

## PROJECT NOTE

### Project Background:

Mumbai Metropolitan Region Development Authority (MMRDA) is the planning and implementing agency for all infrastructure development projects such as road widening, new roads, bridges, flyovers, ROBs, subways, elevated roads, Metro-Monorail Projects, Water Resource Development and other related works for the Mumbai Metropolitan Region (MMR).

As part of above activities, MMRDA has conceived a regional water supply scheme with the Surya River as the source for 403 Mld bulk water supply for meeting partially the water requirements Western Sub-region comprising of Vasai-Virar City Municipal Corporation (VVCMC), Mira Bhayander Municipal Corporation (MBMC) and 27 villages outside VVCMC area.

The scheme approval and water allocations are;

Administrative approval by MMRDA (For 303 Mld) Rs.945-00 Crore

Water allocation in Surya River by Water Resources  
Department of Maharashtra State

i)	GR dtd.23.05.2009	42.65 Mm3
ii)	GR dtd.07.12.2011	67.18 Mm3
iii)	GR dtd.21.08.2013	36.50 Mm3
	Total	146.33 Mm3

The allocation is adequate for 403 Mld water supply. The distribution between the two ULBs is as below:

1) MBMC = 218 MLd, (2) VVCMC = 170 MLd, (3) 27 Villages = 15 MLd, Total = 403 MLD

The population projections, water demand & present water supply in MBMC & VVCMC are presented subsequently. It may be noted that it is beneficial for these ULBs that MMRDA has undertaken this project on behalf of two ULBs.

Mira Bhayander (Profile of the City )

Mira Bhayander Municipal Corporation was formed in the year 2002 by merging the two towns i.e Mira and Bhayander.

Mira Bhayander which is part of Thane district is located at the northern threshold of Greater Mumbai. This area which has been identified as one of the growth center around Mumbai is well connected with the metropolis by suburban commuter rail and Mumbai Ahmedabad National Highway.

Mira Bhayander Municipal Corporation with an area of 79 sq.km served by Western Railway suburban service has significant growth potential. Due to close proximity to Greater Mumbai, the Mira Bhayander City is experiencing very rapid urban growth. With prohibitive land prices in Mumbai, low and middle income households are shifting to the Mira Bhayander. Thus, it presently serves as a growing dormitory to the Mumbai City.

## Population Projections, Water demand – Present Supply And Shortfall

Population projections, water demand, present supply and shortfall are as under. Presently the city receives 85MLd and 35 MLd from two different sources.

Year	Population (Lakhs)	Water Demand (MLd)	Present Supply (MLd)	Shortfall	
				(MLd)	Percentage
2011	8.15	122	120	2	1.60
2016	10.29	154	120	34	22.10
2021	13.05	195	120	75	38.50
2031	19.55	293	120	173	59.00
2041	24.43	366	120	246	67.20
2046	27.37	411	120	291	70.80

It is seen that shortfall in the year 2021 is 75 MLd which is nearly 38.5%. The situation shall become alarming unless water supply is augmented. On realizing 218 MLd bulk water supply from Surya RWSS, the shortfall up to the year 2036 shall be fully met.

### Vasai-Virar ( Profile of the City)

Vasai-Virar Sub-Region is situated in the north-west corner of the Mumbai Metropolitan Region and covers 380sq.km. (About 9.5% of the area of Mumbai Metropolitan Region) and was formed in the year 2010 by merging 4 Municipal Councils (Virar, Vasai, Nala Sopara & Navgarh-Manikpur) & 53 villages. The Vasai-Virar Sub-region is separated from Greater Mumbai and Mira-Bhayander by the Vasai Creek.

The area served by Western Railway suburban service has a significant growth potential. Due to close proximity to Brihan Mumbai. The VVCMC is experiencing very rapid urban growth. With prohibitive land prices in Mumbai low and Middle income households are shifting to the Vasai Virar. Thus, it is presently serve as growing dormitory in Mumbai City.

The VVCMC AREAM had prepared CDP in the year 2010 for a period of 35 years from 2010 to 2046. This CDP was also approved by MoUD of Central Government.

Population Projection, Water Demand, Present Supply and Shortfall are as under. Presently the city receives total 140 Mld from four different sources

Year	Population (Lakhs)	Water Demand (MLd)	Present Supply (MLd)	Shortfall	
				(MLd)	Percentage
2011	12.21	183	140	43	23.6
2016	16.00	240	140	100	41.7
2021	20.76	311	140	171	55.0
2031	31.14	467	140	327	70.0
2041	38.93	584	140	444	76.0
2046	43.62	654	140	514	78.6

It is seen from above that even in the year 2011, the shortfall is 432 Mld which is more than 23%. The situation will become alarming unless water supply is augmented. On realizing 170Mld bulk water supply from Surya- RWSS, the shortfall for the year 2011 shall be nearly met.

## **27 Villages outside VVCMC Area**

27 villages in vicinity of VVCMC area are not merged in the city corporation.

Population of 27 villages as per census 2011 is 60,560. The Surya RWSS incorporates provision of 15ML/d bulk water supply to all 27 villages.

Considering geographical aspects, these 27 villages are divided in seven (7) groups. Branch tapping shall be providing for each group at appropriate location. Further transmission and distribution shall be responsibility of the villages.

### **Physical Infrastructure Components**

#### **a) Design basis**

The components of water supply systems are designed on basis of guidelines given in Manual on Water supply and Treatment by CPHEEO

As per guidelines and considering about 2 hours required for daily maintenance, daily hours of operation shall be 22 hours.

Flowrates for 403ML per day supply shall accordingly be 432.2 Mld in 22 hours i.e. 471.5 MLd.

#### **b) Losses**

Losses in WTP are considered as 3% and transmission losses are considered at 0.5% per 10 km. The flowrates are accordingly determined for various components.

#### **c) Design of Components**

##### **1) -Intake and Raw water pumping station**

- Located at Kawadas weir

- Raw water quality good and treatable

- Designed for 1.5 times required flowrates i.e. total 707.260 mld

- Suitable for 4(W) + 2(S) and 2 (Future) pumps for augmentation by 150 Mld

- Intake designed for Vortex-free operation of pumps

- inlet shall have screens, sluice gates and shall be in two compartments

##### **2) -Raw water pumping main-**

MS, 2235 mm diameter length 2035m

##### **3)-Surge tank is most appropriate and proposed**

#### **4)- WTP- Capacity of WTP is kept 456 Mld output so as to deliver 403 mL/d in 22 hours in two MBRs**

- Process suitable for raw water for which water sample analysis done

- Conventional process comprising aeration, alum dosing, flashing, mixing, flocculation, clarification by plate settler, rapid sand filtration (declining rate) with combination air and post chlorination adopted. Filter Units Shall be 32 Nos.

- Sludge treatment and recirculation of wash water are included in the process

- Provision kept for expansion / augmentation of WTP by 150 MLd

- Space for future clarification unit and filters are kept

##### **5) -Clear water sump and pumping station**

- Capacity of 1.5 hours for present flow rate.-sump designed for vortex free operation of pumps

- suitable for 4 (W) +2(S) +2(Future) pumps, are selected

##### **6) Water hammer protection**

- A pipeline as interconnection from inlet to CCT will act as one way surge tank

7) Break pressure tank –

Break pressure tank is provided to convert downstream clear water main as gravity main so as to be low maintenance system.

-the BPT is of 1.035 ML capacity and located adjacent to WTP

BPT is designed using unsteady flow equation is paper Development of Guidelines for sizing BPT by Proff. R.N.Ingle.

8) Clear water gravity transmission system

-Total length of gravity main is 86.1 km and comprises following 3 sections

2235 mm diameter 12.5 mm shell thickness MS from BTP to junction upstream of Kashidkopar MBR, length 55.5 km for combined flow to two ULBs and includes 3000 mm Diameter 1.7 km long tunnel

From above junction to Kashidkopar MBR, 1829 mm diameter , MS 2 km length for flow to VVCMC

From this junction to chene MBR, 1829 mm diameter , MS 26.9 km length for flow to MBMC and includes 2000 mm diameter 4.435km and 0.9km long tunnels .

All mains have been considered for cathodic protection. The MS pipes shall be internally cement mortar line and externally coated with 3 layers. For hydraulic modelling C values adopted are 145( new pipes) & 120 ( long term).

Major length of pipeline is in RoW of NH -8. In some stretches where RoW is less than 24 m, the pipeline shall be under shoulder of the road and therefore concrete encasing shall be provided for pipelines.

Tunnel on NH crossing- In order to negotiate high level ridge along NH and also crossing NH, a tunnel is proposed. The tunnel shall be 1.7 km length and shall function as conduit. Tunnel diameter is 3600 mm and width with 300mm thick RCC lining. The finished diameter is 3000mm.

Tunnel for crossing Tungareshwar Wild life Sanctuary ( WLS)-In order to cross WLS and as construction activity on ground is not permitted 4.435 km long underground tunnel is proposed. Diameter shall be 2600 mm and width 300 mm RCC lining finished diameter shall be 2000mm

River, creek and road crossing-The river crossing i.e. Vaitarna and Tansa shall be laying pipeline below bed level by open excavation. The length are 240 m and 179 m respectively. Vasai creek crossing shall be by 2600 mm bore diameter, 300 mm thick RCC lining and 2000mm finished diameter tunnel in firm rock below bed level. Length of crossing is 900 mm. The stainless steel lining shall be provided in addition to RCC lining.

Two Micro tunnels are proposed Vendri river & Kaman creek. One crossing of Thane Ghodbunder road at Varsave Village is encountered. The crossing shall be by micro tunnel as per approval of MSRDC.

Railway – One crossing encountered on Vasai Diva railway section between Juchandra & Kaman village which shall be done by pushing RCC box in embankment. The pipeline shall be laid in RCC box in embankment. The pipeline shall be laid in RCC box and space between pipeline and box shall be filled with concrete.

Minor crossing at Nallahs-Minor crossing shall be negotiated by laying pipelines below bed levels.

7) Other alternatives have been explored by the Project Authority, there is no suitable site for development activities proposed as above except the forest area proposed as above & the requirement of forest land is barest minimum and unavoidable.

8) The Certificate Nos.4 regarding minimum demand of forest land by Project Authority and Certificate No.5 about absences of alternative about the project by Deputy Conservator of Forests Thane are enclosed on page Nos.45-46.

9) Forest land for widening of National Highway No 8 in Dahanu forest division was approved during the year 2000 By MoEF & CC New Delhi in favor of Executive Engineer Division No 3 Thane, Maharashtra. Row permission for Surya water supply project for laying underground steel drinking water pipeline along & within diverted forest land is taken from Ministry of Road, Transport & Highways New Delhi New Delhi vide letter dated 9-7-2015.

10) For laying of underground pipeline project at Versova, Ghodbunder creek & Kaman river on NH 8 near Juchandra CRZ clearances are taken from MoEF & CC New Delhi vide letter dated 9-2-2015 & 20-10-2017 respectively.

11) For laying of underground pipeline at Versave, Ghodbunder creek & Kaman river on NH 8 near Juichandra Mangrove forest is existing at Villages-Varsave, Sasunvagher, Chandrapada & Bapane Villages. These mangrove areas are taken for diversion of forest area under forest conservation Act, 1980. For approval.

12) For laying of underground pipeline project Diverted forest land & fresh diversion of forest land are involved. Therefore separate proposals are prepared & are submitted for necessary approval from MoEF & CC New Delhi.

Benefit to society.

1)MMRDA Mumbai has decided to take up water resources development projects and 403 MLD water supply systems to meet the growing demand of drinking water in the western region of western sub-region comprising of Vasai-Virar City Municipal Corporation (VVCMC), Mira Bhayander Municipal Corporation (MBMC) and 27 villages outside VVCMC area.

2) The projects include water supply scheme to bring water from Surya source owned by Irrigation department of Government of Maharashtra situated at about 54 k beyond the boundary of western sub-region of MMR.

3) The project is aimed at improving enhancing the existing water supply of drinking water of western sub-region of MMR.

Considering for public utility of project for drinking water. The project is in public interest. Therefore may kindly be recommended for approved from MoEF & CC, New Delhi.

Place-Mumbai

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