
	Dia.450 mm	8361.60							
	Dia.500 mm	9736.30							
	Dia.600 mm	12860.20							
	Dia.700 mm	16411.70							
3	ITEM No. 3								
	Providing and supplying ISI mark C.I.S/S pipes of following class and diameter including all taxes (Central and Local) insurance, railway freight, unloading from railway wagaon, loading into trucks,, unloading stacking etc. complete. (For repair work)	As per NMC rate analysis							
	Dia.80 mm	1191.80							
	Dia.100 mm	1456.70							
	Dia.150 mm	2279.70							
	Dia.200 mm	3292.90							

Reference to CSR/ Item of work		As per MJP-CSR-2007-08 / NMC CSR						
4	ITEM No. 4							
	Providing and Supplying ISI Standard D.I.specials & fitting with sealing rubber gasket of SBR,complete with cast iron follower gland and Mild Steel Nut Bolt	(CSR 2006-07, I.No.10 P.No 58)	Total (Add+4% VAT+1%ins)					
	80 mm to 300 mm	77000	80880.80					
	350 mm to 700 mm	72000	75628.80					
5	ITEM No. 5							
	Providing and supplying ISI standard CI flanged / S&S specials including all taxes (Central and Local), railway freight, insurance, unloading from railway	(CSR 2006-07, I.No.6, P.No 55)	Total (Add+4% VAT+1%ins)					
	i) Upto and including 150 mm dia (C.I.S/S)	6200	6512.48					
	ii) Above 150 mm dia (C.I.S/S)	6600	6932.64					
	i) Upto and including 150 mm dia(C.I.Flanged)	7000	7352.80					
	ii) Above 150 mm dia. (C.I.Flanged)	6000	6302.40					
6	ITEM No. 6							
	Providing C.I. Mechanical joint Double Socket Reducers as describd in Table-21 of I.S.13382/1992 complete with sealing rubber gasket of SBR dimensionally described in IS-12820/1989 with cast iron follower gland and mild steel nut bolts coate or otherwise protected from rusting and suitable for C.I. pipes.	(CSR 2007-08, I.No.9 P.No 158)	Add for Vat @4%	Total + 1% Insurance				
	100*80	2201	2289.04	2311.93				
	150*80	3464	3602.56	3638.59				
	150*100	3667.00	3813.68	3851.82				
	200*100	4220.00	4388.80	4432.69				
	200*150	4615.00	4799.60	4847.60				
	250*150	6307.00	6559.28	6624.87				
	250*200	6154.00	6400.16	6464.16				

Reference to CSR/ Item of work		As per MJP-CSR-2007-08 / NMC CSR						
	300*150	7756.00	8066.24	8146.90				
	300*200	7769.00	8079.76	8160.56				
	300*250	7903.00	8219.12	8301.31				
	350*200	11166.00	11612.64	11728.77				
	350*250	11201.00	11649.04	11765.53				
	350*300	11069.00	11511.76	11626.88				
	400*250	16866.00	17540.64	17716.05				
	400*300	14941.00	15538.64	15694.03				
	400*350	15041.00	15642.64	15799.07				
	450*300	18677.00	19424.08	19618.32				
	450*350	18665.00	19411.60	19605.72				
	450*400	18433.00	19170.32	19362.02				
	500*350	22453.00	23351.12	23584.63				
	500*400	22110.00	22994.40	23224.34				
	500*450	21552.00	22414.08	22638.22				
	600*400	32603.00	33907.12	34246.19				
	600*450	31730.00	32999.20	33329.19				
	600*500	29791.00	30982.64	31292.47				
	700*500	44752.00	46542.08	47007.50				
	700*600	40616.00	42240.64	42663.05				
7	ITEM No. 7							
	Supply of CI Mechanical joints C.I.Flanged Socket Tail Pieces as described in Table-11 of IS-13382/1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820) complete with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I. pipes & D.I. Pipes	(CSR 2006-01, I.No.2 P.No 143-144)	Add for Vat @4%	Total + 1% Insurance				
	Diameter							
	80	1160	1206.40	1218.46				
	100	1264	1314.56	1327.71				
	150	2275	2366.00	2389.66				
	200	2947	3064.88	3095.53				
	250	4445	4622.80	4669.03				
	300	4976	5175.04	5226.79				
	350	6563	6825.52	6893.78				
	400	8567	8909.68	8998.78				
	450	10055	10457.20	10561.77				
	500	12636	13141.44	13272.85				
	600	16204	16852.16	17020.68				
	700	22100	22984.00	23213.84				

Reference to CSR/ Item of work		As per MJP-CSR-2007-08 / NMC CSR							
8	ITEM No. 8								
	Supply of CI Mechanical joint Collars suitable for C.I.Spun Pipes & dimensionally described in Table-13 of IS-13382/1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/1989) with follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I. pipes & D.I. Pipes	(CSR 2007-08, I.No.1 P.No 151)	Add for Vat @4%	Total + 1% Insurance					
	Diameter								
	80	907	943.28	952.71					
	100	974	1012.96	1023.09					
	150	1750	1820.00	1838.20					
	200	1997	2076.88	2097.65					
	250	3202	3330.08	3363.38					
	300	4099	4262.96	4305.59					
	350	5051	5253.04	5305.57					
	400	7861	8175.44	8257.19					
	450	8826	9179.04	9270.83					
	500	12062	12544.48	12669.92					
	600	15046	15647.84	15804.32					
	700	19658	20444.32	20648.76					
9	ITEM No. 9								
	Providing and Supplying C.I Mechanical joint All Socket Tees as dimensionally described in Table -18-13382/1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/1989) with cast iron Iron Follower gland and Mild Steel Nut Bolt coated or otherwise protected from rusting and suitable for C.I./D.I pipe.	(CSR 2007-08, I.No.7, P.No. 155)	Add for Vat @4%	Total + 1% Insurance					
	All skt Tees								
	100X100X80 mm dia	3413.00	3549.52	3585.02					
	100X100X100 mm dia	3784.00	3935.36	3974.71					
	150X150X100 mm dia	5375.00	5590.00	5645.90					
	150X150X150 mm dia	6666.00	6932.64	7001.97					
	200X200X80 mm dia	6392.00	6647.68	6714.16					
	200X200X100 mm dia	6463.00	6721.52	6788.74					
	200X200X150 mm dia	7698.00	8005.92	8085.98					

Reference to CSR/		As per MJP-CSR-2007-08 / NMC CSR						
	Item of work							
	200X200X200 mm dia	8470.00	8808.80	8896.89				
	250X250X80 mm dia	9001.00	9361.04	9454.65				
	250X250X100 mm dia	9200.00	9568.00	9663.68				
	250X250X150 mm dia	10979.00	11418.16	11532.34				
	250X250X200 mm dia	11600.00	12064.00	12184.64				
	250X250X250 mm dia	13012.00	13532.48	13667.80				
	300X300X80 mm dia	9870.00	10264.80	10367.45				
	300X300X100 mm dia	10092.00	10495.68	10600.64				
	300X300X150 mm dia	12944.00	13461.76	13596.38				
	300X300X200 mm dia	13372.00	13906.88	14045.95				
	300X300X250 mm dia	14156.00	14722.24	14869.46				
	300X300X300 mm dia	15624.00	16248.96	16411.45				
10	ITEM No. 10							
	Providing and Supplying C.I Mechanical joint Double Socket Tees with Flanged Tees dimensionally described in Table -19-13382/1992 complete with	(CSR 2006-07, I.No8, P.No. 148)	Add for Vat @4%	Total + 1% Insurance				
	Double Skt b/Flg Tees							
	100X100X80 mm dia	3410.00	3546.40	3581.86				
	100X100X100 mm dia	3608.00	3752.32	3789.84				
	150X150X100 mm dia	5275.00	5486.00	5540.86				
	150X150X150 mm dia	6282.00	6533.28	6598.61				
	200X200X80 mm dia	6041.00	6282.64	6345.47				
	200X200X100 mm dia	6444.00	6701.76	6768.78				
	200X200X150 mm dia	7422.00	7718.88	7796.07				
	200X200X200 mm dia	8509.00	8849.36	8937.85				
	250X250X80 mm dia	8531.00	8872.24	8960.96				
	250X250X100 mm dia	8977.00	9336.08	9429.44				
	250X250X150 mm dia	10654.00	11080.16	11190.96				
	250X250X200 mm dia	11147.00	11592.88	11708.81				
	250X250X250 mm dia	11542.00	12003.68	12123.72				
	300X300X80 mm dia	10016.00	10416.64	10520.81				
	300X300X100 mm dia	10211.00	10619.44	10725.63				
	300X300X150 mm dia	11790.00	12261.60	12384.22				
	300X300X200 mm dia	11890.00	12365.60	12489.26				
	300X300X250 mm dia	13121.00	13645.84	13782.30				
	300X300X300 mm dia	16081.00	16724.24	16891.48				
	350X350X80 mm dia	14009.00	14569.36	14715.05				
	350X350X150 mm dia	16030.00	16671.20	16837.91				
	350X350X200 mm dia	10678.00	11105.12	11216.17				
	350X350X300 mm dia	19136.00	19901.44	20100.45				

Reference to CSR/		As per MJP-CSR-2007-08 / NMC CSR						
	Item of work							
	350X350X350 mm dia	21898.00	22773.92	23001.66				
	400X400X80 mm dia	18313.00	19045.52	19235.98				
	400X400X100 mm dia	19411.00	20187.44	20389.31				
	400X400X150 mm dia	21613.00	22477.52	22702.30				
	400X400X200 mm dia	22049.00	22930.96	23160.27				
	400X400X300 mm dia	26570.00	27632.80	27909.13				
	400X400X400 mm dia	30424.00	31640.96	31957.37				
	450X450X100 mm dia	22943.00	23860.72	24099.33				
	450X450X200 mm dia	26908.00	27984.32	28264.16				
	450X450X300 mm dia	33954.00	35312.16	35665.28				
	450X450X400 mm dia	35826.00	37259.04	37631.63				
	450X450X450 mm dia	38914.00	40470.56	40875.27				
	500X500X100 mm dia	24574.00	25556.96	25812.53				
	500X500X250 mm dia	33602.00	34946.08	35295.54				
	500X500X300 mm dia	34813.00	36205.52	36567.58				
	500X500X400 mm dia	41974.00	43652.96	44089.49				
	500X500X500 mm dia	50675.00	52702.00	53229.02				
	600X600X100 mm dia	35118.00	36522.72	36887.95				
	600X600X300 mm dia	48223.00	50151.92	50653.44				
	600X600X400 mm dia	54940.00	57137.60	57708.98				
	600X600X500 mm dia	59454.00	61832.16	62450.48				
	600X600X600 mm dia	72998.00	75917.92	76677.10				
	700X700X100 mm dia	46543.00	48404.72	48888.77				
	700X700X350 mm dia	65154.00	67760.16	68437.76				
	700X700X400 mm dia	69998.00	72797.92	73525.90				
	700X700X400 mm dia							
	700X700X700 mm dia							
11	ITEM No. 11							
	Supply of CI Mechanical joint Double Socket 90(1/4) bends as dimensionally described in Table-14 of IS-13382/1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/1989) with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I. pipes & D.I. Pipes	(CSR 2006-07, I.No.3, P.No. 144)	Add for Vat @4%	Total + 1% Insurance				
	Dia.100 mm	2722.00	2830.88	2859.19				
	Dia.150 mm	4999.00	5198.96	5250.95				
	Dia.200 mm	6634.00	6899.36	6968.35				
	Dia.250 mm	9875.00	10270.00	10372.70				
	Dia.300 mm	12018.00	12498.72	12623.71				

Reference to CSR/		As per MJP-CSR-2007-08 / NMC CSR						
Item of work								
	Dia.350 mm	19898.00	20693.92	20900.86				
	Dia.400 mm	27121.00	28205.84	28487.90				
	Dia.450 mm	34615.00	35999.60	36359.60				
	Dia.500 mm	43076.00	44799.04	45247.03				
	Dia.600 mm	60882.00	63317.28	63950.45				
	Dia.700 mm	96100.00	99944.00	100943.44				
12	ITEM No. 12							
	Supply of CI Mechanical joint Double Socket 45(1/8) bends as dimensionnaly described in Table-15 of IS-13382/1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/1989)complete with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I. pipes & D.I. Pipes	(CSR 2006-07, I.No.4, P.No. 145)	Add for Vat @4%	Total + 1% Insurance				
	Dia.100 mm	2426.00	2523.04	2548.27				
	Dia.150 mm	4211.00	4379.44	4423.23				
	Dia.200 mm	5546.00	5767.84	5825.52				
	Dia.250 mm	8136.00	8461.44	8546.05				
	Dia.300 mm	9817.00	10209.68	10311.78				
	Dia.350 mm	16376.00	17031.04	17201.35				
	Dia.400 mm	20206.00	21014.24	21224.38				
	Dia.450 mm	28186.00	29313.44	29606.57				
	Dia.500 mm	31402.00	32658.08	32984.66				
	Dia.600 mm	43481.00	45220.24	45672.44				
	Dia.700 mm	91962.00	95640.48	96596.88				

Reference to CSR/ Item of work		As per MJP-CSR-2007-08 / NMC CSR						
13	ITEM No. 13							
	Supply of CI Mechanical joint Double Socket 22.5 ⁶ bends as dimensionally described in Table-16 of IS-13382/1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/1989) complete with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I. pipes & D.I. Pipes	(CSR 2006-07, I.No.5, P.No. 145-146)	Add for Vat @4%	Total + 1% Insurance				
	Diameter							
	Dia.100 mm	2328.00	2421.12	2445.33				
	Dia.150 mm	3954.00	4112.16	4153.28				
	Dia.200 mm	4957.00	5155.28	5206.83				
	Dia.250 mm	7495.00	7794.80	7872.75				
	Dia.300 mm	9048.00	9409.92	9504.02				
	Dia.350 mm	14284.00	14855.36	15003.91				
	Dia.400 mm	18313.00	19045.52	19235.98				
	Dia.450 mm	23165.00	24091.60	24332.52				
	Dia.500 mm	26996.00	28075.84	28356.60				
	Dia.600 mm	35773.00	37203.92	37575.96				
	Dia.700 mm	53812.00	55964.48	56524.12				
14	ITEM No. 14							
	Supply of CI Mechanical joint Double Socket 11.25 ⁶ bends as dimensionally described in in Table-17 of IS-13382/1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/1989) complete with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I. pipes & D.I. Pipes	(CSR 2006-07, I.No.6, P.No. 146)	Add for Vat @4%	Total + 1% Insurance				
	Diameter							
	Dia.100 mm	2275.00	2366.00	2389.66				
	Dia.150 mm	3864.00	4018.56	4058.75				
	Dia.200 mm	4758.00	4948.32	4997.80				
	Dia.250 mm	7034.00	7315.36	7388.51				
	Dia.300 mm	7794.00	8105.76	8186.82				
	Dia.350 mm	12299.00	12790.96	12918.87				
	Dia.400 mm	16660.00	17326.40	17499.66				
	Dia.450 mm	21028.00	21869.12	22087.81				
	Dia.500 mm	22920.00	23836.80	24075.17				
	Dia.600 mm	31422.00	32678.88	33005.67				

Reference to CSR/		As per MJP-CSR-2007-08 / NMC CSR						
Item of work								
	Dia.700 mm	42359.00	44053.36	44493.89				
15	ITEM No. 15							
	Providing and supplying ISI standard MS specials of required thickness with 3 coats of approved make epoxy paint (Shalimar, Ciba or Mahindra & Mahindra	(CSR 2006-07, I.No. 7, P.No.56)	Add for Octroi in corp limit@4%	Total + 1% Insurance				
	D/F/Spls of all dia.	52000	54080.00	54620.80				
16	ITEM No. 16							
	Providing, supplying, lowering, laying, fixing in proper position & alignment the double flanged short body pattern type manually operated SluceValve having body, disk and end cover in graded cast iron to IS-210 Gr.CF 200 generally conforming in BS 5155, Synthetic rubber faced ring secured on disk by retaining ring with stainless steel screw stub shaft of stainless steel riding in teflon bearing excluding C.C foundation/structural steel support conforming to IS-	(CSR 2006-07 I.No.2(a-d) , Page No.126-127)/	Add for Vat @4%	1% Insurance	Lowerin & laying	Add for corp limit@5%	Total for laying (VAT 4% +1% INSSURANCE	Total for providing & laying
	PN-1/1.6							
	Scour Valves - PN-1	PN-1						
	100	5134.00	205.36	5392.75	799	39.95	881.23	6273.98
	Sluice Valves - PN-1							
	100	5134.00	205.36	5392.75	799	39.95	881.23	6273.98
	150	7713.00	308.52	8021.52	1246	62.30	1374.24	9395.76
	200	13664.00	546.56	14210.56	1331	66.55	1467.99	15678.55
	250	20414.00	816.56	21230.56	1755	87.75	1935.62	23166.18
	300	24696.00	987.84	25683.84	2275	113.75	2509.14	28192.98
	350	43754.00	1750.16	45504.16	2783	139.15	3069.43	48573.59
	400	54028.00	2161.12	56189.12	3110	155.50	3430.08	59619.20
	450	77739.00	3109.56	80848.56	3291	164.55	3629.71	84478.27
	500	97768.00	3910.72	101678.72	3654	182.70	4030.07	105708.79
	600	137591.00	5503.64	143094.64	4029	201.45	4443.66	147538.30
	700	283754.00	11350.16	295104.16	4404	220.20	4857.26	299961.42
17	ITEM No. 17							
	Providing, Lowering, laying and fixing in proper alignment and position Kinetic Double Orifice type Air Valves as per standard specifications having small orifice elastic ball resting on a gun metal orifice nipple, large orifice vulcanite ball seating on moulded seat	(CSR 2007-08, I.No.9(a) , Page No.139)	Add for Vat @4%	1% Insurance	Lowerin & laying	Add for corp limit@5%	Total for laying (VAT 4% +1% INSSURANCE	Total for providing & laying
	a) Kinetic Air Valve Flanged Type - PN - 1							

Reference to CSR/		As per MJP-CSR-2007-08 / NMC CSR							
	Item of work								
	50 mm	9034	361.36	9489.31	161	8.05	177.57	9666.88	
	100 mm	17970	718.80	18875.69	213	10.65	234.92	19110.61	
	150 mm	28238	1129.52	29661.20	333	16.65	367.27	30028.47	
	200 mm	42418	1696.72	44555.87	266	13.30	293.38	44849.25	
18	ITEM No. 18								
	Providing, supplying, lowering, laying, fixing in proper position & alignment ISI MARK CIDF reflux valves (non-return valves) of following dia. including all taxes (central & local) railway freight inspection charges unloading from railway wagon, loading into truck, transportation upto departmental stores / site, unloading, stacking etc. complete without bypass arrangement -- PN-1)	(CSR 2007-08 I.No.1(a) , Page No.127)	Add for Vat @4%	1% Insurance	Lowerin & laying	Add for corp limit@5%	Total for laying (VAT 4% +1% INSSURANCE	Total for providing & laying	
	100	4242.00	169.68	4455.80	799	39.95	881.23	5337.03	
	150	6393.00	255.72	6648.72	1246	62.30	1374.24	8022.96	
	200	13214.00	528.56	13742.56	1331	66.55	1467.99	15210.55	
	250	21789.00	871.56	22660.56	1755	87.75	1935.62	24596.18	
	300	32512.00	1300.48	33812.48	2275	113.75	2509.14	36321.62	
	350	38902.00	1556.08	40458.08	2783	139.15	3069.43	43527.51	
	400	49711.00	1988.44	51699.44	3110	155.50	3430.08	55129.52	
	450	83728	3349.12	87077.12	3291	164.55	3629.71	90706.83	
	500	100993	4039.72	105032.72	3654	182.70	4030.07	109062.79	
19	ITEM No. 19								
	Providing, supplying, lowering, laying, fixing in proper position & alignmen CI D/F angle type spring loaded pressure relief valve of approved make and quality including all taxes ('central and Local) Octroi, inspection charges transportation to departmental	(CSR 2007-08 I.No.18 , Page No.145)	Add for Vat @4%	1% Insurance	Lowerin & laying	Add for corp limit@5%	Total for laying (VAT 4% +1% INSSURANCE	Total for providing & laying	
	50 mm Dia.	3150	126.00	3308.76	161	8.05	177.57	3486.33	
	80 mm Dia.	4778	191.12	4969.12	194	9.70	213.97	5183.09	
	100 mm Dia.	6689	267.56	6956.56	212	10.60	233.82	7190.38	
	150 mm Dia.	10421	416.84	10837.84	333	16.65	367.27	11205.11	
	200 mm Dia.	23013	920.52	23933.52	363	18.15	400.36	24333.88	
	250 mm Dia.	32349	1293.96	33642.96	424	21.20	467.64	34110.60	
	300 mm Dia.	42662	1706.48	44368.48	484	24.20	533.81	44902.29	

Reference to CSR/ Item of work			As per MJP-CSR-2007-08 / NMC CSR						
ITEM No.	20								
	Providing and making Ferrule connections on pipeline including cost of ferrule, saddle piece, specials, excavation & refilling of pit etc. complete.		As Per market Rate	Excavation	Providing and making G.M. / Brass ferrule	Tap	Total		
	a) on HDEP Pipeline								
	Dia 15 mm	Each		75.90	321.10	33.50	430.50		
	Dia 20 mm	Each		75.90	456.10	41.60	573.60		
	Dia 25 mm	Each		75.90	545.10		621.00		
	Dia 40 mm	Each		177.10	534.10		711.20		
	Dia 50 mm	Each		354.20	544.00		898.20		
	b) on CI/DI/MS Pipeline								
	Dia 15 mm	Each		75.90	410.10	33.50	519.50		
	Dia 20 mm	Each		75.90	656.10	41.60	773.60		
	Dia 25 mm	Each		75.90	845.10		921.00		
	Dia 40 mm	Each		177.10	1034.10		1211.20		
	Dia 50 mm	Each		354.20	1144.00		1498.20		
21	ITEM No. 21								
	Providing and fixing ball valve of required dia. including necessary sockets, union, nut, testing etc. complete.(Prior approval of sample and brand by Ex.		As per lowest tender rate from Veolia.						
		Dia 15 mm	208.00						
		Dia 20 mm	228.00						
		Dia 25 mm	302.00						
		Dia 40 mm	426.00						
		Dia 50 mm	807.00						
	Lockabal Ball Valve								
		Dia 15 mm	1000.00						
		Dia 20 mm	1000.00						

Reference to CSR/ Item of work		As per MJP-CSR-2007-08 / NMC CSR						
22	ITEM No. 22							
	Providing installing and giving satisfactory field test of flanged ends Bulk type water meter of following type and as mentioned below (Removable Mechanism Type) with FGI-250 cast iron body, class 'B' conforming to ISO-4064, marked to read in metric system, along with manufacturer's test and guarantee certificate including cost of all materials and labour, with EEC mark and C.I Strainer 'T' (Basket) type with flanged ends and with stainless steel or Brass mesh with; openings of 2.5 mm to 3 mm and suitable for operating pressure of 16 Kg/cm2 and test pressure of 24 Kg/cm2 including necessary excavation & refilling.	As per lowest tender rate from Veolia.						
	BULK METERS WITH STRAINER							
	EEC mark Removable Mechanism Type							
	Dia 50 mm	25120						
	Dia 80 mm	29042						
	Dia 100 mm	33754						
	Dia 150 mm	51054						
	Dia 200 mm	68200						
	Dia 250 mm	95060						
	Dia 300 mm	221315						
	Dia 400 mm	416023						
	Dia 500 mm	640436						
23	ITEM No. 23							
	A) Providing installing and giving satisfactory field test of Domestic water meter horizontal inferential, single jet or multi-jet, dry dial, suitable for 50° C temperature,	As per lowest tender rate from Veolia.						
	ISI mark	DOMESTIC WATER METERS WITH STRAINERS						
		Dia 15 mm	1287					
		Dia 20 mm	2465					
		Dia 25 mm	3653					
		Dia 40 mm	6100					

Reference to CSR/		As per MJP-CSR-2007-08 / NMC CSR						
	Item of work							
24	ITEM No. 24							
	Manufacture supply and commission of Electromagnetic flow meter (EMF) for row/ pure water with accuracy 0.5% of measured value and protection as per given specifications for size 10mm - 1000mm. Including sensor, trasmitter, surge arrestor, 25mtere sensor/ transmitter cable, GI duct of suaitable size for 25 mtrs/ each flow meter including pipe cutting, levelling and installation of flow meter in pipe lines with necessary tool tackles cranes etc. as may be required at site and based on technical specification etc. as per attached with 6 years battery back-up.	As per lowest tender rate from Veolia.						
	Electromagnetic water meter							
	Dia 150 mm	598564						
	Dia 200 mm	673621						
	Dia 250 mm	715909						
	Dia 300 mm	758192						
	Dia 400 mm	1040470						
25	ITEM No. 25							
	Providing and constructing R.C.C. valve chamber in M-200 mix. including excavation in all types of strata, foundation concrete , R.C.C. roof cover, with	(As per rate analysis MJP CSR 07-08)						
	For Valves							
	Chamber size 0.9 X 1 X 1.65 m deep	21800.00						
	Chamber size 1.2 X 1.2 X 1.85 m deep	28900.00						
26	ITEM No. 26							
	Providing and constructing B.B masonry chamber for water meter & strainer . including excavation in all types of strata, foundation concrete , R.C.C. roof	(As per rate analysis PWD 07-08)						
	For Water meter							
	Chamber size 0.9 X 0.6 X 0.6 m deep	4500.00						
	Chamber size 0.9 X 0.6 X 0.9 m deep	5500.00						
	Chamber size 1.2 X 0.9 X 1.0 m deep	8100.00						
	Chamber size 1.5 X 1.0 X 1.5 m deep	12700.00						
	Chamber size 2 X 0.9 X 1.50 m deep	14200.00						
	Chamber size 2.50 X 0.9 X 1.50 m deep	16600.00						
	Chamber size 2.80 X 0.9 X 1.50 m deep	17900.00						
	Chamber size 3.80 X 0.9 X 1.50 m deep	22400.00						
	Chamber size 4.60 X 0.9 X 1.50 m deep	26000.00						
	Chamber size 5.6 X 09 X 1.50 m deep	30400.00						

Reference to CSR/			As per MJP-CSR-2007-08 / NMC CSR						
Item of work									
		Chamber size 6.4 X 09 X 1.70 m deep	37100.00						
		Chamber size 7.9 X 2 X 1.50 m deep	60200.00						
27	ITEM No.	27							
		Providing and fixing C.I. road box including loading, unloading and carting to site of work including all necessary excavation in all types of strata and fixing in murrum packing etc.complete.	(CSR 2007-08, I.No. 5(b) P.No 225)	Add for work in corp limit@5%	+1% Insurance				
		225x300 mm (40 Kg)	1419	70.95	1504.85				
28	ITEM No.	28							
		Reinstating the road surface with excavation, 30 cm soling,murum blindage, 40 mm size metal,25 mm thick premixed bitumen,carpet with hot mixed seal coat, including compacting at all stages etc.complete-	As Per NIT CSR	Add for work in corp limit@5%					
		For WBM & Tar road (other than IRDP) 100-400 mm							
			438	21.90	438.00				
		IRDP & PWD/ corp cement roads reinstating	1250						
29	ITEM No.	29							
		Providing and casting in situ following grades of C.C of trap / granite / quartzite / gneiss metal for foundation and bedding including dewatering, form work, compacting and curing, finishing, etc. complete.	(PWDCSR 2007-08, I.No. 7, P.No. 12)	Add for work in corp limit@5%	+1% Insurance	Total +Vat 4%			
	A)	a) 1:2:4 (M-150) grade (with 12 to 20 mm metal)	3130	156.50	3319.37	3452.14			
		b) 1:1.5:3 Mix.(Road surface)	3415	170.75	3621.61	3766.47			

Reference to CSR/		As per MJP-CSR-2007-08 / NMC CSR						
	Item of work							
30	ITEM No. 30							
	Providing and laying in situ Cement concrete of trap/granite/quartzite/ gneiss metal of approved quality for RCC work as per detailed drawing and designs, or as directed by Engineer - In - Charge including normal dewatering, form work, compaction, finishing the formed surfaces with CM 1:3 of sufficient minimum thickness to give a smooth and even surface wherever necessary or roughening if special finish is to be provided and curing, etc, complete. (By weight batching and mix design for M-250 and M-300 only. Use of L & T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted. Excluding M.S. or Tor reinforcement). In RCC M-300	(CSR 2006-07, Item No 4 P.No 38)	Add for work in corp limit@5%	+1% Insurance	Total +Vat 4%			
	M-200 (RCC casing in box for pipe dia.	3094	154.70	3281.19	3412.44			
31	ITEM No. 31							
	Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, parades, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete. (including cost of binding wire) M.S.bars	(CSR 2006-07, I.No 7P.No 38)	Add for work in corp limit@5%	+1% Insurance	Total +Vat 4%			
		58151	2907.55	61669.14	64135.91			
32	ITEM No. 32							
	Detecting under ground services such as telephone, electric cables, water & sewer pipe line by advance technology including all operations such as installation of system, etc. complete along the route of pipe line.			total				
		5000		5000				

Reference to CSR/		As per MJP-CSR-2007-08 / NMC CSR						
	Item of work							
33	ITEM No. 33							
	Making cross connection to existing distribution main of any type including excavation, breaking and removing existing pipes, lowering, laying of specials and pipes in their position, refilling, closing the water supply in that area, dewatering and restarting the water supply, etc. complete as directed by Engineer-in-charge for following diameters of existing pipeline, irrespective of diameter of branch line (the number of joints involved will be paid separately depending upon the nature of joints and required pipes, excluding cost of valves and specials)	(CSR 2006-07, I.No. 9, P.No. 43)	Add for work in corp limit@5%	+1% Insurance	Total +Vat 4%			
		80	887	44.35	940.66	978.29		
		100	995	49.75	1055.20	1097.41		
		150	1332	66.60	1412.59	1469.09		
		200	1428	71.40	1514.39	1574.97		
		250	1723	86.15	1827.24	1900.33		
		300	2172	108.60	2303.41	2395.55		
		350	2692	134.60	2854.87	2969.06		
		400	3043	152.15	3227.10	3356.18		
		450	3615	180.75	3833.71	3987.06		
		500	4397	219.85	4663.02	4849.54		
		600	6902	345.10	7319.57	7612.35		
		700	8530	426.50	9046.07	9407.91		
		750	10688	534.40	11334.62	11788.00		
		800	13459	672.95	14273.27	14844.20		
		900	17901	895.05	18984.01	19743.37		
		1000	24698	1234.90	26192.23	27239.92		
		1100	27168	1358.40	28811.66	29964.13		
		1200	29885	1494.25	31693.04	32960.76		

Reference to CSR/		As per MJP-CSR-2007-08 / NMC CSR						
	Item of work							
34	ITEM No. 34							
	Providing, fabricating and fixing expansion joints for pipelines as per the drawing. The rate to include machining the strakes and steel ring as shown in the drawing and welding on either automatic welding machine or manually, Rate includes plates and flats required for expansion joint and all othr materials such as synthetic rubber, rubber ring, etc. complete. including packing as per specifications, grease, bolts and nuts, etc. including local handling, all types of taxes and duties etc. complete. Expansion joints suitable for pipe diameters.	(CSR 2007-08, I.No.6 , Page No.186)	Add for work in corp limit@5%	Total + Ins 1% + Vat 4%				
	400 mm dia.	21675	1083.75	22985.30				
	500 mm dia.	28194	1409.70	29898.70				
	600 mm dia.	44407	2220.35	47092.58				
	700 mm dia.	60919	3045.95	64603.56				
	750 mm dia.	60919	3045.95	64603.56				
	800 mm dia.	70896	3544.80	75184.17				
	850 mm dia.	70896	3544.80	75184.17				
	900 mm dia.	82315	4115.75	87294.02				
	950 mm dia.	82315	4115.75	87294.02				
	1000 mm dia.	98562	4928.10	104523.96				
35	ITEM No. 35							
	Laying of M.S cover pipes ,minimum 2.00 m below IRDP Roads, cement concrete and major roads by horizontal directional drilling method / push on method including all operations such as making pits for installation of machine, excavation starting and end point for laying of pipes etc. complete. (Including cost of cover pipe but excluding cost of inner pipe)	(As per rate analysis MJP rates)	As per Qtn	Total + Ins 1%				
		pipe cost	Labour	Total				
	700 mm dia 12 mm thick M.S cover pipe	13075	18667	32059.42				

Reference to CSR/ Item of work		As per MJP-CSR-2007-08 / NMC CSR						
36	ITEM No. 36							
	Providing & fixing Box for water meter including necessary excavation, fixing & refilling etc. complete.	As per lowest tender rate from Veolia.						
	15 mm to 40 mm	845						
37	ITEM No. 37							
	Removal of public stand posts, including excavation, dismantling, cutting & plugging of pipe, cleaning the site etc. complete.	As per lowest tender rate from Veolia.						
		930						
38	ITEM No. 38		MJP CSR	MJP CSR	MJP CSR			
	Disconnection of illegal connections, including necessary excavation, cutting of pipe, dismantling pipe, plugging of pipeline etc. complete.	(As rate analysis)	Excavation (1.2 x1.6x1.2)	Dismantling	Cutting	Specials	Total	
		989.76	693.50	72	24.26	200	989.76	
39	ITEM No. 39							
	Providing, constructing & fixing in position meter display box of suitable size of M.S. fabricated body with anticorrosive treatment and cover with necessary locking arrangement, connections, fittings, etc. complete for electromagnetic water meter and modem with protection as per IC-55.	As per lowest tender rate from Veolia.						
		8623						
40	ITEM No. 40							
	Repairs to brick Masonry/RCC chambers of walls including dismantling damaged portion, curing etc. complete.	INCLUSIVE 5% CORP+1% INSURANCE+ 4% VAT	(Thane PWD CSR 2006-07 I.No.8-1A BDW , Page No.183)	(Thane PWD CSR 2006-07 I.No.2-1 BDG , Page No.21)	(PWD CSR 2006-07 I.No.10-5 BDL , Page No.59)	Total		
	a) Brick Masonry in Cement Mortar 1:4 per cum	2897.29	82.72	2692.61	121.96	2897.29		
			(Thane PWD CSR 2006-07 I.No.8-3D BDW , Page No.180)	(Thane PWD CSR 2006-07 I.No.9-10B BDG , Page No.22)	(PWD CSR 2006-07 I.No.10-5 BDL , Page No.59)			

Reference to CSR/ Item of work		As per MJP-CSR-2007-08 / NMC CSR					
	b) RCC M-200 per cum	3245.13	387.08	2736.09	121.96	3245.13	

Reference to CSR/			As per MJP-CSR-2007-08 / NMC CSR					
Item of work								
41	ITEM No.	41						
	Providing & fixing precast chamber covers in Cement Concrete in M-200 and 150 mm thk.		As per lowest tender rate from Veolia.					
	Per sq m		4727					
42	ITEM No.	42						
	Providing,lowering & Laying Double flanges cast iron sluice valves with EPDM fully covered wedge and epoxy coating internal and external.		As per lowest tender rate from Veolia.	lowering & Laying	Total			
	Dia 80 mm	Nos.	11,400	881	12281.23			
	Dia 100 mm	Nos.	13,400	1374	14774.24			
	Dia 150 mm	Nos.	24,900	1468	26367.99			
	Dia 200 mm	Nos.	43,500	1936	45435.62			
	Dia 250 mm	Nos.	73,600	2509	76109.14			
	Dia 300 mm	Nos.	95,680	3069	98749.43			
43	ITEM No.	43						
	Double flange Ductile Iron Flange adaptor for CI,DI & PVC/HDPE pipes to allow an easy dismantling of the valves							
	Dia 80 mm	Nos.			2500.00			
	Dia 100 mm	Nos.			2900.00			
	Dia 150 mm	Nos.			4700.00			
44	ITEM No.	44						
	Ductile Iron flanged Dismantling joint to install main equipment on existing pipe		As per lowest tender rate from Veolia.					
	300mm	Nos.	55,300					
	400mm	Nos.	87,300					
45	ITEM No.	45						
	Electrofusion saddle with coupler for HDPE for outside Slum		As per lowest tender rate from Veolia.					
	Nos.	Saddle dia 110x20mm	1034					
	Nos.	Saddle dia 110x25mm	1034					

Reference to CSR/			As per MJP-CSR-2007-08 / NMC CSR					
Item of work								
	Nos.	Saddle dia 110x32mm	1034					
	Nos.	Saddle dia 110x40mm	1034					
	Nos.	Saddle dia 160x20mm	1034					
	Nos.	Saddle dia 160x25mm	1034					
	Nos.	Saddle dia 160x32mm	1034					
	Nos.	Saddle dia 160x40mm	1034					
	Nos.	Saddle dia 160x50mm	1034					
46	ITEM No.	46						
	Supply & Laying blue plastic in trenches		As per lowest tender rate from Veolia.					
	For inside Slum	RMT	60					
47	ITEM No.	47						
	Providing and installation Pipe ends and slip on flange (PE 100, HDPE)		As per lowest tender rate from Veolia.					
	Dia 75 mm	Nos.	1120					
	Dia 110 mm	Nos.	1440					
	Dia 160 mm	Nos.	1700					
48	ITEM No.	48						
	Providing,loering,laying & Connecting double flanged short body pattern type manually opertated bitterfly valve having body,disc and end cover in graded cast iron to IS 210 Gr.CF 200 generally conforming in BS 5155, Synthetic rubber faced ring secured on disc by retaining ring with stainless steel screw stub shaft of stainless steel riding in teflon bearings excluding C.C. foundation/structural steel support confirming to IS 13095-1991		MJP CSR (page No.133 iteam.No.3)	4% vat	Total +1% Insurance	lowering & Laying	Total	
		400 mm	48817	1952.68	51277.38	3430.09	54707.00	
		450 mm	58044	2321.76	60969.42	3629.71	64599.00	
		500 mm	69263	2770.52	72753.86	4030.07	76784.00	
		600 mm	93215	3728.60	97913.04	4443.66	102357.00	
		700 mm	133391	5335.64	140113.91	4857.26	144971.00	
		750 mm	159516	6380.64	167555.61	6165.33	173721.00	
		800 mm	176781	7071.24	185690.76	7780.00	193471.00	
		900 mm	219548	8781.92	230613.22	8060.14	238673.00	
		1000 mm	274681	10987.24	288524.92	9635.11	298160.00	
		1200 mm	390239	15609.56	409907.05	10055	419962	

Reference to CSR/			As per MJP-CSR-2007-08 / NMC CSR					
	Item of work							
49	ITEM No. 49							
	Providing and making flanged joints to flanged C.I. / M.S. pipes of all classes / specials etc. including cost of all jointing materials (rubber packing, nut bolts, etc.) labour, hydraulic testing etc. complete.	(CSR 2007-08, I.No.8, P.No.62-63)	Add for work in corp limit@5%	+1% Insurance	Total +Vat 4%			
	Dia 50 mm	Nos.	170	8.50	180.29	187.50		
	Dia 80 mm	Nos.	170	8.50	180.29	187.50		
	Dia 100 mm	Nos.	170	8.50	180.29	187.50		
	Dia 150 mm	Nos.	346	17.30	366.93	381.61		
	Dia 200 mm	Nos.	361	18.05	382.84	398.15		
	Dia 250 mm	Nos.	519	25.95	550.40	572.42		
	Dia 300 mm	Nos.	540	27.00	572.67	595.58		
	Dia 350 mm	Nos.	706	35.30	748.71	778.66		
	Dia.400 mm	Nos.	886	44.30	939.60	977.18		
	Dia.450 mm	Nos.	1083	54.15	1148.52	1194.46		
	Dia.500 mm	Nos.	1121	56.05	1188.82	1236.37		
	Dia.600 mm	Nos.	1201	60.05	1273.66	1324.61		
	Dia.700 mm	Nos.	1823	91.15	1933.29	2010.62		
	Dia.750 mm	Nos.	1874	93.70	1987.38	2066.88		
	Dia.800 mm	Nos.	2389	119.45	2533.53	2634.87		
	Dia.900 mm	Nos.	2541	127.05	2694.73	2802.52		
			2712	135.60	2876.08	2991.12		
50	ITEM No. 50							
	Ductile Iron saddle for house service connection to replace the ferrules on Cast and Ductile iron pipes for different diameters of pipes and house service	As per lowest tender rate from Veolia.						
	for pipe of 80	Nos.	1600.00					
	for pipe of 10	Nos.	1600.00					
	for pipe of 15	Nos.	2200.00					
	for pipe of 20	Nos.	2500.00					
	for pipe of 25	Nos.	3200.00					

Reference to CSR/ Item of work			As per MJP-CSR-2007-08 / NMC CSR					
51	ITEM No.	51						
	Data logger		As per lowest tender rate from Veolia.					
		Nos.	100000					
52	ITEM No.	52						
	Providing and fixing of interlocking Blocks		As per lowest tender rate from Veolia.					
		Sqm	650					
53	ITEM No.	53						
	Fabrication of structural steel sections		As per lowest tender rate from Veolia.					
		MT	75000					
54	ITEM No.	54						
	Extension rods to operate Sluice valve		As per lowest tender rate from Veolia.					
	80mm - 100 mm	Nos.	1200.00					
	150mm - 250mm	Nos.	1400.00					
	300mm	Nos.	1600.00					
55	ITEM No.	55						
	Providing and installation of 1 KVA UPS with SMF batteries for 2 hrs. back-up for 100% full load including providing and installation of MS wall mountable prefabricated cabinet for accommodating UPS & batteries with locking arrangement with electrical wir		As per lowest tender rate from Veolia.					
		Nos	51644					

Reference to CSR/ Item of work			As per MJP-CSR-2007-08 / NMC CSR						
56	ITEM No.	56							
	Providing and laying of following Dia.Galvanised iron (GI) light duty/ Concrete (NP) pipe as a casing pipe for HDPE/MDPE pipe at crossing major roads, natural/side/cross drains.		MJP CSR 2007-2008 (page No.79 Section-1	Add for work in corp limit@5%	+1% Insurance		4% Vat	Total	
	Dia 25 mm (GI, Light	Rmt	145	7.25	153.77	153.77	159.92	159.92	
	Dia 40 mm (GI, Light duty)	Rmt	228	11.40	241.79	241.79	251.46	251.46	
	Dia 100 mm (GI, Light duty)	Rmt	721	36.05	764.62	764.62	795.20	795.20	
	Dia 150 mm	Rmt	396	19.80	419.96	419.96	436.76	436.76	
	Dia 200 mm (NP- 2)	Rmt	495	24.75	524.95	524.95	545.95	545.95	
57	ITEM No.	57							
	Rehabilitation for old ESR including repairs to leakages in container gy grouting, plastering outside & inside with water proof compound, Painting to fron outside of whole structure ,paint with epoxy paint double coat to inside of container, repair of spiral stair case ,repairs of chambers & providing slab cover Etc. Complete		Rs taken per liter						
			1.3	2270000	2951000	2951000			

Reference to CSR/			As per MJP-CSR-2007-08 / NMC CSR					
	ITEM No.	Item of work						
60	60	Replacment of Sluice Valves including excavation,desmentalling, providing & fixing M.S .Sluice gates in position as per specification, dewatering, testing & refilling with specials.etc The replaced pipe / materials may be shifted to the site as directed by the Engineer. (Item includes cost of pipe but excluding cost of specials)	Providing Lowering & Laying As Per Item No.16	Excavation	Dismantaling	Total		
	Sluice Valves	450 mm	84478.27	417.45	2000	86895.72		
		500 mm	105708.79	417.45	2000	108126.24		
		600 mm	147538.30	417.45	2000	149955.75		
		700 mm	299961.42	417.45	2000	302378.87		
	Butterfly Valves	900 mm	238673.00	731.17	2000	241404.17		
		1200 mm	419962	731.17	2000	422693.17		

Consolidated Analysed Rate for Providing ,lowering, laying & jointing Cast Iron pipes based on Lowest landed Rate of quotations call by NMC on (23-08-2008)

Dia	Wt. Per Rmt in Kg.	Landed rate at Nagpur	Add for Wastage 4% on 3	Total (3+4)	Total	Transportation 2500/ MT for 1730 km	Total (6+7)	Over-heads (5% on 8)	Add VAT 8% on 9	Total rate for supply (8+9+10)	Add insurance 1% on 11	Total rate for supply (11+12)	Rate adding 10 % Contractor's profit	Lowering, Laying & Jointing					Total for providing, low, lay & Jointing
														Basic rates	5% for city	Total (15+16)	Add Insurance 1%	Total (17+18)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
80	17.36	883.00	35.32	918.32	918.32	31.00	976.87	48.84	78.15	1103.9	11.04	1114.9	1226.4	40.00	2.00	42.00	0.42	42.42	1268.8
100	19.82	1080.00	43.20	1123.20	1123.20	37.15	1194.04	59.70	95.52	1349.3	13.49	1362.8	1499.0	40.00	2.00	42.00	0.42	42.42	1541.4
150	32.18	1690.00	67.60	1757.60	1757.60	58.25	1868.58	93.43	149.49	2111.5	21.11	2132.6	2345.9	57.00	2.85	59.85	4.79	64.64	2410.5
200	47.09	2440.00	97.60	2537.60	2537.60	85.33	2699.06	134.95	215.92	3049.9	30.50	3080.4	3388.5	72.00	3.60	75.60	6.05	81.65	3470.1

Consolidated Analysed Rate for Providing ,lowering, laying & jointing Ductile Iron K-9 pipes based on Lowest landed Rate of quotations received from Manufacturers as on 23-08-08

Dia	Wt. Per Rmt in Kg.	lowest Landed rate of Manufacturer at Nagpur	Add for Wastage 0.2% on 3	Total (3+4)	Transportation / Rmt for 10 km	Total (5+6)	Over-heads (5% on 7)	Add VAT 8% on 7	Total rate for supply (8+9)	Add insurance 1% on 10	Total rate for supply (10+11)	Rate adding 10 % Contractor's profit on 12	Lowering, Laying & Jointing					Total for providing, low, lay & Jointing
													Basic rates	5% for city	Total (14+15)	Add Insurance 1% on 16	Total (16+17) +Adding 4% Vat on Labour	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
100	16.00	1318	3.00	1321.00	56.29	1377.29	68.86	110.18	1556.3	15.56	1571.9	1729.1	40.00	2.00	42.00	0.42	44.12	1773.2
150	24.35	1920	3.84	1923.84	82.47	2006.31	100.32	160.51	2267.1	22.67	2289.8	2518.8	57.00	2.85	59.85	0.60	62.87	2581.7
200	36.50	2124	4.25	2128.25	73.05	2201.30	110.06	176.10	2487.5	24.87	2512.3	2763.6	72.00	3.60	75.60	0.76	79.41	2843.0
250	47.80	2852	5.70	2857.70	98.27	2955.98	147.80	236.48	3340.3	33.40	3373.7	3711.0	96.00	4.80	100.80	1.01	105.88	3816.9
300	60.20	3620	7.24	3627.24	125.05	3752.29	187.61	300.18	4240.1	42.40	4282.5	4710.7	103.00	5.15	108.15	1.08	113.60	4824.3
350	79.50	4471	8.94	4479.94	152.80	4632.74	231.64	370.62	5235.0	52.35	5287.3	5816.1	126.00	6.30	132.30	1.32	138.97	5955.1
400	94.40	5335	10.67	5345.67	178.77	5524.44	276.22	441.96	6242.6	62.43	6305.0	6935.5	153.00	7.65	160.65	1.61	168.75	7104.3
450	111.50	6420	12.84	6432.84	227.49	6660.33	333.02	532.83	7526.2	75.26	7601.4	8361.6	152.00	7.60	159.60	1.60	167.64	8529.2
500	128.90	7481	14.96	7495.96	259.38	7755.34	387.77	620.43	8763.5	87.64	8851.2	9736.3	183.00	9.15	192.15	1.92	201.83	9938.1
600	168.10	9872	19.74	9891.74	351.95	10243.70	512.18	819.50	11575.4	115.75	11691.1	12860.2	244.00	12.20	256.20	2.56	269.11	13129.3
700	216.40	12613	25.23	12638.23	434.35	13072.57	653.63	1045.81	14772.0	147.72	14919.7	16411.7	293.00	14.65	307.65	3.08	323.16	16734.9

Rate Analysis for fabrication Of M.S.Pipes with Contractor's plate

DATA SHEET		
Rate of Steel in Rs. Per M.T.	49000.00	Per M.T.
Excise Duty	16.32%	on fabrication
Contractor's Profit	15%	
Vat Tax	4%	
Rate adopted for Steel scrap(M.T.)	7000.00	
Add wastage @	5%	
Transport of Steel Plate from Godown to Factory/per/MT		
Lead in Km>=10 up to 50	10	
Transport of Steel Pipe from W-shop to site/per/m		
Lead in Km>=10 up to 50	10	
Fabrication of pipe per M. T.	5000	
Inspection charges	0.50%	
Insurance charges	1.00%	

Rate Analysis For M.S. Pipes based on market rates as on March 2007 For 10 mm thick plate

Dia (I.D.) in mm	Thickne ss in mm	Wt Kg /m	Adding wastage	Total Wt.	Rate/Kg	Cost of plate	Vat on colm 6	Total	Transport of Steel Plate from Godown to Factory per m	Fabrication per /Kg	Hudraulic testing	Transport of M.S.Pipe from Factory to site	Excise duty on fabricated material	Deduct Excise duty paid on plate	Diff of excise duty	contractors profit	Total	Deduct scrap	Total	Added 0.5% Inspection	Added 4% Work contract	Added 1% Insurance	Rate to be adopted
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	10		5.00%		49		4.00%			5										0.50%	4%	1.00%	
300	10	76	3.8	79.8	49	3910.2	156.41	4223.02	9.86	380	21.53	13.89	756.34	607.76	148.58	586.53	5383.41	26.6	5356.81	5383.59	5598.93	5654.92	5655.00
350	10	89	4.45	93.45	49	4579.05	183.16	4945.37	11.54	445	21.53	15.74	885.11	711.72	173.39	686.86	6299.43	31.15	6268.28	6299.62	6551.6	6617.12	6617.00
400	10	101	5.05	106.05	49	5196.45	207.86	5612.17	13.10	505	21.53	15.74	1003.97	807.68	196.29	779.47	7143.30	35.35	7107.95	7143.49	7429.23	7503.52	7504.00
450	10	113	5.65	118.65	49	5813.85	232.55	6278.95	14.65	565	21.53	29.52	1122.84	903.64	219.2	872.08	8000.93	39.55	7961.38	8001.19	8321.24	8404.45	8404.00
500	10	126	6.3	132.3	49	6482.7	259.31	7001.32	16.34	630	21.53	29.52	1251.61	1007.6	244.01	972.41	8915.13	44.1	8871.03	8915.39	9272.01	9364.73	9365.00
600	10	150	7.5	157.5	49	7717.5	308.7	8334.90	19.45	750	21.53	47.23	1489.34	1199.52	289.82	1157.63	10620.56	52.5	10568.06	10620.9	11045.74	11156.2	11156.00
700	10	175	8.75	183.75	49	9003.75	360.15	9724.05	22.69	875	21.56	47.23	1736.99	1399.44	337.55	1350.56	12378.64	61.25	12317.39	12378.98	12874.14	13002.88	13003.00
750	10	187	9.35	196.35	49	9621.15	384.85	10390.85	24.25	935	21.56	47.23	1855.85	1495.4	360.45	1443.17	13222.51	65.45	13157.06	13222.85	13751.76	13889.28	13889.00
800	10	200	10	210	49	10290	411.6	11113.20	25.94	1000	21.61	57.63	1984.63	1599.36	385.27	1543.5	14147.15	70	14077.15	14147.54	14713.44	14860.57	14861.00
850	10	212	10.6	222.6	49	10907.4	436.3	11780.00	27.49	1060	21.61	57.63	2103.5	1695.32	408.18	1636.11	14991.02	74.2	14916.82	14991.4	15591.06	15746.97	15747.00
900	10	224	11.2	235.2	49	11524.8	460.99	12446.78	29.05	1120	21.61	57.63	2222.37	1791.28	431.09	1728.72	15834.88	78.4	15756.48	15835.26	16468.67	16633.36	16633.00
950	10	237	11.85	248.85	49	12193.65	487.75	13169.15	30.73	1185	21.68	57.63	2351.15	1895.24	455.91	1829.05	16749.15	82.95	16666.20	16749.53	17419.51	17593.71	17594.00
1000	10	249	12.45	261.45	49	12811.05	512.44	13835.93	32.29	1245	21.68	57.63	2470.02	1991.2	478.82	1921.66	17593.01	87.15	17505.86	17593.39	18297.13	18480.1	18480.00
1050	10	261	13.05	274.05	49	13428.45	537.14	14502.73	33.85	1305	21.76	57.63	2588.9	2087.16	501.74	2014.27	18436.98	91.35	18345.63	18437.36	19174.85	19366.6	19367.00
1100	10	274	13.7	287.7	49	14097.3	563.89	15225.08	35.53	1370	21.76	57.63	2717.67	2191.12	526.55	2114.6	19351.15	95.9	19255.25	19351.53	20125.59	20326.85	20327.00
1150	10	286	14.3	300.3	49	14714.7	588.59	15891.88	37.09	1430	21.76	57.63	2836.54	2287.08	549.46	2207.21	20195.03	100.1	20094.93	20195.4	21003.22	21213.25	21213.00
1200	10	298	14.9	312.9	49	15332.1	613.28	16558.66	38.64	1490	21.76	172.89	2955.4	2383.05	572.35	2299.82	21154.12	104.3	21049.82	21155.07	22001.27	22221.28	22221.00
1300	10	323	16.15	339.15	49	16618.35	664.73	17947.81	41.89	1615	21.9	172.89	3203.06	2582.97	620.09	2492.75	22912.33	113.05	22799.28	22913.28	23829.81	24068.11	24068.00
1400	10	348	17.4	365.4	49	17904.6	716.18	19336.96	45.13	1740	21.9	172.89	3450.7	2782.89	667.81	2685.69	24670.38	121.8	24548.58	24671.32	25658.17	25914.75	25915.00
1500	10	372	18.6	390.6	49	19139.4	765.58	20670.56	48.24	1860	21.9	172.89	3688.43	2974.81	713.62	2870.91	26358.12	130.2	26227.92	26359.06	27413.42	27687.55	27688.00
1600	10	397	19.85	416.85	49	20425.65	817.03	22059.71	51.48	1985	21.9	172.89	3936.07	3174.73	761.34	3063.85	28116.17	138.95	27977.22	28117.11	29241.79	29534.21	29534.00
1700	10	422	21.1	443.1	49	21711.9	868.48	23448.86	54.72	2110	21.9	172.89	4183.71	3374.65	809.06	3256.79	29874.22	147.7	29726.52	29875.15	31070.16	31380.86	31381.00
1800	10	446	22.3	468.3	49	22946.7	917.87	24782.44	57.84	2230	21.9	172.89	4421.44	3566.57	854.87	3442.01	31561.95	156.1	31405.85	31562.88	32825.4	33153.65	33154.00
1900	10	471	23.55	494.55	49	24232.95	969.32	26171.59	61.08	2355	21.9	172.89	4669.08	3766.49	902.59	3634.94	33319.99	164.85	33155.14	33320.92	34653.76	35000.3	35000.00
2000	10	496	24.8	520.8	49	25519.2	1020.77	27560.74	64.32	2480	21.9	172.89	4916.72	3966.41	950.31	3827.88	35078.04	173.6	34904.44	35078.96	36482.12	36846.94	36847.00
2100	10	520	26	546	49	26754	1070.16	28894.32	67.43	2600	21.9	172.89	5154.45	4158.34	996.11	4013.1	36765.75	182	36583.75	36766.67	38237.34	38619.71	38620.00

KIMPLAS PIPING SYSTEMS LTD.

Providing and Supplying Blue MDPE pipes conforming to ISO 4427:1996 manufactured from virgin resin PE 80 Food grade compounded Raw Material having Blue Colour only with quality assurance certificate from quality agencies like WRC / CIPET (India) / DVGM / KIWA / SPGN etc. for usage in Drinking Water syatem
The cost shall include testing of all materials, all taxes Central,Sate , Municipal,Inspection charges, transportation up to site, transitinsurance, loading, unloading, stacking etc. complete as specified and directed.



Diameter in OD	Pressure Rating					Vat 4%	Insurance 1%	Total Rate + Contractor Profits 5%
DN	PN 6 (SDR 21)	PN 8 (SDR 17)	PN 10 (SDR 13.6)	PN 12.5 (SDR 11)	PN 16 (SDR 9)			
in mm	in Rs./mtr.	in Rs./mtr.	in Rs./mtr.	in Rs./mtr.	in Rs./mtr.			
20	-	-	-	-	31.85	33.00	33.33	36.66
25	-	-	-	40.43	44.10	46.00	46.46	51.11
32	-	-	-	68.60	73.50	76.00	76.76	84.44
40	-	-	-	104.13	112.70	117.00	118.17	129.99
50	-	-	-	147.00	171.50	178.00	179.78	197.76
63	-	-	202.13	232.75	281.75	210.00	212.10	233.31
75	-	225.40	274.40	324.63	398.13	285.00	287.85	316.64
90	260.93	323.40	394.45	459.38	569.63	410.00	414.10	455.51
110	392.00	482.65	583.10	673.75	833.00	606.00	612.06	673.27
125	480.20	584.33	716.63	888.13	1065.75	745.00	752.45	827.70
140	600.25	736.23	897.93	1102.50	1347.50	934.00	943.34	1037.67
160	787.68	960.40	1174.78	1470.00	1776.25	1222.00	1234.22	1357.64
180	991.03	1217.65	1489.60	1898.75	2235.63	1549.00	1564.49	1720.94
200	1228.68	1504.30	1831.38	2327.50	2768.50	1905.00	1924.05	2116.46
225	1555.75	1906.10	2365.48	2940.00	3503.50	2460.00	2484.60	2733.06
250	1903.65	2340.98	2910.60	3613.75	4318.13	3027.00	3057.27	3363.00
280	2401.00	2940.00	3654.18	4563.13	5420.63	3800.00	3838.00	4221.80
315	3025.75	3692.15	4628.05	5726.88	6860.00	4813.00	4861.13	5347.24

Item No:- 1(E)

HDPE

Providing and Supplying HDPE pipes conforming to IS 4984 of following class including test of material, all taxes Central, State, Municipal, Inspection charges, transportation up to site, transit insurance, loading, unloading, stacking complete. The HDPE pipes shall be manufactured from virgin resin PE 100 grade with minimum required strength



Diameter in OD	Pressure Rating							
DN	PN 6	PN 8	PN 10	PN 12.5	PN 16	Vat	Insurance	Total Rate
in mm	in Rs./mtr.	in Rs./mtr.	in Rs./mtr.	in Rs./mtr.	in Rs./mtr.	4%	1%	
20	-	-	-	-	23.64	25.00	25.25	25.25
25	-	-	-	30.60	36.69	38.00	38.38	38.38
32	-	-	41.47	48.43	59.60	62.00	62.62	62.62
40	-	52.64	63.51	76.71	92.22	96.00	96.96	96.96
50	64.38	80.91	97.88	118.76	142.68	148.00	149.48	149.48
63	100.34	128.62	155.73	186.18	224.03	162.00	163.62	163.62
75	143.99	181.11	220.40	261.44	317.70	229.00	231.29	231.29
90	202.71	259.99	315.52	378.45	457.19	328.00	331.28	331.28
110	297.98	386.14	466.47	560.72	677.88	485.00	489.85	489.85
125	385.99	498.22	600.88	721.96	875.80	625.00	631.25	631.25
140	485.46	624.23	752.12	905.96	1096.20	782.00	789.82	789.82
160	631.77	813.45	981.51	1182.04	1435.94	1021.00	1031.21	1031.21
180	797.65	1027.33	1245.12	1494.52	1810.62	1295.00	1307.95	1307.95
200	982.38	1266.00	1535.55	1843.24	2236.05	1597.00	1612.97	1612.97
225	1247.44	1603.85	1938.07	2334.07	2827.94	2016.00	2036.16	2036.16
250	1532.07	1975.34	2386.85	2871.00	3488.12	2482.00	2506.82	2506.82
280	1921.69	2477.76	2990.05	3600.21	4373.49	3110.00	3141.10	3141.10
315	2432.96	3133.16	3774.50	4558.22	5526.97	3925.00	3964.25	3964.25

Improvement @ Pench-II WTP (Gorewada)

for Augmented capacity of 140 mld

Sr. No.	Block Cost of the Modification (Capital Cost)		Amount (Rs. Lakhs)
1.1	Investigation & Assessment of existing WTP & submission of report with detailed methodology of up-gradation.		8
1.2	Designing components for augmenting capacity to 140mld.		10
1.3	Investigation & conducting Non destructive test to ascertain the structural strength & status of existing civil works of all component of WTP		10
2	Constructing additional Flash Mixer, Flocculator, Tube Settler & interconnecting channels suitable for 22.5mld. Including all civil & electro mechanical works.		94.5
2.1	Augmentation in existing filtration plant with V-wire Under drain system, to yield output of 140mld including suitable alteration to inlet, outlet, backwash arrangement, rate controller with all civil modification, mechanical augmentation.		141.4
2.2	Augmentation to Existing Chemical dosing arrangement (PAC + Alum) including all Civil & mechanical modification)		12
2.3	Construction of New Chlorine House (200 sqm) including all Civil, Electrical, Mechanical & instrumentation work)		35
3	Rehabilitation of Mechanical component to increase the serviceability. (As per the list of components given in report)		75
4	Augmentation of Electrical components		55
	Replacement of existing cabling with surface cabling system.		
	Replacement of individual electrical control panel of all component of WTP.		
	Replacing the existing internal & external lighting arrangement in the complete WTP & recirculation system area excluding pure water pump house with latest energy saving fitting & fixtures.		
5	Supply Erection & commissioning of Instrumentation at WTP (As per the list of components given in report)		40
6	General Rehabilitation work		80
a	General Rehabilitation & repairs to existing Civil, mechanical structures of works not covered in above	15	
b	External & internal painting to components of WTP and repainting in 3rd & 5th Year	25	
c	Painting to Ext.structural items & piping system	9	
d	Development of Central office, lab, Store Room and Modification for improvement of amenities for O & M staff	15	
e	Replacement of Covers, Door, Window, ventilators, railing, ladders at existing WTP	5	
f	Site cleaning, leveling and suitable drainage system to avoid water logging	8	
g	Landscaping and site development work	3	
7.0	Misc works & As built drawings		15
8.0	Structural strengthening & rehabilitation of PW Sump and CLF, Filter units not covered in above		70
Total (Rs lakhs)			645.9

Rehabilitation of ESR in Nagpur City

Sr.No	Particulars	Qty	Unit	Rate	Total Amount
Item 1	Providing pressure grouting at a pressure of 0.56 Kg/sqcm in required row/Zigzag fashion as specified at 1.5M interval as per site condition to stop leakages through water retaining structures to the entire satisfaction of the Engineer-in-charge including material compound, hadening materials, compressor equipment including scaffolding smooth finishing, etc. complete	200	Bag	MJP CSR 07-08 I.No/P.No 556	111263
Item 2	Drilling 40 mm die holes in masonry or concrete structure with providing and fixing 0.5m long G.I pipe line for pressure grouting including all material, labour cost and machinery charges, etc	100	RMT	551	55058
Item 3	Providing & applying of elastomeric (450% elongation), thermoplastic, fire retardant, coating skin tenxile strength 18 to 21 kg/cm ² , antifungal antibacterial anticorrosive, graft co-polymer Coating on smooth plastered surface. 100 Micron dyufilm thickness of self bonding with plastered surface and 100 Micron of top coat.	608	Sqm	MJP CSR-07-08 I.No 23 P.No 203 739	449312
Item 4	Providing & applying with mechanical arrangement cement sand gunite of 50 mm thickness to floors, walls, floor slabs, columns	1600	Sqm	MJP CSR-07-08 I.No 21 P.No 202 303	484800
Item 5	Providing cement plaster to inside container 1:3 mix, 20 mm thick	608		PWD CSR-06-07 I.No 9 P.No 59 73	44384
Item 6	Replacement of MS ladder inside container	7.2	m	MJP CSR-07-08 I.No 5 P.No 246 810	5832

Item 7	Replacement of mercury water level indicator	1	No	MJP CSR-07-08 I.No 9 P.No 247 15400	15400
Item 8	Replacement of Lightening conductor	1	No	MJP CSR-07-08 I.No 1 P.No 245 8940	8940
Item 9	Providing cement plaster to outside container 1:3 mix, 12 mm thick	1700		PWD CSR-06-07 I.No 5 P.No 58 58	98600
Item 10	Providing RCC valve chambers 1.2 X1.2 m	3		As per rate analysis 26000	78000
Item 11	Repairs to stair case including replacement of precast slab, strengthening stair case column etc	20	m	8000	160000
Item 12	Painting from out side with water cement paint	1750		PWD CSR-06-07 I.No 23 P.No 90 23	40250
Item 13	Providing scaffolding ,centering for	Job		1000000	1000000
Item 14	Testing ESR for water tightness.	Job		200000	200000
Item 15	Repairs to compound wall, gates, providing drains, levelling site & plantation etc	Job		200000	200000
Total					Rs. 2951839

Construction Of R.C.C. Chambers Size

RATE ANALYSIS 0.9m x 1.0 m x 1.65 m

Taluka :- Nagpur

Dist. :- Nagpur

ESTIMATES No. 1

ABSTRACT

Estimated Cost Rs. 21800.00

Item No.25

(As per MJP CSR 2007-08)

Qty.	Unit	ITEMS	Rate	Per	Amount
		ITEM No. 1 Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 M and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding back filling, etc. complete. (CSR 2008-09, I.No. 1 P.No 31) @ 5% added in corp. area	77.42	cum	77
1.0	cum	ITEM No. 2 Excavation for foundation / pipe trenches in hard murum including removing the excavated material upto a distance of 50 M and lifts as below, stacking and spreading as directed by Engineer-in-charge, normal dewatering, preparing the bed for foundation and excluding back filling, etc. complete. (CSR 2008-09, I.No. 2 P.No 31) Lift 0 to 1.5 M	86.66	cum	87
1.0	cum	ITEM No. 3 Excavation for foundation / pipe trenches in hard murum and boulders, W.B.M. road including removing the excavated material upto a distance of 50 M beyond the area and lifts as below, stacking and spreading as directed by Engineer-in-charge, normal dewatering, preparing the bed for foundation and excluding back filling, etc. complete. (CSR 2007-08, I.No. 3 P.No 31) Lift 0 to 1.5 M	97.05	cum	194
2.0	cum				
1.0	cum	Lift 1.5 to 3.0 M	102.84	cum	103

(As per MJP CSR 2007-08)

Qty.	Unit	ITEMS	Rate	Per	Amount
0.48	cum	ITEM No.4 Providing and casting in situ cement concrete of required grades of trap / granite / quartzite / gneiss metal for bed blocks, foundation blocks and such other items including bailing out water, ply wood/ steel form work, compacting, roughening them if special finish is to be provided, finishing uneven and honeycombed surface and curing etc. complete. The cement mortar 1:3 plaster is considered for rendering uneven and honeycombed surface only. (MJPCSR 2007-08, I.No. 1, P.No. 39) M-100	2430	cum	1166
0.36	cum	ITEM No.5 Providing and laying in situ Cement concrete of trap/granite/quartzite/ gneiss metal for RCC work in foundation like raft, grillage, strip foundation and footing of RCC columns and steel stanchions including normal dewatering, form work, compaction, finishing and curing, etc, complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L & T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted. Excluding M.S. or Tor reinforcement). In RCC M-300 (CSR 2006-07 I.No.1 , Page No.37) In RCC M-150	3468	cum	1248
1.88	cum	ITEM No.6 Providing and casting in situ Cement concrete of trap/granite/quartzite/ gneiss metal of approved quality for RCC work as per detailed drawing and designs or as directed by Engineer -in-charge including normal dewatering, centering, form work, compaction, finishing the formed surfaces with C.M. 1:3 of sufficient minimum thickness to give a smooth and even surface wherever necessary or roughening is special finish is to be provided and curing, etc, complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L & T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted. Excluding M.S. or (CSR 2007-08, Item No 4 P.No 37) M-200	3412.44	cum	6415

(As per MJP CSR 2007-08)

Qty.	Unit	ITEMS	Rate	Per	Amount
0.18	M.T.	ITEM No.7 Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pardies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete. (including cost of binding wire) m.s.bars (CSR 2007-08, I.No 8 P.No 43-44)	64135	M.T.	11544
1.16	cum	ITEM No.8 Refilling the trenches with available excavated stuff with soft material first over pipeline and then hard material in 15 cm layers with all leads and lifts including consolidation, surcharging, etc. complete.	24.26	cum	28
3.84	cum	ITEM No.9 Disposal of surplus excavated stuff by truck including loading ,unloading and stacking as directed lead upto 10 Km. (CSR 2006-07, I.(c)statement No-V P.No 16) $134.88 \times (1+5/100)$	232.12	cum	891
TOTAL					21753.00
SAY Rs.					21800.00

RATE ANALYSIS OF B.B.MASONRY CHAMBER INCLUDING R.C.C.COVER**Item No.26**

Taluka :- Nagpur

Dist. :- Nagpur

for flow meter & strainer size 0.9 M X 0.6 M X 0.6 MDiameter of pipe 40 mm
dia.

Cost Rs. : 4500.00

(As per MJP CSR 2004-05)

ITEMS	No.	L	B	D	Qty.	Unit	Rate	Amount
ITEM No. 1 Excavation for foundation / pipe trenches in (CSR 2008-09, I.No. 1 P.No 31) Lift 1 to 1.50 m	1	1.56	1.26	0.6	1.18	cum	77.42	91.00
ITEM No. 2 Excavation for foundation / pipe trenches in hard (CSR 2008-09, I.No. 2 P.No 31) Lift 1 to 1.50 m	1	1.56	1.26	0.1	0.20	cum	86.66	17.00
ITEM No. 3 Excavation for foundation / pipe trenches in hard (CSR 2007-08, I.No. 3 P.No 31) Lift 1 to 1.50 m	1	1.56	1.26			cum	97.05	
ITEM No. 4 Providing and casting in situ following grades of C.C of trap / granite / quartzite / gneiss metal for foundation and bedding including dewatering, form work, compacting and curing, finishing, etc. complete. (MJPCSR 2007-08, I.No. 1, P.No. 39) M-100 For BB masonry chamber i) Long walls ii) Short walls iii) BB masonty cross wall	2 2 1	1.56 0.4 0.4	0.43 0.43 0.35	0.1 0.1 0.1	0.13 0.03 0.01	cum cum cum		
				Total	0.17	cum	2430	413.00
ITEM No. 5 Providing Second class Burnt Brick masonry with conventional/ I.S. type bricks in cement mortar 1:4 including scaffolding, racking joints and watering in pillars of curved shape as shown in the drawings. Spec.No.: Bd.G.10/Page No. 318 (PWD CSR Thane 2007-08 I.No 9 P.No 22) For BB masonry chamber i) Long walls ii) Short walls iii) BB masonty cross wall	2 2 1	1.36 0.6 0.6	0.23 0.23 0.15	0.5 0.5 0.5	0.31 0.14 0.05	cum cum cum		
				Total	0.50	cum	2580	1290.00

ITEMS	No.	L	B	D	Qty.	Unit	Rate	Amount
ITEM No. 6 Providing internal cement plaster 12 mm thick in a single coat in cement mortar 1:4 without neeru finish to concrete or brick surface in all positions including scaffolding and curing complete. Providing groove at joint of B.B.Masonry and concrete members complete. Spec.No.: Bd.L-2/Page No.368 (PWD Thane CSR 2007-08 I.No 4 P.No 30) For BB masonry chamber								
i) Long walls	2	1.36		0.6	1.63	sq.m		
ii) Short walls	2	0.6		0.6	0.72	sq.m		
iii) BB masonty cross wall	2	0.6		0.6	0.72	sq.m		
				Total	3.07	sq.m	80	246.00
ITEM No.7 Providing and laying in situ, cement concrete M-15/(1:3:6) of trap/granite/quartzite/gneiss metal for foundation and bedding including plywood/steel formwork bailing out water, compacting, finishing uneven and honeycombed surface, curing etc. complete. The Cement Mortar 1:3 plaster is considered for rendering uneven and honeycombed surface only. Newly laid concrete shall be covered by gunny bag, plastic, tarpaulin etc. (Wooden centering will not be allowed.). Spec.No.: Bd.E-1/Page No.456 (MJP CSR 2007-08 I.No 6 P.No 15) Coping over BB masonry chamber								
i) Long walls	2	1.36	0.23	0.1	0.06	cum		
ii) Short walls	2	0.6	0.23	0.1	0.03	cum		
iii) BB masonty cross wall	1	0.6	0.15	0.1	0.01	cum		
				Total	0.10	cum	3130	313.00
ITEM No.8 Providing and casting in situ Cement concrete of trap/granite/quartzite/ gneiss metal of approved quality for RCC work as per detailed drawing and designs or as directed by Engineer -in-charge including normal dewatering, centering, form work, compaction, finishing the formed surfaces with C.M. 1:3 of sufficient minimum thickness to give a smooth and even surface wherever necessary or roughening is special finish is to be provided and curing, etc, complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L & T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted. Excluding M.S. or Tor reinforcement). In RCC M-200 (CSR 2007-08,I.No.4(b), P.N.40) In RCC M-200								
2) For Slab cover	1	1.36	1.06	0.1	0.14	cum		
Total					0.14	cum	3260	456.00

ITEMS	No.	L	B	D	Qty.	Unit	Rate	Amount
ITEM No.9 Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation, slabs, beams, columns, canopies, staircases. newels, chajjas, lintels, pardies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete. (including (CSR 2008-09,I.No 8 P.No. 43-44) @ 0.07MT Per cum of above Item No 8 Add for steps 20 mm dia bar hooks 16 mm dia bar Total	0.07	0.14			0.010	M.T.		
	2	1.00	2.47	kg/m	0.005	M.T.		
	6	0.90	1.58	kg/m	0.009	M.T.		
					0.024	M.T.	58151	1396.00
ITEM No.10 Refilling the trenches with available excavated stuff with soft material first over pipeline and then hard material in 15 cm layers with all leads and lifts including consolidation, surcharging, etc. complete. (CSR 2007-08, I.No.16, P.No.37) Qty of excavation Deduct Volume occupied by chamber up to G.L. PCC & Foundn concrete Net Qty.	1	1.36	1.06	0.6	1.38 0.86 0.27	cum cum cum		
					0.25	cum	24.00	6.00
ITEM No.11 Disposal of surplus excavated stuff by truck including loading ,unloading and stacking as directed lead upto 10 Km. (CSR 2007-08, Stt No V P.No 16)					1.13	cum	210.46	238.00
Total Rs.								4466.00
Say Rs.								4500.00

**Replacement of existing unsevicable Sluice gate including dismentling old one,
providing & fixing new Sluice gate.**

RATE ANALYSIS

Item No.59

Taluka :- Nagpur

Dist. :- Nagpur

**ESTIMATE
ABSTRACT**

Estimated Cost Rs. 112000.00

(As per MJP CSR 2005-06)

Qty.	Unit	ITEMS	Rate	Per	Amount
		ITEM No. 1 Dismantling existing unserviceable sluice gate including breaking RCC/ masonry wall and reinstating after replacement etc complete (Existing inlet channel for treated water sump)			
1	Job		3200.00	Job	3200
		ITEM No. 2 Designing, providing and fixing M.S. sluice gates in position with detailed drawing as approved by the competent authority and specification including cost of all materials, labour opperating pedestal, connecting rod, painting with three coats of anti-corrosive paint, etc. complete as directed by Engineer-in-charge. (CSR 2007-08, I.No.12 , Page No.243) @ 5% added in corp. Area + 4% Vat + 1% insur			
4	Qtl		9705.70	Qtl	40715
		ITEM No. 3 Providing and laying in situ Cement concrete of trap/granite/quartzite/ gneiss metal of approved quality for RCC work as per detailed drawing and designs, or as directe by Engineer - In - Charge including normal dewatering, form work, compaction, finishing the formed suffaces with CM 1:3 of sufficiennt minimum thickness to give a smooth and even sugace wherever necessary or roughening if special finish is to be provided and curing, etc, complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L & T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted. Excluding M.S. or Tor reinforcement). In RCC M-300 (CSR 2007-08,Item No 4 P.No 42) @ 5% added in corp. Area + 4% Vat + 1% insur M-200			
0.94	cum		3412.44	cum	3215

(As per MJP CSR 2005-06)

Qty.	Unit	ITEMS	Rate	Per	Amount
0.94	Qtl	ITEM No. 4 Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation, slabs, beams, columns, canopies, staircases. newels, chajjas, lintels, pardies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete. (including cost of binding wire) M.S.bars (CSR 2005-06,I.No 7P.No 45)	64135.91	Qtl	60416
1.00	Nos	ITEM No. 5 Excavation in all Soils & Rocks & Refilling $\text{Excav}=(1*5*1.5*2.0 \text{ Av rate})$ $\text{clrefilling}(((77+87+97+280+604)/5)+24=\text{Rs}228)$	3795.00		3795
10.00	BHP/HR	ITEM No. 6 Dewatering the excavated trenches and pools of water in the building trenches / pipeline trenches, well works by using pumps and other devices including disposing off water to safe distance as directed by Engineer-in-charge (including cost of machinery, labour, fuel), etc. complete. @ 5% added in corp. Area + 4% Vat + 1% insur	35.30		353
			Total Say	Rs. Rs.	111694 112000