Presentation on Status of Water and Sanitation in Bangalore

By

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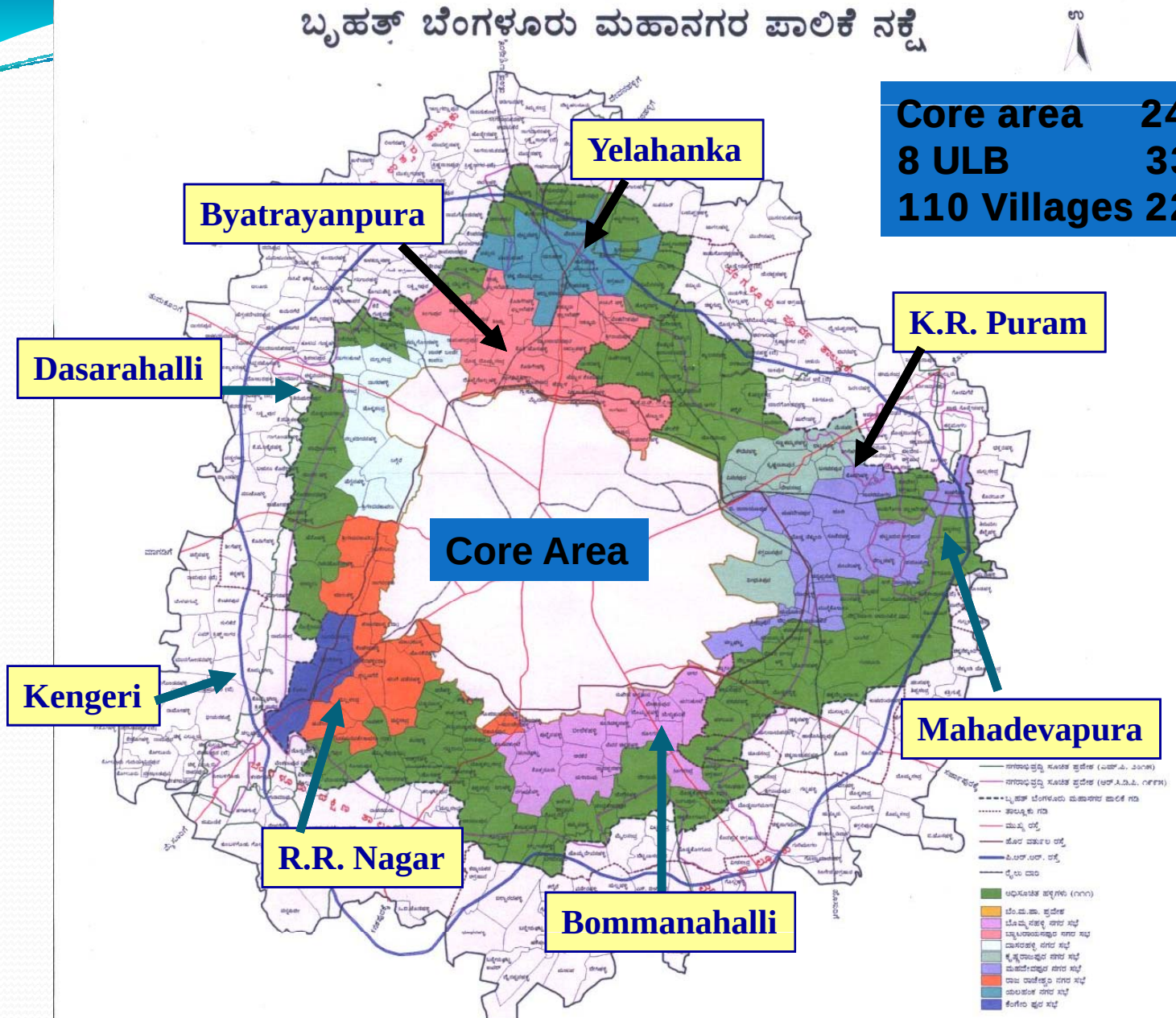
BBMP – KEY – MAP



Core area	245 Sq. Km
8 ULB	330 Sq. Km
110 Villages	225 Sq. Km

BWSSB Service Area 800.29 Sq.Km

Water supply history

1891-1900	1896- Hesargatta WSS – untreated water
1921-1930	Hesargatta – Combined jewel filters
1931-1940	T G Halli Arkavathi WSS-27 MLD
1951-1960	1952-T G Halli – 45 MLD added
1961-1970	1964 – T G Halli – 135 MLD
1971-1980	1974 – CWSS I Stage – 135 MLD
1981-1990	1882- CWSS Stage II – 135 MLD
1991-2000	1993- CWSS Stage III – 270 MLD
2001-2010 2011-2020	2002 – CWSS Stage IV phase I -270 MLD CWSS Stage IV Phase II – 500 MLD

Water supply demand and supply

Year	Population in Lakhs	Water Demand in MLD	Water supply in MLD	Short fall in MLD
2001	53.79	870	540	330
2010	85.00	1275	900	375
2015	110.00	1650	1470	180
2021	130.00	1950	1470	480
2036	150.00	2250	1470	780

Present water supply

Projects	Year of commissioning	Installed Capacity (MLD)	Present Supply (MLD)
Arkavathy (TG Halli)	1933	145	0
Cauvery Stage I	1974	135	145
Cauvery Stage II	1983	135	142
Cauvery Stage III	1993	270	320
Cauvery Stage IV, Phase – I	2002	270	308
Cauvery Stage IV, Phase – II	2012	500	200
Total Supply		**1455**	**1115**

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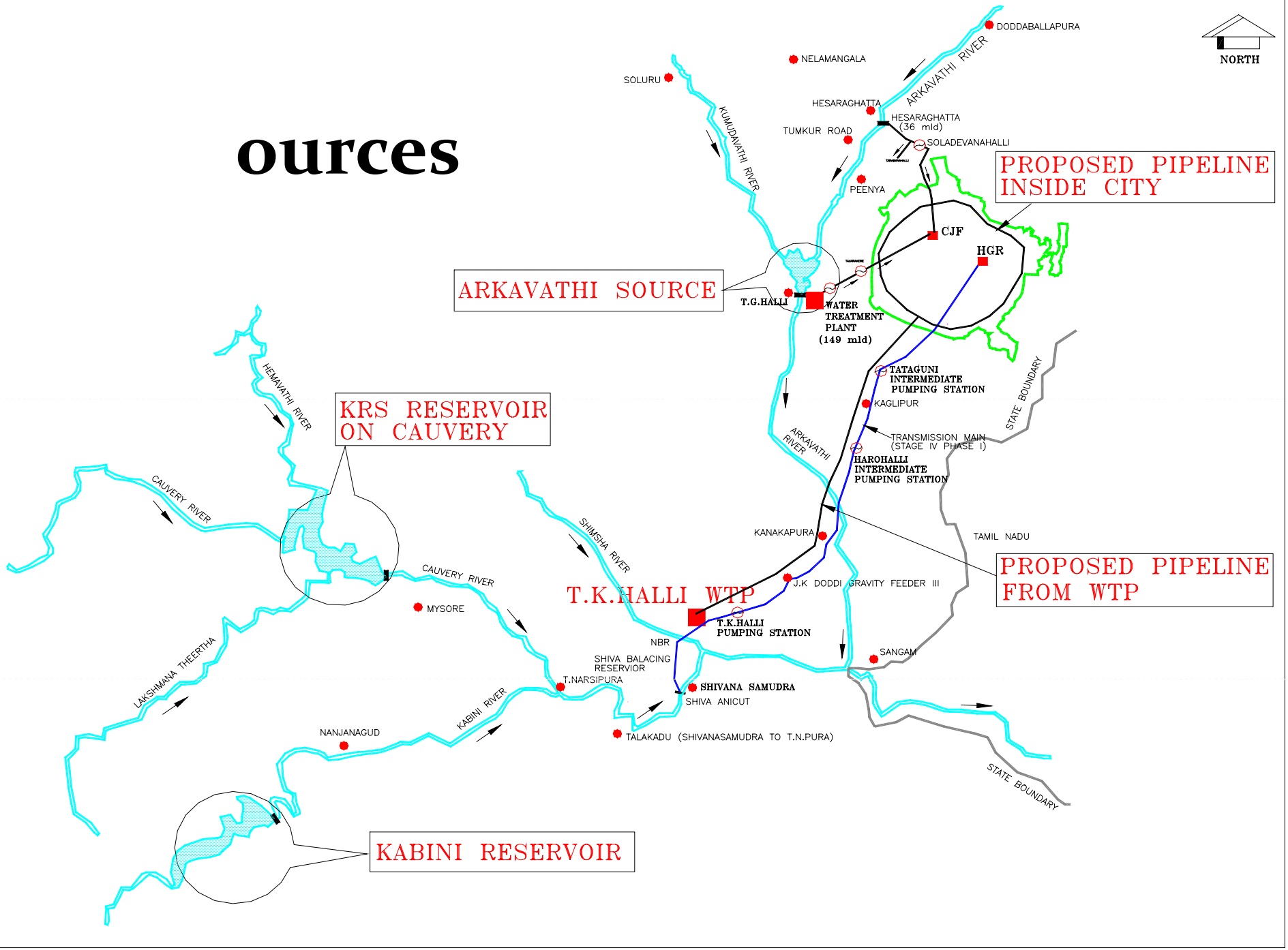

NORTH
DODDABALLAPURA
NELAMANGALA
SOLURU
ARKAVATHI RIVER
KUMUDAVATHI RIVER
HESARAGHATTA
HESARAGHATTA (36 mld)
TUMKUR ROAD
SOLADEVANAHALLI
PEENYA
PROPOSED PIPELINE INSIDE CITY
CJF
HGR
ARKAVATHI SOURCE
T.G.HALLI
WATER TREATMENT PLANT (149 mld)
TATAGUNI INTERMEDIATE PUMPING STATION
KAGLIPUR
STATE BOUNDARY
TRANSMISSION MAIN (STAGE IV PHASE I)
HAROHALLI INTERMEDIATE PUMPING STATION
ARKAVATHI RIVER
HEMAVATHI RIVER
KRS RESERVOIR ON CAUVERY
CAUVERY RIVER
KANAKAPURA
TAMIL NADU
PROPOSED PIPELINE FROM WTP
SHIMSHA RIVER
T.K.HALLI WTP
J.K DODDI GRAVITY FEEDER III
CAUVERY RIVER
MYSORE
T.K.HALLI PUMPING STATION
NBR
SHIVA BALACING RESERVIOR
SANGAM
LAKSHMANA THEERTHA
T.NARSIPURA
SHIVANA SAMUDRA
SHIVA ANICUT
KABINI RIVER
NANJANAGUD
TALAKADU (SHIVANASAMUDRA TO T.N.PURA)
STATE BOUNDARY
KABINI RESERVOIR

CWSS Stage IV Phase II

- **Augmentation of 500 MLD Water Supply**

- **Agreement signed between GOI & JICA for Water Supply component – Rs. 1750 crore on 31-03-2005**

- **Administrative approval accorded by GoK for Rs. 3384 crore on 08-06-2005**

- **Funding Pattern:**
  - **JICA-Rs. 2830 crore, (85%)**
  - **GOK (7.5%) & BWSSB (7.5%)– Rs.277 crore each**

CWSS Stage IV Phase II

- Water Supply – **13 Contract packages awarded during December 2009- includes Supply of MS plates, Raw Water line, Water Treatment Plant, Transmission mains, Electromechanical equipments at pumping stations, Clear Water Tanks, Trunk mains in city and Ground Level Reservoirs.**

- Sewerage – **18 contract packages includes Construction of 11 nos. of Used water Treatment Plants to treat 339 MLD sewage (7 contract packages) , Rehabilitation of Trunk Sewers (10 contract packages) and Procurement of Jetting Machines.**

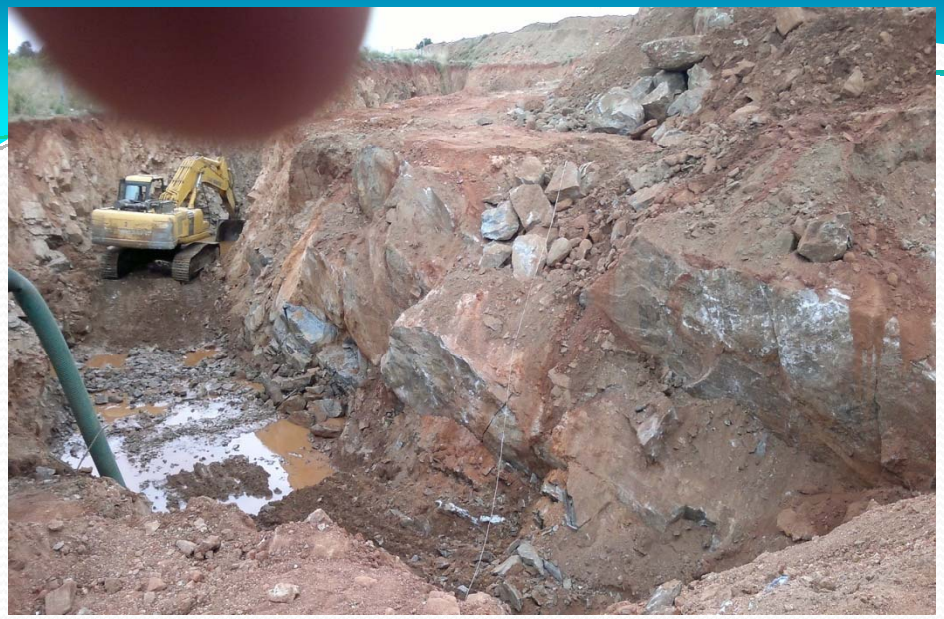
- Distribution Improvement (UFW) – **Work to be taken up in South, Central and West divisions (3 contract packages)**

- Slum Development – **To provide water supply and sanitary facilities to 362 slums in co-ordination with NGOs under 4 contract packages**

- Upto date expenditure – **Rs.2374.34 crores.**

W-1

Hard rock strata



Pipe line on Hullu halla bridge

Steep valley

Pipe line on rough terrain

W2

Cascade Aerator

Parshall flume & Raw water channel

Flash mixer

Filter gallery

W6a

JSG GLR

JSG GLR inside

Uttarahalli - Initial site condition

KUDLU GLR

Issues and challenges

- Supplying water to erstwhile CMC and TMC's
- Man power requirement in view of the additional jurisdiction
- Equitable distribution
- Reduction of UFW/ NRW
- Revenue realization
- Rapid urbanization
- Finite source
- No near by alternative source
- Difficulty in public acceptance over the use age of reclaimed water
- No increase in tariff since long time

Generation of wastewater

Year	Quantity in MLD
2006	1000
2011	1125
2021	1464
2036	1949

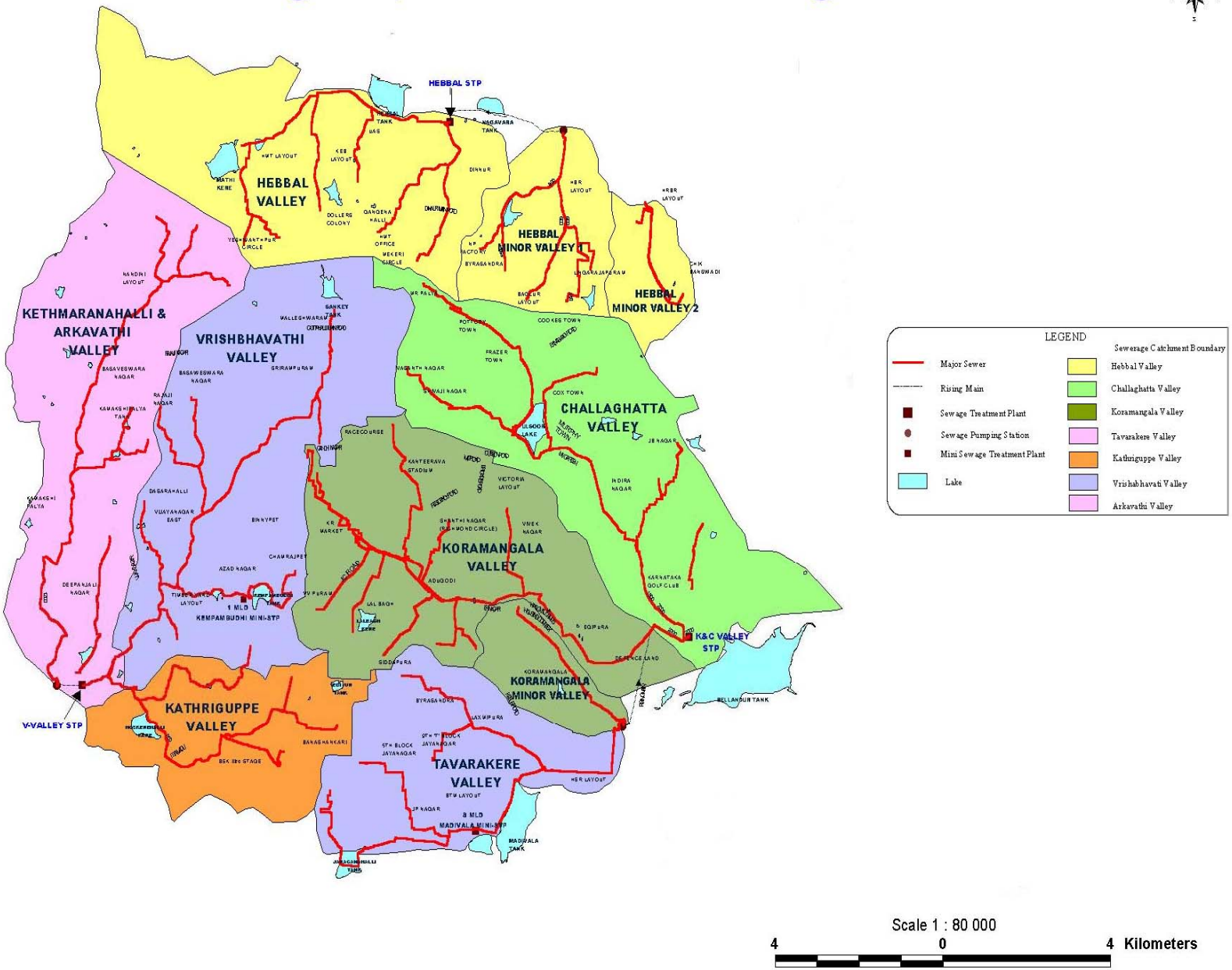
Sanitation history

1920-1950	Sewerage system existed
1950-1960	Major sewerage system constructed
1970-1980	K & C Valley wastewater treatment plant (Primary) & V- Valley STP (Primary)
1980-2000	K & C and V Valley and Hebbal upgraded to secondary
2000-2010	CWSS Stage IV Phase I – 7 treatment plants & sewerage system

Objectives

- **Collection of wastewater – Lateral system – 3600 Kms**
- **Conveyance to the plant – Trunk sewers – 246 Kms**
- **Treatment – 14 Treatment plants – 721 MLD capacity**
- **Disposal to the water bodies - Lakes**

Existing Major sewers & Sewarage Catchments



On going projects

Environmental Action Plan – A

- **Replacement and Rehabilitation of existing sewers**
- **Total length – 33 Kms**
- **Cost – Rs. 47 Crores under NRCP**
- **Work is completed**

On going projects

Environmental Action Plan – B

- **Replacement and Rehabilitation of existing sewers**
- **Total length – 70 Kms**
- **Taken up under 8 packages**
- **Cost – Rs. 176 Crores under JnNURM & JICA**
- **Project period 2010-2013**

On going projects

Zero Flow in Hebbal drainage zone

- **Length – 19 Kms**
- **Taken up under 3 packages**
- **Cost – Rs. 35 Crores under BWSSB funds & Mega city funds**
- **Project period 2010-2013**

On going projects

Providing UGD Facilities to 8 ULBs in BBMP area

- **Estimated Cost : Rs. 1098.15 Crore**
- **Amount put to bid : Rs. 966.21 Crore**
- **Awarded Cost : Rs. 1191.79 Crore**
- **Funding : JnNURM - World Bank**
- **Project Period : 4 Years**

On going projects

Summary of KMRP works

- **Sewerage works involve providing of lateral network of 2000 Km and Sub mains of 300 Km.**
- **Proposed for restoration of the portion of the road cut.**
- **12 No. of sewer cleaning equipments procured for maintaining the sewerage system.**
- **Works are taken up in 24 packages & programmed to complete by Sept 2015.**

On going projects - progress

Sl No.	ULB's	Total Pipe laying Qty to be achieved in Kms	Progress achieved in Kms	Percentage	Completion Date
1	Yelahanka CMC	60.28	57.82	95.92%	Feb-13
2	Byatarayanapura CMC	468.81	269.46	57.47%	Feb-14
3	Mahadevapura CMC	357.11	155.81	43.63%	Sep-15
4	Krishnarajapuram CMC	314.85	246.91	78.42%	Feb-14
5	Bommanahalli CMC	466.91	260.84	55.86%	Feb-14
6	Rajarajeshwarinagar CMC	117.22	78.37	66.85%	Feb-14
7	Kengeri TMC	57.62	14.1	24.47%	Sep-14
8	Dasarahalli CMC	470.92	374.61	79.54%	Feb-14
TOTAL		2313.72	1457.91	63.01%	Sep-15

Future projects

- ✓ Environmental Action Plan – C
  - **Cost – Rs. 360 Crores**
  - **Length – 109 Kms**
- ✓ Water supply and Sanitation to 110 Villages
  - **Awaiting clearance from Central Government**
- ✓ Augmentation of water supply
  - **Expert committee has been formed**
  - **Committee is exploring the possibilities**

Water Reclamation Plants

Sl. No.	Location	Capacity in MLD	Treatment Facility
1.	Vrishabhavathi Valley	180	Secondary – Trickling filters
2.	K & C Valley	248	Secondary: Activated sludge process
3.	Hebbal Valley	60	Secondary: Activated sludge process
4.	Madivala	04	Secondary: UASB + oxidation ponds+ constructed wetlands
5.	Kempambudhi	01	Secondary: extended Aeration
6.	Yelahanka	10	Activated sludge process + filtration+ chlorination (Tertiary)

Water Reclamation Plants

Sl. No.	Location	Capacity in MLD	Treatment Facility
7.	Mylasandra	75	Secondary – Extended aeration
8.	Nagasandra	20	Secondary -Extended aeration
9.	Jakkur	10	Secondary – UASB +Extended aeration
10.	K. R. Puram	20	Secondary – UASB +Extended aeration
11.	Kadabeesanahalli	50	Secondary-Extended aeration
12.	Rajacanal	40	Secondary- Extended aeration
13.	Cubbon Park	1.5	Membrane
14.	Lalbagh	1.5	Extended Aeration + Plate Settlers + UV disinfection
	Grand Total	721	

Quantity of used water treated

Month	Average daily inflow in ML						
	2006	2007	2008	2009	2010	2011	2012
January	198.89	246.07	210.01	307.00	303.28	271.98	259.98
February	233.55	247.32	216.15	316.33	318.15	251.02	277.56
March	236.92	234.59	264.28	313.87	330.55	261.97	275.28
April	269.88	264.22	305.91	277.75	276.15	274.92	270.90
May	310.17	276.99	294.20	251.55	323.67	251.50	249.71
June	224.34	299.24	304.44	244.93	307.66	279.12	285.55
July	245.12	289.05	278.76	236.87	308.70	304.51	356.58
August	253.33	327.73	301.85	275.66	306.78	285.22	354.27
September	295.74	268.33	257.06	292.62	285.64	252.68	356.13
October	301.31	247.88	261.78	271.95	297.04	304.74	383.27
November	288.76	238.10	264.39	265.12	301.92	309.28	379.74
December	245.59	217.67	303.05	269.91	275.20	249.00	384.29
Average	258.72	263.18	272.75	276.72	302.88	274.81	320.50

Issues and challenges

- Existing sewerage network is old in many areas
- Needs rehabilitation/ replacement
- Existing sewerage network is unable to convey sewage generated
- Under utilization of the STP's
- Untreated wastewater is flowing in open storm water drains
- Untreated wastewater is entering the Lake there by causing pollution

Issues and challenges

a) Inadequate capacity of sewers
b) Collapse of sewers due to corrosion
c) Reverse gradient
d) Flat gradient
e) Sewers are not properly connected
f) Displacement sewers during floods
g) Encroachment of sewers and manholes
h) Damage to sewers and manholes for irrigation purposes
i) Dumping of solid waste
j) Usage of low strength pipes (NP2)
k) Laid without proper bedding

Issues and challenges

1. Improvements in size and quality of sewers.
2. Protection to the sewers.
3. Re alignment of sewers
4. Ventilation of sewers
5. Providing of decentralized wastewater management.
6. Introduction of wastewater pumping stations
7. Mechanical cleaning of sewers.
8. Up-gradation / remodeling of existing wastewater treatment plants.
9. Improvement in preventive maintenance.
10. Training of Engineers/Maintenance staff.
11. Purchase of Mechanical/Electrical equipments.

Thank You