

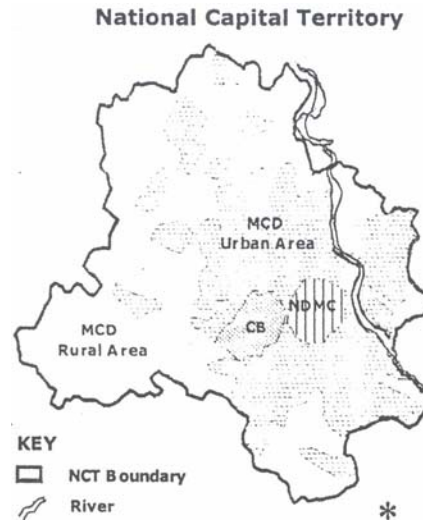
## Chapter – 8 : Water Supply



## CHAPTER - 8 CITY WATER SUPPLY SYSTEM

### 8.1 INTRODUCTION

Delhi is situated along a perennial source of water, the river Yamuna. The river divides the city into East Delhi known as Trans Yamuna Area, and New Delhi. The National Capital Territory of Delhi (NCTD) has an area of 1483 km<sup>2</sup> and comprises of three constituents MCD (1297.29 km<sup>2</sup>), NDMC (42.74 km<sup>2</sup>) and DCB (42.97 km<sup>2</sup>) respectively. This chapter presents historical overview of water supply system, present status of production and demand, extent of coverage and agencies involved in transmission and distribution of water.



### 8.2 HISTORY OF DELHI WATER SUPPLY

Delhi depends largely on river Yamuna<sup>1</sup> and partially on river Ganga for its share of water. The flow of the river is regulated at Tajewala Barrage (subsequently by Hathinikund barrage) and the dry weather flow is entirely diverted into Eastern Yamuna Canal for UP and the Western Yamuna Canal (WJC) for Haryana, UP, Rajasthan and partly for Delhi. Whatever flow appears at Wazirabad, the intake works for Delhi Water Works, is out of regeneration of sub surface drainage.

The Delhi Water Works was constructed at Chandrawal with a capacity of 1 MGD / 4.5 MLD in the year 1890 and the source of water supply was a row of wells sunk along the river. Delhi's population then was 1.93 lakhs. After the Delhi Darbar in 1911, Delhi witnessed an increase in population.

By the year 1912, the water demand had exceeded the capacity and recourse was taken to drawing water directly from the river and this necessitated the installation of settling tanks and slow sand filters. The population had risen to 2.33 lakhs and capacity of Water Works raised to 3.3 MGD / 15 MLD.

In the year 1921, a raw water pumping station was established at Wazirabad and the water was carried to Chandrawal for treatment, where the capacity was raised to 7 MGD / 32 MLD, the population served was 3.04 lakhs. Since then, the capacity of the water works has been gradually increasing in stages and stood at 35 MGD / 159 MLD by 1948.

Consequent upon signing of Indus Water Treaty between India and Pakistan in 1960; to tide over scarcity of water, the Govt. of Punjab allocated 150 MCM / 0.119 MAF of water to Delhi out of Ravi-Beas waters from Bhakra-Nangal

<sup>1</sup> River Yamuna owes its origin to Yamunotri glacier of lower Himalayas and enters the plains at Dakpathar (Dehradun) in Uttaranchal

storages and this was further raised to 245 MCM / 0.2 MAF in 1976. The Western Jamuna Canal was remodelled and lined to enable Delhi to establish Water Treatment Plant(s), [WTPs] in North West Delhi (at Haiderpur) and thus a second source of surface water came into existence in addition to river Yamuna at Wazirabad. By 1981, whereas the population had shot upto 62.22 lakhs, the production capacity had risen to 1378.7 MLD / 303 MGD. (Refer Annex 8.1)

#### Box 1 - Share in Yamuna Water

As per MOU on sharing of Yamuna waters between Haryana, UP, Rajasthan & NCTD signed on 12.05.1994, share is 0.724 BCM (consumptive). This is subject to construction of Renuka dam, Kishau dam, Lakhwar Vyasi Project, etc. To meet future water requirements it is necessary to initiate these works on Top Priority

##### Seasonal allocation

July to Oct	:	0.580 BCM (1926 cusec)
Nov to Feb	:	0.068 BCM (231 cusec)
Mar to June	:	0.076 BCM (255 cusec)
<b>Total</b>	:	<b>0.724 BCM (808 cusec)</b>

“Provided further the said interim allocation shall get progress modified as storages are constructed, the final allocations as indicated in para 7 of MoU”.

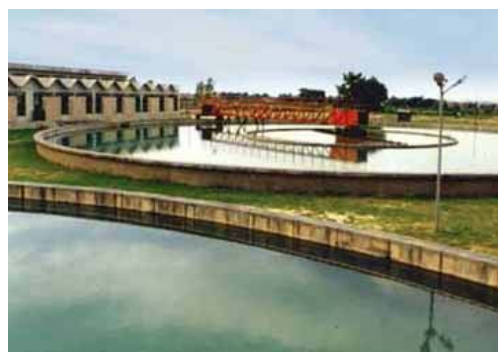
Separate agreement will be executed in respect of each identified storage within the framework of over all allocation made under the agreement

### 8.3 PRODUCTION SYSTEM

#### Sources of Water

River Yamuna, Western Jamuna Canal (a carrier of Yamuna waters as also Bhakra waters) and the Upper Ganga Canal, are surface water sources for Delhi. Around 446 tube wells drilled in Yamuna bed and areas within city to meet the water requirement.

#### Treatment System



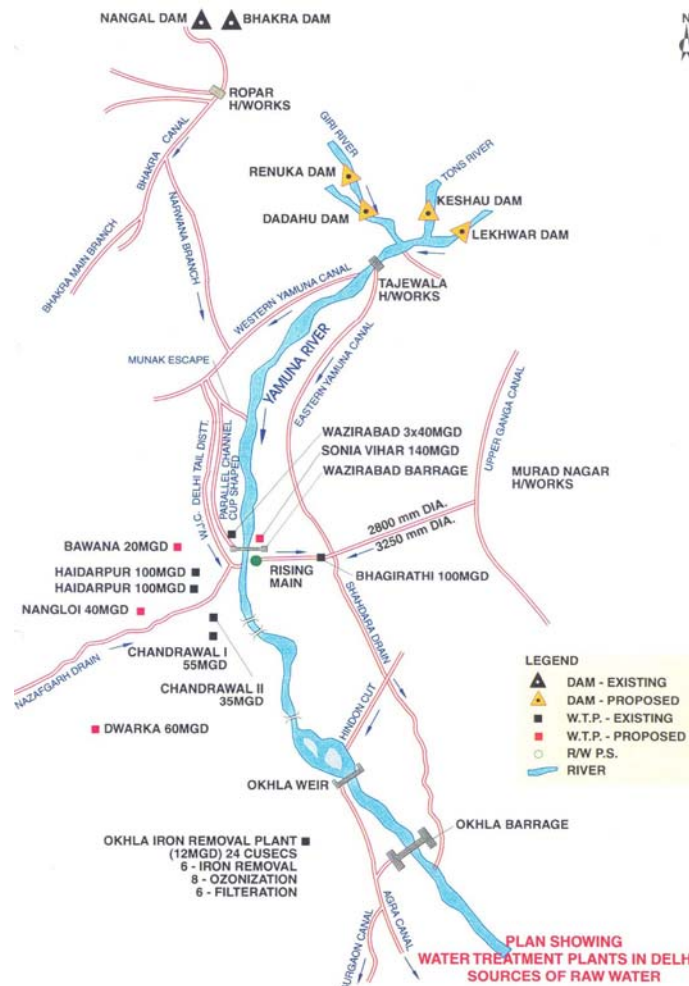
DJB is equipped to treat 790 MGD of water inclusive of about 100 MGD of ground water abstraction. However the actual production is 735 MGD, with a short fall of  $990 - 735 = 255$  MGD at production point.

Table 8.1 presents the water treatment capacity indicating source of raw water.

**Table 8.1: Treatment Capacity indicating Source of Raw Water**

Source of Raw Water	Name of Water Treatment Plant	Installed Capacity MGD	Production by Optimisation MGD
River Yamuna	Chandrawal I & II	90	105

Source of Raw Water	Name of Water Treatment Plant	Installed Capacity MGD	Production by Optimisation MGD
River Yamuna	Wazirabad I II & III	120	124
Bhakra storage / Yamuna	Haiderpur I & II	200	210
Bhakra storage	Nangloi	40 <sup>2</sup>	21
River Yamuna	Bawana	20 <sup>2</sup>	Nil
Upper Ganga Canal	Bhagirathi	100	110
Upper Ganga Canal	Sonia Vihar	140	65 <sup>3</sup>
Ground Water	Ranney Wells & Tube wells	100	100
	<b>Total</b>	<b>790</b>	<b>735</b>



**Figure 8.1 Water Treatment Plants in Delhi & Sources of Raw Water**

<sup>2</sup> Water to these plants will be available on completion of Construction of Parallel WJC out of savings from en - route seepage losses, the work is in progress.

<sup>3</sup> A 140 MGD Water Treatment Plant, Sonia Vihar, has been constructed for treatment of Ganga water (stored in Tehri dam), through Upper Ganga Canal and drawn at Muradnagar. Initially 65 MGD of water has been released from the plant, on 8<sup>th</sup> August 2006 and the quantity of supply will be increased in phases.

### Transmission and Distribution System

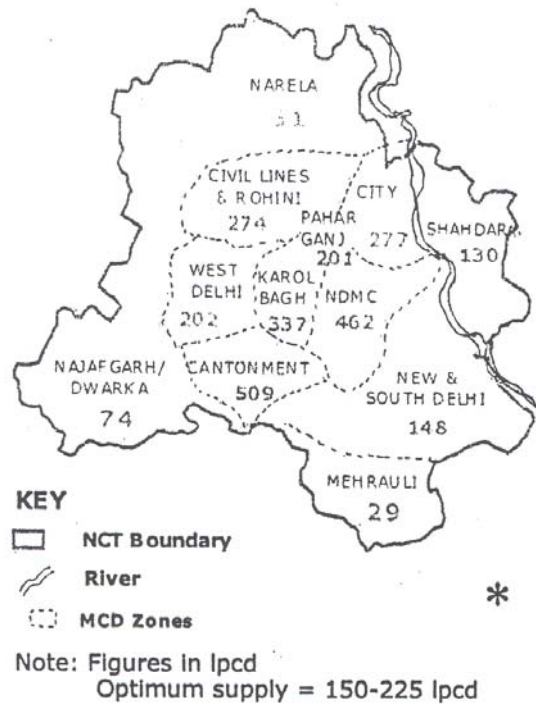
By and large water supply system is through piped water network in urban area, hand pumps and private motorised wells / tubewells, and in areas without planned water supply, through tankers. Details are presented in Table 8.2

**Table 8.2: Transmission and distribution network in Delhi**

S. No.	Item	During 2001	As on 01.04.2005
1.	Length of Water mains(kms)	8363	More than 9,000
2.	No. of Water connections	13,33,833	About 15.52 lakhs
3.	No. of Water Stand Posts (Public Water hydrants)	11,533	
4.	No. of Water Tankers	493	1100 as per revised budget estimate 2005-06
5.	No. of Private Tube wells	2,00,000 (Estimated)	
6.	Capacity of Existing Underground Reservoirs	175 MG corresponding to 6-7 hours of production	Proposed to build 35 % of average demand as storage capacity.

Availability of water is 2 to 3 hrs in general and in some areas (mostly in North Delhi) directly on line, 24 hrs indicating inequitable distribution of water in different parts of Delhi.

### In-Equality of Water Supply



**Figure 8.3 In-equality of Water Supply in different parts of the city**  
Source: Delhi 1999 - A Fact Sheet NCRPB

**(a) Water Supply to JJ / Slum Clusters**

Around 20 lakh people are settled in JJ cluster with water requirement of 270 MLD. Water supply is provided through public water hydrants, tankers and hand pumps. So far Slum & JJ Deptt. had undertaken four Projects of in-situ up gradation of JJ Clusters as at Ekta Vihar (414 families), Proyog Vihar (260 families), Shanti Vihar (113 families) and Shahbad Daulat Pur (4800 families)



DJB is able to meet around 60-65% of the water requirement of slum dwellers. The other sources such as hand pumps, tankers and water trolley contributes to 25-30% of water demand.

**Unaccounted for Water**

Unaccounted for water is in the range of 40 - 45 %. Water losses through unaccounted flow comprises of (i) Unbilled Un-metered Consumption @2%, (ii) Leakage in Transmission mains @ 16% and (iii) Leakages in Distribution mains @ 24%.

Thus in reality, 58% of water produced ( 58% of 735 = 426 MGD ) is available for meeting water requirements leading to water shortages in tail end areas and inequitable distribution of water. This is one reason why people have to resort to high abstraction of ground water.

Authorised Consumption is thus	@ 58% as per breakup
(i) Billed Meter Consumption i/c water supply in bulk	@ 13%
(ii) Billed unmetered consumption	@ 37%
(iii) Unbilled Unmetered Consumption	@ 8%

However Non Revenue Water is 42% + 8% = 50%

\* [Source: World Bank funded Study report by Pricewater House Coopers]

**8.4 WATER PRICING AND RECOVERY**

The annual water supplied to MCD, NDMC and DCB was 10,34,384 ML, 43,059 ML and 12,808 ML respectively in 2002-03. The amount received from these departments is Rs. 3785 million. Table 8.3 shows the details of water supplied and cost recovered from various bodies. The details of water pricing are presented in Annex 8.2.

**Table 8.3: Transmission and distribution network in Delhi**

		2000-01	2001-02	2002-03	Average
MCD Area	Quantity (ML)	974658	1021508	1034384	1010183
	Value (Million)	2732.13	3671.02	4351.20	3584.78
NDMC	Quantity (ML)	44631	44551	43059	44080
	Value (Million)	124.23	159.21	180.42	154.62
DCB	Quantity (ML)	13084	13041	12808	12978
	Value (Million)	36.42	46.60	53.67	45.56
TOTAL	Quantity (ML)	1032373	1079100	1090251	1067241
	Value (Million)	2893	3877	4585	3785

### 8.5 ESTIMATION OF WATER DEMAND

The water requirement of Delhi is 1,104 GPCD against the production of 783 GPCD. The excess demand of water is met through 2 lakh private tubewells drilled by owner in their premises. The total demand for 2021 is 1840 GPCD. In order to meet the future demand DDA in the draft Master Plan for Delhi 2021 has split the water requirement in two parts Potable and Non Potable as 35 & 45 GPCD respectively, with the proviso that "In the existing areas till the arrangement of non potable water is made, potable water shall be supplied. For urban extensions and areas under development schemes, these norms are recommended with necessary provisions (Refer Table 8.4 & Annex 8.3).

**Table 8.4: Estimation of Water Demand as per DDA and DJB norms**

Year	Type	Population (lakhs)	Water Demand (Treated) * MGD	
			As per DJB @60 GPCD	As per DDA ** @80 GPCD
2001	Census	137.8	828	1104
2006	Anticipated	165.0	990	1320
2011	Projected	190.0	1140	1520
2021	Projected	230.0	1380	1840

\* The raw water requirements will be 110% of the figures shown above.

### 8.6 AUGMENTATION SCHEMES FOR WATER SUPPLY

1. Recycling of waste water of existing Water Treatment Plants: Delhi Jal Board will be able to recycle the waste water of Haiderpur, Wazirabad, and Bhagirathi Water Treatment Plants by which addition in the capacity by 37 MGD will be achieved.
2. Schemes of setting up new WTPs of 20 MGD at Okhla and 40 MGD at Dwarka are proposed to be taken up subject to availability of raw water.
3. Boring of 110 tube wells along with re-boring of 446 is proposed.
4. In addition to 100 tubewells bored in the flood plains of river Yamuna, 30 tubewells are proposed to be bored.
5. Installation of 625 deep bore handpumps.

On completion of augmentation works, the DJB will be equipped to produce 919 MGD of water as per details below:

S. No.	Water Treatment Plants	Capacity 2006 MGD	Capacity 2011 / 2021 MGD
1.	Wazirabad I II & III	120	130
2.	Chandrawal I & II	90	100
3.	Haiderpur I & II	200	216
4.	Bhagirathi	100	110
5.	Dwarka	--	40
6.	Sonia Vihar	65	140
7.	Nangloi	40	40
8.	Bawana	--	20
9.	Okhla	--	20
10.	Ranney wells & Tubewells	100	91
11.	Ranney wells for Okhla		12
12.	<b>Total</b>	<b>715</b>	<b>919</b>

The estimated demand @ 60 GPCD for a population of 190 lakhs will be 1140 by 2011. Thus there will be a shortfall of  $1140 - 919 = 221$  MGD.

The estimated demand @ 60 GPCD for a population of 230 lakhs will be 1380 by 2021. Thus there will be a shortfall of  $1380 - 919 = 461$  MGD.

## 8.7 WATER QUALITY

Although water quality of Yamuna water up stream of Wazirabad Barrage is good for drinking after conventional treatment, but on account of periodical discharge of industrial effluents, presence of iron is noticed in the ground water abstracted from Ranney wells & tube wells etc. north of Wazirabad Barrage at Palla. A 31 MGD Iron removal plant is proposed to be installed for removal of iron in the first phase.

Presence of ammonia due to pollutants released in the river and WJC, is noticed and the WTPs had to be temporarily closed. This situation needs to be controlled. Iron and ammonia is observed in Ranney well waters going to Okhla WTP requiring establishment of iron removal plant and ammonia stripping plant. Flouride is noticed in some of the tubewells of South Delhi and is a matter of concern.

DJB has a number of laboratories to check the quality of water, both from the WTPs as also from the distribution system. The quality of treated water meets standards set by the MoUD.

## 8.8 RAIN WATER HARVESTING

DJB has taken up rain water harvesting in its own buildings and rainwater harvesting structures have been provided in 190 installations of the board covering an area of 9.15 lakh sq.m. These structures will successfully recharge ground water aquifers by harvesting 5.10 lakh cubic meters approx of rain water.

Certain important precautions need to be taken that roof top rain water after the first 3 showers is drained out and only clear water run off is allowed to go to the underground strata, else there is a danger of ground water pollution.

This calls for extensive education to the people, and undertaking inspections.

### 8.9 NEW DELHI MUNICIPAL COUNCIL (NDMC)

NDMC population as per census 2001 is 1,71,806. The NDMC receives 115 to 120 MLD water in bulk through 19 bulk meters (as on date 8 meters are reported to be non functional) from the DJB and draws 18 to 20 MLD of groundwater drawn from 137 tube wells (effective No. 122) to supplement water supply in its area having 352 km length of water mains (4 inches to 42 inches in diameter) and operates 23 UGR & BPS. The distribution system is maintained by the NDMC.

### 8.10 DELHI CANTONMENT BOARD (DCB)

MES is the main agency to receive water for the Delhi Cantt Board.

Area covered is whole of Delhi Cantt including S P Marg area, Mahipalpur area and Shankar Vihar but excluding Naraina Village.

- Population of cantt : 2006 - 1,51,605  
2011 - 1,63,000
- Total water requirement : 2006 - 13 MGD  
2011 - 15 MGD
- Water is being received from DJB at two Nodal Points from Palam Reservoir and Inderpuri Reservoir.
- Water being received is 100% metered
- Present storage available is 15 MG in UG sumps and OH tanks.
- There are 55 booster pumping stations.
- Length of water mains is apprx 375 kms
- Water is being metered in the distribution side at the pump houses for bulk consumers but not at individual houses. Flat rate is being charged from individuals varying with type of accommodation.
- Ground Water is being extracted to the tune of 3.5 MGD and the same is being chlorinated and mixed with the DJB water to meet our present requirement.
- Quality in general is potable but in some pockets it is brackish.
- Distribution losses are very less may be 5%.
- For Bulk consumers rate of Rs 6.50 per KL is charged.  
[Source Garrison Engineer, MES]
- Delhi Cantt Bd maintains 21 Tube wells, 7 Over Head Tanks (OHTs) 9 Underground Reservoirs (UGRs), & 21 Booster Pumping Stations. For Naraina Village DCB receives 0.9 MGD of water from Naraina Reservoir. [ As per DJB]

- Thus  $7.8 + 3.5 + 0.9 = 12.2$  plus water abstracted from 21 tube wells by DCB MGD of water supply is utilised for a population of 1,51,605 in the year 2006, i.e. an average of 80 GPCD / 365 LPCD approx.

#### 8.11 SPECIAL PROVISIONS Relating to NDMC, DCB and MES (In brief)

The DJB shall be bound to supply water to the NDMC and DCB, MES at the place or places act, which immediately before the commencement of the DJB Act, the Delhi Water Supply & Swerage Disposal undertaking of the MCD used to supply water in bulk.

Provided that the quantity of water supply shall not be less than the quantity supplied before commence of the Act.

The board shall be bound to receive in bulk all sewerage from these bodies for treatment and disposal

#### 8.12 ISSUES REQUIRING ATTENTION

1. **There is urgent need to invoke Interstate agreement for construction of Storage Reservoirs / dams in the Upper reaches of River Yamuna, like Kishau, Dadhau, Lakhwar Vyasi etc., though identified years before and incorporated in the MOU for sharing of Yamuna waters, have yet to be decided for construction.**

**This is important since the existing capacity is inadequate to meet the present water requirements.**

2. To expedite construction of Parallel WJC and with the consent of Haryana to draw water for the constructed WTPs at Bawana and Nangloi (remaining 20 MGD). This will also improve availability of raw water at Wazirabad Barrage after linking WJC with the river.
3. The output of the WTPs is based on the designed capacity. These plants have been progressively constructed over the last 50 years or more and there is a need to correctly assess the output of each of the WTPs.
4. Losses in treatment of water at the WTPs have been considered by the DJB at 8% as per CPHHEO manual, however actual losses need to be ascertained.
5. As per studies carried out by the Consultants, 16% leakage is in Transmission mains and another 24% leakages in the distribution mains, totaling to 40%. This is a considerably high rate of loss and needs to be brought down to 15% as suggested in the Manual of Water Supply & Treatment issued by the CPHHEO, MoUD, Govt. of India.
6. The water supply is intermittent and leads to avoidable wastage, besides posing risk to health.
7. There is inequity in water supply and calls for rationalisation of water supply.

8. The successive Master plan documents have been emphasizing on dispersal of population, however MPD 2021 aims at a prospective population of 23 million. **Either the Infrastructure facility should be available as per or in excess of requirement or the future population needs REVIEW for being toned down in accordance with availability of Infrastructure services.**
9. Though rain water harvesting is the need of the hour, utmost care and precaution is the necessity to ensure that the ground water is not polluted. This calls for extensive training in provision and more so in operation of such structures besides effective monitoring.
10. Water pricing / tariff structure needs to be self sustainable and atleast meet O&M costs in full. A tariff regulatory commission may be set up so that the tariff set by the DJB are accepted by the people.
11. Uninterrupted power supply with stable voltage is a necessity for proper & smooth operation of WTPs & Booster pumping stations.
12. Years before (In 1967), during the tenure of Dr K.L.Rao, Union Minister for Irrigation & Power, a proposal was considered to establish an impounded reservoir in the Aravali hills of Dhauj & Kot near Faridabad to store the flood waters of river Yamuna and set up a 100 MGD WTP to meet water requirements of South Delhi. This was not steered through on account of Geological considerations. This can be reexamined using the latest techniques of engineering & geology and if through, people of South Delhi & Faridabad could be benefited and the storage could be established as a joint venture of the Govts of Delhi & Haryana.

ANNEX 8.1

**CHANGE IN INSTITUTIONAL RESPONSIBILITIES IN WATER SUPPLY**

**Delhi Jal Board** - With the enactment of the Delhi water Board Act 1998, all functions and responsibilities of the DWS & SDU were assumed by the Delhi Jal Board (DJB). As of now Delhi Jal Board (DJB) is responsible for procurement of raw water, treatment and supply to the three constituents and responsible for distribution of water supply and related works in MCD area. DJB is also responsible to collect, transmit, treatment and disposal of waste water from the three constituents and for operation & maintenance of sewer system within the MCD area.

**The Delhi Joint Water & Sewerage Board** - The Delhi Joint Water and Sewerage Board came into existence in the year 1926 and was responsible for operation and maintenance of Delhi Water Works and supplying water in bulk to the FIVE local bodies in Delhi, which in turn supplied water in their respective areas.

**Post Independence Scenario** - India attained independence from the British rule on the 15<sup>th</sup> August 1947. Consequent upon partition of the country, there was a tremendous influx of people to Delhi, raising its population of 9.18 lakhs in 1941 to 17.44 lakhs in 1951. This called for substantial augmentation of water supply, which was raised from 35 MGD / 159 MLD in 1948 to 60 MGD / 272 MLD in 1955.

**Jaundice Epidemic & Construction of Wazirabad Barrage** - Delhi witnessed a jaundice epidemic in November 1955. On the recommendation of the Jaundice Enquiry Committee, a barrage was constructed across the river Yamuna and completed in 1959. While the barrage created pondage to enable withdrawal of water from the river, it also facilitated in keeping the river course towards the right bank.

**The Delhi Water Supply & Sewage Disposal Undertaking (DWS & SDU)** - With the creation of the Municipal Corporation of Delhi (MCD) in 1958 by an act of Parliament, numerous local bodies became a part of the MCD, except the New Delhi Municipal Committee and the Cantonment Board. The Delhi Joint Water & Sewerage Board became an undertaking of the MCD and was named as The Delhi Water Supply & Sewage Disposal Undertaking (DWS & SDU) having the responsibility to procure, treat and transmit water for the entire Union Territory of Delhi and to distribute water in the MCD area. With an ever increasing population, growing at an alarming rate of approximately 5% per annum, water shortage started being felt in spite of raising the treatment capacity to 97 MGD / 440 MLD by 1961 for a population of 26.44 lakhs.

**Contamination of Water Supply of Delhi in 1964** - Contamination of the Delhi Water Supply occurred in September 1964 and the causes of contamination were enquired by the Committee constituted by the Ministry of Health, Govt. of India under the Chairmanship of Shri P. S. Naskar, Union Deputy Minister of Health. The Committee also went into recommending short term and long term remedial measures.

An important recommendation needs to be undertaken related to Unit Rate of Water supply @ 50 GPCD / 225 LPCD for domestic needs and a separate provision needs to be made for water demand for Industries and Gardening needs. The report also identified future sources of water supply to meet growing water requirements of Delhi till 2001. These sources were Bhakra reservoir, Ramganga project, and dams on river Yamuna and its tributaries such as Kishau dam.

The water requirements for a projected population of 100 lakhs by 2001 AD were

estimated at 766 MGD (3468 MLD) at an overall per capita rate of water supply of 76 GPCD / 345 LPCD.

There was extensive development and construction of housing in the Trans Yamuna area, South Delhi, and South West Delhi which called for identifying additional sources of water supply. Under an agreement with the Govt of UP, a 100 MGD /455 MLD Bhagirathi Water Treatment plant was established in Trans Yamuna area in 1984, drawing raw water from the Upper Ganga Canal through a closed conduit.

## ANNEX 8.2

## TYPE AND RATES OF WATER TARIFF IN DELHI

Water tariff is in two parts: Service charges / fixed access charges based built-up area per month per connection; Volumetric water consumption charges

**(a) Service charges / Fixed Access charges based on built up area per month per connection:**

Categories	Service Charges
<b>Category -1(A)</b> JJ & Resettlement colonies / Rural Areas / Janta Flats / LIG / MIG / HIG / Single Room Tenements / Type - I / II / III / IV Govt. Quarters and other houses having built up area upto 200 sq. mts only; and Religious places / Dharamshalas / Cremation grounds / orphanages / Homes for destitute / Pias / Institutes for Physically handicapped & Mentally retarded persons. Hostels & Educational Institutes / Attached Hostels / Working Women's Hostels irrespective of built up area.	@ Rs 40.00 per month per connection (M)
<b>Category - 1(B)</b> Residential Premises having built up area above 200 sq mts area	Rs. 120.00 per month per water connection
<b>Category II</b> Non domestic Premises	Rs. 250.00 per month
<b>Category III</b> Non domestic Premises	Rs 600.00 per month

**(b) Volumetric Water Consumption Charges:**

Category I		Category II		Category III	
Upto 6 KL	0.0	Upto 25 KL	10.0	Upto 25 KL	15.0
7 to 20 KL	2.0	25 to 50 KL	20.0	25 to 50 KL	25.0
21 to 30 KL	7.0	Above 50 KL	30.0	50 to 100 KL	35.0
Above 30 KL	10.0			Above 100 KL	50.0

Water charges based on actual consumption and to be calculated as 1.5 B X. Hence the bill will be calculated as follows: -

$$P = M + 1.5 B X$$

Where, M = Service Charges (Rs)

B = Block tariff rate per KL (Rs per KL)

X = Units consumed in Kls (Number)

Volumetric consumption for JJ colonies / Rural Areas will be based on an assumption of 10 Kls consumption per household per month till the time metering in these areas is not accomplished. The consumers in such colonies and rural areas shall also pay the Service Charges. 50% of water consumption charges are towards sewerage maintenance. In addition, Water Cess Charges shall continue to be recovered at the previous rate of 2 paise per KL till revised by the Central Government / DJB.

Meter maintenance (rent) charge @ Rs 10.00 PM in case of DJB supplied meters after expiry of warranty period.

In the context of Multistoried houses or a number of housing units in the same plot area, it is clarified that the service charges will be levied as per covered / built up area on each connection sanctioned and for each respective premise in a multistoried complex, on the built up area of each unit having independent connection. Service charge with regard to bulk water connection (excluding NDMC, MES etc.) including Group Housing societies shall be levied for each of the constituent units.

DJB employees, residing either in DJB allotted staff quarter or other than DJB accommodation, shall be billed as per the approved water tariff, as in the case of any other consumer. However, as a welfare measure, a concession of 50% on flat rate basis against the total amount of bill will be allowed subject to the condition that the water connection is in the name of employee and water is used for domestic use only.

Till such time water meters are installed in the DJB allotted accommodation. The rate of provisional billing will be as under subject to review on the basis of actual consumption as recorded by the installed meter;

Type of accommodation	Provisional average per month
Type I/ II / III	10 KL
Type IV /V	20 KL

#### Classification of Consumer Categories

Usage of water will be of three categories for billing for various purposes.

Category I Domestic

Category II Non Domestic

Category III Non Domestic like Hotels with lodging facilities, Industrial Units, AC restaurants, banquet halls, Cinema Halls etc.

If more than 30% of the floor area of premises is used for non domestic purposes, the entire premises will be treated as Category II or III (as the case may be). In case of any dispute, the decision of Director of Revenue shall be final and binding.

In case of such mixed land use premises, if there are separate water connections installed for different uses, the bill will be raised accordingly.

#### The Estimated Bulk Issue rate of Water for 2006 - 2007 is Rs. 6.01

DJB will introduce a new scheme for new water connection towards composite services in laying MDPE pipe line etc at the door step of the consumer at the following rates;

Category	Charges per connection
I	Rs 2500
II	Rs 4000
III	Rs 6000

In case of category I, the prospective consumer may opt for payment of connection charges in four quarterly installments.

## ANNEX 8.3

## MASTER PLAN FOR DELHI PERSPECTIVE - 2001 (MPD-2001)

MPD - 2001 was published in the Gazette of India vide notification dated 1<sup>st</sup> August 1990 and under Infrastructure: Physical dealt at length "Water Supply". Requirement of Water supply has been worked out at 80 GPCD / 363 LPCD with the following breakup:

(i)	Domestic	225
(ii)	Industrial commercial and community requirement based on 45,000 liter / ha / day	47
(iii)	Fire protection based on 1 % of total	4
(iv)	Gardening based on 67,000 liter / ha / day	35
(v)	For floating population and special users like embassies, big hotels	52

With the provision that minimum water supply in any residential area should be 135 litres (30 gallons) per capita per day. The projected population by 2001 AD was 128 lakhs and thus estimated water requirement was 4660 MLD (1024 MGD). A perusal of review note for Master Plan Delhi - 1962, which forms Annexure VI to the MPD-2001 with special reference to water supply states " The standard adopted by Master Plan, 50 gallons per capita per day for the city of Delhi as a whole was rather low, the standard is being revised to 80 gallons per capita per day."

## Estimation of Water Requirements by DJB

As per CPHHEO Manual, rate of domestic water supply for Metro cities is 150 lpcd at consumers point, and allowing 15% losses in distribution at production point	172 lpcd
Industrial, Commercial, Community needs @ 45000 liters / ha / day	47 lpcd
Special uses, embassies, floating population, hotels, airports, railway stations etc.	52 lpcd
Fire protection @ 1 % of total demand	3 lpcd
<b>Total Approx</b>	<b>274 lpcd 60 GPCD</b>