

Surya Regional Water Supply Scheme for Bulk Water supplies to Western Sub region of MMR

Executive Summary

Mumbai Metropolitan Region Development Authority has decided to take up water resources development projects and water supply systems to meet the growing demand of drinking water supply in the Region. The Project includes water supply scheme to bring water from Surya source owned by the Irrigation Department of Govt. of Maharashtra situated at about 54 km beyond the boundary of MMR on north side in order to augment the water supply of western sub-region of MMR. Tailrace water released from the hydel power project at the base of the dam is available as a source for proposed 403 MLD Water Supply Scheme to be developed to augment the water supply of two ULBs, VVCMC & MBMC and MMRDA's proposed Rental Housing projects in the western sub-region of MMR through Bulk supply. The project includes laying of water supply pipeline from Surya Dam to provide water supply of 218 MLD to Mira Bhainder Municipal Corporation (MBMC) and 185 MLD water to Vasai Virar City Municipal Corporation (VVCMC).

Water from Surya Reservoir will be released through power house located at the base of the Dam at Dhamni. Tailrace water of the power house flows further into the Kawadas Weir and will be used for the proposed water supply scheme. It is further necessary to lift this water, convey it to the location where it can be treated and further transported by appropriate system to the various ULB's and groups of villages. The proposed project comprises of intake well, Membrane Bioreactor (MBR) Water treatment plant (WTP) at Surya Nagar and pipeline along the National Highway No 8

1.2 PROPOSED WATER SUPPLY SCHEME

The western sub-region of MMR comprising VVCMC, MBMC & adjoining villages are facing shortage of water to the extent of 45%.MMRDA therefore proposed Surya Integrated Water Supply Scheme to meet shortage of water in sub-region. MMRDA will take all precautions to protect environment and project affected people as a single agency in execution of this project. If both MBMC and VVCMC were to bring water from this source separately, duplication of pipeline, Operation & Maintenance work and multiple agencies would have disturbed the environment to greater extent.

The Service Area of Project –

The western sub region of MMR comprises of VVCMC, MBMC, and adjoining villages. This scheme is to supply bulk water to –

- A. Mira – Bhyandar Municipal Corporation Area and 5 adjoining villages**
- B. Vasai -Virar Municipal Corporation Area and 27 villages not included in corporation area**

Fig b: Proposed location plan

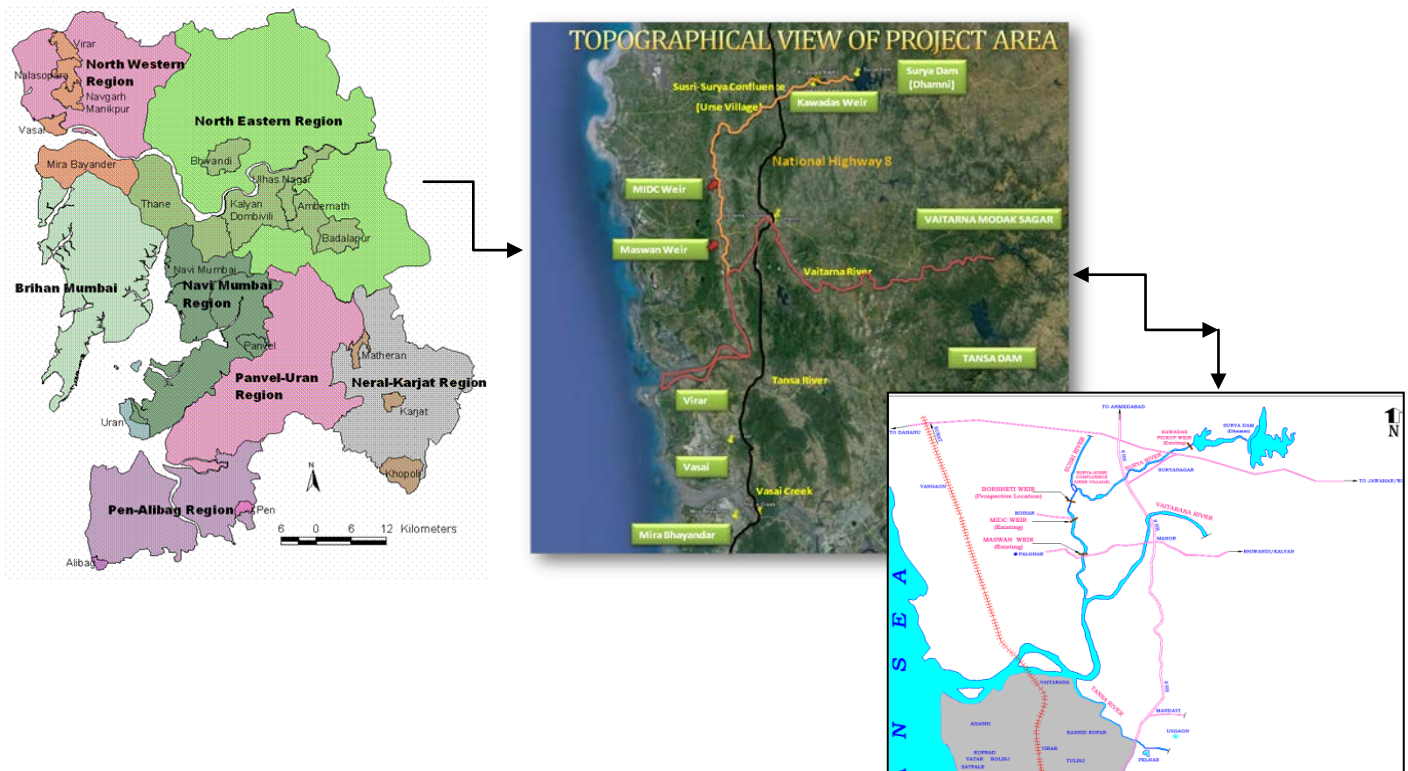


Table 1. Proposed Allocation of Bulk Water Supply

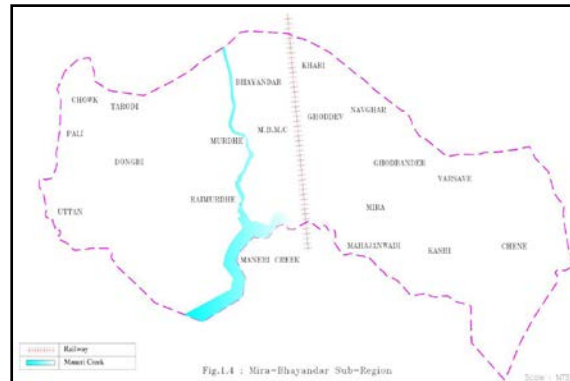
Sr.No	Name	Qty. allocated
1	Vasai-Virar Municipal Corporation area including 49 Villages merged in VVMC	170 MLD
2	MMRDA's proposed Rental Housing Project in Vasai- Virar Sub-region	
3	27 villages in Vasai - Virar Sub-region not merged in VVMC	15 MLD
4	Mira – Bhayandar Municipal Corporation including MMRDA's special planning areas at Uttan and other 5 Villages	218 MLD
5	MMRDA's Proposed Rental Housing Project in Mira – Bhayander Sub-region	
	Total	403 MLD

Surya Project area falls in Thane District which forms a part of North Konkan Region which lies between the Sahyadri hills in the east and the Arabian Sea in the West. It has coastal line of about 113 Kms. It lies Between 18°42' and 20°20' North latitudes and 72°45' to 73°48' East longitudes in eastern part of the state Its East-West spread is maximum at the South which is about 100 Kms. The North-south length is approximately 140 Kms. District headquarters Thane is about 25 Kms from the international airport and 35 Kms from the Mumbai City.

A. MIRA-BHAYANDAR SUB REGION

Mira-Bhayandar city is located on Northern boundary of Mumbai and on Western side of Mumbai-Ahmedabad National Highway (NH-8). The city includes two important towns i.e. Mira and Bhayandar.

Fig c: Map shows expanse Mira-Bhayandar Sub-region.



Mira Bhayandar Municipal Corporation (MBMC) is the civic body that governs the city and was established in the year 2002. Total area of the corporation limit is 89 sq.km. As per 2001 census, population of Mira-Bhayandar is 5.20 Lakhs and the population as per 2011 Census is 8.15 Lakhs. Thus the growth rate per annum 4.6%. Mira developed only in the East part, while the West part, on the other side of the railway line is covered with salt pans and mangroves. Mira Road (East) is a predominantly residential area. It is calm, quiet surroundings and low pollution is a boon for residents. Bhayandar is divided into two parts by the Mumbai suburban rail line – East and West. The West was traditionally residential, and the East was predominantly commercial and an industrial area. Recent population growth and a flurry of construction has blurred the boundaries between Bhayandar and neighbouring Mira on the East side of the rail tracks, turning it into a populous suburb.

EXISTING WATER TO MIRA-BHAYANDAR IS AS FOLLOWS:

- STEM (Shahad Temghar) : 86 MLd
- MIDC : 5 MLd

Mira Bhayander Municipal Corporation

Mumbai metropolitan region covers an area of about 4350 Sq.Km. comprising of Municipal Corporation of greater Mumbai, 13 municipal town and 1500 villages with a 1970 census population of 7.793 million people. For the purpose of planning water resources and hydrometric study, the Mumbai metropolitan region is divided into six zones. Mira Bhayander comes under zone one. Fast increase in urban population in Mira Bhayander has lead to tremendous scarcity of drinking water in this area. Most population is dependent on tanker fed water supply.

Mira Bhayander Municipal Corporation (MBMC) is one of the fastest growing Corporations areas near Mumbai. Mira Bhayander sub region on the fringes of Mumbai falls under the Mumbai Metropolitan Region. The Mira Bhayander region is fast developing considering its nearness to the megacity Mumbai and improvement in its connectivity to Mumbai through

many projects proposed for this region. It has been facing the problems of unsustainable urban growth and unplanned development over the years more particularly in Water Sector.

Population of Mira Bhayandar according to 1991 census was 1, 75,400. The decadal growth rate of 1971-81 and 1981-91 are 103 and 161 respectively. The rate of growth of population of Mira Bhayandar 1981-91 is phenomenal as compared to Brihan Mumbai which was 33.43. This was mainly due to the large housing complexes developed privately on lands permitted to be developed by government. According to census 2001 the decadal growth rate of Mira Bhayandar is 196.

The population of the Mira-Bhayandar Municipal Corporation has grown to 5,20,000 as per 2001 census of which 2,86,391 males and 2,33,997 females . This shows a decadal growth rate of 196% or an annual growth rate of 19.6%. The population of Mira Bhayandar in the year 2006 is 7, 28,000 (Source –Urban Health Survey, Mira Bhayandar Municipal Corporation).

Table 2: Population Projection – 2006-2041

Year	Population (Lakhs)	Decadal Growth Rate
2001	5.20	-----
2006	7.28	80%
2011	9.83	70%
2021	15.73	60%
2031	22.00	50%
2041	28.55	25%

Table 3: Projected water demand 2006-2031

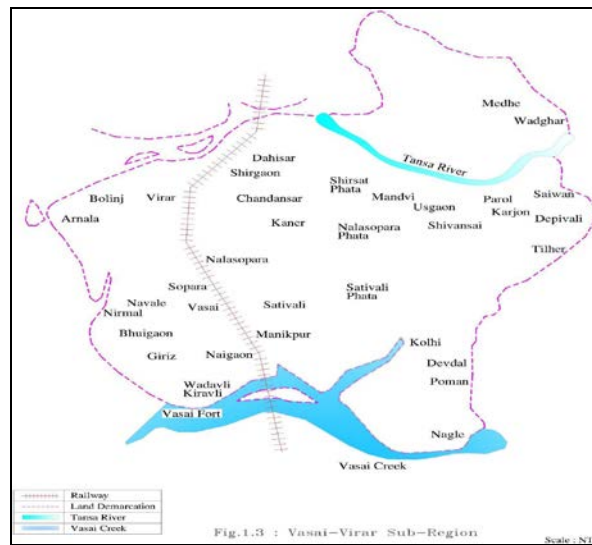
Year	Population (Lakhs)	Present Water Supply (MLD)	Water demand in MLD
2001	5.20	86	72.8
2006	7.28	86	101.92
2011	9.83		137.62
2021	14.74		206.36
2031	22.11		309.54

As the population is assumed not to go beyond 22 lakhs due to land constraint, the water demand is calculated 309.54 MLD.

B. Vasai-Virar Sub-Region

Vasai-Virar Sub-region is located on northern boundary of Mira-Bhayandar and on Western side of Mumbai-Ahmedabad National Highway (NH-8).

Fig d : Map shows expanse of Vasai-Virar sub-region



The Sub-region includes Vasai–Virar Municipal Corporation (VVMC) and other 27 villages. The Corporation was formed in the year 2010 by merging following 4 towns:

- (1) Nallasopara
- (2) Vasai
- (3) Virar
- (4) Navghar Manikpur

In addition above 4 towns, 49 urbanised villages (Out of total 76 villages in Sub-region) were included in the city Corporation. Villages not merged in corporation are, thus 27 numbers.

The Sub-region has very high growth rate. Annual composite growth rate for the decade 1951 – 2001 for 4 towns stated above was 10.92%. The growth rate has further increased in the decade 2001 – 2011. The population of VVMC as per Census 2011 is 12.21 Lakhs.

Vasai-Virar Municipal Corporation (VVMC) is the civic body that governs the city and was established in the year 2010. Total area of corporation limit is 105 sq.km. The existing water supply to Vasai-Virar is as follows:

- Pelhar (Old Scheme) : 14 MLd
- Maswan : 100 MLd
- Usgaon : 24.5 MLd
- Papadkhind : 1.5 MLd

Vasai Virar City Municipal Corporation

Mumbai metropolitan region covers an area of about 4350 Sq.Km. comprising of Municipal Corporation of greater Mumbai, 13 municipal town and 1500 villages with a 1970 census population of 7.793 million people. For the purpose of planning water resources and hydrometric study, the Mumbai metropolitan region is divided into six zones. Vasai Virar comes under zone two. Fast increase in urban population in Vasai Virar has lead to

tremendous scarcity of drinking water in this area. Most population is dependent on tanker fed water supply.

Vasai Virar City Municipal Corporation (VVCMC) is one of the fastest growing Corporations areas near Mumbai. Vasai Virar sub region on the fringes of Mumbai falls under the Mumbai Metropolitan Region. The Vasai Virar region is fast developing considering its nearness to the megacity Mumbai and improvement in its connectivity to Mumbai through many projects proposed for this region. The low cost housing project is also proposed for the urban poor in this area. The MCCVV is proposing to develop the Heritage installations and also create Recreational hubs in the area for Tourism development. This area has good shoreline suitable for water sports development. It has been facing the problems of unsustainable urban growth and unplanned development over the years more particularly in Water Sector. VVCMC has come forward to resolve these issues and bring about reforms.

As per provisional reports of Census India, population of Vasai Virar in 2011 is 1,221,233; of which male and female are 649,535 and 571,698 respectively. The sex ratio of Vasai Virar city is 880 per 1000 males. The decadal growth rate in population has been 58% and 70% during the last two decades i.e., 1981-1991 and 1991-2001. As per census 2001, the population of Vasai Virar was 702723. The projected population is 22.23 lakhs during 2021.

TABLE 5 : PROJECTED WATER DEMAND 2001-2041

Year	Population (Lakhs)	Present water supply(MLD)	Water demand in MLD	Demand Supply Gap	Water Scheme suggested
2001	7.02	130			
2011	12.21	130	235	105	Surya
2021	22.23		400	270	Wandri, Ghateghar
2031	33.34		600	470	Kaman, Kholsapada, Rajiwali- Sativali
2041	41.67		750	620	Pinjal

The water supply is 130MLD and hence, for present population of 12.21 lakhs, rate of water supply per capita (lpcd) works out to 106 which is lower than CPHEEO norms of 150 LPCD for metropolitan city. All the adjoining Corporation areas like Thane, Kalyan-Dombivali, Navi Mumbai, Mira-Bhayandar, and Ulhasnagar are also facing the same situation. All the existing sources of water are exhausted and the Corporations are required to find new source of water supply. Thus acute water shortage is being faced by the Corporation and surrounding area and it is likely to grow enormously if timely measures are not taken for developing new sources.

C. MMRDA's Rental Housing Project

The Govt. of Maharashtra has appointed MMRDA as the Implementing Agency for Rental Housing Projects in the MMR in 2008. The Rental Housing Projects undertaken by the MMRDA are of 'Vital Public Purpose' and is first of its kind as "Slum Prevention Programme". The MMRDA has undertaken an ambitious project of constructing or procuring 5 Lakh self contained Rental Housing units of minimum 160 sq. ft. carpet area within the Mumbai

Metropolitan Region in 5 years. MMRA intends to procure residential complexes of self-contained tenements from the interested developers / land owners / any other agencies approved by MMRDA against incentive of FSI or TDR in Mumbai Metropolitan Region.

The complex will have all basic required infrastructures such as internal roads, storm water drain, sewer lines, water supply lines, electricity etc. MMRDA till date has granted local clearance to 39 Rental Housing Proposal at various locations in MMR which will generate Rental Housing stock of about 2.58 Lakh Rental housing units in next 3 to 4 years. Some rental housing projects are located in Vasai-Virar sub-region and Mira – Bhayander Sub-region.

2.5 Source

Surya River is source for the 403 MLd regional water supply scheme for bulk water supply to the two ULBs viz. Vasai-Virar Municipal Corporation and Mira-Bhayandar Municipal Corporation.

2.5.1 Proposed Location

The Surya River is the basic source of water for this project. The Surya Dam at Dhamni located at 19° 55' N latitude and 73° 03' E longitude is the mother source for the development of several technically feasible options for this project. The river originates from Sahyadri Mountain in Mokhada Tehsil of Thane District. The river flows south west and joins Vaitarna in Palghar Tehsil. The river travel is about 55 Km. Initial 8 – 9 km travel is through very High Mountain with levels varying from 90 m RL to 60 m RL. Next course for about 20 km is on steep slope with levels falling from 60 m to 17 m. Last phase of travel for 20 km upto Maswan is with moderate slope with level falling from 17 m to 4 m. Maswan is extreme point on the river course upto which tidal effect are encountered. Important tributary of the river is Susri River which joins at 27 km from origin of Surya River.

2.5.2 Physical Infrastructure Components

The water supply system envisages abstracting raw water from the river Surya at suitable location, treating the water by adopting appropriate process in water treatment plant and transmitting to master balancing reservoirs to be located at outskirts of the two ULBs. The MBRs shall be bulk supply points and destinations for the water supply system.

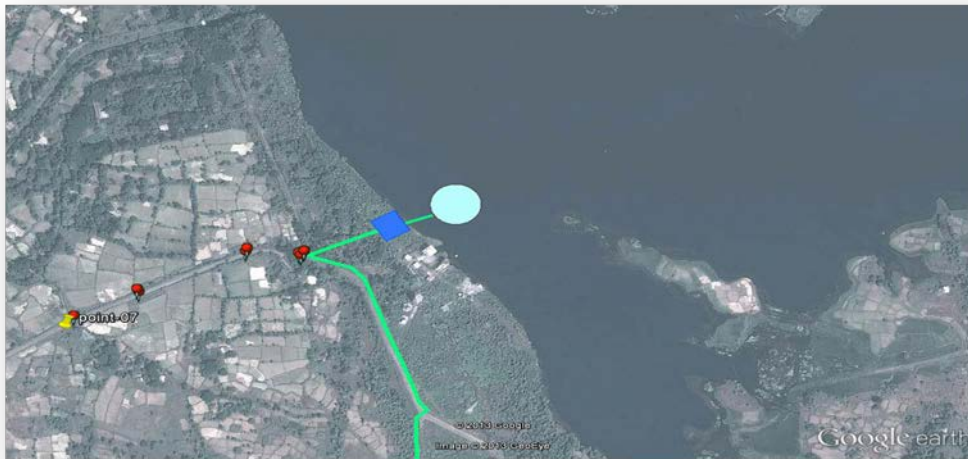
The integrated water supply scheme shall include following components:

- i) Intake and raw water pumping station at Kawadas
- ii) Raw water pumping main
- iii) Water treatment plant at **Surya Nagar**
- iv) Clear water pumping station at WTP at **Surya Nagar**
- v) Clear water pumping main to break pressure tank (BPT)
- vi) Break pressure tank
- vii) Clear water transmission main
- viii) Enroute crossing of NH by tunnel
- ix) Tansa & Vaitarna River and Vasai creek crossings
- x) Master balancing reservoirs

2.6.1. Kawadas Pick-up Weir as the Source

The Kawadas Pick-up Weir is located about 5.6 km downstream of the Surya Dhamni Reservoir. There are three existing intake wells belonging to the MJP and Reliance Industries abstracting about 36 MLD water from this source. The bed level of the reservoir is 60.

There is adequate area available on the upstream side of the weir to design and develop another intake well for abstracting 303/403 MLD water from this weir without affecting other daily abstractions. The width of Dam is 648.93 m and height is approximately 3.5 m. Intake location is proposed 140 m inside river. The abstracted water is proposed to be pumped to the likely WTP site at Suryanagar for treatment.



After treatment the treated water shall be pumped to the highest point along the route about 16 km from the WTP site of Suryanagar. Thereafter the water will flow by gravity to the VVCMC MBR proposed at Kashid Kopar. The quantity allocated for the MBMC shall be conveyed by gravity main to the proposed MBMC MBR at Ghodbandar.

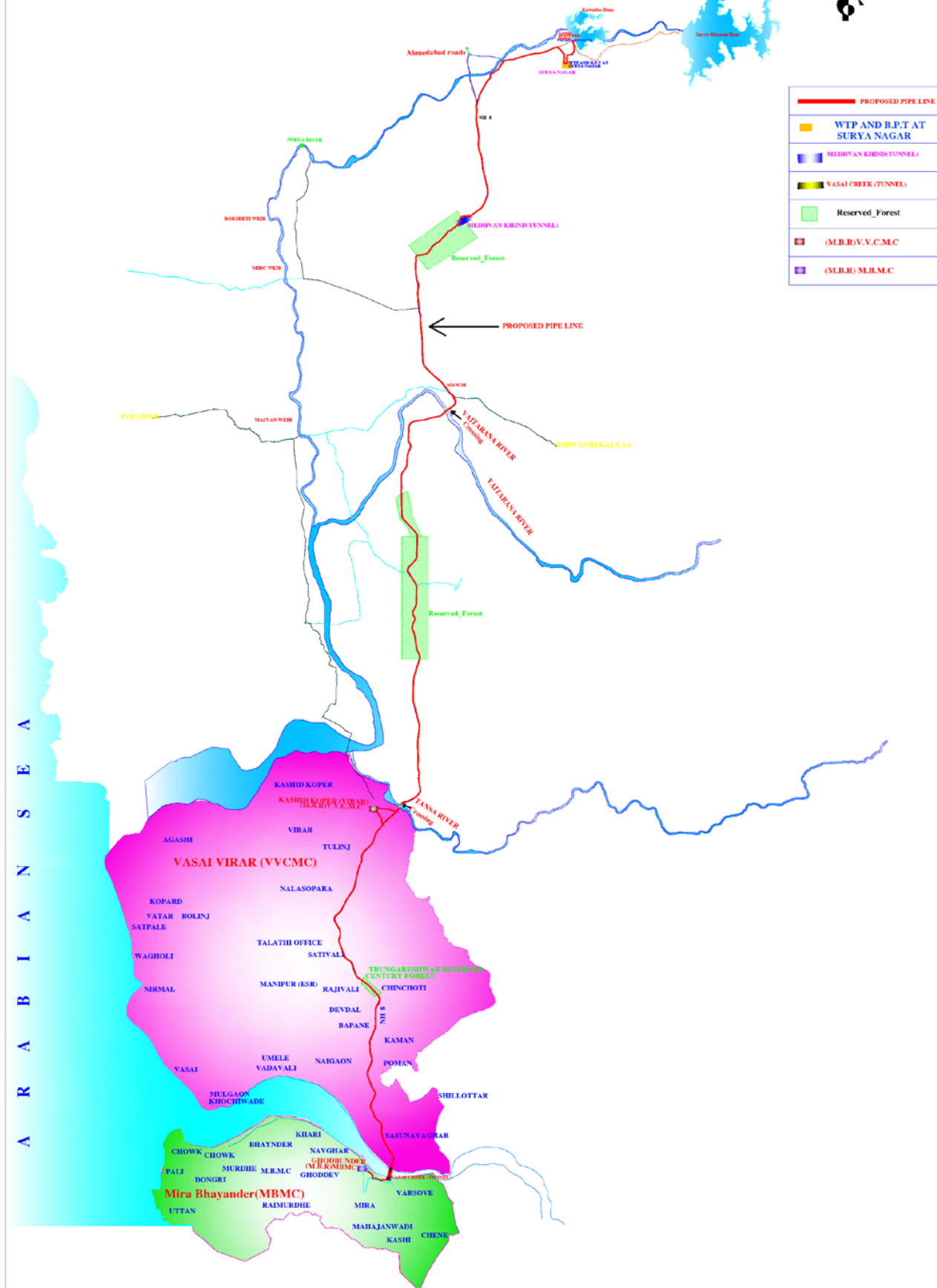
2.7 Water Treatment Plant

The water abstracted from any of the above sources has to be treated before it reaches the consumers. It is therefore necessary to design and construct a water treatment plant for the defined capacity of 403 MLD. It is anticipated that the plant shall require about 12 to 15 Hectares land depending on the treatment process alternatives available. The Surya Nagar Colony located about 5.54 km from the Village Kasa Khurd and about 2 km from the Kawadas weir at an average level of about 80 m has been selected for locating the water treatment plant. The colony covers an area of about 20 Ha. Since the land belongs to the Govt. it was considered as the best option to avoid land acquisition. This site was therefore selected as the best alternative for source at the Kawadas weir.

2.8 MBR Sites

The Kashid Kopar MBR of 25 ML supplies water to the VVCMC. The Ghodbunder MBR of 25 ML supplies water to MBMC.

PROPOSED PIPE LINE ALIGNMENT MAP



—	PROPOSED PIPE LINE
	WTP AND B.P.T. AT SURYA NAGAR
	MEDHYAN KHIND(TUNNEL)
	VASAI CREEK (TUNNEL)
	Reserved_Forest
	(M.B.R./V.V.C.M.C)
	(M.B.R) M.B.M.C

2.9 Tunnels

There are two Tunnels & 121 Underpasses (including small bridges/ nallas) proposed to be constructed during the pipeline installation. The details are as under. The excavated material generated in the above construction will be reused to maximum extent and remaining will be disposed off in consultation with Authorities.

i) Tunnel on NH crossing

Size of gravity main crossing NH is 2032 mm diameter. It is proposed to provide tunnel of suitable size such that the pipeline can be laid in the tunnel. Considering 2032 mm diameter of pipeline, 450 mm saddle at bottom of pipe and requirement of about 800 mm for air valve, minimum size of tunnel required works out 3282 mm. Considering margin, size of tunnel is proposed 3500 mm. The tunnel shall be horse-shoe shaped.

Tunnel boring at the NH8 Medhwan Khind will be carried out by a tunnel boring machine of make Herinchnekt or equivalent for a diameter of about 3.6m, with average length of the bore of 12 to 15m / day. The Noise level generated at the tunnel face and inside the tunnel is of the order of 40 to 50db. Since the machine is likely to operate within the permissible limits of the noise generation, noise prevention and reduction measures may not apply. Mechanism of removal of the excavated material the excavated material is removed using small wagons and locomotive. Similar method shall be used in the Surya Project. The mitigation measures required are proposed in EMP.

ii) Railway Crossing

Vasai - Panvel railway crossing will be done by jacking and pushing method through embankment.

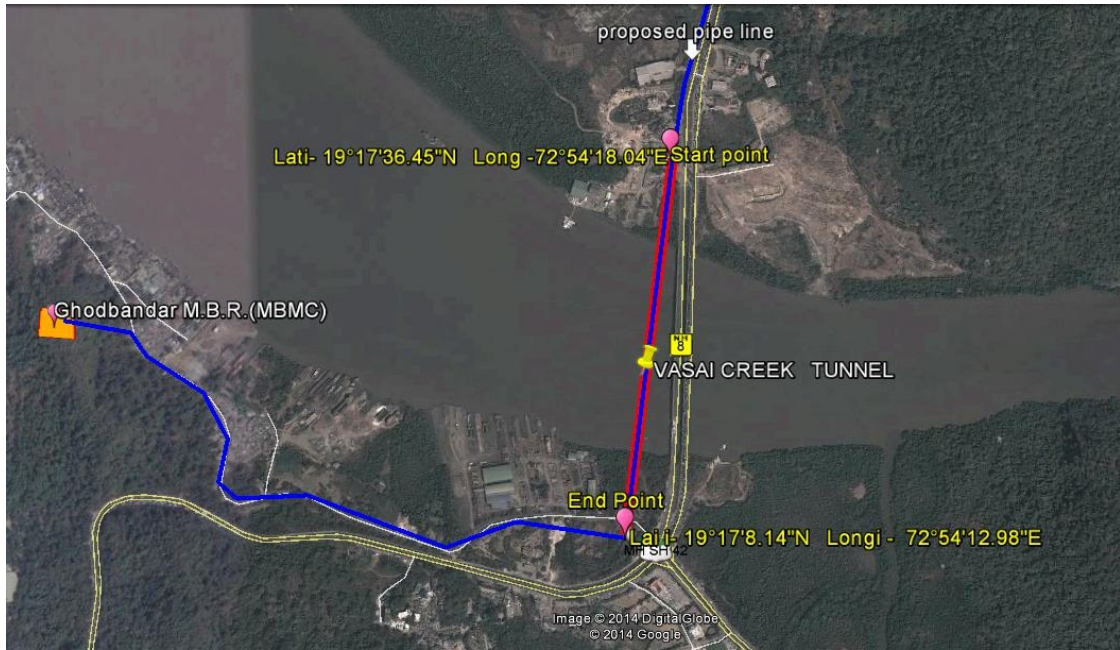
iii) Minor Crossing

It is proposed to lay pipeline below the bed level / ground level by doing open excavation which will be feasible and economical. The pipe sections shall be encased in rich concrete.

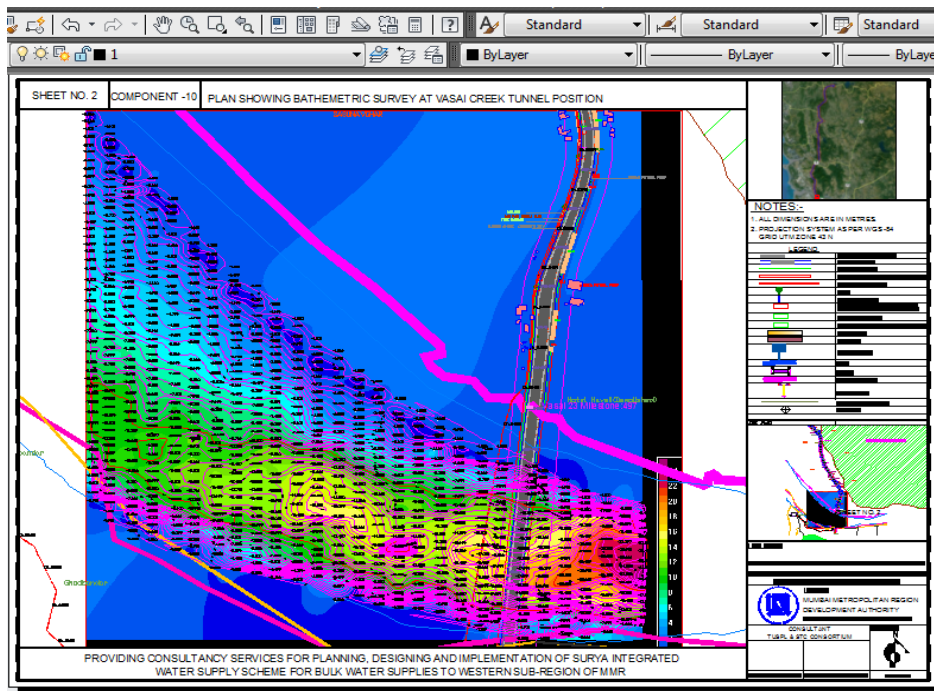
iv) River & Creek Crossings

One tunnel is proposed for crossing Vasai Creek enroute. The length of Tunnel in CRZ III area of VVCMC is 42 Meters & 60 Meters in CRZ III area of MBMC.

The Vasai Creek is located at Latitude Start 19°17'33" & End 19°17'10" and Longitude start 72°54'18" & End 72°54'13". The Vasai Creek bridge is having length of 555.32 M and two parallel bridges having width of 10 M each total width is 20 M It is proposed to provide tunnel on west side of bridge nearly 40 M away from the bridge having finished diameter of 2 M & length is 880 Metres. It will be 6 metres below water bed in hard rock.



Bathymetric Survey has been conducted about 1000 m on left side of bridge and 300 m right side of bridge along the creek to finalize exact location. The Bathymetric charts of Vasai Creek are designed to present accurate, measurable description and visual presentation of the submerged terrain and under water land profile.



As per CZMP of MBMC the plot falls in CRZ I and III and as CZMP of VVCMC the plot falls in CRZ III. It is proposed to start & end tunnel beyond CRZ I area so that mangroves are not affected.

Tansa River Crossing

The location of Tansa River crossing will be at $19^{\circ} 29' 34''$ N and $72^{\circ} 54' 29''$ E on seaward side of the bridge on NH 8 on Tansa River. It is also possible to provide pipeline 5 m below the bed level / scour level by doing open excavation. Working is to be restricted to low tide period. Pipeline will be encased in rich concrete in river section. Open excavation is feasible & economical option.



Vaitarna River Crossing

The location of Vaitarna River crossing will be at $19^{\circ} 42' 43''$ N and $72^{\circ} 55' 50''$ E on west side of the bridge of NH 8 on Vaitarna River. . It is also possible to provide pipeline 5 m below the bed level / scour level by doing open excavation. Working is to be restricted to low tide period. Pipeline will be encased in rich concrete in river section. Open excavation is feasible & economical option.



Clearance by MCZMA

MCZMZ considered the proposal in its 87th Meeting held on 20th January 2014 and observed as follows in its clearance letter No. CRZ-2013/CR-336/TC-4 dated 24th April 2014.

“ The Authority observed that it is an infrastructure project, aiming for water supply to Mira Bhairder & Vasai Virar region and laying of pipeline, requires prior CRZ clearance from MoEF, as per para 4 (ii) of CRZ Notification.”

In the light of above the MCZMZ decided to recommend the proposal to MoEF subject to following conditions.

- a. The proposed construction should be carried out strictly as per the provisions of CRZ Notification, 2011 (as amended from time to time) and guidelines / clarifications given by MoEF from time to time.
- b. The material excavated (soil debris) generated will be reused for back filling purposes / disposed to authorised waste disposal site outside CRZ area.
- c. Water treatment plant shall be located in Non CRZ area
- d. Five times the number of mangroves destroyed/ cut during the construction process should be replanted. The plan for the same shall be submitted to MCZMA.
- e. Hon'ble High Court permission is mandatory, if construction activity is in mangrove or its 50 metre buffer zone area
- f. All the other mandatory permission from different statutory authorities should be obtained prior to commencement of work.

The clearance is hereby sought from Ministry of Environment & Forests as per para 4 (ii) of CRZ Notification 2011 for the following as discussed above –

1. Passing of water pipeline through tunnel across Vasai Creek
2. Passing of water pipeline across Tansa River
3. Passing of water pipeline across Vaitarna River