

NATIONAL CAPITAL TERRITORY OF DELHI ZONES (DIVISIONS)

-  NCTD BOUNDARY
-  ZONES
-  VILLAGE BOUNDARIES
-  N.H. / MAJOR ROADS
-  OTHER ROADS
-  RAILWAYS



MASTER PLAN FOR DELHI 2021 (Draft)

SUB DIVISIONS FOR ZONES (DIVISIONS) A TO H

-  ROADS
-  RAILWAY
-  DRAIN
-  ZONE (DIVISIONS) BOUNDARY
-  SUB ZONE BOUNDARY
-  UNION TERRITORY OF DELHI BOUNDARY



ANNEXURES

PERSPECTIVE PLANS OF PHYSICAL INFRASTRUCTURE

P.K. Tripathi
IAS
CHIEF EXECUTIVE OFFICER

DELHI JAL BOARD
Govt. of N.C.T. of Delhi
VARUNALAYA PHASE-II
KAROL BAGH, NEW DELHI-110005
Tel : 23511658, 23544795
Fax : 23516182
E-mail : ceodjb@bol.net.in

D.O. NO. DJB/CEO/2004/___5880_____
Dated :28.04.2004

Dear Sir,

Kindly refer to your d.o. No.Dir /MPD-2021/DDA/F-298/898-EP dated October 7, 2003 regarding perspective plans for infrastructure services for Delhi-2021. Please find enclosed herewith "Perspective Plan for infrastructure Services for Delhi – 2021" on account of water supply. While preparing this plan, the Delhi Jal Board has taken the views of Special Officer, MPD-2021, DDA, Central Ground Water Board and studies carried out by different agencies in the field of water supply wherever possible.

Encl: As above

Yours sincerely,
Sd/-

(P.K. TRIPATHI)

Shri Madhukar Gupta, IAS
Vice-Chairman,
Delhi Development Authority,
Vikas Sadan, INA,
New Delhi

Sub:- Perspective Plan for Infrastructural Services for Delhi-2021 -- Water Supply

The total area of the National Capital Territory of Delhi (N.C.T.D.) is 148639 Ha. As per 2001 census the population of Delhi is 137.8 lacs. Taking into account, the past trends, the population of Delhi is estimated to be around 190 lacs by 2011 & 230 lacs by 2021.

PRESENT WATER AVAILABILITY

The Delhi Jal Board having an installed capacity of 650 MGD against which on an average 670 MGD potable water is being produced by optimization of Water Treatment Plants.

PRESENT WATER DEMAND

The present water demand for potable water in Delhi has been assessed as 828 MGD @ 60 gpcd for all uses. No allowance is made for use of potable water for parks & lawns/horticulture/agriculture purposes due to water shortage.

PROJECTED WATER DEMAND IN 2006

The Delhi Jal Board anticipates that by the year 2006 about 990 MGD potable water @ 60 gpcd for a population of 165 lacs shall be required. However, the D.D.A. has projected the 2006 water demand as 1320 MGD @ 80 gpcd.

PROJECTED WATER DEMAND IN 2011

The Delhi Jal Board anticipates that by the year 2011 about 1140 MGD potable water @ 60 gpcd for a population of 190 lacs shall be required. However, the DDA has projected the 2011 water demand as 1520 MGD @ 80 gpcd.

PROJECTED WATER DEMAND IN 2021

The Delhi Jal Board anticipates that by the year 2021 about 1380 MGD potable water @ 60 gpcd for population of 230 lacs shall be required. However, the DDA has projected the 2021 water demand as 1840 MGD @ 80 gpcd.

BASIS FOR ADOPTING PER CAPITA WATER REQUIREMENT

a) **DELHI JAL BOARD**

The Delhi Jal Board is adopting the domestic consumption as per C.P.H.E.E.O. Manual 1999 on water supply which provides for domestic consumption in Metropolitan & mega cities as 150 LPCD plus 15% losses. As per the Manual the water requirement for other uses is to be assessed separately. To assess the water demand for other uses, the Delhi Jal Board has followed the Master Plan Document-2001. Consequently, the per capita water requirement works out as follows:

I.	Domestic	(150 + 22)	-	172 LPCD
II	Industrial, Commercial and community requirement at 45,000 Its. Per Ha. Per day		-	47 LPCD
III	Special uses, embassies, floating population, hotels, airports and railway stations etc.		-	52 LPCD.

IV Fire protection @ 1% of total demand - 3 LPCD

Total – 274 LPCD

(Say 60 gallons per capita per day (GPCD)).

b) DELHI DEVELOPMENT AUTHORITY

The total city requirement is considered as 80 gpcd out of which 50 gpcd is for domestic requirement and 30 gpcd for non-domestic purposes. The domestic water requirement of 50 gpcd comprises of 30 gpcd for potable needs and 20 gpcd for non-potable water. The requirement of potable water out of total requirement of 80 gpcd has been assessed as 35 gpcd i.e. 30 gpcd for domestic and 5 gpcd for non-domestic demand while the demand for non-potable water has been assessed as 45 gpcd i.e. 20 gpcd for domestic and 25 gpcd for non-domestic purposes.

PRESENT SOURCES OF RAW WATER

The present sources of raw water available to Delhi are as under:-

Yamuna Water - 750 cusec (Includes 130 cusec transit losses from Tajewala to Haiderpur)
Ganga Water - 200 cusec at Bhagirathi Water Works
BBMB Water - 225 cusec (Ex. Nangal 371 cusec).
BBMB Water - 40 cusec (Ex. Nangal 60 cusec)
Ground Water - 185 cusec.

Based on the availability of above raw water, following water treatment plants are functioning:-

Sl. No.	Source of Raw Water	Name of the Plant	Installed Capacity
1	River Yamuna	Chandrawal I & II	90 MGD
2	River Yamuna	Wazirabad I, II & III	120 MGD
3	Bhakra Storage	Haiderpur I	100 MGD
4	Yamuna	Haiderpur II	100 MGD
5	Bhakra Storage	Nangloi	40 MGD
6	Upper Ganga Canal	Bhagirathi	100 MGD
7	Sub-Surface Water	Ranney Wells/Tubewells	100 MGD
Total			650 MGD

Although, installed capacity of Nangloi Water Treatment Plant is 40 MGD, but presently it is treating only 20 MGD, due to raw water constraints. Balance 20 MGD water is likely to be available for this plant after remodeling of two aqueducts on Western Yamuna Canal by Haryana Government. Also, 300 cusecs raw water is reserved in Tehri Dam storage for Delhi which will be utilized in proposed Sonia Vihar water treatment plant.

SHARE IN YAMUNA WATER

An MOU for sharing of Yamuna water between five riparian states, Haryana, U.P., Himachal Pradesh, Rajasthan & N.C.T. of Delhi has been signed on 12.5.1994 and Delhi share in Yamuna water has been fixed as 0.724 BCM (consumptive). The above allocation is subject to construction of Renuka Dam, Kishau Dam, Lakhwar Vyashi Project, Hathnikund Barrage and parallel lined channel. Pending construction of these dams, following seasonal allocations have been made: -

S. No.	States	July to Oct.	Nov. to Feb.	Mar. to June	Total
1	Haryana	4.107	0.686	0.937	5.730
2	Uttar Pradesh	3.216	0.343	0.473	4.032
3	Rajasthan	0.963	0.070	0.086	1.119
4	Himachal	0.190	0.108	0.080	0.378
5	Delhi	0.580 (1926 cusec)	0.068 (231 cusec)	0.076 (255 cusec)	0.724 (808 cusec)

Presently, Delhi is getting about 750 cusecs of raw water during the lean season against a consumptive allocation of 255 cusecs. After fulfilling the consumptive need, 495 cusecs flows back in the river as return flow.

With the construction of the dams in the upper reaches of river Yamuna, Delhi's consumptive allocation will be 808 cusecs and total allocation will be 2350 cusecs.

POLICY DECISIONS NEED TO BE TAKEN IMMEDIATELY FOR EFFICIENT WATER MANAGEMENT

Requirement of potable water for significant years are discussed later in this plan. However, seeing to the gap in the present demand and supply and for the overall efficient management of water resources, the following policy decisions need to be taken/implemented on priority:-

(i) Regulation and control of under ground water:-

Presently, there is no control over the extraction of underground water except banning of new bore wells in selected pockets by C.G.W.A. This has led to depletion of water table at an accelerating pace and in future large area will be affected. Depletion of water table would lead to enhancement of demand from the D.J.B.

It is, therefore, necessary to bring underground water under the purview of Delhi Jal Board on the lines of similar provision in Chandigarh. A draft bill namely the Delhi Water Board Act (Amendment) Act has been formulated and the same needs to be promulgated at the earliest. A preamble of the Bill giving detailed justification is annexed as Annexure – A to the Plan.

(ii) Cost of enhancement:-

Marginal cost of further enhancements of water is going to be substantial, as it will involve construction of huge reservoirs in the form of dams, construction of conveyance system, construction of transmission, peripheral and distribution main and underground reservoirs in the city. At present, infrastructure development fund is being charged from the Developing Agencies for developed areas @ Rs.15/- per litre of average

daily demand, but the same is not enough to finance the cost of the huge reservoirs and dams. So, it is necessary to enhance the same to finance the construction of dams and transmission of bulk/raw water. The quantum of levy and detail modalities can be worked out subsequently.

(iii) Prevention of wastage and theft of water: -

Wastage and theft of water will have to be curbed mercilessly. Suitable amendments are necessary in Delhi Water Board Act to provide for stringent measures for enforcing curbs on theft/wastage of water. Simultaneously, it would be necessary to evolve more intelligent system of leak detection and control which would require investments for metering at all levels, segregation of district metering areas, setting of up of pressure gauges etc.

WATER SUPPLY SCENARIO IN 2006

As given earlier, there shall be demand of approximately 990 MGD by this year. Against this demand, following water treatment plants are envisaged:-

Sl. No.	Source of Raw Water	Name of the Plant	Installed Capacity in 2006
1	River Yamuna	Chandrawal I & II	90 MGD
2	River Yamuna	Wazirabad I, II & III	120 MGD
3	Bhakra Storage	Haiderpur I	100 MGD
4	Yamuna	Haiderpur II	100 MGD
5	Bhakra Storage	Nangloi	40 MGD
6	Upper Ganga Canal	Bhagirathi	100 MGD
7	Sub-Surface Water	Ranney Wells/Tubewells	115 MGD
8	Upper Ganga Canal	Sonia Vihar	140 MGD
9		Recycling of waste water at water treatment plant at Haiderpur	16 MGD
Total			821 MGD

PROPOSED STEPS TO BE TAKEN TO MEET THE SHORT FALL UPTO 2006 :-

(i) SONIA VIHAR WATER TREATMENT PLANT: -

The raw water for 140 MGD Sonia Vihar water treatment plant will be received from Tehri dam through Upper Ganga canal where Delhi has an allocation of 300 cusecs of raw water. This Plant is likely to be completed by the year 2004.

(ii) BALANCE 20 MGD NANGLOI WATER TREATMENT PLANT: -

The Govt. of Haryana has taken up work of construction of two Aqueducts which are likely to be completed by end of 2004, thereby, carrier system will be able to carry the full quantity of 125 cusecs for Nangloi water treatment plant allocated from Bhakra storage.

(iii) RECYCLING OF WASTE WATER AT THE EXISTING WATER TREATMENT PLANTS: -

Delhi Jal Board has a proposal to recycle waste water of existing water treatment plants which will add about 46 MGD. But by the year 2006, Delhi Jal Board will be able to recycle the waste water of Haiderpur water treatment plant which will increase the capacity by 16 MGD.

(iv) EXTRACTION OF ADDITIONAL SUB-SURFACE WATER: -

About 15 MGD can be extracted from flood plains of river Yamuna in NCT of Delhi in Palla region through a battery of remaining 30 tubewells as about 70 tubewells out of 100 tubewells as suggested by C.G. W.B. have already been commissioned.

Still, there will be a shortfall of 179 MGD, which can only be met if additional raw water of about 360 cusec is allocated to Delhi during the lean period for which the Govt. of N.C.T. may approach Ministry of Water Resources, Govt. of India.

WATER SUPPLY SCENARIO IN 2011

Sl. No.	Source of Raw Water	Name of the Plant	Installed Capacity in 2011
1	River Yamuna	Chandrawal I & II	90 MGD
2	River Yamuna	Wazirabad I, II & III	120 MGD
3	Bhakra Storage	Haiderpur I	100 MGD
4	Yamuna	Haiderpur II	100 MGD
5	Bhakra Storage	Nangloi	40 MGD
6	Upper Ganga Canal	Bhagirathi	100 MGD
7	Sub-Surface Water	Ranney Wells/Tubewells	125 MGD
8	Upper Ganga Canal	Sonia Vihar	140 MGD
9	Saving from seepage losses with the construction of new parallel lined channel	Dwarka	40 MGD
10	-do-	Bawana	20 MGD
11	-do-	Okhla	20 MGD
12	-	Recycling of waste water at water treatment plants	46 MGD
Total			941 MGD

PROPOSED STEPS TO BE TAKEN TO MEET THE SHORTFALL UPTO 2011

As seen from the above table, Delhi Jal Board will be able to increase its treatment capacity of 821 MGD at the end of 2006 to 941 MGD by the year 2011 by taking following steps:-

(i) WATER TREATMENT PLANT AT DWARKA, BAWANA & OKHLA

The existing parallel lined channel from Munak to Haiderpur water treatment plant is having seepage losses to the tune of 30%. It is proposed to construct a parallel lined channel from Munak to Haiderpur water treatment plant. With the construction of this channel, there will be saving of about 160 cusecs of raw water and Delhi Jal Board has proposed construction of water treatment plants of 40 MGD at Dwarka, 20 MGD at Bawana and 20 MGD at Okhla.

Even after the commissioning of above Projects, there is shortfall of about 200 MGD. To meet this shortfall, the following steps are proposed to be taken up:-

- a) Govt. of NCT of Delhi should approach Ministry of Water Resources for increase in raw water allocation of Yamuna water by 460 cusecs during the lean period to meet the drinking water requirement of Delhi during the above period.
- b) Govt. of NCT of Delhi has initiated rainwater harvesting in Delhi, which will help in sustaining the present availability of ground water. These efforts shall be continued thereafter also.
- c) In addition to sustaining sub-surface water availability of 115 MGD at the end of 2006 by rain water harvesting, the D.J.B. can extract additional 10 MGD as suggested by C.G.W.B. from the following locations: -
 - ii) 5 MGD can be extracted from flood plains of river Yamuna in NCT of Delhi along Okhla barrage-Kalindi Kunj reach through a battery of about 25 tubewells.
 - iii) 5 MGD can be extracted from flood plains of river Yamuna in NCT of Delhi along Swami Narain Mandir Nizamuddin bridge reach through a battery of about 25 tubewells.

Common Wealth Village is likely to come up near Swami Narain Mandir for the proposed Common Wealth Games to be held in 2010. The entire village can be fed through a battery of 25 tubewells and a small treatment plant of 5 MGD. **The D.D.A. will have to reserve about 7.5 acres of land for the treatment plant in the vicinity of the area.**

- iv) It is recommended that D.D.A. may explore possibility of dual pipe system in limited way for flushing purpose only, in all group housing societies and new colonies. The idea is to collect the wastewater from bathrooms in a storage tank and pump it to separate overhead storage tank for this purpose at rooftop and then connect the same with cisterns in the toilets for flushing purpose only. The present population of Delhi is 138 lacs and it is projected to be 190 lacs by 2006, which means the population, will increase by 52 lacs. Now, assuming that 60% of this population will come up in new planned colonies the population works out to be about 30 lacs. As per D.D.A., the domestic non-potable consumption is 20 gpcd. Out of this 20 gpcd it can be safely assumed that 10 gpcd will be for washing/cleaning purposes and 10 gpcd for toilet and flushing

purposes. This means that saving on water by application of partial dual piping system will be 30 MGD.

- v) Although, there is no further scope of augmenting the present sub-surface water in NCT of Delhi, due to lack of both quantity and quality, the N.C.R. region in the neighboring states have promising prospects.

The entire projected shortfall of 200 MGD by 2011 can be met by developing a system of tubewells in following regions in the NCR: -

- a. YAMUNA FLOOD PLAINS OF NCR – This area falls in panipat & Sonapat districts of Haryana and Baghpat district of Uttar Pradesh. The area extends from Karaina in the North to Palla in the South.
 - b. THE AREA ALONG UPPER GANGA CANAL IN NCR – This area extends from Jani (located on Baghpat – Meerut road) in the North and Muradnagar in the South. The demarcated area is in a length & width of about 20 Kms. And 50 Kms. Respectively on either side of Upper Ganga canal.
 - c. THE GANGA FLOOD PLAINS IN NCR – C.G.W.B. has earmarked the area along the Ganga River as one of the most potential for development of ground water to be supplied to NCT of Delhi. The khaddar zone on the Western side of Ganga River extend up to 15 Kms from Parichatgarh in the North to Syana in the South and falls in Parichat Development Block of Ghaziabad district of Uttar Pradesh. The area is bounded by Madhya Ganga Canal in the West and Ganga River in the East.
- vi) In one of the meeting with Principal Secretary (UD), U.P. Govt. suggested that Delhi can get additional about 200 cusec of raw water through saving in losses in Upper Ganga Canal subject to the lining of the same. However, Delhi has to bear the cost of lining of the canal. D.J.B. accordingly engaged, Roorkee University for carrying out detailed study. In the study report, they have concluded that about 200 cusec of water can be saved after lining of the canal. The cost of lining has been worked out by them Rs.1200 crores. Delhi Jal Board has requested Govt. of U.P. to work out the cost which is to be shared by Delhi.

vii) Water Reclamation

The D.J.B. shall also explore the possibility of reclamation of sewage water on the lines of NE Water of Singapore using ultra-filtration, reverse osmosis and UV treatment processes by going through a pilot project of 6 MGD at Okhla S.T.P. If, it is found techno-economically feasible, then, large-scale reclamation of sewage water at Treatment Plants can be taken up in phases. The first plant for such large scale tertiary treatment of water will be at the Sewage Treatment Plant at Rithala which can add upto 40 MGD of treated water. This can be further taken to Haiderpur WTP for distribution.

In view of above, it is obvious that the shortfall of 230 MGD by 2011 can only be met either by increased allocation of Delhi during lean period or by developing a system of tube wells in the NCR or by combination of two as an interim measure till the dams in Upper Reaches in Yamuna are completed. The intervention of Ministry of Water Resources is needed for both cases. The existing corridor for raw water transportation after the lining of Western Yamuna Canal and completion of parallel lined channel will be more or less sufficient to carry the

additional requirement of 2011. The D.D.A. will have to allocate the land measuring about 345 acres @ 1.5 acres/mgd for the construction of additional. 230 mgd treatment plants. **While allocating the land for additional treatment capacity, location of new developing colonies and sources of raw water shall have to be kept in view.**

WATER SUPPLY SCENARIO IN 2021

Sl. No.	Source of Raw Water	Name of the Plant	Installed Capacity in 2011
1	River Yamuna	Chandrawal I & II	90 MGD
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12	-	Recycling of waste water at water treatment plants	46 MGD
Total			941 MGD

PROPOSED STEPS TO BE TAKEN TO MEET THE SHORTFALL UPTO 2021

As seen from the above table, Delhi Jal Board will be in a position to provide treatment capacity of 941 MGD by the year 2021 against the projected demand of 1380 MGD @ 60 gpcd for 230 lacs population, thus, there is a shortfall of 439 MGD. To meet this shortfall, the work on following dams has to be expedited. There seems to be no other alternative.

On completion of above projects, Delhi will receive its full share of 0.724 BCM (808 Cusecs Consumptive). The total allocation works out to 2350 cusecs that means an additional 1600 cusecs (865 MGD) will be available to Delhi which is more than enough to meet the projected shortfall of 439 MGD by 2021. The D.D.A. may reserve the land measuring 345 acres by 2011 and additional 315 acres by 2021 to construct the additional water treatment plants.

A. RENUKA DAM

A provision of 275 MGD (about 1.25 million cubic meters per day) has been earmarked for Delhi's use in the Renuka Dam project in Himachal Project. The revised project report of this dam was discussed in the 72nd meeting of the Advisory Committee on Irrigation, Flood Control and Multipurpose Projects on 18 January 2000. There, the Committee decided to approve the project on the condition that clearance by the Ministry

of Environment and Forests be obtained separately and that the cost be shared between the Government of NCT of Delhi and the Government of Himachal Pradesh.

The total cost of the project is Rs.1224.64 crores. In the meeting held on 30.12.2000 between Chief Secretary, NCT of Delhi and Chairman, HPSEB and ASC (Power) Govt. of Himachal Pradesh, both sides agreed in principle that Govt. of Himachal Pradesh could consider sharing average cost of around Rs. 166 crores for Power component only & rest will be born by Delhi Govt.

The project is held up for want of clearance of Ministry of Environment & Forest, Govt. of India for which action is to be taken by H.P. Govt.

B) KISHAU DAM

A provision of 372 MGD (about 1.7 million cubic meters per day) has been earmarked for Delhi's use in the storage of this dam. The dam is to be constructed on the River Tons in Uttranchal. Kishau Dam project has been examined in C.W.C. for broad technical and economic aspects and was found technically and economically feasible. It was recommended for consideration by the Advisory Committee at an estimated cost of Rs. 35,662 million (December 1998 price level). The Kishau Dam Project was taken up in the 72nd meeting of the Advisory Committee on Irrigation, Flood Control and Multipurpose Projects, on 18 January 2000. After discussion, it was decided that consideration of the project be deferred until a further elaboration of the economic viability has been prepared, including apportioning project costs among the irrigation, power and water supply components. As per latest information from Uttranchal Govt. it has been informed that a MoU has been signed with the Tehri Hydro Development Corporation (THDC) for construction of the dam.

C) LAKHWAR VYASI DAM

This dam is to be constructed on the River Yamuna in Uttranchal and will provide 330 million cubic meters of storage and 420 MW power. The Government of Uttar Pradesh submitted an updated estimate amounting to Rs.14,460 million to the Central Water Commission for technical and economic clearance, in April, 1998. Delhi will get 135 MGD from storage of this dam when completed. As per information received from Uttranchal Govt., it has been informed that negotiations are on with National Hydroelectric Power Corporation for taking up the work.

ANNEXURE – 'A'

This is an established fact that a large amount of ground water is being exploited unchecked by the citizens of Delhi due to which the ground water level has been falling rapidly. Since ground water is a major source of drinking water, indiscriminate extraction of the same has/will lead to its shortage. This situation prevails all over the country.

To curb this menace the Union Ministry of Water Resources has circulated a draft bill, which has underlined the broader issue of regulation and control of development of ground water in the country. It further provides for an independent regime in rural and urban areas at state levels to deal with the issue effectively. The National Water Policy (1987) also calls for controls on exploitation of ground water through regulation and integrated and coordinated development of surface and ground water.

Clause (b) of section 9 (1) already provides that one of the functions of the Board shall be to plan for, regulate and manage the exploration of groundwater in Delhi in consultation with Central Ground Water Authority. Proviso to clause (b) puts an embargo on Board's power to license and levy user charges for exploration of ground water in any area falling within the jurisdiction of the New Delhi Municipal Corporation or any other local authority except with the authority of Central Government.

In view of above and the existing proviso to section 9(1) (b) it is considered appropriate that necessary power are given to the Board by amending the existing act instead of going in for a new regime to deal with the related issues. Also the Delhi Water Board is a statutory body already having the required technical know-how for handling matters relating to the issues involved. Therefore, the Delhi Water Board (Amendment) Bill – 2002 to amend the Delhi Water Board Act 1998 has been approved by Delhi Jal Board vide item No.23 resolution No.204 dated 8.5.2002. The proposed amendment does not have any financial implication. The proposed bill needs to be passed by the Delhi Legislative Assembly on priority.

Perspective Plan for Sewerage**A-II**

DELHI JAL BOARD
OFFICE OF THE MEMBER (Dr)
VARUNALAYA PHASE-II : KAROL BAGH : NEW DELHI

No: DJB/Mem(Dr)/2004/

Dated: 18.06.04

Kindly refer to your letter no. Dir/MPD-2021/DDA/F-298/607EP dated 11.06.2004 addressed to Chief Secretary with a copy to CEO regarding Perspective Plan for Infrastructure Services for Delhi-2021 pertaining to Sewerage Sector from DJB side. This is in continuation to our letter no. DJB/CE(C) III/F 46/2003/2150-53 dated 21.07.2003 on the same subject with further details.

Sd/-
(RAKESH SETH)
MEMBER (Dr)

Encl: As above.

Sh. Madhukar Gupta, Vice Chairman,
 Vikas Sadan, INA, New Delhi-110023.

Subject: Perspective plan for infrastructure Services for Delhi-2021 Sewerage.

The total area of the National Capital Territory of Delhi (NCTD) is 148639 Hac. As per 2001 Census the population of Delhi is 137.8 Lacs. Taking into account, the past trends, the population of Delhi is estimated to be around 190 Lacs by 2011 & 230 Lacs by 2021.

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other uses is to be assessed separately. To assess the water demand for other uses, the Delhi Jal Board has followed the Master Plan Document-2001. Consequently, the per capita water requirement works out as follows :

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Total:	274 LPCD

(Say 60 gallons per capita per day (GPCD)
Delhi Jal Board have entrusted in December-2001.

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7.	Sub-Surface Water	Ranney Wells/Tubewells	100 MGD
Total			650 MGD

1. INFRASTRUCTURE: PHYSICAL

1.1 PHYSICAL INFRASTRUCTURE 2021 PROJECTIONS:

It has been projected by DDA that for 2021 projected population of the city will be 230 Lacs and requirement of potable water is 805 MGD and non-potable water is 1035 MGD. Total sewage generated has been worked out to 1012 MGD by DDA which seems to be on the lower side keeping in view of the requirement of water worked out by DDA to the tune of (805 MGD + 1035 MGD) 1840 MGD whether it is potable or non-potable because both the water will generate the waste water.

1.2 RESOURCES REQUIREMENT FOR YEAR – 2021 :

ii) SEWERAGE: -

Sewage quantum is worked out @ 80% of domestic water requirement per capita (50 gpcd) catering to 40 gpcd (180 lpcd) excluding handling of animal, commercial and industrial waste water.

PRESENT STATUS:

The present water supply in Delhi is 640 MGD. At present, the details of sewage generation are as under :

- i) Water supplied by DJB = $640 \times 0.8 = 512.4$ MGD
- ii) Estimated sewage generated
From extraction of water from
Private bore holes/tubewells: **100.0 MGD**
- iii) Industrial waste water **40.0 MGD**
652.4 MGD

To cater to the growing population, the water supply will be augmented to 919 MGD in 2011/2021.

The wastewater that will be generated will be of the order of 806 MGD for the year 2011 for total water supply of 919 MGD by DJB. As additional sources of water have not been identified for supply of water to DJB upto 2021, it can be seen that population growth results in reduced per capita water supply and corresponding reduction in per capita waste water generation. The total quantum of wastewater however is not expected to change.

The details regarding sewage treatment capacities are as under:

SEWAGE TREATMENT PLANTS (CAPACITY IN MGD)

S.NO.	NAME OF STP	EXISTING CAPACITY	ADDITIONAL CAPACITY PROPOSED UPTO YEAR 2011.
1.	Rithala	80	30
2.	Rohini	15	40
3.	Yamuna Vihar	20	25
4.	Kondli	45	45
5.	Narela	10	40
6.	Pappan Kalan (Dwarka)	20	20
7.	Najafgarh	5	-
8.	Vasant Kunj	5	-
9.	Mehrauli	5	-
10.	Ghitorni	5	-
11.	Keshopur	72	-
12.	Nilothi	40	30
13.	Cantonment	-	8
14.	Okhla	140	30
15.	Delhi Gate	2.2	15
16.	Sen Nursing Home	2.2	-
17.	Coronation Pillar	40	10
18.	Timar Pur	6	-
TOTAL :		512.4	293

Total proposed capacity in year 2011 : 512.4 MGD
293.0 MGD
805.4 MGD

The DSIDC is constructing 14 CETPs for Industrial Waste Water for a total capacity of 40 MGD.

PROPOSED STRATEGIES FOR DIFFERENT ASPECTS:

- i) Drawing up a detailed blue print for augmenting sewerage system of Delhi which may include following key proposals.
- ii) Phasing of new work for total coverage of city with interim arrangements.
- iii) In the old city and other areas identified in some places, new sewerage lines can not be laid and the existing sewer lines have to be desilted and rehabilitated.
- iv) Technological changes :
The Delhi Jal Board has switched over to the DBO Contracts for setting up the STPs. In these cases, availability of land with the DJB is mentioned and the contractor has the option for offering the suitable technology which can fulfill other specified parameters.

Sewerage system in the whole Delhi except NDMC and Cantt. areas is being laid and maintained by Delhi Jal Board where surface drains are being constructed and maintained By General Wing, MCD, CSE (MCD), DDA, PWD, Irrigation and Flood Department, Govt. of NCT of Delhi etc.

Decentralized STPs with capacity of 3-5 MLD at the sub-city level, (10-15 Lacs population) and at community level if environmentally sustainable (mandatory for new developments). Decentralized STPs for smaller capacities can be set up keeping in view the techno economically feasibility and viability and availability of land by the DDA.

INSTITUTIONAL IMPROVEMENT:

The DJB has already set up 21 divisions by restructuring for the maintenance of water distribution system and sewage net-work. Suggestion for implementation of principle of “polluter pays” is very good and can be examined by Delhi Jal Board. As far as to create one single agency for the management of surface drainage and sewerage is a cumbersome subject because lot of agencies are involved in the management of surface drainage whereas sewerage system is managed by DJB except in NDMC and Cantt areas.

ENCOURAGING PUBLIC PRIVATE PARTNERSHIPS:

Public Private Partnership for the collection of sewerage, its treatment and disposal of treated effluents can be adopted in phases. DJB has already adopted the public private partnership for the maintenance of Sonia Vihar Water Treatment Plant (under construction) and at some places, newly constructed Sewage Treatment Plants are being operated and maintained by some private agencies at present.

PRESENT STATUS OF SEWERAGE SYSTEM:

SEWAGE TREATMENT PLANT & ANCILLARY WORKS:

Out of 17 STPs under construction all the 17 STPs have been completed. In east Delhi, Delhi Jal Board has planned to augment the capacity of Sewage Treatment Plant by 45 MGD at Kondli and 25 MGD at Yamuna Vihar. The tenders of Kondli Plant are

before the Evaluation Committee. An effluent Pumping Station at Yamuna Vihar is proposed for which short listing of firms had been done and offers are being invited.

The existing Sewerage Conveyance System is a large network of branch peripheral and Trunk Sewers. There are 28 main Trunk Sewers with sizes ranging from 700mm dia to 2400 mm dia with a total length of about 130 kms. The balance length of sewage conveyance system comprises of peripheral sewers and internal sewers of small sizes and a total length of approximate 6000 kms. The Trunk Sewers have been laid over the years at different stages. Some of these are as old as 40-60 years old. The condition of Trunk Sewers specially the older one has deteriorated as a result of silting and settlements.

TRUNK SEWERS: -

It is estimated that about 91 kms. of Trunk Sewers need desilting and rehabilitation including repair of settlement. Work for desilting/rehabilitation in 22 kms. length has already been completed.

The following major works of rehabilitation of Trunk Sewers is in progress:

- i) Desilting of Trunk Sewer No. 4 from Gurudwara Rashid Market to Preet Vihar SPS Shahdara.
- ii) Desilting of Trunk Sewer No. 5 Shahdara.
- iii) Rehabilitation through Trenchless technology of 600 mms dia sewer from Gautam Nagar Culvert to Ch. Dilip Singh Marg crossing along Arbindo Marg.
- iv) Rehabilitation through Trenchless technology of 900 mm dia Sewer Line from T-junction Shekh Sarai to Madangir along Road no. 13.
- v) Rehabilitation of 1600mm dia Trunk Sewer from Harsh Vihar to Haider Puri SPS.
- vi) Rehabilitation/renovation of 1600-1900 mm dia brick barrel Trunk Sewer from Delhi Gate to College lane and egg shape Sita Ram brick sewer from Turkman Gate to Azmeri Gate.
- vii) Rehabilitation of 1650 mm dia old brick barrel from Q-point to SPS Kilokari and 1200 mm dia cross connection no. 4 from 66" dia brick barrel to Railway Bridge Nizamudin.

While the following works of rehabilitation of Trunk Sewer will be carried out after approval of Delhi Jal Board :-

- i) Desilting of Trunk Sewer (1600-2100 mm dia) from Jhilmil Colony to Jagriti SPS Shahdara.
- ii) Desilting and sealing of joints of Punjabi Bagh and Jail Road Trunk Sewer in West Zone.
- iii) Improvement of peripheral sewer of 600-800-1000 mm dia from T-point Red Light at Laxmi Nagar to Madhuban Chowk and 450-700-800 mm dia from Ramesh Park to Kanishka Emporium, Laxmi Nagar, AC-40 Shahdara.
- iv) Desilting, CCTV survey and sealing of joints of 1200 mm dia UTS line from manhole no. 64 to 72 near DRDO Complex.

LAYING OF SEWER LINES :-

There are 567 unauthorised/regularized colonies in Delhi. The status of sewerage system in Unauthorised/ Regularised Colonies, Resettlement Colonies and Urban Villages are as under :-

S.NO.	STATUS	TOTAL NOS.	SEWER LINES LAID
1.	Unauthorised/Regularised Colonies	567	482
2.	Resettlement Colonies	44	44
3.	Urban Villages	135	98

REPLACEMENT OF SEWER LINES: -

Old/damaged sewer lines are being replaced in a phased manner. It is targeted to replace 585 kms. of existing sewer lines. Replacement of old/damaged sewer line is 116.15 kms.

NON-CONVENTIONAL SOURCE OF ENERGY: -

Vaish Committee has recommended for utilization of Bio-Gas at various sewage Treatment Plants for generation of electricity which can be utilized for operating the STPs. 1440 Lacs cft of Bio-Gas generated from Okhla Sewage Treatment Plant was supplied to residents having sewage gas connection in adjacent Colonies and revenue of Rs. 32 Lacs was collected. Bio-Gas Engines at new Plants of Rithala were commissioned in September-2002 to generate the electricity. Which in turn is utilized for operating the plants itself, there saving of Rs. 35 Lacs P.M. in electricity bill was possible.

PROPOSED STEPS TO BE TAKEN, HEAD WISE TO MEET THE REQUIREMENTS FOR 2021: -

1. TRUNK SEWERS: -

There are 28 main Trunk Sewers with sizes ranging from 700 mm dia to 2400 mm dia with a total length of 130 kms. The condition of these Trunk Sewers has deteriorated considerably and also silted up to large extent, so DJB has been rehabilitating these sewers in a phased manner. All Trunk Sewers will be desilted in a phased manner.

2. LAYING OF SEWER LINE IN UNAUTHORISED/ REGULARIZED COLONIES:

At present there are 567 unauthorised/regularized colonies. Sewage facilities will be provided in all the colonies subject to technical feasibility.

3. LAYING OF SEWER LINE IN URBAN VILLAGES :

At present there are 135 Urban Villages. Efforts will be made to provide sewage facilities in all the villages, subject to technical feasibility.

4. LAYING OF SEWER LINES IN RESETTLEMENT COLONIES :

Sewage facilities have been provided in all the Resettlement Colonies.

5. PERIPHERAL AND BRANCH SEWERS :

Old Sewer Lines are either inadequate or silted, this results in less discharge to SPS/STPs. It is proposed to replace old 4" dia and 6" dia sewer lines.

6. NON CONVENTIONAL SOURCE OF ENERGY :

It is proposed that all major STPs will be provided with Gas Engines so that they are self sufficient with the power supply.

7. SEWAGE TREATMENT – AUGMENTATION WORKS :

M/s. TCE was given study for various augmentation works. Draft Final Report has been submitted by M/s. TCE. The augmentation work will be completed in a time bound manner.

8. SEWAGE FACILITIES IN RURAL VILLAGES :

At present DJB is not laying sewerage system in Rural Villages. Matter will be taken up with Govt. of NCT of Delhi to provide sufficient funds for laying of sewers and treatment of generated sewage on the basis of schemes under-Grant-in-Aid.

9. SEWAGE FACILITIES IN UNAUTHORISED COLONIES :

At present as per the instructions of Hon'ble High Court, Sewer facilities can not be provided in these colonies. These Colonies are Regularised by Delhi Govt. from time to time. Sewerage system will be laid in these colonies on there being regularized or if Govt. approves laying of sewer in these colonies. Sewerage system will be provided wherever schemes are technically feasible.

In addition, following are the new initiatives taken by Delhi Jal Board.

§ It is proposed to construct 6 STPs on the mouth of following drains:

1. For the drains out falling into river Yamuna:
 - a) Civil Mill Drain
 - b) Additional STP on Delhi Gate Drain
 - c) Barapulla Nallah
2. For the drains out falling into Najafgarh Drain:
 - a) Palam Drain
 - b) Ring Road Drain
 - c) Daryai Nallah

§ We are setting up a Pilot Project in collaboration with CSIR to treat sewage flowing into the drains by using microbes wherever land is not available for constructing STPs

§ We have also used of enzymes in Balbir Nagar Drain to treat sewage. The results are encouraging. It is proposed to use enzymes at Kondli STP on regular basis. Its use will decrease consumption of air and consequently drastic saving in power consumption.

§ On all water Treatment Plants wastewater is produced from backwashing of filters and desludging of clarifiers. These effluents carry various chemicals and at present are discharged into various drains, which ultimately pollutes river Yamuna.

It is proposed to set up waste recovery/recycling plants on all the water Treatment Plants by the end of 2011 so that effluent is stopped from reaching drains/Yamuna and recovery of potable water is benefited.

§ It is proposed to set up power plants based on sludge gas being produced at Okhla sewage disposal works, so that sufficient power is produced at the plant itself. This plant will be constructed on BOOT basis. This will be source of power generation based on non-conventional source of energy.

The list of major works to be completed by 2021 is given at annexure – A.

FOR SHAHDARA ZONE :

Proposed Pumping Stations :

- § Yamuna Vihar 60 MGD (peak)
- § New Preet Vihar 48 MGD (peak)

Proposed Treatment Plants :

- § Yamuna Vihar 26 MGD (av.)
- § Kondli 45 MGD (av.)

FOR RITHALA ROHINI ZONE :

Proposed Pumping Stations :

- § Kishan Ganj 36 MGD (peak)
- § Anand Vihar 18 MGD (peak)
- § Shalimar Bagh 6 MGD (peak)
- § New Rithala 22 MGD (peak)
- § Nangloi Extn. 22 MGD (peak)

Proposed Treatment Plants :

- § Rithala 30 MGD (av.)

FOR OKHLA ZONE :

Proposed Pumping Stations :

- § Pahari Dhiraj 21 MGD (peak)
- § Police Colony, 36 MGD (peak)
- § Seva Nagar 31 MGD (peak)
- § Barapulla Nalla, 43 MGD (peak)

Proposed Treatment Plants :

- § Okhla 30 MGD (av.)
- § Barapulla Nallah 20 MGD (av.)

FOR KESHOPUR ZONE:

Proposed Pumping Stations:

- § Raja Garden 48 MGD (peak)
- § Poshangipur 11 MGD (peak)
- § Punjabi Bagh 7 MGD (peak)
- § Delhi Cantonment 17 MGD (peak)

Proposed Treatment Plant:

- § Delhi Cantonment 8 MGD (av.)

FOR CORONATION PILLAR ZONE:

Proposed Pumping Stations:

- § Roshan Pura 7 MGD (peak)
- § New University 7 MGD (peak)
- § SGT Nagar Extn. 9 MGD (peak)
- § Dhir Pur 6 MGD (peak)
- § Rana Pratab Bagh 2.5 MGD (peak)

Proposed Treatment Plant

- § Coronation Pillar 10 MGD (av.)

FOR OUTER DELHI ZONE:

Proposed Treatment Plants:

- § Pappan Kalan (Dwarka) 18 MGD (av.)
- § Nilothi 24 MGD (av.)
- § Rohini Ph-IV & V 40 MGD (av.)
- § Narela Subcity-I 26 MGD (av.)
- § Narela Subcity-II 15 MGD (av.)
- § Decentralised system for group of villages in Outer Delhi (capacity range between 0.5 MGD to 2.5 MGD).

**OFFICE OF THE CHIEF ENGINEER (I&F)
IVth FLOOR ISBT BUILDING, KASHMERE GATE,
GOVT. OF NCT OF DELHI, DELHI**

No. NCRPB/CEF/P&D/AE-II/2000/7176

Dated: 11.06.04

To

Shri Ashok Kumar,
O.S.D. (MPPR),
Delhi Development Authority,
D-6, Vasant Kunj,
New Delhi – 110071.

Sub: Progress of the land use Plan of MPD-2021.

Sir,

Please refer to your letter No. Dir/MPD-2021/2003/Delhi Development Authority/ F-361/D-559 dated 14.01.2004 on the above noted subject, addressed to Development Commissioner, Govt. of NCT of Delhi, and copy endorsed to this Office, requesting to provide integrated perspective Plan relating to drain sector for finalization of draft Master Plan – 2021. In this connection, it is intimated that the last Master Plan for storm water drainage in Delhi was prepared by the Master Plan Organization set up in irrigation & Flood Control Department in the year 1972-1976, under the guidance of a committee of experts, set up by Delhi Administration, vide memo No.F.3 (13)/67-Irrigation & Flood Control Department dated 9.2.1968 (copy enclosed). This Master Plan took into account the urbanization limits upto the year 1981. Though, while according approval for this master plan for drainage, the committee of the experts had suggested that whenever Master Plan – 2021 A.D. is reconsidered, a fresh review should be made for the Master Plan for drainage also. However, till date, the master plan for drainage has not been updated in Delhi. Keeping in view the inadequacy in the storm water system, particularly, in the unplanned (unauthorised or regularized) and various other colonies of the city, which are highlighted every year during rains, a revised master plan for storm water drainage needs to be prepared immediately, considering the urbanization limits upto 2021 A.D. Although, the task of preparation of revised master plan for Delhi can be outsourced to some expert consulting agencies e.g. WAPCOS, TATA Consultancy, RITES, etc.; yet, before assigning this task to any agency, the storm water run off norms needs to be finalized. Moreover, for preparation of the revised master plan, various inputs have to be provided by all the civic agencies e.g. MCD, NDMC, PWD, Delhi Development Authority, I & F Department, Delhi Cantonment Board and DSIDC, regarding the extent of urbanization and industrialization going to come up till the year 2021.

It, is therefore, necessary that a committee of experts under the chairmanship of Member (RM), Central Water Commission, who has a full equipped Hydrology Directorate working under him, with Chief Engineers of all the civic agencies as members, has to be constituted to finalize the run off norms; and the terms of reference for the preparation of revised Master Plan for storm water drainage in Delhi.

In view of above, Jt. Director, Department of Urban Development, Govt. of Delhi, 10th Floor, Delhi Sachivalaya has been requested vide this office letter dated 06.05.2004 to take immediate action in this regard, so that the work of preparation of master plan for storm water drainage can be initiated without any further delay.

Yours faithfully,

Sd/-

(K.L. Chugh)

SSW to CHIEF ENGINEER (I & F)

Copy forwarded for information to:

The Joint Director III (MPPR), Delhi Development Authority, D-06, Vasant Kunj, New Delhi with reference to her letter no. Dir/MPD-2021/Delhi Development Authority/F-298/D-85 dated 19.04.2004.

SSW to CHIEF ENGINEER (I & F)

Perspective Plan for Power

A-III

JAGDISH SAGAR

Chairman & Managing Director

DELHI TRANSCO LIMITED

Regd. Office: Shakti Sadan, Katla Road,
New Delhi-110002

Telephone : 011-23231748, 23215198

Fax : 23234640

Dear Shri Baijal,

Sub: Perspective Plans for Infrastructure Services for Delhi – 2021.

Please refer to your d.o. letter No. Dir./MPD-2021/DDA/F-298/989-EP dated 7th October, 2003 on the subject noted above. I do regret the delay in replying.

We had earlier provided the main information required vide our letter No. CMD(DTL)-11A/Reform/577 dated 20.02.2003, which I enclose for ready reference. I have given further thought to the issues contained in your letter and have the following additional comments to offer.

As per the 16th Power Survey of CEA the anticipated demand of 2020-21 is indicated as 8800 MW. However, the NCR Planning Board anticipated demand will be 14211 MW. The basic of the demand projected by NCR Board is not known and it seems wildly unrealistic. The figures indicated in the 16th Power Survey seem to be much more realistic taking into consideration to the annual growth, although in recent years the actual requirement has not necessarily kept pace even with the CEA's projections.

We shall have to install one 400 KV sub-station for each 1000 MVA load, with three 220 KV sub-station (4x100 MVA). Therefore, to meet the load demand upto the year 2021 as per the 16th Power Survey we need five more 400/220 KV sub-station and fifteen more 220/66-33 KV sub-station in addition to the existing ones. For evacuation of power from 400 KV stations from the existing lines, the lines have to be upgraded with higher sizes of conductor. The future 220 KV cable shall also be made 1000/1200 Sq.mm. copper conductor. Besides the above, an HVDC link is also required to be established in Delhi for which provision has to be made in the perspective plan. The tentative locations for the locations for the above HVDC station have been conceived as Mundaka and Maharani Bagh.

Further, for arriving at realistic had figures and disaggregating them area-wise, the studies being carried out by the DISCOMs, and their requirement of 66 and 33 KV Gird Substations, will also have to be taken into consideration.

However, the above only gives us a broad outline. In order to prepare a perspective plan for the development of the electric supply system between now and 2021, it would also be necessary to optimise the investment to be made in Transmission and Distribution at different stages. It is not advisable to plan for heavy investments in electrical infrastructure in mere anticipation of growth, without a better perspective on where and when, in what stages and in which areas, the actual load growth is likely to materialise. Difficulties are created by the continuing mismatch between the situation envisaged in the Master Plan and the actual ground situation. Firstly, there are always unauthorised areas which draw power illegally from the distribution system, and it will be necessary to provide for their electrification. Recently, so far as unauthorized colonies are concerned, the Distribution companies have agreed to work towards the target of

completing electrification of existing unelectrified areas by 31st December, 2004, assuming the requisite cooperation both from the public in obtaining and seeking connections and in remitting development charges and from the various agencies concerned so far as sites and route clearances etc. are concerned. This is undoubtedly an ambitious target but, even if achieved, it will not suffice as a one-time exercise since there is a tendency for such areas to continue to have new outgrowths or for their density to increase with re-building within them. Further, the load in some areas changes with changes of land use, e.g. commercialization of planned residential areas, etc.

The proposals enclosed with your letter will tend to increase the load in existing developed areas also; and somewhat unpredictably since it may be difficult at this stage to forecast the effect of allowing extra floors or permitting higher FAR or of mixed residential and commercial land use and commercial office use of industrial premises etc.

The major issue that arises on account of all the above factors is the inherent difficulty of augmenting the existing infrastructure in an already built-up area. The problems encountered include those of finding sites for sub-stations at all levels, of finding routes whether over-head or underground for lines and cables, and of access to existing underground lines and cables for purposes of repair etc. We feel, therefore, that it is absolutely necessary that the next Master Plan should incorporate general provisions designed to address these issues to facilitate some flexibility in augmenting capacities according to need. In the absence of a better coordinated strategy to address these problems, not only will there be delay in completing necessary augmentation works, and a continuing gap between the local capacity of the electric distribution system and the local requirement in different areas, but there will also continue to be friction because of inter-agency conflicts and work of one service at times disrupting another. A strategy to address this issue should include provisions relating to road design (providing for easy routing to electric lines), schemes for mapping of all services and a set of policies to be followed by all civic agencies in regard to permission for route clearance from other departments for the power sector. This issue has become further complicated because of the inability of some of the civic agencies to treat the new private distribution utilities on the same footing as Government-owned organizations.

We would, therefore, recommend that a group should be set up to work out the detailed guidelines which should be incorporated in the Master Plan in regard to these issues.

Yours sincerely,
Sd/-
(JAGDISH SAGAR)

Encl: As above.
Shri Anil Baijal,
Vice Chairman,
Delhi Development Authority,
Vikas Sadan,
New Delhi – 110023.

JAGDISH SAGAR

Chairman & Managing Director

DELHI TRANSCO LIMITED

Shakti Sadan, Kotla Road, New
Delhi-110002

Dear Shri Risbud,

Please refer to your letter No. PS/Commr. (Plg.) DDA/03 dated 7th January 2003.

The information contained in the different documents enclosed with your letter regarding the power sector in Delhi is very much out-dated and has become irrelevant with the passage of time.

In view of the above, I am updating the information and data wherever required in the following documents:

1. Copy of draft on Power, as a component of MPD-2021.
2. Copy of the report prepared by expert Sub group on 'Physical Infrastructure for MPD-2021.
3. Copy of recommendations presented in the Seminar on "Physical Infrastructure" organized by DDA on 29th September 2000.

I am also sending a note titled Power Sector in Delhi detailing the process of reforms carried out and other details on Power Position in Delhi for your information.

Yours sincerely,

Encls: As above.

(JAGDISH SAGAR)

Shri Vijay Risbud,

Commissioner (Planning),

Delhi Development Authority,

Vikas Minar, Indraprastha Estate,

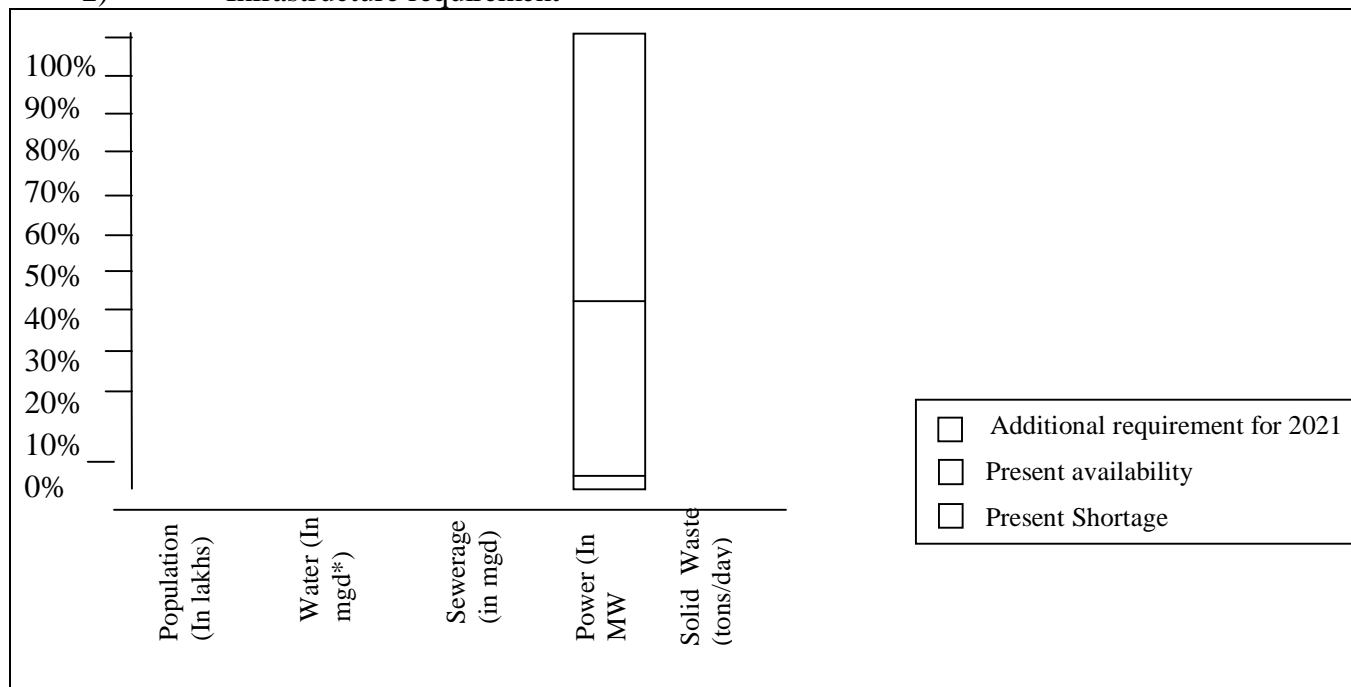
New Delhi – 110002.

PRE-DRAFT PHYSICAL INFRASTRUCTURE MPD-2001

1) The changed figures for Power in Table 1.1.

	Population (In lakhs)	Water (In mgd*)		Sewerage (in mgd)	Power (In MW)	Solid Waste (tons/day)
		Potable	Non- Potable			
Projection 2004-05					3860	
Present requirement (2003-04)					3500	
Present availability					3170	
Projection 2021					8800	
Additional requirement					5630	

2) Infrastructure requirement



3) 1.2 (iii) **POWER:** The Projected requirement of power is indicated for year 2016-17 by CEA (16th Power Survey of India) as 7397 MW

4) The latest figures for existing & estimated power demand and supply have been substituted in Table 6.1 as under:

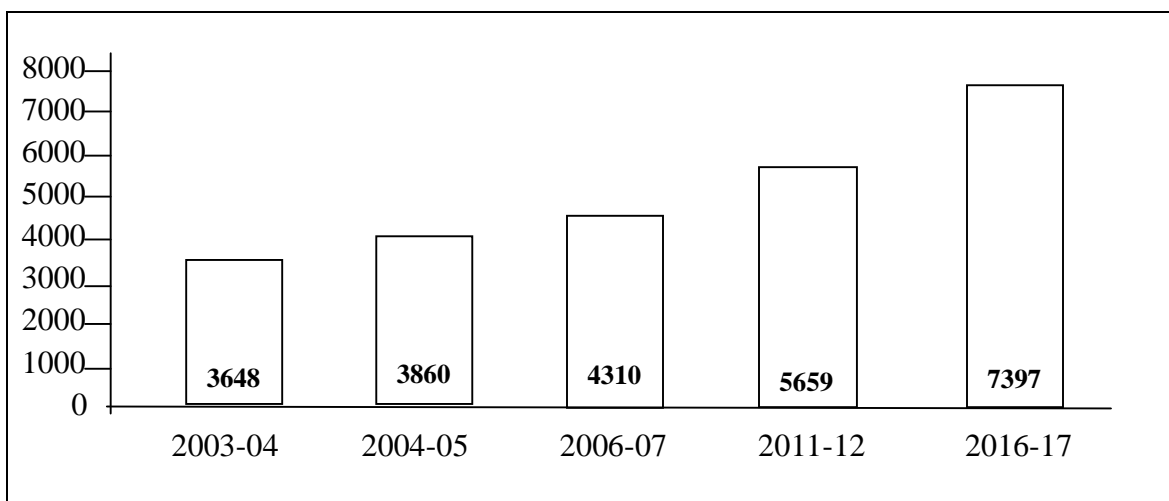
Year	Peak Demand in MW		Peak availability in MW	Peak Deficit in MW
	As per 16 th Power Survey CEA	As per Master Plan		
2002-03*	3450		3150	-300
2003-04*	3648		3710	62
2006-07*	4310		4931	621
2011-12*	5689		5741	52
2016-17*	7397			
2020-21**	8800			

* As provided by CEA as per 16th Electric Power Survey of India

** Tentative based on 16th Electric Power Survey of India

- 5) The latest figures for Peak Demand are as follows:-

PEAK DEMAND (MW)	
2003-04	3648
2004-05	3860
2006-07	4310
2011-12	5659
2016-17	7397



- 6) Annexure VI: Projected additional power requirement: The Plants mentioned at A in the category of plants proposed in Private Sector are no longer under consideration.

At point B under the heading 'Plants proposed to be put up by DVB against Plan Funds; it is to inform that Pragati Power Project of 330 MW capacity has been partially commissioned (208 MW commissioned) and the 122 MW Waste Heat Recovery portion is likely to be commissioned within this monthly (Feb. 2003). The present position regarding the projected arrangement for additional power required is enclosed herewith.

POWER SECTOR IN DELHI

Reforms Process (1999 – 2002)

In view of the fact that the erstwhile Delhi Vidyut Board was incurring heavy financial losses mainly due to high transmission and distribution losses and power cuts had become a regular feature, the Delhi Government accorded top priority for improvement of power sector in Delhi. In pursuance of this objective the following steps were taken.

(I)

- i) As a first step to reforms and restructuring of the power system, Delhi Electricity Regulatory Commission (DERC) was set up in March-1999. The DERC are vested with the powers of a Civil Court under the Code of Civil Procedures-1908 and are competent to call upon the licensees to furnish the Commission periodically or as and when required any information concerning generation, transmission, distribution and supply or use of electricity, under their domain. DERC determines the bulk supply and retail tariff and regulate power purchase

- and procurement process of the licensees and transmission utilities including the price at which the power shall be procured from the Generating Companies.
- ii) The DVB was formally unbundled into six successor entities, three companies for managing the distribution functions, one for transmission and one for generation. One company referred to as the Holding Company was established to park the unserviceable assets/liabilities of the erstwhile DVB so that the other five companies may start functioning with clear balance sheets. The distribution functions were subsequently privatized with the signing of Share Holders' Agreement with the prospective buyer's on June 27, 2002 and management control of the companies was handed over to the private companies on 01.07.02. As per Agreement the management control of two distribution companies (Discoms) have been handed over to M/s BSES while M/s Tata power has been handed over the distribution functions in one Discom. M/s BSES now serves the areas of West, South, Central and East Delhi while M/s Tata Power takes care of distribution functions in North and North-West Delhi. The Government however continues to hold 49% equity in the distribution companies.
- In order to give a clear and true picture of the losses in the erstwhile DVB to the prospective bidders for distribution Companies a new concept of aggregate technical & Commercial (AT & C) losses was introduced in place of T& D losses. AT & C losses are the difference between the number of units of energy supplied and the number of units of energy for which payment was actually recovered.
- iii) While passing the Bulk Supply Tariff order on 22.02.02, DERC has fixed opening level of loss for the three Discoms. Selection of bidders was based upon these targets of minimum loss reduction. It was envisaged that initially the gap between the expenses of Transco including the cost of power purchase and the amount realized from the Discoms shall be met by way of loan assistance from the Government of NCT of Delhi for which the amount of Rs.3450/- has been provided for five years period from 2002-2003. With the reduction of AT & C loss, the gap will progressively reduce and the Bulk Supply Tariff will be increased. It is estimated that within the period of 5 years the Discoms will become financially viable and it will be possible to fix Bulk Supply Tariff rates at the level of average cost of power purchase and other expenses of Transco.
- iv) Delhi Government has constituted a core committee of very senior officers including Pr. Secretary (Power) and the Chairman-cum-Managing Director (Transco & Genco) to look into all major issues coming in the way of a smooth transition. This will go a long way in maintaining the required co-ordial relations between the new entities and the Government.

(II) Generation:

The DVB average generation during the period 1998-99 to 2001-02 was more than 2500 MUs. The year-wise details, of generation, show marked improvement in the generation of power during 1998-99 to 2002-03 (up to Dec.2002)

Year	1998-1999	1999-2000	2000-2001	2001 – 2002	2002 (up to Dec.2002)
Generation (Million Unit)	2104	2533	2795	2679	2464

In order to enhance the generation capacity, the erstwhile DVB awarded a 330 MW Pragati Power Project to M/s. BHEL on turnkey basis. This work on the project commenced on 05th May, 2000. This project consists of two Gas Turbines of 104 MW and one Steam Turbine of 122 MW. The first and second Gas Turbines were commissioned on 2nd July 02 and 3rd Dec.02 respectively. The third unit (steam turbine) of 122 MW is scheduled to be commissioned by the first week of Feb. 2003.

One of the main features of this project is latest technology being used to limit the NOX (Pollution level) to the level of just 35 PPM as compared to 100 PPM for such type of gas turbines.

(III.) **Transmission and Distribution systems:**

a) **Capacity Addition:**

The power requirements in Delhi are growing @ 7-8 % per annum approximately both in terms of maximum demand and energy requirements. In order to meet this growing demand the T & D system is being augmented at all voltage levels depending upon the requirement in the concerned areas. The capacities added since Dec. 1998 onwards are as under.

Transmission Line Capacity added in Ckt Kms.

Voltage Level	1999-2000	2000-01	2001-02	2002-03
i) 400 KV	--	74	--	--
ii) 220 KV	10.9	--	14.97	5.7
iii) 66 KV	18	--	18.70	4.603
iv) 33 KV	33	40	66.135	2.25
v) 11KV + L V	740	1002	1012	195.567

Sub –station (transformation) capacity added in MVA

Voltage Level	1999-2000	2000-01	2001-02	2002-03
i) 400 KV	--	315	--	--
ii) 220 KV	350	100	200	100
iii) 66 KV	260	60	300	20
iv) 33 KV	157	154	236	30
v) 11 KV	311	248	317	69.043

The second section of 74 C.kt. Kms. Bawana-Bamauli 400 KV double circuit ring main transmission line capable of carrying 4000 MW of power has been energized in October 2000. The work on the 3rd section i.e. Barnauli-Ballabgarh is in progress and is expected to be completed by March'3. After completion of the Delhi ring main at the cost of Rs. 233 crores, the double-circuit transmission line will be capable of carrying 4000 MW of power and will ensure uninterrupted power supply through out Delhi.

b) Installation of Shunt Capacitors

955 MVAR capacity has been added in the system since Dec. 98 to March, 2002. DVB has also commissioned 220 MVAR Shunt Capacitors on the LT system on lease basis, for the first time.

c) Peak Load Demand met

DVB managed to meet the peak load demand to the tune of 3097 MW on 18.07.2002, which is 588 MW higher than the peak load demand of 2509 MW recorded during the year 1998-99. Year-wise peak load demand met and yearly percentage increase is given as under:

Particular	1998-99	1999-2000	2000-01	2001-02	2002-03(up to Dec.02)
Peak Load met (MW)	2509	2580	2690	2879	3097
% age increased over the previous year	6.54	2.83	3.49	7.83	7.57

(IV) Induction of Information Technology in the erstwhile DVB: Exposure to computers and Internet was provided to the officers and staff by arranging trainings at reputed institutes. DVB developed its own website during 2001. Efforts are further on the provide infrastructure for use of I.T. in all spheres of the activities of Delhi Transco Limited.

DEMAND/AVAILABILITY OF POWER FOR DTL UPTO 2011-12 (DURING PEAK HRS0 (UPDATED ON 18.01.2003))

S. No.	STATION PROJECT	ORGN. TO WHICH IT BELONGS	APPROX. COST IN Ps./UNIT	STATUS	ANTICIPATE AVAILABILITY										
					2003-03 IN MW	2003-04 IN MW	2003-05 IN MW	2003-06 IN MW	2003-07 IN MW	2003-08 IN MW	2003-09 IN MW	2003-10 IN MW	2003-11 IN MW	2003-12 IN MW	
A)	EXISTING PROJECTS														
1.	GENCO	GENCO	245	EXISTING PROJECTS	400	400	400	400	400	400	400	400	400	400	
2.	PARGATI PROJECT	PPCL	306	WORK STARTED AT SITE	200	330	330	330	330	330	330	330	330	330	
3.	BTPS	NTPC	235		600	600	600	600	600	600	600	600	600	600	600
4.	BASIC GRID ALLOCATION FROM EXISTING SOURCES				1375	1375	1375	1375	1375	1375	1375	1375	1375	1375	1375
5.	ALLOCATION FROM UNALLOCATED 25% QUOTA				150	150	150	150	150	150	150	150	150	150	150
6.	a) EASTERN REGION b) EASTERN REGION (PEAK POWER)	PTC	188 240		90 40	90 40	90 40	90 40	90 40	90 40	90 40	90 40	90 40	90 40	90 40
7.	YEAR TO YEAR	i) HPSEB” ii) UTTRANCHAL”	250		150 150	440 150	440 150	440 150	500 150	500 150	500 150	500 150	500 150	500 150	500 150
8.	AGGREMENT														
	TOTAL 'A'					3155	3575	3575	3575	3635	3635	3635	3635	3635	3635
B)	ARRANGEMENT FROM UPCOMING PROJECTS														
8.	CHAMERA-II	NHPC		PPA SINGED.	--	30	30	30	30	30	30	30	30	30	
9.	ANTA, AURIYA STAGE-II	NTPC		PPA SIGNED STATE GOVT. GURANTEE AWAITED.	--	--	115	115	115	115	115	115	115	115	
10.	RIHAND STAGE II	NTPC			--	--	80	80	80	80	80	80	80	80	
11.	DHAULI GANGA, HEP	NHPC	235	DO	--	--	--	23	23	23	23	23	23	23	
12.	ALLIAN DHUANGAN		430	PPA SIGNED MOD SIGNED ON 16.02.2000	--	--	--	--	135	135	135	135	135	135	

S. No.	STATION PROJECT	ORGN. TO WHICH IT BELONGS	APPROX. COST IN Ps./UNIT	STATUS	ANTICIPATED AVAILABILITY									
					2002-03 IN MW	2003-04 IN MW	2004-05 IN MW	2005-06 IN MW	2006-07 IN MW	2007-08 IN MW	2008-09 IN MW	2009-10 IN MW	2010-11 IN MW	2011-12 IN MW
13.	NAPTHA JHAKRI		302		--	80	80	80	80	80	80	80	80	80
14.	DHAMWARI SUNDA HEP		280	MOU SIGNED	--	--	--	65	65	65	65	65	65	65
15.	PARBATI	NHPC	386	PPA UNDER CONSIDERATION								80	80	80
16.	KOLDAM	NTPC	250	PPA SIGNED	--	--	--	--	87	87	87	87	87	87
17.	TEHRIDAM PROJECT	THDC		100MW POWER REQUIRE	--	55	55	55	55	55	55	55	55	55
18.	UNCHAHAR-III			MENT BEING SENT	--	--	-	--	--	25	25	25	25	25
19.	DADRI (TH)-II				--	--	-	--	--	50	50	50	50	50
20.	FOZAL-HYDRO	COSMOS	366				6	6	6	6	6	6	6	6
21.	URI-II	NHPC	326								20	20	20	20
22.	PAKULDUL, HEP	NHPC	256										100	100
23.	SEWA-II	NHPC	302							10	10	10	10	10
24.	VAVASI				--	--	--	--	--	400	400	400	400	400
25.	TRIPURA (GAS)	NEEPC	193				100	125	150	200	275	275	275	275
26.	NTPC's PROJECT FROM EASTERN REGION		287	CONSENT FOR 500MW GIVEN PPA UNDER NEGOTIATION	--	--	500	500	500	500	500	500	500	500
27.	TOTAL ' B '					135	936	1049	1296	1831	1926	2006	2106	2106
28.	TOTAL AVAILABILITY				3155	3710	4511	4624	4931	5466	5561	5641	5741	5741
29.	EXPECCTED DEMAND IN MW				3250	3500	3750	4000	4250	4500	4750	5050	5350	5650
30.	SHORTAGE				95	-210	-761	-624	-681	-966	-811	-591	-391	-91

Perspective Plan for Solid Waste**A-IV (i)****MUNICIPAL CORPORATION OF DELHI
OFFICE OF THE DIRECTOR-IN-CHIEF (CSE)
TOWN HALL : DELHI.**

No. F-406/ DNC/2003/44

Dated: 28/04/2004

To
The Member Secretary,
N.C.R. Planning Board,
India Habitat Centre,
New Delhi.

Sub:- Strategies/Master Plan-2021 for Solid Waste for Delhi City.

Sir,

A telephonic message has been received from N.C.R. Planning Board that they are preparing the Master Plan-2021 for NCR Region pertaining to Solid Waste for Delhi City. The Municipal Corporation of Delhi has already forwarded the same to the Delhi Development Authority for incorporating the same in Master Plan-2021. A copy of the same is attached herewith, for ready reference.

Encl: As above.

Sd/-
Director-in-Chief
(CSE)

Copy to:-

- I) P.S. (U.D.) for f/o information.
- II) Commissioner, MCD
- III) Addl. Commer. (CSE)

Director-in-Chief
(CSE)

**MUNICIPAL CORPORATION OF DELHI
CONSERVANCY & SANITATION ENGINEERING DEPARTMENT**

The CSE Department of Municipal Corporation of Delhi is one of the important departments and responsible for management and handling of solid waste as well as disposal of storm water drainage from its jurisdiction which is about 94% of the total area of Delhi. This department is carrying out sweeping from the streets, lanes & roads; and collecting garbage received from the residents in its Dhalaos, besides, storage, transportation and disposal of waste at Sanitary Land Fill sites. Considering the present population of 14 millions and 500 grams of domestic waste per capita (NEERI study), the garbage generated is 6000 to 7000 M.T., per day. With the present pace of growth of population, the population by 2021 shall be around 22 millions and garbage generation shall be around 20,000 M.T. per day with an increase @ 5% approximately (NEERI study).

Strategies for MPD-2021 for Solid Waste

Collection/Storage:

a) Community Bins/Receptacles:

Presently, the MCD have provided Dhalaos and receptacles/community bins at different locations in the colonies/areas for collection and storage of municipal waste. It is generally found that the DDA does not adequately provide such kind of spaces in the existing as well as in new colonies. It is proposed that a space measuring 100 sq. mtr. may be provided on every 8 to 10 thousand population in the colonies/areas to cater to the needs of storage of garbage. In addition to this, spaces measuring around 200 sq. mtr. are to be provided for segregation of different kind of non-biodegradable waste.

b) Attendance Office:

The collection of solid waste is one of the crucial components of the solid waste management. To have effective control in the field as well as on the work, the office of Assistant Sanitary Inspector, a small office, consisting of 100 sq. meter is to be provided in each colony to have effective attendance system and interface with the Residents Welfare Associations. This projection is based on the recommendations of DUEIIP.

c) Facilities for Kabariwalas:

It has been observed that the recyclable waste is being sold to Kabariwalas, which is subsequently recycled depending upon its uses. It would be necessary to have at least two markets in each zone for all 12 zones of MCD, i.e. recycling centers/kabari markets are to be developed by the DDA or MCD to reduce and re-use the recyclable part of the municipal garbage. For developing this kind of facility close to business district centers or near markets, a space of about 1000 Sq. Mtr. shall be required.

d) Space for Storage:

The Municipal Corporation of Delhi have recently handed over the land for development of Millennium Park on Ring Road to the DDA under the orders of the Hon'ble L.G. Delhi measuring 4 Acres. In lieu of this land, it was promised by the Engineer Member, DDA that land measuring 2 Acres will be provided to

MCD by the DDA; but, unfortunately, this could not be materialized. Space measuring around 2 Acres is to be provided in central location for storage of tools and equipments of the CSE Department, in lieu of the land already handed over to DDA for Millennium Park.

Transportation:

a) **Workshop & Parking facilities:**

A space for providing adequate shelter for repair and maintenance of vehicles and other heavy equipments is required to have effective transportation system. Presently, the CSE Department is having about 700 refuse removal trucks and 100 Front-end-Loaders for transportation of waste being generated by the city, which is likely to increase further based on the quantum of garbage generation by 2021. To rationalize the pace of garbage generation, it is required to have 2200 vehicles (NEERI report), for which parking and workshop facility in the existing as well as new colonies likely to come up by 2021 is required to be provided. On an average, a space of area measuring 3000 Sq . Mtr. for at least 5 of the existing areas of different zones, namely Shahdara (South) Zone, Narela Zone, Najafgarh Zone, South Zone and S.P. Zone, is required. For further development of colonies, additional space @ 3000 Sq. Mtr. is required to be given for developing parking and workshop facilities for transportation of garbage.

b) **Transfer Stations:**

To have effective and economical transportation system, intermediate transfer stations are required to be made. It is proposed that at least land for six transfer stations measuring 5000 Sq. Mtr. each may be provided in each of the 12 zones spreading in north, south, east and west directions of the city.

Disposal:

a) **Landfill Sites:**

Presently, the solid waste is being dumped at three SLF sites, namely Bhalswa, Ghazipur and Okhla. These land fill sites have saturated and outlived their normal life. As per Solid Waste (Management & Handling) Rules,2000 notified by the Ministry of Environment and Forest, Govt. of India, the Engineered Sanitary Land Fill sites are required to be developed in each direction of the city to have economical and effective solid waste management. Recently, the Hon'ble Supreme Court of India in its order has pointed out that at least 10 garbage processing facilities are to be provided. The requirement of land for development of engineered S.L.F. site should preferably be in low lying areas and the agency / MCD would be developing it with proper liner for gases and leachets management as per guidelines issued by the Ministry of Environment & Forest, Govt. of India. The approximate area of each land fill site should at least take care of next 20-25 years and garbage intake capacity of 2000 M.T. daily and the area of proposed land for SLF should preferably be around 1500 Acres in totality.

b) **Processing facilities:**

For developing processing facilities for different kind of waste and specialized waste, like Slaughter House Waste and Cow dung, Composting/Pellets etc. by opting various technologies, space measuring about 10 Acres for each facility is

required. These processing facilities should be closed to the waste generating centers namely Dairy colonies or near Slaughter House. Thus, making the total requirement of land as 100 Acres for 10 Processing Units. All these processing facilities are likely to come up on public private partnership basis, as they are highly capital-intensive units.

Disposal of Storm Water Drainage:

The disposal of storm water is one of the crucial components for the urban structure services. In most part of the city wherever low lying colonies have been developed by the Agencies, the responsibility of disposal of storm water lies on the shoulders of the Municipal Corporation of Delhi, for which pumping facilities within the Complex are required. In some colonies, on account of non-availability of space, the problem of water stagnation persists and the residents have to suffer a lot. Considering human factors, it is proposed that wherever low habitation exists in the approved area, the space of 1000 sq. mtr. should be provided to MCD for setting up pumping facilities for proposal disposal of storm water.

Perspective Plan for Solid Waste**A-IV(ii)**

RAKESH MEHTA, IAS
COMMISSIONER

MUNICIPAL CORPORATION OF DELHI

Town hall, Chandni chowk
Delhi-110006

Dear,

You had made observations that you would like to have Master Plan for Treatment and Disposal 2005-2024, which has been prepared by COWI Consultants, so that the same can be incorporated in the Master Plan 2021. As per the Master Plan 2005-2024, a number of activities have been listed in various sites and a number of new technologies have been suggested by the COWI, which includes the following:-

- (i) Setting up Construction and Demolition Waste Treatment Facility
- (ii) Methanisation Plants
- (iii) Compost Plants
- (iv) Bio-Cell Technology
- (v) Refuse Derived Fuels
- (vi) Home Composting

I am enclosing herewith the relevant copies of the Master Plan, which can be included in the Master Plan, 2021. Action Plan for proposed facilities for Waste Treatment and Disposal during the Master Plan Period 2005-2024 is attached at Annexure – 'I'. The details of time frame required for implementing various waste treatment project is attached at Annexure – 'II'. The requirement of land area for various waste treatment facilities for Municipal Solid Waste Management may be seen at Annexure – 'III'.

The total area of land requirement as per the Master Plan is 65.6 hectares, whereas the total area currently available is 41.2 hectares. In the Annexure – III, it has been estimated that the total investment for the above facilities upto 2024 would be Rs.3719.88 crores. The revenue scheme on account of these facilities as has been listed in the Master Plan would amount to Rs.2855.70 crores.

With regards,

Yours sincerely,

Sd/-

(RAKESH MEHTA)

Encl: as above
Shri A.K. Jain,
Commissioner (Planning),
Delhi Development Authority,
Vikas Minar, I.P. Estate,
New Delhi – 110002.

Action Plan

Need for the Action Plan

A Plan of Action has been developed to provide a time schedule and overall breakdown of the main activities for implementation of the Master Plan. The format of the Plan of Action is in such a way that provides an overview of the implementation rather than engages in too many details and inter-linkages between tasks. The aim is to develop a format that can be taken over by MCD, revised and used for monitoring purposes.

The purpose of Action Plan is to evaluate in detail the actions required to convert strategy into practice. The Action plan sets out in detail the steps taken in implementing each component of the overall strategy over a period of time.

Structure of the Action Plan

The Action Plan provides a list of activities for management of municipal solid waste in Delhi and assigns a time frame for implementation of the specified activity. The Action Plan is divided into three time segments:

- The short-term period 2005-2009 (5 years);
- The medium-term period 2010-2014 (5 years);
- The long-term period 2015-2024 (10 years).

The Action Plan is more detailed in its provisions for the short term i.e. for a period of five years. The medium and long-term provisions are less detailed and focus on the major objectives and targets as the detail of the plan will have to take into account the success of the implementation of the objectives for the short term as well as the actual developments.

Development of the Action Plan

Action Plan is a result of continuous interaction with the consultants and the MCD officials. The listed out activities and their time frame of implementation was discussed with MCD officials to arrive at realistic targets.

The Action Plan has been developed by the consultants on the basis of “Financial Model”, the details of which are provided in Volume 7, Master Plan Appendices. The Financial model provides forecast for municipal solid waste quantities, waste flow and land requirements for treatment facilities. It also provides forecast for revenue and the overall costing and financial analysis.

Features of the Action Plan

The key components of the Action Plan are summarised below:

- Institutional Developments of the Conservancy and Sanitation Engineering (CSE) department (e.g. new management principles and new units).
- Development of new sanitary landfills with adequate capacities to cater for municipal solid waste arising in the study area over five year planning period.
- Closure and restoration of existing landfills to minimise the potential for further pollution from these sites.
- New composting schemes/facilities to minimise the demand for sanitary landfill facilities.
- New treatment options of Refuse Derived Fuel (RDF) and Methanisation to minimise the demand for sanitary landfill facilities.
- Public-Private-Partnership for waste treatment projects.

Action Plan 2005 – 2009

The major projects listed out in the Action Plan 2005-2009 are as follows:

- New organisational structure and capacity building in CSE.
- Commissioning of first two pilot facilities based on Methanisation and RDF with daily capacities of 50 and 100 tonnes respectively through a renewed call for proposals from the private sector and rigorous scrutiny in MCD.
- Commissioning of two facilities for processing of Construction and Demolition (C & D) waste.
- Revamping and operation of MCD composting plant at Okhla at a capacity of 200 tonnes per day (tpd).
- Planning of new composting plant with a capacity of approx. 600 tpd.
- Operation of Bhalswa Compost plant (privately operated) at full capacity (500 tpd).
- Operation of NDMC compost plant at full capacity (200 tpd) after discussions between MCD and NDMC.
- Financial and technical support by MCD for two local composting projects implemented by Resident Welfare Association (s) (RWA) and NON Government Organisations (NGOs) at neighbourhood level.
- Commissioning of new sanitary landfills at Jaitpur, Narela Bawana Road and Bhatti Mines of Design, Build and Operate basis.
- Closure of existing three landfills and development of restoration projects.
- Changes to the street sweeping procedures in order to keep this waste separate from other waste streams throughout the storage and transportation process.

Action Plan for the period 2005 – 2009 is presented in the Annexure.

Action Plan 2010 – 2014

The major projects listed out in the Action Plan 2010-2014 are as follows:

- Commissioning of the composting plant planned in the first phase 2005 – 2009.
- Planning of an additional 600 tpd composting plant.
- Commissioning of extension of the planned methanisation plant at Narela Bawana Road to an operating capacity of 250 tpd from 2011.
- Commissioning of additional methanisation plant of 250 tpd capacity, thereby bringing the total capacity for methanisation to a total of 500 tpd.
- Development of a third methanisation facility (also 250 tpd) to be commissioned in 2015.
- Commissioning of extension of the planned RDF facility to an operating capacity of 500 tpd from 2011.
- Designing of a new RDF plant to be tendered for Commissioning in 2015.
- Commissioning of an additional treatment facility in the Bhatti Mines areas for processing approx. 1000 tpd of C & D waste.
- Closure of sanitary landfill at Jaitpur.
- Continuous scheduled extensions of Narela Bawana Road and Bhatti Mines landfills including use of bio-cell technology.
- Finalisation of new landfill site to take over from Jaitpur with all permits obtained.

- Mining of Okhla landfill by a private developer identified through a competitive bidding procedure and the site cleared and used for development of offices and institutions.
- Sites at Gazipur and Bhalswa transformed into recreational areas with landfill gas being utilised at Gazipur.
- Supporting of several local composting projects implemented by RWAs and NGOs through an incentive scheme that provides financial and technical support from MCD.

Action Plan 2015 – 2024

The major projects listed out in the Action Plan 2015 – 2014 are as follows:

- Operation of a total of five composting plants (2100 tpd), three C&D waste processing plants (2000 – 2500 tpd), four methanisation plants (1000 tpd), and three RDF plants (1500 tpd) with a total daily capacity of more than 6600 tonnes.
- Closure and restoration of sanitary landfill at Narela Bawana Road.
- Continuous scheduled extensions of Bhatti Mines and the new landfill with the use of bio-cell technology.
- Finalisation of third new landfill site to take over from Narela Bawana landfill with all permits obtained.
- Supporting of local composting projects implemented by RWAs and NGOs through an incentive scheme that provides financial and technical support from MCD.

The following table provides details of different projects required to be planned, executed and operated with overall supervision of the MCD during the entire Master Plan period (2005 – 2024).

Proposed Facilities for Waste Treatment and Disposal during the Master Plan Period (2005-2024)

Sr. No.	Facility	Proposed Location	Waste Treatment Capacity (tpd)	Area Required (ha)	Area Available (ha)	Start Year of Operation	Project cost (INR)	Remarks
1.	Landfill	Jaitpur	-	10	10	2005	24,00,00,000	Project underway, to be speeded up
2.	Compost (Upgrade)	Okhla, MCD,	200	3.2	3.2	2006	14,02,50,000	Work to start next year
3.	Compost (Upgrade)	Okhla, NDMC,	200	3.4	3.4	2006	14,02,50,000	Discussion required with NDMC
4.	Landfill	Narela Bawana Road	-	112	62	2007	168,00,00,000	Work to be speeded up urgently, addl land requirement to be addressed.
5.	C & D	Burari, Jahangirpuri	500	3.92	20.98	2007	15,00,00,000	Project to commence next year
6.	C & D	Bakarwala	500	3.92	2.1	2007	15,00,00,000	Project to commence next year
7.	Methanisation (Pilot)	Narela Bawana Road	50	2.5	2	2007	16,00,00,000	Project to commence next year
8.	RDF (Pilot)	Burari, Jahangirpuri	100	5.	5	2007	15,00,00,000	Project to commence next year
9.	Landfill	Bhatti Mines	-	73	0	2008	224,00,00,000	Work to be speeded up, land acquisition is a priority.
10.	Compost	To be identified	600	12		2010	30,60,00,000	Land identification to begin in 2004.
11.	Methanisation (upgrade)	Narela Bawana Road	250	-	-	2011	72,00,00,000	Project to commence in 2009.
12.	Methanisation	To be identified	250	2.5		2011	72,00,00,000	Land identification to begin in 2004.
13.	RDF (upgrade)	Burari, Jahangirpuri	500	-	-	2011	60,00,00,000	Project to commence in 2011.
14.	Compost	Bhalswa, private	500	4.9	4.9	2013	0	Assuming 25% investment by MCD.
15.	C & D	Bhatti Mines	1000	7.85	2.5	2014	15,00,00,000	Project to commence in 2013.
16.	Compost	To be identified	600	12		2015	30,60,00,000	Land identification by 2010, Project to commence in 2013.
17.	Methanisation	To be identified	250	2.5		2015	80,00,00,000	Land identification by 2010, Project to commence in 2013.
18.	RDF	To be identified	500	5		2015	75,00,00,000	Land identification by 2010, Project to commence in 2013.
19.	Methanisation	To be identified	250	2.5		2020	80,00,00,000	Land identification by 2010, Project to commence in 2018.
20.	RDF	To be identified	500	5.		2020	75,00,00,000	Land identification by 2010, Project to commence in 2018.
	Total		6750	271.19	116.08		1071,25,00,000	

Proposed Projects and Facilities for Waste Treatment and Disposal as suggested by the Master Plan (2005-2024)

Facility/Project	Proposed Location	Start	Finish	Remarks
Capacity Building in CSE of MCD	-	Jun-04	May-05	
Waste management unit in CSE	-	Jun-04	May-05	
Upgrade of Existing and Establishment of new Compost Plants				
Okhla MCD Plant upgrade	Okhla	Jun-04	Dec-05	
Okhla, NDMC Plant upgrade	Okhla	Jan-06	Jan-06	Discussion with NDMC
Bhalswa Compost Plant upgrade	Bhalswa	Jan-06	Jan-06	Discussion with plant operator
New Plant I	To be identified	Jan-07	Dec-09	Land acquisition is a priority
New Plant II	To be identified	Jan-17	Dec-19	Land acquisition is a priority
Construction Demolition Waste Processing (C&D) Plants				
Phase I (two facilities)	Burari, Bakarwala	Jan-05	Dec-06	
Phase II	To be identified	Jul-13	Dec-14	
Biomethanisation Plants				
Pilot Plant	Narela Bawana Road	Dec-04	Dec-06	
Upgrade of Pilot Plant	Narela Bawana Road	May-09	Dec-10	
Plant II	To be identified	Nov-08	Dec-10	Land acquisition is a priority
Plant III	To be identified	Nov-12	Dec-14	Land acquisition is a priority
Plant IV	To be identified	Nov-17	Dec-19	Land acquisition is a priority
Refuse Derived Fuel (RDF) Plants				
Pilot Plant	Burari,	Nov-04	Dec-06	
Upgrade of Pilot Plant	Burari,	May-09	Dec-10	
Plant II	To be identified	Nov-12	Dec-14	Land acquisition is a priority
Plant III	To be identified	Nov-17	Dec-19	Land acquisition is a priority

Facility/Project	Proposed Location	Start	Finish	Remarks
Existing and New Sanitary Landfills				
New Ldf. at Narela Bawana Road	Narela Bawana Road	May-04	Jun-06	
Closure of Bhalswa Landfill	Bhalswa	Jul-05	Feb-08	
New Landfill at Jaitpur	Jaitpur	Jul-04	Jul-05	
Closure of Okhla Landfill	Okhla	Feb-06	Sep-08	
New Landfill at Bhatti Mines	Bhatti Mines	Aug-06	Aug-08	Land acquisition is a priority
Closure of Gazipur Landfill	Gazipur	Aug-08	Apr-11	
Street Sweeping				
Better procedures	Whole Delhi	May-05	Mar-07	
Neighborhood Composting				
Neighborhoods Projects	To be identified	Jan-06	Dec-06	
Public Information and Education				
Campaigns/source segregation	Whole Delhi	May-05	May-12	

Current Approval Procedure for Waste Facilities

An issue that is a serious hindrance for timely implementation of projects is the current approval procedure for waste management facilities (and others).

The procedures required in taking projects from concept to completion require several procedural issues to be completed, not only within MCD but also with other Authorities. Typical procedures followed in various projects along with timeframes required are stated in table. Time frames mentioned here are only an approximation on the basis of past experience, in the case of landfills and compost plants.

Table 3.2 : Timeframes Currently Required by CSE Department for Implementing Waste Management Projects

Sr. No.	Activity	Time required in months
1.	Screening of suitable sites incorporating requirements of the MSW rules, 2000; and preliminary feasibility assessment for acquisition of the land	3
2.	Preparation of preliminary estimates, obtaining administrative and technical approval from within MCD	2
3.	Preparation of detailed estimate, checking by the planning department and obtaining technical sanction	2
4.	Notice inviting tender	1
5.	Receipt and evaluation of tenders, checking by planning department	2
6.	Approval by Finance Department	1
7.	Preparation of preamble and approval by Standing Committee	2
8.	Carrying out rapid EIA of the selected site	6
9.	A survey of the selected site by the DPCC/CPCB and approval of the same by the DDA/DPCC/CPCB (possibly also by the central water commission – CWC);	3
10.	Confirmation of the land for the selected purpose by a technical committee;	3
11.	Central ground water authority approval	3
12.	No objection certificate from Pollution Control Board	3
13.	Approval of the location by the DDA and its incorporation in the Master Plan;	6
14.	The implementing agency will then approach the land owning agency for land allocation. These could be MCD / DDA / L & DO/cantonment board / DJB / private owners or others. (land is to be given to the MCD for setting up treatment and disposal facilities on a priority basis under a recent ruling of the hon'able supreme court of India);	6
15.	Incorporation of the land in the MPD (DDA master plan);	6
16.	Planning, design and development of the area by the Conservancy and Sanitation Engineering (CSE) department of the MCD considering the guidelines laid down by the MSW rules, 2000;	6
	Total	56
17.	Construction and subsequent operation of the selected site with periodic inspection by the concerned agencies.	Variable

Under the current regime, it is thus likely that development of new treatment and disposal sites will take up to 56 months or almost 5 years from site identification to start of construction of the planned facility. However, this time may be reduced if some of the above activities are run in parallel, c.f. section 3.4.4.

Targets for Waste Treatment (tpd)

	2005	2009	2014	2019	2024
Total daily waste quantity collected	5,711	7,086	9,000	11,345	14,302
Waste for treatment	850	1,882	3,350	4,797	5,839
Waste for landfilling, direct supply	4,861	5,203	5,650	6,549	8,462
Waste for landfilling including residues	4,949	5,431	6,246	7,483	9,613

The table provides an overview of the facilities for treatment and disposal proposed for the Master Plan Period.

Proposed Facilities for Treatment and Disposal

Facility	Location	Capacity tpd	Area Requirements (ha)	Total Area Available, ha	Start Year of Operation
Composting Plant	North Zone	500	4.9	4.9	2013
Composting Plant	Okhla, MCD (Upgrade)	200	3.2	3.2	2006
Composting Plant	Okhla, NDMC	200	3.4	3.4	2006
Composting Plant (s)	New site	600	12		2010
Composting Plant (s)	New site	600	12		2015
C & D Processing Plant	North Delhi	500	3.92	3.92	2007
C & D Processing Plant	West Zone	500	1.3	2.1	2007
C & D Processing Plant	South Zone	1000	2.5	2.5	2014
Methanisation Plant	North Zone	50	2.5	2	2007
Methanisation Plant	North Zone	250	-	-	2011
Methanisation Plant	New site	250	2.5		2011
Methanisation Plant	New site	250	2.5		2015
Methanisation Plant	New site	250	2.5		2020

Facility	Location	Capacity tpd	Area Requirements (ha)	Total Area Available, ha	Start Year of Operation
RDF Plant	North Zone	100	5	5	2007
RDF Plant	North Zone	500	-	-	2011
RDF Plant	New site	500	5		2015
RDF Plant	New site	500	5		2020
Total area requirement			65.6		
New Developments				41.2	

The table shows the accumulated landfill need for the Master Plan period as well as the corresponding area need assuming an average landfill height of 20 metres. The estimated landfill volumes at the three proposed sites at Jaitpur, Narela Bawana Road and Bhatti Mines are included as well.

Landfill Volume Needs in the Master Plan Period

The total landfill volume need in Master Plan Period 2005-2024	40,972,851 m ³
The total landfill area required in Master Plan Period 2005-2024	205 ha.
Estimated volume remaining at the three existing sites (from 2005);	~5,00,000 m ³
Estimated volume at the three proposed new sites;	
Jaitpur	25,00,000 m ³
Narela Bawana Road (assuming additional land near site is acquired)	150,00,000 m ³
Bhatti Mines (identified pits only)	200,00,000 m ³
Total volume identified for the Master Plan period	380,00,000 m ³
Landfill volume requirements for the Master Plan Period	445,16,237 m ³
Shortfall in volume after all identified volumes have been used	85.4%

Commercial Aspects of the Recommended Master Plan for Treatment and Disposal

A number of assumptions were made to arrive at the capital costs for implementation of SWM master plan for Delhi. The total developmental costs, based on these assumptions, in the form of investments and annual operation and maintenance costs can be summarised as per the table.