

Chapter - VI

Infrastructure

Water Supply and Sanitation

A. Introduction

Provision of water supply for potable purposes as well as commercial and industrial uses, evacuation of used water and ensuring good sanitation are basic to economic development and safeguarding the health of the people of Chennai Metropolitan Area. This calls for integrated programmes and management efforts over the entire urban area covering the City, the Municipal Towns, the developing Urban Local Bodies and the new areas that will become urbanized.

B. Current Scenario

6.2 The present situation is that while the city corporation area is better served with water and sanitation infrastructure and facilities, the rest of the area suffers in comparison. The following table brings out the wide differences both in terms of public supply of drinking water to resident population and sewerage and sanitation systems.

Table No. 6.1 Water Supply and Sewer Current Scenario in Selected Municipalities in CMA				
Area	Max. Water Availability million litres per day 2007	Per capita Supply Best of Times (lpcd)	Extent of Sewered Area %	Effluent Treated million litres per day 2007
Chennai City	645	107	99	486
Selected Municipal Towns				
Thiruvottiyur	30	11	No UGD (for a part)	No Treatment plant
Madhavaram	5	54	No UGD	No Treatment plant
Pallavaram	5	46	No UGD	No Treatment plant
Ambattur	4	27	No UGD	No Treatment plant

Source: Commissioner of Municipal Administration

6.3 While the supply side situation overall is as above the availability of services for the poorer sections is minimal. Even in the better-served City area most of the slum settlements – more than 90% of slum households – receive water from metro tankers (according to a recent study). In spite of near 100% underground sewerage available in the City, the toilets (including community/public latrines) connected to the sewer system cover only 77.5% of slum households. According to a recent survey, less than 30% of slum households have individual latrine facilities.

Quality of Water

6.4 The following Table shows the quality of water supplied by Metro water to the City.

Table No. 6.2 Quality of Water Supplied by CMWSSB in Chennai city

Principal Parameters of Quality	WHO Standard	Quality As Realised at Consumer End
1. Turbidity (NTU)	10 Max	5
2. Colour (unit on platinum cobalt scale)	25 Max	Colourless
3. Total Dissolved Solids (mg per litre maximum)	2000 Max	370

Source: CMWSSB

6.5 The Metro water gets the water supply from a diverse number of sources from lakes and tanks fed by monsoon, underground aquifers as well as distant sources such as from Krishna River and Veeranam Lake. In addition water is sourced from open and shallow wells, bore-wells not only from the CMA but also from places outside by individuals, institutions and water tanker operators. The following Table shows these different Metro water sources.

Table No. 6.3 Sources and Availability of water

Source	Quantity in Mld
Public	200
Poondi, Sholavaram, Red Hills Lake System (including diversion of flood flow from Araniyar to Korataliyar)	
Ground Water from Northern Well Fields	100
Southern Coastal Aquifer	5
Sub Total (A)	305
Krishna Water I Stage	400
Krishna Water II Stage	530
New Veeranam (CWSAP-I)	180
CWSAP-II (Proposed)	20
Sea Water Desalination (Proposed)	200
Sub Total (B)	1330
Grand Total (A) + (B)	1635
Mark II hand pumps (public)	6970 Nos.

Source:CMWSSB

6.6 The salient features of the Sewerage Macro System Units are given below: All the locations except Nesapakkam are at the edge of the City. The total treatment capacity is 481 MLD per day as against an estimated sewage generation of at least 700 MLD.

Table No. 6.4 Salient Features of the Sewerage Macro Systems Treatment Units

Zone	Location	Type	Capacity (mld)
I	Kodungaiyur	Activated Sludge Plant	270
II	Kodungaiyur	Activated Sludge Plant	
III	Koyambedu	Activated Sludge Plant	94
IV	Nesapakkam	Activated Sludge Plant	63
V	Perungudi	Activated Sludge Plant	54
Total			481

Source: CMWSSB

6.7 Localised sewerage systems are in existence in Alandur, Valasaravakkam, and Ambattur. Several of them are partial and a few of them have just been completed. In respect of the local bodies of Pallavaram, Tambaram, Madhavaram, Kathivakkam, Porur,

Ullagaram, Puzhithivakkam, Avadi, Maduravoyal and Thiruvottiyur proposals have been formulated for instituting underground sewerage systems.

6.8 Metro water has taken up the development of water supply and sewerage system along the IT Corridor being established south of Chennai for a projected future demand of 50 MLD. Concurrently an underground sewerage system is also proposed. This corridor will include a number of Town and Village Panchayats on both sides of the Rajiv Gandhi Salai (OMR).

Equity Considerations

6.9 In the present system there is a wide disparity in the quantity, quality and timing and methods of water supply as between the general category of consumers and consumers with low affordability. It should be the effort to design a system based on use for drinking purposes and personal hygiene as common to all groups and requirements for sanitation depending upon the quantities for toilet flushing. Even in the European context many of the cities are proposing a supply of between 100 and 120 lpcd for residential supply with nearly 50% sourced from recycled water for toilet flushing.

C. Principal Stakeholders

6.10 According to the Chennai Metropolitan Water Supply and Sewerage Act Metro water is responsible for supply of protected water and provision of sewerage facilities over the whole of CMA extending to 1189 sq.km. However presently its activities are confined to the City Corporation limits within 176 sq.km. and a further 8 sq.km. in the immediate environment of the City. Metrowater should strive to extend its operations gradually to cover the entire CMA. The principal stakeholders in the public sector in the rest of the CMA are the local bodies, municipalities and town and village Panchayats. These local bodies are mainly responsible only for maintenance of the system and distribution installed by Tamil Nadu Water Supply and Drainage Board (TWAD) a parastatal organization. Recently however Government has directed the Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) to be the nodal agency for execution and maintenance of underground sewerage schemes in the adjacent and distant urban areas within the CMA. Under this directive CMWSSB is required to develop proposals for execution of a comprehensive sewerage system for the entire metropolitan area in addition to existing sewerage system in Chennai.

6.11 In the private sector apart from individuals and institutions tanker contractors and bottled water suppliers are the main stakeholders. Organised stakeholders for evacuation of sewage is practically non-existent. The owners of properties are responsible for cleaning up of septic tanks. Septic tank water overflows are common in the extended areas.

D. Projection of Needs

6.12 Future demand for water in the CMA has been estimated separately for the City, the Municipalities, Town Panchayats and Village Panchayats assuming different supply standards from 150-120-100 lpcd for the City, 125-100-75 lpcd for Municipalities, 100-80-60 for Town Panchayats and 80-70-60 for the Village Panchayats. The annexed table (Annexure I) shows the water demand projections for 2026 for residential, commercial and industrial uses for the three scenarios mentioned above.

6.13 The demand for various uses is summarized in the following table as high, medium and low projected needs (Scenarios 1,2 and 3 respectively).

Table No:6.5 Estimation of Water Requirements for Various Uses - CMA (in MLD)			
Use	High - Scenario 1	Medium – Scenario 2	Low – Scenario – 3
Residential	1606	1296	1046
Commercial	482	324	210
Industrial	161	130	105
Total	2248	1750	1360

6.14 An assessment (September 2007) of abstractable reliable quantity of water from various sources is given in the following table:

Table No:6.6 Safe Yield from Different Sources			
Sl. No.	Name of source	Safe Yield in MLD	Remarks
1.	Poondi – Sholavaram – Red Hills Lake System	227	Based on the assessment during 1997 revision of Master Plan for water supply.
2.	Groundwater aquifer from Northern Well Field	68	
3.	Other sources like Southern Coastal Aquifer, Rettai Eri, Porur, etc.	5	
4.	Receipt of Krishna Water from Telugu Ganga Project (when full agreed quantity of 930 MLD (12 TMC) supplied)	837	10% loss from entry point to Poondi Lake has been considered.
5.	Veeranam lake (CWSAP-I)	180	
6.	Desalination Plant	200	a) 100 MLD in 2008 b) 100 MLD in 2009
7.	Local sources including Palar River in the CMA area other than City limits.	32	Based on the assessment during 1997 revision of Master Plan for water supply.
8.	Abstractable quantity of local groundwater in the city for uses other than drinking and cooking	240	
9.	Waste water reuse a) Already in use b) Expected in future (SIPCOT use)	45 120	From 2009
Total		1954	

Source: CMWSSB

6.15 Taking into account the pressure on available sources of supply particularly from groundwater for future planning scenario – I projections may be taken as a realistic supply to be achieved. This scenario requires only 2088 MLD of potable water for residential and commercial uses which is nearly equal to the safe yield from public supply taking into account all existing sources including the sea water desalination plant for 100 mld under construction at Kattupalli. If recycling of grey water for latrine flushing purposes is taken into account it would reduce the requirement of potable water further.

6.16 The water for industrial needs are assessed between 161 to 105 mld. The present sewage treatment capacity of the Chennai system is 481 MLD and on recycling could yield at least 300-400 MLD. which can very well meet not only the 2026 industrial demand but also meet any further demand by industries as far as the quantity is concerned.

6.17 Raising water supply standards beyond scenario – III will not only increase the cost of supply and distribution but also impinge on the treatment of used water which if not undertaken would lay a heavier toll on environmental safety.

E. Policies and Strategies

6.18 In the light of the above the following policies and strategies would lead to sustainable use of water resources without affecting future urban development of CMA in anyway.

- a) Since all major sources have been tapped, Metro water's emphasis should now shift to holistic management of water and optimizing local resources.
- b) It should immediately embark on identifying management measures including augmentation of local sources within the Chennai basin. The measures include
 - i) maximizing rainwater harvesting from public areas and un built areas,
 - ii) increasing storage capacity of surface tanks,
 - iii) recharge of known and new aquifers,
 - iv) recycling of black and grey water,
 - v) reduction of loss through evaporation,
 - vi) cutting down transmission losses and other avoidable losses at the consumers' end.
 - vi) metering of all apartments and
 - vii) restructuring of tariff.
- c) Metro water should ensure that the quality of water supply conforms to those prescribed by the Central Public Health and Environmental Engineering Organisation (CPHEEO).

- d) Metro water should be made responsible only for the allocation of water resources to constituent local bodies based on their population and standard of supply arrived at.
- e) Expensive underground sewerage system should be limited to dense areas outside the City where metro-water would be responsible for construction, operation and maintenance of the systems.
- f) Provision of integrated sewerage systems for the urban local bodies that are contiguous to each other should be planned so that the sewage generated from more than one local body can be treated in a single sewerage treatment plant.
- g) The Alandur model of public-private participation could be replicated in other areas.
- h) The existing and proposed sewage treatment plants should be able to deliver treated water that can be used for industrial use, for other non-potable uses and for recharging surface reservoirs and underground aquifers.
- i) Metro Water can use a GIS based information system for long-term assets management and strengthening.

Area Policies

- a) Local bodies to develop action plans for distribution of water allocated to them and other identified local sources of water in collaboration with metro water.
- b) Local bodies to develop action plans for low-cost and alternative sanitation facilities in non-sewered areas.
- c) Use of recycled grey water for toilet flushing purposes and gardening and other uses will be made mandatory for all new developments above the prescribed level of developments.

F. The Plan

6.19 The plan recommends allocation of water to areas within the City and outside as follows in order to encourage equitable distribution, providing opportunities for balanced development and improving living quality in the outlying areas of the City.

Table No. 6.7 Water Allocation 2026 _CMA				
Area	Estimated Population 2026 In lakhs	Total Water Allocated 2026 MLD	Residential and Commercial MLD	Industrial Use MLD
Chennai City	58.56	949	879	70
Total CMA (Outside City)	67.26	802	743	59
North CMA (Thiruvallur District)	38.47	474	438	35
South CMA (Kancheepuram District)	28.79	328	305	24
Total	125.82	1750	1621	129

Note: Industrial use may have to be met mainly from recycled sewage.

6.20 The total water allocation is made up of 1635 MLD of water available from all present sources including desalination and 185 MLD of recycled sewage water. If additional recycled water is available the pressure on potable water will be reduced to that extent. The institution of conservation and management measures including local recycling of grey water for toilet flushing purposes would bring down the demand for further potable water and thus the need for exploring new sources such as additional desalination of water. It will also increase the long-term sustainability of the water sector and at the same time reduce adverse environmental impact from used water.

6.21 CMDA would facilitate in collaboration with Metro water formulation of local action plans by municipal bodies and viable groups of local bodies for instituting water distribution infrastructure and common sewage treatment plants.

6.22 The plan recommends a comprehensive hydro geological study for west CMA area including the Sriperumbudur area where presently the data is inadequate for identifying new underground aquifer recharge areas.

6.23 The plan recommends preparation of a water map indicating all potential surface and groundwater sources. The Integrated Water Management Plan may include desilting of existing lakes for augmentation of storage of rain/flood water and capturing monsoon run-off. The concept of zero run-off drainage with retention ponds, sediment traps and balancing lakes should be adopted.

6.24 The plan recommends the renovation and refurbishing about 320 surface tanks for augmenting local resources of potable water. The tanks that can be taken up on a priority basis are given in the Annexure II.

6.25 Parameters for conservation and better management of water and parameters for installation of sanitation and recycling in new developments are incorporated in the Development Regulations.

G. Electricity

6.26 Power is a basic infrastructure influencing the growth of industrial, agricultural and service sectors and ultimately the economic development. One of the determinants for quality of life is the level of availability and acceptability of affordable and quality power. It is one of the sectors, to which Government is giving priority in fixing the plan outlays at national as well as state levels.

6.27 Total number of HT and LT consumers in Chennai city is 21.14 lakhs with a connected load of 6289 MW as on 31.03.07. The maximum peak reached in 2006-07 in

Chennai was 1723 MW and the average daily consumption is between 30 to 35 MU. The generating stations of 1396 MW capacity in and around the City are as detailed below:

NCTPS	630 mw	(Coal based thermal station - TNEB)
ETPS	450 MW	(coal based thermal station - TNEB)
BBGTS	120 MW	(Gas based station - TNEB)
GMR VASAVI	196 mw	(Diesel based station - IPP)
Total	1396 MW	

6.28 The projected demand of Chennai area has been arrived based on the projected population for the period upto 2026 and by taking percapita consumption of 1 kw/person. The additional requirement of power at the end of each Plan period is as follows:

At the end of	2006 - 11	1100 MVA
	2011 - 16	1200 MVA
	2016 - 21	1400 MVA
	2021 - 26	1500 MVA

To cater to the additional requirements of power, the details of the new substations proposed by TNEB in the Chennai area upto 2026 are given below.

Table No. 6.8 New Sub Stations proposed								
Sub Station	2011		2016		2021		2026	
	No.of SS	Capacity in MVA	No.of SS	Capacity in MVA	No.of SS	Capacity in MVA	No.of SS	Capacity in MVA
765 KVSS	-	-	-	-	1	3000	1	3000
400 KVSS	2	1260	2	1260	3	1890	3	1890
230 KVSS	6	1200	6	1200	9	1800	9	1800
110 KVSS	22	1100	24	1200	36	1800	36	1800
33 KVSS	44	704	48	768	72	1152	72	1152
Total	74		80		121		121	

It is planned to establish a thermal station at northern Chennai with the capacity of 1000 MW during the 11th Plan period under joint venture with National Thermal Power Corporation.

6.29 To meet the load growth due to increased industrial activity and population, TNEB is preparing and implementing a master plan for infrastructure development for every 5 years to meet out the load growth / demand with a perspective view to supply reliable and quality power to the consumers.

H. Postal Services

6.30 For growth and modernization, an efficient postal system is crucial and postal system is fast emerging as an important component of modern communication and I.T. sector. Our Indian postal system is the largest in the world. It also plays a crucial role in resource mobilization, apart from providing a variety of postal services. Major initiatives envisaged in the Tenth Plan include

- Up-gradation constituting the bulk of outlay proposed, identifying computerization and connectivity as the core activity in the tenth Plan, coupled with modernization and mechanisation programme and
- Expansion of postal network business development and
- financial services.

6.31 In CMA, a wide network of postal system exists and serves the population effectively. There are 134 major post offices in CMA. The postal department may have to dovetail their plan taking into account the population projection, distribution etc. envisaged in this Master plan.

I. Telecommunication

6.32 Telecommunication is an important tool for socio-economic development. Department of Telecommunication has been formulating development policies for accelerating the growth of telecom services in our country. There have been far-reaching developments in the recent past in the telecom, IT, consumer electronics and media industries worldwide. Considering the above and also to facilitate India's vision of becoming an IT superpower and develop a world-class telecom infrastructure in India, a New Telecom Policy was announced in 1999.

6.33 The New Policy Framework will focus on creating an environment, which enables continued attraction of investment in the sector and allow creation of communication infrastructure by leveraging technological development.

6.34 The area of operation of Chennai Telephones is co-terminus with the CMA boundary notified by CMDA. There is an exponential growth in Chennai in the last decades. It has grown from 26 exchanges with 2, 14,400 lines in 1992 to 209 modernized exchanges with equipment and total capacity of 17, 86,079 lines in 2005. Number of exchanges has grown to 331 in 2006. According to BSNL, in Chennai telephone district the number of their landlines were 10.09 lakhs and their cell phone connections were 5.78 lakhs. BSNL telephone density in Chennai alone works out to 20.08 and when the connections given by the private players also are taken into account the telephone density in Chennai may be in the order of about 30.

J. Monitoring and Review

6.35 A committee to be known as “Shelter and Infrastructure Committee” with representation of Government and non-government stakeholders and experts will be constituted to monitor the implementation of policies and strategies in this sector including water supply and sanitation and to initiate such studies and assemble such information as needed for the purpose. This committee will meet at least once in three months or as many times as needed. It will draw up detailed terms of reference for its work in consultation with the concerned stakeholders.

6.36 This committee may work through special working groups created for the purpose for the different sub-sectors under it.

Annexure - I

Estimates of water requirements					
I. Chennai City		Year			
		2011	2016	2021	2026
1.	Population in lakhs	49.95	52.39	55.4	58.56
2.	Water requirement in MLD for the resident population				
(a)	@ 150 lpcd	749	786	831	878
(b)	@ 120 lpcd	599	629	665	703
(c)	@ 100 lpcd	500	524	554	586
3.	Water requirement in MLD for the other than residential use such as office, commercial, industrial premises and other places of employment, education, etc.				
(a)	@ 30% of 2(a) above	225	236	249	264
(b)	@ 25% of 2 (b) above	150	157	166	176
(c)	@ 20% of 2(c) above	100	105	111	117
4.	Industrial use				
(a)	@ 10% of the 2(a) above	75	79	83	88
(b)	@ 10% of the 2(b) above	60	63	66	70
(c)	@ 10% of the 2(c) above	50	52	55	59
5.	Total requirement				
	@150 lpcd	1049	1100	1163	1230
	@120 lpcd	809	849	897	949
	@100 lpcd	649	681	720	761
II. Municipalities in CMA					
1.	Population in lakhs	21.75	25.60	30.20	35.69
2.	Water requirement in MLD for the resident population				
(a)	@ 125 lpcd	272	320	378	446
(b)	@ 100 lpcd	218	256	302	357
(c)	@ 75 lpcd	163	192	227	268
3.	Water requirement in MLD for the other than residential use such as office, commercial, industrial premises and other places of employment, education, etc.				
(a)	@ 30% of 2(a) above	82	96	113	134
(b)	@ 25% of 2 (b) above	54	64	76	89
(c)	@ 20% of 2(c) above	33	38	45	54
4.	Industrial use				
(a)	@ 10% of the 2(a) above	27	32	38	45
(b)	@ 10% of the 2(b) above	22	26	30	36
(c)	@ 10% of the 2(c) above	16	19	23	27
5.	Total requirement				
	@125 lpcd	381	448	529	625
	@100 lpcd	294	346	408	482
	@75 lpcd	212	250	294	348
III. Town Panchayats					
1.	Population in lakhs	5.89	7.41	9.45	12.21
2.	Water requirement in MLD for the resident population				
(a)	@ 100 lpcd	59	74	95	122
(b)	@ 80 lpcd	47	59	76	98
(c)	@ 60 lpcd	35	44	57	73

3.	Water requirement in MLD for the other than residential use such as office, commercial, industrial premises and other places of employment, education, etc.				
(a)	@ 30% of 2(a) above	18	22	28	37
(b)	@ 25% of 2 (b) above	12	15	19	24
(c)	@ 20% of 2(c) above	7	9	11	15
4.	Industrial use				
(a)	@ 10% of the 2(a) above	6	7	9	12
(b)	@ 10% of the 2(b) above	5	6	8	10
(c)	@ 10% of the 2(c) above	4	4	6	7
5.	Total requirement				
	@100 lpcd	82	104	132	171
	@80lpcd	64	80	102	132
	@60 lpcd	46	58	74	95
IV. Village Panchayats					
1.	Population in lakhs	10.59	12.96	15.99	19.88
2.	Water requirement in MLD for the resident population				
(a)	@ 80 lpcd	85	104	128	159
(b)	@ 70 lpcd	74	91	112	139
(c)	@ 60 lpcd	64	78	96	119
3.	Water requirement in MLD for the other than residential use such as office, commercial, industrial premises and other places of employment, education, etc.				
(a)	@ 30% of 2(a) above	25	31	38	48
(b)	@ 25% of 2(b) above	19	23	28	35
(c)	@ 20% of 2(c) above	13	16	19	24
4.	Industrial use				
(a)	@ 10% of the 2(a) above	8	10	13	16
(b)	@ 10% of the 2(b) above	7	9	11	14
(c)	@ 10% of the 2(c) above	6	8	10	12
5.	Total requirement				
	@80 lpcd	119	145	179	223
	@70lpcd	100	122	151	188
	@60 lpcd	83	101	125	155

Total Estimate of Water Requirement (CMA)					
Chennai Metropolitan Area		Year			
		2011	2016	2021	2026
1.	Population in lakhs	88	100	112	126
2.	Water Requirement in MLD for the resident population				
a)	Scenario I	1165	1284	1431	1606
b)	Scenario II	938	1035	1154	1296
c)	Scenario III	762	838	933	1046
3.	Water requirement in MLD for the others from residential use such as office, commercial, industrial premises and other places of employment, education etc.				
	Scenario I	349	385	429	482
	Scenario II	235	259	289	324
	Scenario III	152	168	187	295

4.	Industrial Use				
	Scenario I	116	128	143	161
	Scenario II	94	103	115	130
	Scenario III	76	84	93	105
5.	Total Requirement				
	Scenario I	1631	1797	2003	2248
	Scenario II	1267	1397	1558	1750
	Scenario III	990	1090	1213	1360

Annexure - II

List of Tanks to be renovated on priority basis

1. Porur Eri
2. Perugudi Eri
3. Kovilambakkam Eri
4. Tambaram pudhu Thangal
5. Tambaram pudhu Eri
6. Kadaperi
7. Pallikaranai Narayanapuram Eri
8. Pallikaranai Anai Eri
9. Pallavaram Eri
10. Velacehry Eri
11. Ayanampakkam Eri
12. Ambattur Eri
13. Korattur Eri
14. Nadukuthagai Eri