REPORT OF THE JOINT COMMITTEE IN COMPLIANCE WITH ORDER DATED 10/07/2025 OF THE HON'BLE NATIONAL GREEN TRIBUNAL (NGT) IN THE MATTER OF OA. NO. 88/2025 (WZ) IN EARLIER OA. NO. 318/2025 (PB), DR. RAKESH BAKSHI VS STATE OF MAHARASHTRA & ORS.

1.0 Background

Original Application No. 88 of 2025 (WZ) in earlier Original Application No. 318 of 2025 (PB), Dr. Rakesh Bakshi Vs State of Maharashtra & Ors. is registered before the Hon'ble NGT by exercising suo motu jurisdiction, based on the letter petition, dated 26/03/2025 addressed by the Applicant. Averments in the aforesaid letter petition are about the deteriorating condition of the Powai Lake due to the continuous discharge of untreated sewage and pollution due to human activates during festive season, which resulted in rapid growth of water hyacinth and deletion of dissolved oxygen levels and endangering aquatic life & biodiversity. Further averments are about the inaction and negligence of The Brihanmumbai Municipal Corporation (hereinafter referred to as "BMC"), which has failed to upkeep and maintain Powai Lake, despite submission of various representations and reports highlighting about pollution due to discharge of untreated sewage, and ecological degradation, the BMC's response has been slow and insufficient. Further, the BMC has failed to implement a comprehensive restoration plan or enforce strict regulations to curb further damage of Powai Lake.

The Hon'ble NGT (PB) directed vide order dated 10/07/2025 (copy of Hon'ble NGT order, dated 10/07/2025 is given at **Annexure-1**) and relevant order is reproduced as below:

> *"5…In view of the environmental questions involved in the case, we also consider it appropriate that a Joint Committee be constituted to verify the factual position and suggest appropriate remedial action. Accordingly, we constitute a Joint Committee comprising of officers duly authorized by Central Pollution Control Board, Maharashtra Pollution Control Board and Maharashtra State Wetland Authority and direct the same to meet within two weeks, undertake visits to the site, look into the grievances of the applicant, associate the applicant and representative of the concerned project proponents, verify the factual position and submit report suggesting*

appropriate remedial action. The Maharashtra State Pollution Control Board will be the nodal agency for coordination and compliance…"

2.0 Approach

In order to comply with the aforesaid Hon'ble NGT (PB) order, dated 10/07/2025, the nodal agency i.e. Maharashtra Pollution Control Board (hereinafter referred to as "MPCB") vide email dated 11/08/2025 has scheduled the meeting & joint committee inspection of Powai Lake on 12/08/2025. The following committee members were present during the meeting and joint committee inspection:

i. Shri Nishchal C., Scientist 'E', CPCB, Regional Directorate, Pune
ii. Shri Rakesh Dafade, Sub-Regional Officer, MPCB, Mumbai-3
iii. Dr. Y. B. Sontake, Member, Maharashtra State Wetland Authority

Also, Shri Yogesh Ghore, Field Officer-MPCB, Sub-Regional Office, Mumbai-3 was present during the joint committee inspection.

Representatives of Sewerage Project Department and Hydraulic Engineering Department of BMC viz. R. N. Lokhande, Executive Engineer; Sunil V. Mane Executive Engineer and Sushil M. Chavan, Dy. Hydraulic Engineer were present during the joint committee meeting & inspection and made oral submissions about the short term measures & long-term measures which are initiated or to be initiated for the rejuvenation of Powai Lake and also provided the visit coordination.

As directed by the Hon'ble NGT vide order dated 10/07/2025, the joint committee through the nodal agency i.e. MPCB had informed the Applicant vide email dated 11/08/2025 about the scheduled meeting & joint committee inspection of the Powai Lake. The Applicant vide email dated 11/08/2025 expressed his unavailability to attend the meeting & associate with the joint committee for inspection. Instead, he has provided a list of authorized representatives who will attend the meeting & joint committee inspection on his behalf. Further, in the aforesaid reply he has also mentioned that he shall be available for all future meetings and proceedings.

Accordingly, the joint committee initially heard the oral submissions made by the representatives of BMC about the short term measures & long-term measures which

are initiated or to be initiated for the rejuvenation of Powai Lake. Subsequently, the joint committee heard the oral submissions made by the authorized representatives of the Applicant. Later, both the parties have accompanied the joint committee during the inspection and showed the alleged locations of ingress of untreated sewage into Powai Lake and the issue of growth of water hyacinth. The joint committee collected grab samples of untreated sewage which is being entering into Powai Lake through the culvert(s) and also collected grab samples of surface water of the Powai Lake.

3.0 About the Powai Lake

Powai Lake is an artificial lake, situated in Mumbai. Indian Institute of Technology Bombay, National Institute of Industrial Engineering, planned commercial complex including with housing complexes and hotels like Hiranandani are established near the periphery of Lake. The Lake is located to the South-East to Vihar Lake, has a surface area of 210 hectares and contributing catchment area of 620.8 hectares, with an average depth of 5 m & gross storage at FSL of 1,200 million gallons. The Lake has a maximum depth of about 12 m and minimum of 3 m and the average water capacity of Lake is 8,38,591 m^3. As informed by the representatives of BMC, the Powai Lake was constructed in the year 1891 to cater the drinking water demand of Mumbai City and subsequently the Lake water was polluted and hence, it was declared as unfit for drinking purpose during 1919. Further, it was informed that the Lake water is being used only for industrial uses, cattle sheds and for pisciculture (fish farming), angling, and other recreational activities.

BMC has provided total 19 no. of culverts along the Southern side periphery of Powai Lake, apparently for regulation of storm water in and around Adi Shankaracharya Road into Powai Lake, which serves a main recharge of water to Powai Lake. Besides, the Powai Lake also gets recharged from the Vihar Lake through percolation/natural nalah near boy's hostel of IIT campus. The excess water of Powai Lake, outfalls into Mithi River through 02 no. of dam outfalls.

4.0 Observations and Findings

4.1 Sources of pollution

Major sources of pollution into the Powai Lake is the untreated sewage generating from un-sewered areas of "S" ward of BMC, comprises of Ganesh Nagar – 1 & 2,

Sainath Nagar, Chaitanya Nagar, and Swaminarayan Nagar, which are located along the Adi Shankaracharya Road i.e. areas located along the Southern periphery of Powai Lake. Also, untreated sewage generating reportedly from un-sewered areas of “S” ward of BMC, comprises of Perubaug area including slum pockets, National Institute of Industrial Engineering (NITE) area, which are located along the Northern and North-Eastern periphery of Powai Lake. As informed, sewage ingress due to leakages from the existing sewer lines in the areas of “S” ward of BMC into the storm water drains are also a cause of concern and source of pollution into Powai Lake. At present, due to rapid urbanization and lack of adequate sewerage network & its connectivity to the terminal STPs, the untreated sewage generating from the aforesaid areas i.e. areas located along the Southern periphery is entering into Powai Lake through the 19 nos. of culverts. Similarly, the untreated sewage generating from the aforesaid areas i.e. areas located along the Northern and North-Eastern periphery is entering into Powai Lake through 02 nos. of lined drains. Besides, 02 nos. of culverts near the trunk sewers are identified near Northern-Eastern and Eastern periphery, which is also having potential to contribute ingress of untreated sewage into Powai Lake in case of unforeseen event like overflow/breakdowns. However, no untreated sewage flow is observed from the said culverts into the Powai Lake. Details of un-sewered areas of “S” ward of BMC, which are located along the Adi Shankaracharya Road are given in the below table. However, the BMC has not yet quantified the un-sewered areas of “S” ward of BMC, which are located along the Perubaug area.

S. no.	Name of the area	Un-sewered area in sq-m
1.	Ganesh Nagar – 1 & 2	40,493.53
2.	Sainath Nagar	33,711.03
3.	Chaitanya Nagar	75,163.74
4.	Swaminarayan Nagar	53,541.41

Out of the aforesaid 19 nos. of culverts, it has been reported in the past by the BMC based on its reconnaissance survey carried-out during 2016 & the present Detailed Project Report being carried-out during March, 2025, continuous ingress of untreated sewage has been reported in 16 nos. of culverts. Details of culverts and drains including reported quantity of untreated sewage flow is depicted in the below Table-1.

Table-1: Details of culverts and drains including status & quantity of untreated sewage flow

S. no.	Culvert description	Status of sewage flow	Quantity of sewage flow in MLD
1.	Gate no. 1	Continuous	0.5
2.	Gate no. 2	Continuous	0.5
3.	Gate no. 3	Not observed	--
4.	Gate no. 4 & 5	Continuous	1
5.	Gate no. 6 & 7	Continuous	0.5
6.	Gate no. 8 & 9	Continuous	0.5
7.	Gate no. 10	Not observed	--
8.	Gate no. 11 & 12	Continuous	1.5
9.	Gate no. 13 & 14	Continuous	3.7
10.	Gate no. 15 & 16	Continuous	3.8
11.	Gate no. 17 & 18	Continuous	4
12.	Gate no. 19	Inaccessible location	--
13.	Perubaug inlet no. 1	Continuous	1
14.	Perubaug inlet no. 1	Continuous	1

Based on the above, estimated quantity of untreated sewage i.e. only dry weather flow from the aforementioned culverts is about 16 MLD and estimated quantity of untreated sewage i.e. only dry weather flow from the aforementioned inlets (lined drains) is 2 MLD. Therefore, total estimated quantity of untreated sewage i.e. only dry weather flow is about 18 MLD. Out of which, openings of culverts nos. 1 to 16 are located within the banks of the Powai Lake and culvert nos. 17 & 18 (Powai Plaza) is connected through closed drain and opening at IIT Premises, which further outfalls into Powai Lake. It is observed that 8.2 MLD of untreated sewage is being entering into Powai Lake through the culverts nos. 1 to 14, whereas the untreated sewage contribution from culverts nos. 15 to 18 is 7.8 MLD and the untreated sewage contribution from Perubaug inlets is 2 MLD. Google earth imagery depicting the location of Powai Lake including the locations of culverts & inlets, contributing to untreated sewage flow is depicted in the below images.

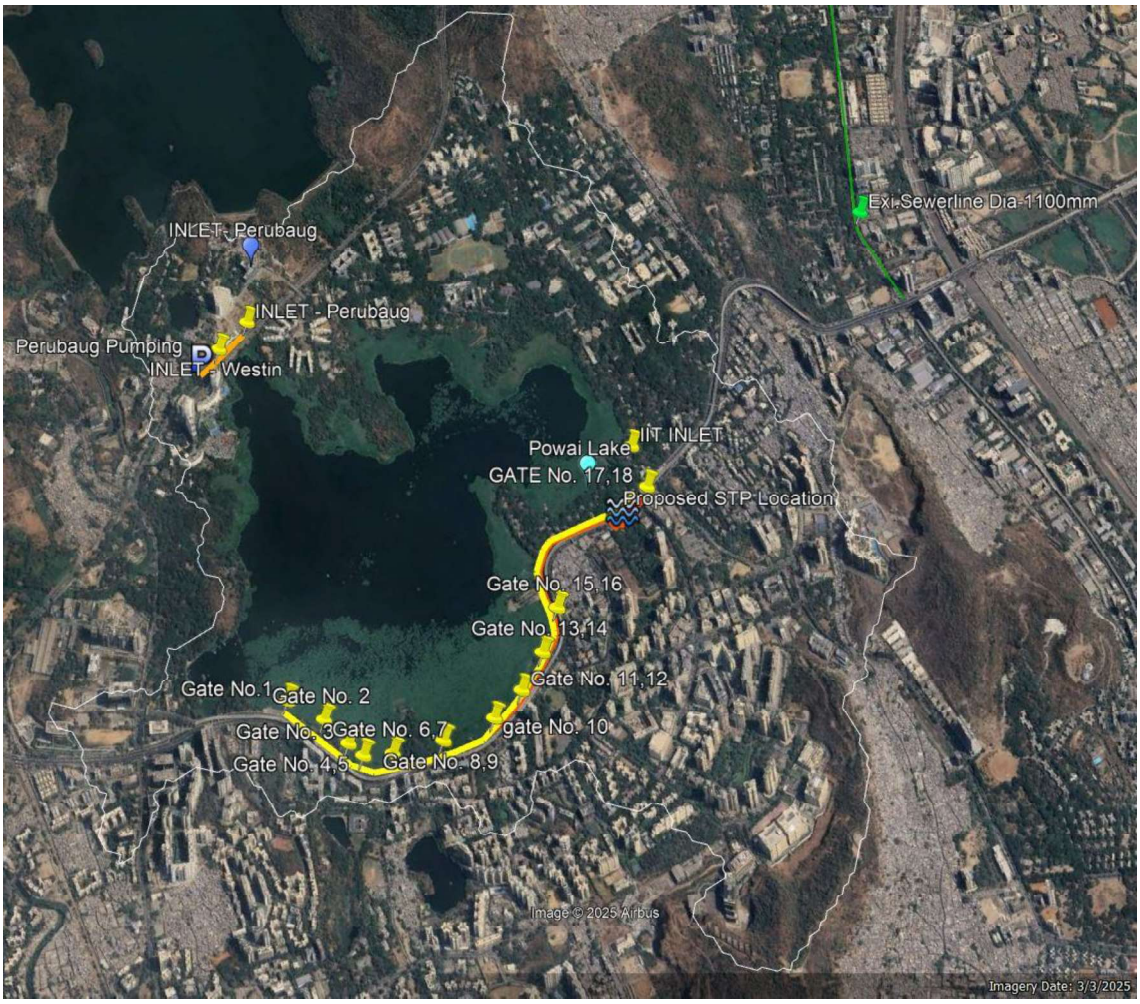


Image: Google earth imagery depicting the locations of culverts & drains contributing to untreated sewage flow into Powai Lake.

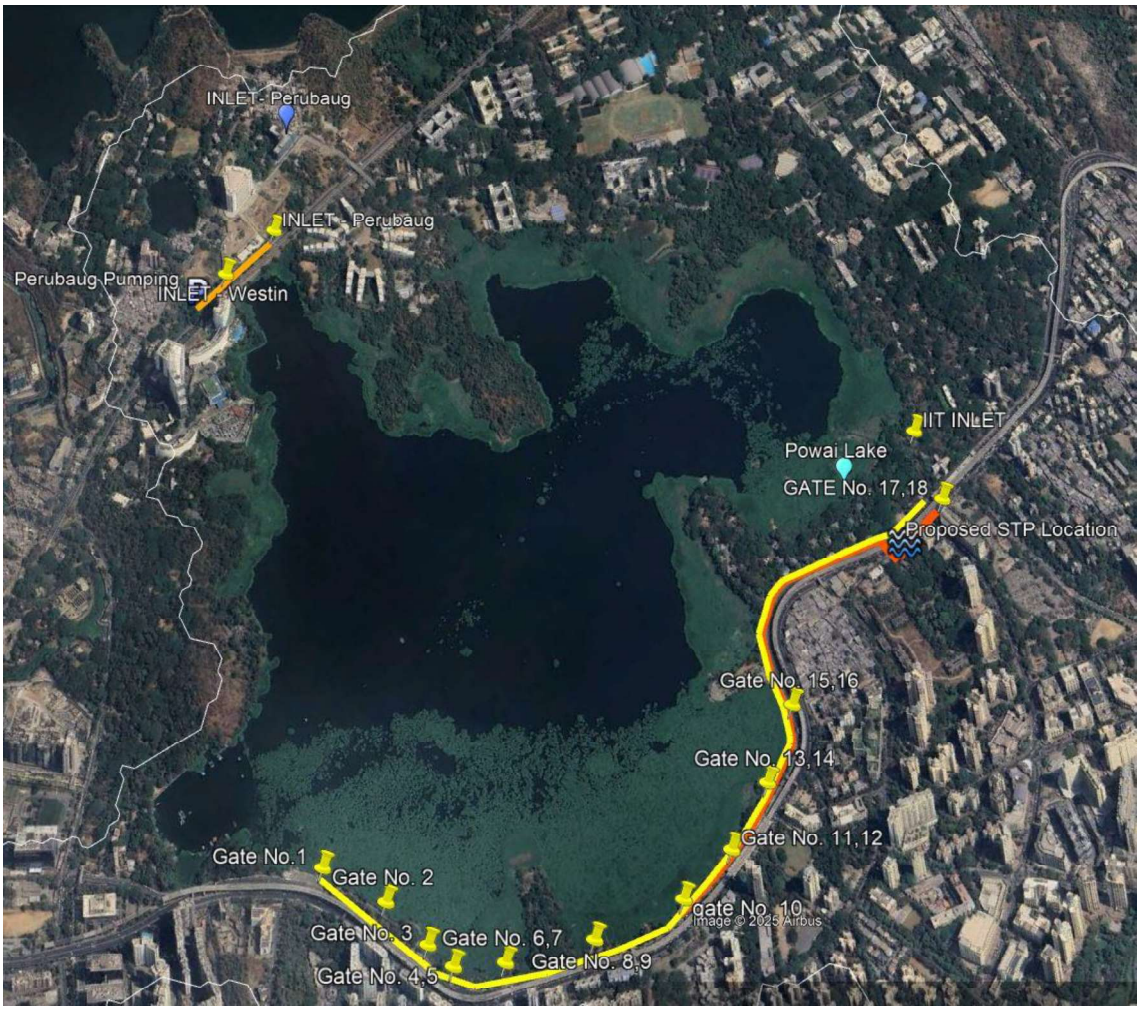


Image: Closer view of Google earth imagery depicting the locations of culverts & drains contributing to untreated sewage flow into Powai Lake.

4.2 Sampling and monitoring by the joint committee

The joint committee carried-out survey & inspection of the Powai Lake and locations of culverts and inlets, which are accessible by boat and/or by approach roads. During the joint inspection cum monitoring, the joint committee collected the representative grab samples of untreated sewage which is being entering into Powai Lake through the culvert(s) i.e. culvert no. 17 & 18 (Powai Plaza) opening at IIT Premises, which further outfalls into Powai Lake and also collected grab samples of surface water at Ganeshghat, Pawawadi of Powai Lake & at 500 m from the banks of Powai Lake. Samples collected during the inspection is sent to the laboratory established by the State Board under Section 17 of the Water (Prevention and Control of Pollution) Act, 1974 i.e. MPCB Central Laboratory at Navi Mumbai for analysis of parameters of concern viz. pH, TDS, DO, BOD, COD, Chlorides,

Hardness, Sulphate, Nitrate-nitrogen, O&G, Heavy metals, and Fecal Coliform. Analysis results of the surface water samples and untreated sewage is depicted in the below Table-2 & 3 and copy of the analysis results submitted by the State Board Analyst appointed under Sub-Section (3) of Section 53 of the Water (Prevention and Control of Pollution) Act, 1974 vide email dated 29/10/2025 and 28/11/2025 is given at **Annexure-2.**

Table-2: Monitoring results of the surface water quality of Powai Lake

S. No.	Parameters	Results		
		Ganeshghat	Pawarwadi	Near floating aerator – 500 m from the banks of Powai Lake
1.	pH	7.7	7.8	7.5
2.	Dissolved Oxygen	3.8	3.7	3.5
3.	Hardness (total)	112	112	96
4.	Chloride	22.49	29.49	19.49
5.	Sulphate	23.42	23.97	6.87
6.	Total dissolved solids	261	258	213
7.	Biochemical Oxygen Demand (BOD)	22	23	26
8.	Chemical Oxygen Demand (COD)	60	64	84
9.	Oil & Grease	BDL	BDL	BDL
10.	Fluoride	0.12	0.10	0.14
11.	Nitrate Nitrogen	0.63	0.53	1.8
12.	Manganese	0.91	BDL	BDL
13.	Cadmium	BDL	BDL	BDL
14.	Copper	BDL	BDL	BDL
15.	Lead	BDL	BDL	BDL
16.	Cyanide	BDL	BDL	BDL
17.	Zinc	BDL	0.05	BDL
18.	Mercury	BDL	BDL	BDL
19.	Arsenic	BDL	BDL	BDL
20.	Faecal coliform	70	46	--

Note: Concentration of all the parameters are expressed in mg/l, except pH. Faecal coliform is expressed in MPN/100 ml. BDL: Below Detectable Limit.

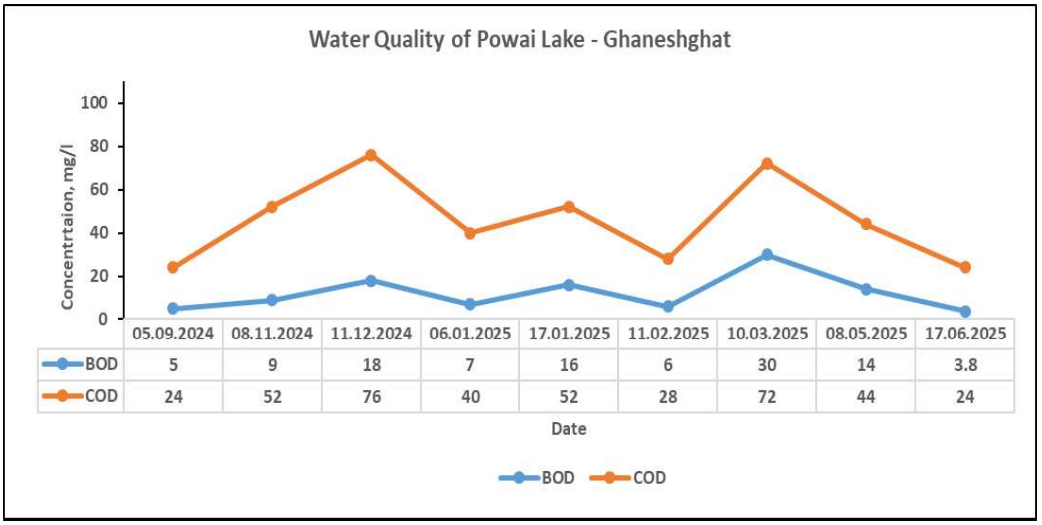
Table-3: Monitoring results of the untreated sewage entering into Powai Lake

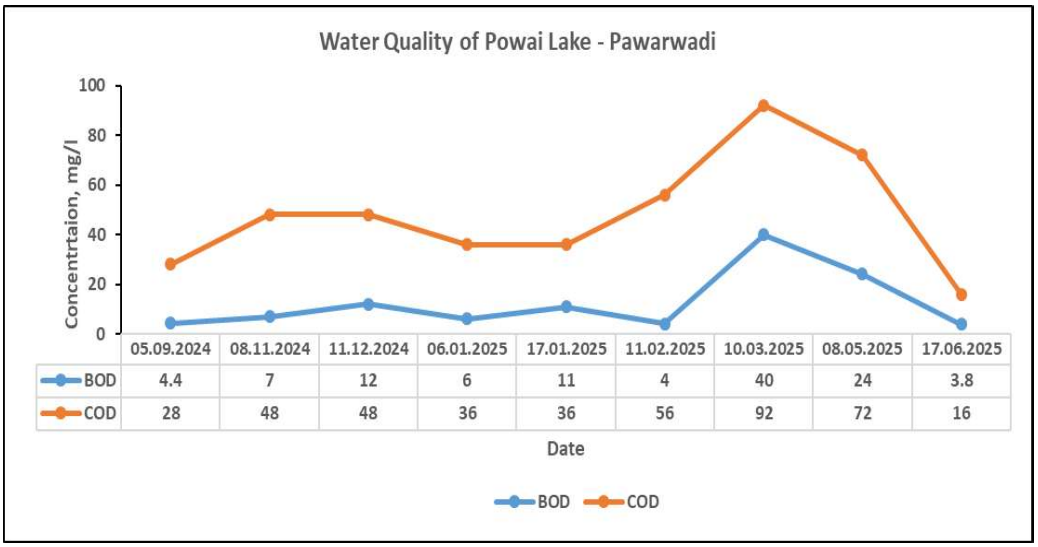
S. No.	Parameters	Results
		Culvert no. 17 & 18
1.	pH	6.8
2.	Dissolved Oxygen	Nil
3.	Hardness (total)	86
4.	Chloride	45.49
5.	Sulphate	8.6

6.	Total dissolved solids	352
7.	Biochemical Oxygen Demand (BOD)	115
8.	Chemical Oxygen Demand (COD)	268
9.	Oil & Grease	BDL
10.	Fluoride	0.09
11.	Nitrate Nitrogen	0.82
12.	Manganese	0.06
13.	Cadmium	BDL
14.	Copper	BDL
15.	Lead	BDL
16.	Cyanide	BDL
17.	Zinc	BDL
18.	Mercury	BDL
19.	Arsenic	BDL
20.	Faecal coliform	--

Note: Concentration of all the parameters are expressed in mg/l, except pH. BDL: Below Detectable Limit.

It is gathered that MPCB is also collecting surface water samples from Powai Lake on monthly basis at two locations viz. Ganeshghat and Pawarwadi. Based on the monitoring results provided by MPCB w.e.f. September, 2024 to June, 2025, the trend analysis in variation in concentration of criteria parameters i.e. COD and BOD at the aforesaid monitored locations are depicted in the below graphs. It is observed that the concentration of BOD has varied from 3.8 to 30 mg/l and the concentration of COD has varied from 24 to 76 mg/l at Ganeshghat. Similarly, the concentration of BOD has varied from 3.8 to 40 mg/l and the concentration of COD has varied from 16 to 92 mg/l at Pawarwadi.





	05.09.2024	08.11.2024	11.12.2024	06.01.2025	17.01.2025	11.02.2025	10.03.2025	08.05.2025	17.06.2025
BOD	4.4	7	12	6	11	4	40	24	3.8
COD	28	48	48	36	36	56	92	72	16

4.3 Remedial measures initiated by the BMC

Erstwhile, the Hon'ble NGT in the matter in OA. No. 68 of 2021 (WZ), Vanshakti & Anr. Vs Municipal Corporation of Greater Mumbai & Ors. vide order, dated 12/01/2022 constituted an eight-member joint committee comprising of MoEF&CC, Regional Office, Nagpur, CPCB, Regional Office, Pune, Commissioner, MCGM, Collector, Mumbai Eastern Suburban Area, DCP of the area (to be designated by Commissioner of Police, Mumbai), Chief Wildlife Warden, Maharashtra, Director Environment, Maharashtra and the State PCB as members, with nodal agency for coordination and compliance as State PCB and the State Wetland Authority. Copy of the Hon'ble NGT order, dated 12/01/2022 is given at **Annexure-3**. Grievance in the said original application is against pollution of Powai Lake in the Eastern suburb of Mumbai and failure of authorities to take remedial action. The applicant mentioned that the sources of pollution are discharge of effluents and sewage, illegal reclamation for construction and dumping of debris. Thereafter, the Hon'ble NGT considered the matter based on the pleadings made by various respondents agencies and the Hon'ble NGT vide order dated 12/01/2022 mentioned that though certain initiatives are said to have been taken for restoration/revival of the lake and prevention of damage to the environment, the steps so far taken are not adequate and desired results are yet to be achieved. Also, mentioned that there is need to continue sustained efforts by the State authorities as well as civil society and to maintain constant vigilance. Further, to take coercive measures to enforce environmental norms by way of coordinated efforts of all the statutory regulators,

wherever necessary. The operative directions of the Hon'ble NGT to the aforesaid joint committee in brief are as follows:

1. To prepare an action plan covering all aspects of environment in the light of earlier studies and plans, as may be updated in the light of current ground situation.
2. The action plan may provide for mode of execution, monitoring mechanism and budget allocation.
3. To take steps to ensure compliance of Wetland Rules, 1972 and other Environmental Rules, including, steps to prevent discharge of sewage or any other effluents and to monitor water quality to protect fish and other aquatic fauna and distinct sites of the marsh crocodile.
4. Mechanism for assessing water quality monitoring at strategic locations, exploring possibilities of installing aeration systems, prohibiting use of phosphate bearing detergents and other measures.
5. The Joint Committee may meet once every month to oversee the execution at least for one year and thereafter, at such intervals as it may find necessary.

In compliance to the aforesaid directions, the joint committee had convened various meetings and also site visits from time to time. Copies of the minutes of the meeting of the joint committee is given at **Annexure-4**. Following are important decisions in brief taken during the said meetings.

a) MCGM to provide the zonal map of sewerage network of the areas around Powai Lake including the area in sq-km covered with and without sewerage network for each ward-wise/area-wise and status of its connectivity to STP for treatment if any; Details on action plan for establishment of sewerage network for un-sewered area and its connectivity to STP for treatment including diversion of sewage from sewered area into STP for treatment.

b) MCGM to carry-out the detailed reconnaissance survey for identification of locations and estimation of present quantity of sewage being flowing into Powai Lake through the existing culverts and natural drains if any;

c) MCGM to carryout reconnaissance survey to quantify water consumption, sewage generation, mode of conveyance/existing sewerage network and treatment provided by IIT campus (including hostel campus).

d) Connectivity and dissemination of real time monitoring results of DO levels of Powai Lake at public domain i.e. website of MCGM.

The joint committee through the nodal agency time and again pursued the matter with the BMC for submission of relevant documents as per the decisions taken during the said meetings. Accordingly, the BMC vide email dated 19/03/2025 submitted the relevant information to the MPCB in respect of restoration & conservation of Powai Lake by implementing short-term and long-term measures including the preparation of Detailed Project Report for ingress detection, interception & diversion of dry weather flow (untreated sewage) of Powai Lake in 'S' ward. Copy of the action taken report submitted by the BMC is given at **Annexure-5**. The said action taken report of the BMC was also submitted to the joint committee by the MPCB during the present proceedings in the matter in OA. No. 88 of 2025 (WZ). The said action taken report contains the details of site assessment & filed investigations by means of carrying-out of reconnaissance survey, total station survey & GIS mapping and estimation of quantity of untreated sewage flow & its analysis. The said action taken report also mentioned about the components of proposals pertaining to short-term & long-term measures for abatement of sewage pollution in Powai Lake. Details of the same are summarized as below.

4.3.1 Long-term measures

For execution of long-term action plan, the BMC has prepared a Detailed Project Report for ingress detection, interception & diversion of untreated sewage (dry weather flow) of Powai Lake in 'S' ward during March, 2025. For execution of long-term action plan, the BMC has prepared separate tenders i.e. Proposal-1 and Proposal-2. The components of Proposal-1 consist of providing and laying of different diameters of sewer pipes by open cut & HDD method along with interceptors for diversion of untreated sewage (dry weather flow) along the Powai Lake in "S" ward. Accordingly, the tender for Proposal-1 is uploaded on the BMC website during February, 2025 and Letter of Acceptance (LOA) was issued to the

lowest contractor on 20/06/2025 for laying of sewer line of total length of 3,056 m & interceptors of 13 nos. including its O&M (for the period of 6 years) for the total estimated cost of Rs. 39.37 Cr. Salient features of the components of works to be undertaken are as follows:

- Untreated sewage entering from culvert nos. 1 to 14 i.e. total flow of about 8.2 MLD to be intercepted and diverted to the newly proposed 8 MLD STP at abandoned Powai sewage pumping station, by providing interceptors and laying sewer line under gravity system.
  - ✓ Total length of sewer line to be laid – 1,909 m
  - ✓ Total no. of interceptors to be laid – 09 nos.

- Untreated sewage entering from culvert nos. 15 to 18 i.e. total flow of about 7.8 MLD to be intercepted and diverted to rob hole on 800 mm existing sewer line along the JVLR by providing interceptors and laying sewer line under gravity system. Further, provision to be made to divert the aforesaid 8 MLD of untreated sewage to the existing operational STP at Bhandup (130 MLD STP, consisting of primary & secondary treatment system i.e. aerated lagoons) by alternate arrangement by laying sewer line under gravity system.
  - ✓ Total length of sewer line to be laid – 942 m
  - ✓ Total no. of interceptors to be laid – 02 nos.

- Untreated sewage entering from Perubaug area i.e. total flow of around 2 MLD to be intercepted and diverted to Perubaug pumping station and later diverted to the existing operational STP at Mithi River (8 MLD STP – commissioned & operational during 2023, consisting of primary, secondary & tertiary treatment system i.e. based on Sequential Batch Reactor (SBR) technology including sludge management & disinfection system) by providing interceptors and laying sewer line under gravity system.
  - ✓ Total length of sewer line to be laid – 205 m
  - ✓ Total no. of interceptors to be laid – 02 nos.

The components of Proposal-2 consist of commissioning of new 8 MLD STP at the Powai abandoned sewage pumping station, and discharge of treated sewage back into the Powai Lake, reportedly in order to maintain the water balance and to

preserve the aquatic life/biodiversity. The aforesaid Proposal-2 is able to manage & treat the untreated sewage entering from culvert nos. 1 to 14 (dry weather flow) along the Powai Lake in "S" ward, through the proposed works by providing the interceptors of 09 nos. and laying of sewer line of about 1,909 m. Accordingly, the tender for Proposal-2 is uploaded on the BMC website during March, 2025 for designing, construction & commissioning of new 8 MLD STP including its O&M (for the period of 6 years) for the total estimated cost of Rs. 68.88 Cr. However, re-tender is invited during June, 2025. Salient features of the components of works to be undertaken are as follows:

- Design, construction & commission of new 8 MLD STP consisting of primary, secondary & tertiary treatment system i.e. based on Membrane Bioreactor (MBR) technology including sludge management & disinfection system.
- Laying of treated sewage discharge line into Powai Lake.

4.3.2 Short-term measures

For execution of short-term action plan, the BMC has initiated the following works i.e. upkeeping of Powai Lake by removing water hyacinth using water hyacinth harvertser, maintaining dissolved oxygen (DO) concentration using mobile barge-mounted sub surface aerators (with 32 KVA DG set & 60 HP barge engine), and 05 no. of stationary jet fountains, along with other measures to curb the solid waste littering problems at the entrance of Powai Lake and at Ganeshghat & Pawarwadi. The BMC is monitoring the DO concentration of Powai Lake through installation of 06 no. of real time DO monitoring stations. Details on quantity of water hyacinth removed during 1st and 2nd phase of work are as follows. Besides, the BMC has initiated issuing a new tender for removing of about 24,000 MT of water hyacinth from Powai Lake for a period of 12 months and as informed, tentative date of commencement of work is during December, 2025. Details of water hyacinth removed is depicted in the below Table-4.

Table-4: Details of water hyacinth removed

Item	Particulars		
	Date of commencement	Date of completion	Total quantity of water hyacinth removed, MT
Phase of work – I: Upkeeping of Powai Lake	07/03/2024	06/10/2025	24,985
Phase of work – I:	14/10/2024	30/07/2025	7,780

Maintenance of Powai Lake			
Total quantity of water hyacinth removed, MT			32,765

4.4 Action taken by MPCB

MPCB based on the public grievances, periodic site inspections and in compliance to the erstwhile Hon'ble NGT order in the matter in OA. No. 68 of 2021 (WZ), Vanshakti & Anr. Vs Municipal Corporation of Greater Mumbai & Ors. had issued directions u/s 33A of the Water (Prevention and Control of Pollution) Act, 1974 and 31A of the Air (Prevention and Control of Pollution) Act, 1981 to the BMC w.r.t. the issues of sewage pollution & idol immersion in Powai Lake. Copies of directions issued by MPCB is given at **Annexure-6**. Details of non-compliances and directions issued by MPCB to the BMC regarding the issue of sewage pollution of Powai Lake are summarized in the below Table-5.

Table-5: Details of non-compliances and directions issued by MPCB to the BMC.

Date of direction	Nature of non-compliances	Directions
15/12/2021	• Discharge of untreated sewage into Powai Lake through 18 nos. of culverts and 02 nos. of nalahs	• To take necessary precautionary measures to prevent ingress of untreated sewage into Powai Lake and to divert to nearby STP for treatment. • To follow the CPCB guidelines for idol immersion for abatement of pollution of Powai Lake. • To submit time bound program to comply with the directions.
29/01/2025	• Overwhelming growth of water hyacinth. • Accumulation of solid waste along the banks of Powai Lake, littering of solid waste near the gardens. • Discharge of untreated sewage into Powai Lake through culverts.	• To carry-out detailed reconnaissance survey for identification of locations and estimation of sewage quantity discharged into Powai Lake through culverts and nalahs. • To take necessary precautionary measures to prevent ingress of untreated sewage into Powai Lake and to divert to nearby STP for treatment and monitoring of water quality of Powai Lake. • To ensure proper collection & disposal of

		solid waste. • To follow the CPCB guidelines for idol immersion for abatement of pollution of Powai Lake. • To submit time bound program to comply with the directions.

4.5 Miscellaneous

i. The BMC has carried-out sedimentation survey of Powai Lake by bathymetric survey technology jointly in co-ordination with Maharashtra Engineering Research Institute (MERI) Nashik Division, Govt. of Maharashtra and office of the Sr. Hydrographer from Maharashtra Maritime Board, Mumbai Division, Govt. of Maharashtra. As per the information shared by the BMC, based on the reports given by MERI, it has been found that Powai Lake's water holding capacity is reduced by 32.30%. Copy of the report submitted by MERI is given at **Annexure-7**. As informed, the BMC has appointed M/s. Green Yatra (NGO) to explore the feasibility of desilting of Powai Lake. At present the said NGO is working on data collection i.e. study of lake basin, study of bio diversity in lake etc.

ii. As per the proposal of the BMC, the untreated sewage of about 7.8 MLD from the culvert nos. 15 to 18 to be intercepted & diverted into existing STP at Bhandup (130 MLD). It is worth to mention that the existing STP at Bhandup (130 MLD) is based on primary & secondary treatment through aerated lagoons. Based on the analysis results of MPCB w.e.f. January, 2025 to August, 2025, it is observed that the existing STP is consistently found non-complied w.r.t. MPCB prescribed discharge standards of treated sewage for criteria parameters i.e. BOD and COD, wherein, the concentration of BOD at outlet of STP is varied from 16 – 105 mg/l > 10 mg/l. Similarly, the concertation of COD at outlet of STP is varied from 60 – 272 mg/l > 50 mg/l.

iii. During July, 2022, the BMC has issued work order for designing, construction & commissioning of new 215 MLD STP at Bhandup, including O&M (for the period of 15 years) for the total estimated cost of Rs. 1170,00,00,000/-. The

said new STP is based on primary, secondary & tertiary treatment system i.e. based on Sequential Batch Reactor (SBR) technology including sludge management & electricity generation from biogas & heat recovery system and disinfection system, by enhancing the treatment capacity & treatment units, in place of its existing STP at Bhandup. As informed by the BMC, construction works of the said new STP are still in progress.

Some of the photographs taken during the joint committee inspection is given at **Annexure-8**.

5.0 Conclusions

i. Major sources of pollution into the Powai Lake is the untreated sewage generating from un-sewered areas of "S" ward of BMC i.e. areas located along the Adi Shankaracharya Road and un-sewered areas of "S" ward of BMC, comprises of Perubaug area including slum pockets, National Institute of Industrial Engineering (NITE) area including sewage ingress due to leakages from the existing sewer lines in the areas of "S" ward of BMC into the storm water drains. As per the Detailed Project Report of BMC, total estimated un-sewered areas of "S" ward of BMC is 2,02,909.71 sq-m. The untreated sewage generated from the aforesaid un-sewered areas of "S" ward of BMC is finding its way into Powai Lake through the 19 nos. of culverts and 02 nos. of inlets, which were initially commissioned for regulation of storm water into Powai Lake, which serves a main recharge of water to Powai Lake. The total estimated quantity of untreated sewage i.e. only dry weather flow entering into the Powai Lake from the aforementioned culverts and inlets is about 18 MLD.

[Please refer S. no. 4.1, as above]

ii. As per the BMC, Powai Lake was constructed in the year 1891 to cater the drinking water demand of Mumbai City and subsequently the Lake water was polluted and hence, it was declared as unfit for drinking purpose during 1919. Further, it was informed that the Lake water is being used only for industrial uses, cattle sheds and for pisciculture (fish farming), angling, and other recreational activities. Analysis results of grab sample of untreated sewage

which is being entering into Powai Lake through the culvert nos. 17 & 18 reveals that the concentration of criteria parameters are as follows: DO: Nil, BOD: 115 mg/l, COD: 268 mg/l respectively. Similarly, analysis results of grab samples of surface water collected at Ganeshghat & Pawawadi of Powai Lake reveals that the concentration of criteria parameters are as follows: DO: 3.8 & 3.7 mg/l, BOD: 22 & 23 mg/l, and COD: 60 & 64 mg/l respectively. Also, analysis results of grab sample of surface water collected at 500 m from the banks of Powai Lake reveals that the concentration of criteria parameters are as follows: DO: 3.5 mg/l, BOD: 26 mg/l, and COD: 84 mg/l respectively. Further, based on the past surface water quality monitoring carried-out by MPCB, it is observed that the concentration of BOD has varied from 3.8 to 30 mg/l and the concentration of COD has varied from 24 to 76 mg/l at Ganeshghat. Similarly, the concentration of BOD has varied from 3.8 to 40 mg/l and the concentration of COD has varied from 16 to 92 mg/l at Pawarwadi.

[Please refer S. no. 4.2, as above]

iii. In order to abate the pollution of Powai Lake due to discharge of untreated sewage (dry weather flow) generating from “S” ward of BMC, the BMC has initiated long-term measures i.e. works/components stipulated under Proposal-1 & 2. The total estimated cost for execution of works as stipulated under Proposal-1 i.e. laying of sewer line of total length of 3,056 m & interceptors of 13 nos. including its O&M (for the period of 6 years) is Rs. 39.37 Cr.

It is observed that the execution of all works as stipulated under Proposal-1 are yet to be commenced in respect of laying of sewer lines along with interceptors for diversion of untreated sewage of 8.2 out of 18 MLD (untreated sewage entering from culvert nos. 1 to 14) into the proposed new STP at Powai abandoned sewage pumping station (8 MLD, STP consisting of primary, secondary & tertiary treatment system i.e. based on Membrane Bioreactor (MBR) technology including sludge management & disinfection system). Similarly, the execution of all works are yet to be commenced in respect of laying of sewer lines along with interceptors for diversion of

remaining untreated sewage of 7.8 out of 18 MLD (untreated sewage entering from culvert nos. 15 to 18) into the existing operational STP at Bhandup (130 MLD, consisting of primary & secondary treatment system i.e. aerated lagoons).

Further, the execution of all works are yet to be commenced in respect of laying of sewer lines along with interceptors for diversion of remaining untreated sewage of 2 out of 18 MLD (untreated sewage entering from Perubaug area) into existing Perubaug pumping station and subsequent diversion into the existing operational STP at Mithi River (8 MLD, consisting of primary, secondary & tertiary treatment system i.e. based on Sequential Batch Reactor (SBR) technology including sludge management & disinfection system).

[Please refer S. no. 4.3.1, as above]

iv. The execution of works as stipulated under Proposal-2 i.e. designing, construction & commissioning of new 8 MLD STP at the Powai abandoned sewage pumping station, for treatment of untreated sewage of 8.2 out of 18 MLD (untreated sewage entering from culvert nos. 1 to 14), got delayed due to tendering process, which was initiated during March, 2025. Subsequently, re-tender is invited during June, 2025 for execution of said works. At present, as informed by the BMC, evaluation of tendering process is completed and Letter of Intent (LOI) is yet to be issued to the selected bidder for designing, construction & commissioning of new 8 MLD STP including its O&M (for the period of 6 years) for the total estimated cost of Rs. 68.88 Cr.

[Please refer S. no. 4.3.1, as above]

v. The BMC has initiated short-term measures by the way of removal of water hyacinth, the said works were initiated in phased manner i.e. 1st Phase: Upkeeping of Powai Lake during March, 2024 to October, 2025 and 2nd Phase: Maintenance of Powai Lake during October, 2024 to July, 2025. As per the records submitted, so far, the BMC has removed about 32,765 MT of water hyacinth from Powai Lake and disposed through its authorized contractor in low lying areas of Villages at Bhiwandi, and at Mumbra, Dist.

Thane. Further, the BMC has proposed to remove about 24,000 MT of water hyacinth from Powai Lake in 3rd Phase for a period of 12 months, however, the work order is yet to be issued. As informed, the 3rd Phase activity shall be tentatively to commence during December, 2025. Nevertheless, it is to mention that till such time the completion of new STP and ancillary infrastructure facility & its connectivity to the new STP as well as to the existing STPs, 18 MLD of untreated sewage (from culvert nos. 1 to 18 and 02 inlets at Perubaug area) will be continued to be discharged into Powai Lake. As a result, the water quality of Powai Lake to continue to deteriorate along with overwhelming growth of water hyacinth and loss of biodiversity.

[Please refer S. no. 4.3.2, as above]

vi. As per the Detailed Project Report of BMC, solid waste, plastic waste, silt and debris were found accumulated within the 19 nos. of culverts and as well as near the flood gates of all the culverts. Also, most of the culverts were found damaged due to ongoing various developmental activities in & around the alleged region.

6.0 Remedial measures by the joint committee

Though various measures have been proposed for abetment of sewage pollution into Powai Lake by implementation of short-term & long-term measures, however, completion of the same may take substantial period of time. Meanwhile, following remedial measures may be implemented for abatement of sewage pollution into Powai Lake:

i. In-situ remediation is simpler to implement than conventional methods, requiring less space and energy. In-situ drain remediation techniques involve the treatment of sewage in the flowing drains by physio-chemical and biological treatment processes. Treatment occurs directly in flowing drains through physical (screening, sedimentation, aeration), chemical (flocculation), and biological (microbial oxidation via phytoremediation) processes. These systems effectively lower BOD and faecal coliform levels while boosting dissolved oxygen including substantial reduction of total nitrogen & phosphorous. Phytoremediation, for example, can reduce faecal coliform by over 50% and raise DO from 0 to 5 mg/l. Additionally, there are alternative

biological treatments available for removing nutrient pollutants such as phosphorous and nitrogen. There are many in-situ drain treatment technologies such as Green Bridge Technology (GBT), Microbial Dosing (MD), Soil Scape Filter Technology (SSFT), Floating Islands Technology (FIT), and Restoration of Nallah with Ecological Units (RENEU) are available in India for treating various drains.

In view of the above, as an interim treatment method, the BMC to expeditiously implement in-situ drain treatment technology in the culverts and drains, which are carrying untreated sewage into the Powai Lake.

ii. After completion of diversion of the untreated sewage into newly proposed sewer lines and subsequent connectivity & treatment at new STP and at existing STPs, the BMC should carry-out rejuvenation of Powai Lake by implementing in-lake restoration techniques – engineering techniques and/or biological techniques. The said activity may be carried-out under the supervision of academic/research institutes having expertise in Rejuvenation of Rivers and Lakes, with funding from the BMC.

iii. The BMC must ensure that no untreated sewage is discharged into the Powai Lake and till setting up of STPs, interim remediation (in-situ remediation) must be done forthwith. In case of any default in this regard, the Hon'ble NGT may direct the BMC to pay compensation of Rs. 5 lakh per month per inlet into the lakes from 01/02/2020, as deemed fit, as per the Hon'ble NGT (PB) matter in the OA. No. 125 of 2017, Court on its own Motion Vs The State of Karnataka.

iv. It has been reported by the BMC in its Detailed Project Report of March, 2025 that about 4,500 Lakh m^3 of silt has been deposited in the Powai Lake. Decreased transmission of light through the water column is among the most important of the physical effects of increased sediment loads on aquatic ecosystems. Increased sediment loads or resuspension of deposited sediments can cause considerable reductions in both oxygen availability and rates of water column reaeration, thereby significantly impacts the biodiversity, ecological processes, and ecosystem functions of the Lake.

In view of the above, the BMC to expeditiously carry-out dredging of edges of Powai Lake to remove the accumulated sediment and debris including de-weeding from the shoreline and shallow areas including de-silting of Powai Lake to restore depth, improve water quality, and enhance the ecosystem functions. Further, analysis of sludge and silt may be carried out before its disposal based on the result of such analysis, the mode of disposal and protocol be determined in accordance with laid down principles under the relevant Rules. The BMC may refer and adopt the appropriate remediation and de-silting techniques which are implemented by the Govt. of Karnataka, as per their action plan & compliance report submitted to the Hon'ble NGT (PB) in the matter in OA. No. 125 of 2017, Court on its own Motion Vs The State of Karnataka.

v. The BMC to install additional jet fountains/ aerators of adequate capacity along the shoreline of Powai Lake i.e. near the mixing zone/confluence of untreated sewage with Lake water so as to aid in better aeration and to prevent septic/ anoxic conditions.

vi. After the rainy season, the BMC to initiate cleaning and de-silting of culverts and drains which are carrying untreated sewage into Powai Lake. As far as practically feasible, all the culverts and drains to be covered with pre-cast RCC slabs in order to prevent unauthorized disposal of solid waste and plastic waste etc.

vii. The BMC to install trash net capture technologies consisting of:

- Storm Drain Inlet Trash Capture Technologies – Curb Inlet Covers, Catch Basin Outlet Screens, Catch Basin Hoods, Catch Basin Fabric Inserts;
- In-Line and End of Pipe Trash Capture Technologies – Linear Radial Devices, Hydrodynamic Separators, Netting Systems; and
- Open Water Trash Capture Technologies – Litter Booms, Trash Skimmer Vessels, Bandalong Litter Trap.

In view of the above, the BMC to explore and implement suitable trash net capture technologies, based on the feasibility assessment to prevent the influx of floating debris including solid waste and plastic waste etc. from entering Powai Lake.

viii. It is observed that the BMC is disposing the removed water hyacinth from Powai Lake to low lying areas in Villages near Bhiwandi, and in Mumbra, Dist. Thane, for disposal through its authorized contractor. Instead of disposal in low lying areas, the BMC may explore the following prospects in terms of its reuse/recycle potential:

- Water hyacinth for feeds – because of its nutritional value and potential use as feed for livestock, poultries, and fish, which make it suitable for use as a substitute or an additive for animal feeds.
- Water Hyacinth for Biofertilisers – Water hyacinth can be either mulched, composted, vermicomposted or anaerobically digested for biofertilisation purposes.
- Water Hyacinth in Crafts – Water hyacinth has great potential for use in craft production. Raw material from the dried plant and its fibre can be utilised to make bags, handbags, wallets, flower pots, fashion accessories, mats and many other items.
- Water Hyacinth Conversion to Bioenergy – Biogas production through the anaerobic digestion and briquette production from water hyacinth biomass.

In view of the above, the BMC to explore and implement suitable methods, based on the feasibility assessment to reuse/recycle the harvested water hyacinth rather than disposing of it in low lying areas.

ix. The BMC to expeditiously complete the works as proposed in Proposal-1 i.e. laying of sewer line of total length of 3,056 m & interceptors of 13 nos. and connectivity to the existing STPs at Bhandup and Mithi River. Also, to expeditiously complete the works as proposed in Proposal-2 i.e. laying of sewer line of total length of 1,909 m & interceptors of 09 nos. & its

connectivity and commissioning of new STP at Powai abandoned sewage pumping station, including laying of discharge of treated sewage conveyance system for final disposal.

x. The BMC to expeditiously complete the works & commissioning of new STP at Bhandup.

xi. The BMC to ensure connectivity and dissemination of real time monitoring results of DO levels of Powai Lake at public domain i.e. website of BMC.

xii. The BMC to ensure that no solid waste, religious offerings, food waste, plastic waste etc. is disposed into the Powai Lake including immersion of idols during festive occasion. Also, to regularly conduct public outreach programs through capacity building for communities near the Powai Lake and also at other areas of Mumbai City for abatement of pollution and conservation of Lakes.

xiii. The BMC to undertake beautification of Lake's shoreline for public use by the way of lake front development. Also, to install fencing around the Powai Lake in order to prevent unauthorized & lackadaisical entry of public including disposal of debris, solid waste and plastic waste etc. Further, the BMC to install sinage boards in vernacular language at appropriate locations about DO's and DON'Ts for prevention of pollution and conservation of Powai Lake.

xiv. The BMC to submit a time bound action plan along with PERT chart for implementation of the remedial measures, as given above.

(Nishchal C.)
Scientist 'E'
CPCB, Regional Directorate, Pune

(Rakesh Dafade)
Sub-Regional Officer
MPCB, Mumbai-3

(Dr. Y. B. Sontake)
Member, Maharashtra State Wetland Authority

*****

Annexure-1

Item No. 04 Court No. 2

BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI

Original Application No. 318/2025

Dr Rakesh Bakshi Applicant

Versus

State of Maharashtra & Ors. Respondents

Date of hearing: 10.07.2025

CORAM: HON'BLE MR. JUSTICE ARUN KUMAR TYAGI, JUDICIAL MEMBER
HON'BLE DR. AFROZ AHMAD, EXPERT MEMBER

Applicant: Dr. Rakesh Bakshi, Applicant in person (through V.C).

ORDER

1. The applicant-Dr. Rakesh Bakshi, Member, DK Flag Foundation, Chittaranjan Tower 4th Floor near Hiranandani Hospital, Hiranandani Powai, Mumbai, has sent the present letter petition dated 26.03.2025 to this Tribunal which has been treated and registered as Original Application No. 318/2025 for exercise of suo motu jurisdiction.

2. The relevant part of the letter petition enumerating grievances of the applicant is reproduced as follows:-

> *" Subject: Urgent Appeal to Save Powai Lake - A Dying Natural Heritage*
>
> *X X X X.*
>
> *With deep concern and utmost urgency, we, the citizens of Mumbai, seek your immediate intervention to save Powai Lake a once-thriving ecosystem now on the brink of destruction. If action is not taken soon, this beautiful waterbody may become a mere memory, replaced by a patch of land suffocated under invasive weeds and pollution.*

The Grave State of Powai Lake

- ***80% of the lake's surface is engulfed by invasive water hyacinths****, rapidly depleting oxygen levels and endangering aquatic life, including its famous crocodile population.*
- ***Over 10.9 million liters of untreated sewage enter the lake daily****, turning the water toxic beyond permissible limits and killing its biodiversity.*
- ***Festivals and human activities add to its distress****, with large amounts of gypsum and other harmful materials polluting the water further.*

Ongoing Destruction and Lack of Action

The situation continues to deteriorate despite awareness among authorities. While news reports have highlighted the lake's declining health, and civic bodies have been informed of the urgency, ***no concrete measures have been taken to mitigate the destruction****.*

BMC's Inaction and Negligence

The Brihanmumbai Municipal Corporation (BMC), which is responsible for the upkeep and maintenance of Powai Lake, has been repeatedly informed of the dire state of the lake. Various representations and reports have been submitted to them, but the response has been ***delayed and inadequate****. Despite knowing the threats posed by pollution, untreated sewage, and rapid ecological degradation, the BMC has failed to implement a* ***comprehensive restoration plan*** *or enforce strict regulations to curb further damage.*

Citizen-Led Efforts

To counter this negligence, concerned citizens, NGOs, IIT Mumbai, and corporate entities have joined hands to initiate the ***Clean Powai Lake Project****. However, without authoritative intervention, these efforts will not be enough to reverse the damage.*

Why Powai Lake Must Be Saved

- *It is one of Mumbai's last remaining freshwater lakes, critical for urban biodiversity.*
- *It plays a significant role in groundwater recharge and climate regulation in the city.*
- *It has the potential to become a model eco-tourism and conservation zone if restored properly.*

Our Urgent Appeal

We humbly yet firmly request the National Green Tribunal to:

1. ***Direct the BMC and other relevant authorities to take immediate and concrete action*** *for lake cleanup before the monsoon worsens the situation.*
2. ***Halt sewage inflow and enforce strict regulations*** *to prevent further pollution.*
3. ***Actively involve environmental experts*** *to devise a sustainable lake restoration plan.*

We have attached photographs, newspaper reports, to validate our concerns.

The future of Powai Lake rests in your hands. *We sincerely urge you to treat this matter with the seriousness it deserves, ensuring that this natural treasure is not lost forever.*

Your intervention will be a legacy for future generations.

Awaiting your prompt and positive response*."*

3. *Prima facie* the averments made in the application raise substantial questions relating to environment arising out of the implementation of the enactments specified in Schedule-I to the National Green Tribunal Act, 2010.

4. In view of the averments made in the application, we consider it appropriate to have response of (1) State of Maharashtra through its Chief Secretary, Government of Maharashtra, (2) Brihanmumbai Municipal Corporation, Maharashtra though its Commissioner, (3) Maharashtra State Wetland Authority through its Chairman, (4) Maharashtra Pollution Control Board through its Member Secretary who are impleaded as respondents no. 1 to 4. The Registry is directed to prepare and attach memo of parties to the application and issue notices to respondents no. 1 to 4 requiring them to file their reply/response within two months.

5. In view of the environmental questions involved in the case, we also consider it appropriate that a Joint Committee be constituted to verify the factual position and suggest appropriate remedial action. Accordingly, we constitute a Joint Committee comprising of officers duly authorized by Central Pollution Control Board, Maharashtra Pollution Control Board and Maharashtra State Wetland Authority and direct the same to meet within two weeks, undertake visits to the site, look into the grievances of the applicant, associate the applicant and representative of the concerned project proponents, verify the factual position and submit report

suggesting appropriate remedial action. The Maharashtra State Pollution Control Board will be the nodal agency for coordination and compliance.

6. Even though in the present case cognizance has been taken by this Bench on the basis of letter petition received by post with approval and assignment under order of Hon'ble Chairperson, but in view of the facts and circumstances of the case including the fact that the place of accrual of cause of action lies within jurisdiction of the Western Zone Bench of this Tribunal at Pune we are of the considered view that it will be appropriate if the case is further heard by the Western Zone Bench of this Tribunal at Pune.

7. Accordingly, the Registry is directed to list the matter before the Western Zone Bench of this Tribunal at Pune on 16.09.2025 after obtaining orders from Hon'ble the Chairperson for transfer of the case.

8. Report of the Joint Committee may be filed by Maharashtra State Pollution Control Board and replies/ responses may be filed by respondents no. 1 to 4 before the Western Zone Bench of this Tribunal at Pune within one month.

9. A copy of this order be sent to the Member Secretary, Central Pollution Control Board, Member Secretary Maharashtra Pollution Control Board and Chairman, Maharashtra State Wetland Authority by email for requisite compliance.

Arun Kumar Tyagi, JM

Dr. Afroz Ahmad, EM

July 10, 2025
Original Application No. 318/2025
AB

Analysis Results of the sample collected on 06.11.2025 from Powai Lake and nalla carrying domestic effluent in the premises of IIT Powai

Annexure-2

SRO Mumbai 3 < sromumbai3@mpcb.gov.in >

Fri, 28 Nov 2025 12:32:23 PM +0530

To "NISHCHAL C"<nischal.cpcb@nic.in>

Cc "RO Mumbai"<romumbai@mpcb.gov.in>

Sir,
Please find attached herewith the analysis result of the sample of water collected on 06.11.2025 from Powai Lake near Floating aeration and sample of domestic effluent flowing through the nallah near H2/Bldg No. 3 Near Quarter No.17-24 inside IIT premises which further meet to Powai lake.
Submitted for your kind perusal and further needful please.

Regards

Sub-Regional Officer Mumbai 3 ,
Maharashtra Pollution Control Board ,
Kalpataru Point, 2nd Floor, Sion East
Mumbai – 400022

2 Attachment(s)

Powai Result (2).pdf
415.6 KB

Powai Result.pdf
415.6 KB

Powai lake water and sewage ingress Sample Result.

SRO Mumbai 3 < sromumbai3@mpcb.gov.in >

Wed, 29 Oct 2025 11:56:41 AM +0530

To "NISHCHAL C"<nischal.cpcb@nic.in>

Cc "RO Mumbai"<romumbai@mpcb.gov.in>,"V.R.Pawale" <vinod.pawale@mpcb.gov.in>,"Y.V.Gore"<yogesh.gore@mpcb.gov.in>

Sir,
Please find attached herewith the analysis results of water sample of Powai lake and sewage ingress to Powai lake.

1. Powai lake water sample collected at Ganeshghat
2. Powai lake water sample collected at Pawarwadi
3. Sewage ingress into Powai lake through Nallah located in the premises of IIT Powai.

Submitted for your information.

Regards

Sub-Regional Officer Mumbai 3 ,
Maharashtra Pollution Control Board ,
Kalpataru Point, 2nd Floor, Sion East
Mumbai – 400022

3 Attachment(s)

sampleReport-115932-366579… 122.3 KB

sampleReport-115933-182487… 122.3 KB

sampleReport-115931-529976… 119.6 KB

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MAHARASHTRA POLLUTION CONTROL BOARD
Central Laboratory.
Central Laboratory, Maharashtra Pollution Control Board, P-3, "Nirmal Bhavan", MIDC Industrial Area, Mahape, Navi Mumbai- 400 710, Tel : 022-67195031
e-mail : icclab@mpcb.gov.in
website : http://mpcb.gov.in

TC-11959

NABL Accreditation:- ISO/IEC 17025:2017, TC-11959	Issue Date: 24/07/2023 Validity: 23/07/2025
Certification Standards:- ISO 45001: 2018, 944015/r1-S-1	Issue Date: 26/02/2024 Validity: 25/02/2027
MoEF Recognition: Legal 42(3)/87	Issue Date: 17/05/2021 Validity: 16/05/2026

Test Report No.: MPCB/CLab/Environment/25-26/09/68-A	**Date:** 04/09/2025 05:17 PM
ULR No.: TC-1195925000002039F	

Test Report-Water (Environment)

Field Sample ID		BR-0100029		
Sample collected by (Officer Name)		FO-Mumbai III(Yogesh Gore) (SRO-Mumbai III)	Location of sample collection	Ganeshghat
Seal No.:		220	Method of sample collection	Grab
Sample Collection	Date	12/08/2025	Total No. of Containers	1
	Time	01:30 PM	Nature/Description of Sample	Lake

Lab ID		**MPCB/CLab/ENV/25-26/349**	Sample condition	-
Received by lab	Date	13/08/2025	Analysis Started On	13/08/2025 05:27 PM
	Time	05:07 PM	Analysis Completed On	22/08/2025 04:25 PM
Sample recived by (Name & Designation)		Dr P D Khadkikar (Senior Scientific Officer)		

Sr.No	Parameter	Results	Unit	Test Method
1	pH@25 degree C	7.7		APHA 24th Edition 4500-H+ B (Electrometric Method)
2	Biochemical Oxygen Demand (BOD) 3 days at 27 degree C	22.0	mg/l	IS 3025 (Part 44)
3	Chloride	22.49	mg/l	APHA 24th Edition 4500-Cl B
4	Chemical Oxygen Demand (COD)	60.0	mg/l	IS 3025 (Part 58)
5	Dissolved Oxygen	3.8	mg/l	IS 3025 (Part 38) Winkler Method
6	Hardness (total)	112.00	mg/l	APHA 24th Edition 2340-C

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Sr.No	Parameter	Results	Unit	Test Method
7	Hardness (Magnesium)	36.00	mg/l	APHA 24 th Edition 3500-Mg B
8	Oil & Grease	BDL	mg/l	APHA 24th Edition 5520 B

Remarks: Nil

Approved & Reviewed By

Dr P D Khadkikar
Senior Scientific Officer,
I/c Central Laboratory,
MPCB, Navi Mumbai. (Authorized Signatory)

Note :
1. The results refer to the samples and parameters requested for analysis.
2. Abbreviations: - BDL=Below Detectable limit, N.D.=Not Detected, N.A.= Not Analyzed
3. The Contents of this Report shall not be reproduced in part or in full without written approval of laboratory.

MAHARASHTRA POLLUTION CONTROL BOARD

Phone : 022-67195031 Email : icclab@mpcb.gov.in Website : http://mpcb.gov.in	"Your Service is our Duty"	**Central Laboratory** Central Laboratory, Maharashtra Pollution Control Board, P-3, "Nirmal Bhavan", MIDC Industrial Area, Mahape, Navi Mumbai- 400 710

Repot Outward No.: MPCB/CLab/Environment/25-26/09/68-B
Date: 04/09/2025 05:17 PM

Analysis Report-Water (Environment)

Client/Industry/location Name & Address
Powai Lake Near Ganeshghat

Sample Details	
Field Sample ID :	BR-0100029
Laboratory Sample Code :	MPCB/CLab/ENV/25-26/349
Sample Details (Water/Air/HW) :	Water
Sampling Method(s) :	Grab
Sample Volume Received :	2.5 lit can
Sample Collected By :	FO-Mumbai III(Yogesh Gore) (SRO-Mumbai III)
Seal No. :	220
Type of Industry / Location details :	
Sample Collected On :	Aug 12 2025 01:30:00:000PM

Sr.No	Parameter	Result	Unit	Method of analysis
1	Total Dissolved Solids(TDS)	261.0	mg/l	APHA 24th Edition 2540 C
2	Cyanide	BDL	mg/l	
3	Fluoride	0.12	mg/l	
4	Nitrate Nitrogen	0.63	mg/l	
5	Sulphate	23.42	mg/l	APHA 24th Edition 4500-SO4 E (Turbidimetric Method)
6	Aluminium	0.08	mg/l	
7	Arsenic	BDL	mg/l	
8	Cadmium	BDL	mg/l	APHA 24th Edition 3111B (Direct Air-Acetylene Flame Method)
9	Copper	BDL	mg/l	APHA 24th Edition 3111B (Direct Air-Acetylene Flame Method)
10	Lead	BDL	mg/l	APHA 24th Edition 3111B (Direct Air-Acetylene Flame Method)
11	Manganese	0.91	mg/l	APHA 24th Edition 3111B (Direct Air-Acetylene Flame Method)
12	Mercury (Processing & Analysis)	BDL	mg/l	APHA 24th Edition 3112 B

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Sr.No	Parameter	Result	Unit	Method of analysis
13	Zinc	BDL	mg/l	APHA 24th Edition 3111B (Direct Air-Acetylene Flame Method)
14	Faecal Coliform (MPN technique)	70.0	MPN/100 ml	APHA 24th Edition 9221 E (Std. Thermotolerant (Fecal) Coliform Procedure)

Remark: Nil

Report Type: final

Report generated on: 04/09/2025 05:17 PM

Complied by: Sharmila Bhirud

Approved by: Dr P D Khadkikar

Reviewed on Date: 04/09/2025 05:17 PM

Reviewed by: Dr P D Khadkikar

Dr P D Khadkikar
Senior Scientific Officer,
I/c Central Laboratory,
MPCB, Navi Mumbai.
(Authorized Signatory)

* Electronic report does not require signature

Note :
1. The results refer to the samples and parameters requested for analysis.
2. Abbreviations: - BDL=Below Detectable limit, N.D.=Not Detected, N.A.= Not Analyzed
3. The Contents of this Report shall not be reproduced in part or in full without written approval of laboratory.

*** End of the Report ***

"Your Service is our Duty"

MAHARASHTRA POLLUTION CONTROL BOARD
Central Laboratory.
Central Laboratory, Maharashtra Pollution Control Board, P-3, "Nirmal Bhavan", MIDC Industrial Area, Mahape, Navi Mumbai- 400 710, Tel : 022-67195031
e-mail : icclab@mpcb.gov.in
website : http://mpcb.gov.in

TC-11959

NABL Accreditation:- ISO/IEC 17025:2017, TC-11959	Issue Date: 24/07/2023 Validity: 23/07/2025
Certification Standards:- ISO 45001: 2018, 944015/r1-S-1	Issue Date: 26/02/2024 Validity: 25/02/2027
MoEF Recognition: Legal 42(3)/87	Issue Date: 17/05/2021 Validity: 16/05/2026

Test Report No.: MPCB/CLab/Environment/25-26/09/67-A	**Date:** 04/09/2025 05:28 PM
ULR No.: TC-1195925000002224F	

Test Report-Water (Environment)

Field Sample ID		BR-0100030		
Sample collected by (Officer Name)		FO-Mumbai III(Yogesh Gore) (SRO-Mumbai III)	Location of sample collection	Pawarwadi
Seal No.:		220	Method of sample collection	Grab
Sample Collection	Date	12/08/2025	Total No. of Containers	1
	Time	01:45 PM	Nature/Description of Sample	Lake

Lab ID		**MPCB/CLab/ENV/25-26/350**	Sample condition	-
Received by lab	Date	13/08/2025	Analysis Started On	13/08/2025 05:26 PM
	Time	05:08 PM	Analysis Completed On	04/09/2025 05:16 PM
Sample recived by (Name & Designation)		Dr P D Khadkikar (Senior Scientific Officer)		

Sr.No	Parameter	Results	Unit	Test Method
1	pH@25 degree C	7.8		APHA 24th Edition 4500-H+ B (Electrometric Method)
2	Biochemical Oxygen Demand (BOD) 3 days at 27 degree C	23.0	mg/l	IS 3025 (Part 44)
3	Chloride	29.49	mg/l	APHA 24th Edition 4500-Cl B
4	Chemical Oxygen Demand (COD)	64.0	mg/l	IS 3025 (Part 58)
5	Dissolved Oxygen	3.7	mg/l	IS 3025 (Part 38) Winkler Method
6	Hardness (total)	112.00	mg/l	APHA 24th Edition 2340-C

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Sr.No	Parameter	Results	Unit	Test Method
7	Hardness (Magnesium)	40.00	mg/l	APHA 24 th Edition 3500-Mg B
8	Oil & Grease	BDL	mg/l	APHA 24th Edition 5520 B

Remarks: Nil

Approved & Reviewed By

Dr P D Khadkikar
Senior Scientific Officer,
I/c Central Laboratory,
MPCB, Navi Mumbai. (Authorized Signatory)

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MAHARASHTRA POLLUTION CONTROL BOARD

Phone : 022-67195031 Email : icclab@mpcb.gov.in Website : http://mpcb.gov.in	"Your Service is our Duty"	**Central Laboratory** Central Laboratory, Maharashtra Pollution Control Board, P-3, "Nirmal Bhavan", MIDC Industrial Area, Mahape, Navi Mumbai- 400 710

Repot Outward No.: MPCB/CLab/Environment/25-26/09/67-B
Date: 04/09/2025 05:28 PM

Analysis Report-Water (Environment)

Client/Industry/location Name & Address
Powai Lake Near Pawarwadi

Sample Details	
Field Sample ID :	BR-0100030
Laboratory Sample Code :	MPCB/CLab/ENV/25-26/350
Sample Details (Water/Air/HW) :	Water
Sampling Method(s) :	Grab
Sample Volume Received :	2.5 lit can
Sample Collected By :	FO-Mumbai III(Yogesh Gore) (SRO-Mumbai III)
Seal No. :	220
Type of Industry / Location details :	
Sample Collected On :	Aug 12 2025 01:45:00:000PM

Sr.No	Parameter	Result	Unit	Method of analysis
1	Total Dissolved Solids(TDS)	258.0	mg/l	APHA 24th Edition 2540 C
2	Cyanide	BDL	mg/l	
3	Fluoride	0.10	mg/l	
4	Nitrate Nitrogen	0.53	mg/l	
5	Sulphate	23.97	mg/l	APHA 24th Edition 4500-SO4 E (Turbidimetric Method)
6	Aluminium	0.06	mg/l	
7	Arsenic	BDL	mg/l	
8	Cadmium	BDL	mg/l	APHA 24th Edition 3111B (Direct Air-Acetylene Flame Method)
9	Copper	BDL	mg/l	APHA 24th Edition 3111B (Direct Air-Acetylene Flame Method)
10	Lead	BDL	mg/l	APHA 24th Edition 3111B (Direct Air-Acetylene Flame Method)
11	Manganese	BDL	mg/l	APHA 24th Edition 3111B (Direct Air-Acetylene Flame Method)
12	Mercury (Processing & Analysis)	BDL	mg/l	APHA 24th Edition 3112 B

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Sr.No	Parameter	Result	Unit	Method of analysis
13	Zinc	0.05	mg/l	APHA 24th Edition 3111B (Direct Air-Acetylene Flame Method)
14	Faecal Coliform (MPN technique)	46.0	MPN/100 ml	APHA 24th Edition 9221 E (Std. Thermotolerant (Fecal) Coliform Procedure)

Remark: Nil

Report Type: final

Report generated on: 04/09/2025 05:16 PM

Complied by: Sharmila Bhirud

Approved by: Dr P D Khadkikar

Reviewed on Date: 04/09/2025 05:28 PM

Reviewed by: Dr P D Khadkikar

Dr P D Khadkikar
Senior Scientific Officer,
I/c Central Laboratory,
MPCB, Navi Mumbai.
(Authorized Signatory)

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*** End of the Report ***

NABL Accreditation:- ISO/IEC 17025:2017, TC-16904	Issue Date: 10/10/2025 Validity: 09/10/2029
Certification Standards:- ISO 45001: 2018, 944015/r1-S-1	Issue Date: 26/02/2024 Validity: 25/02/2027
MoEF Recognition: Legal 42(3)/87	Issue Date: 17/05/2021 Validity: 16/05/2026

Test Report No.: MPCB/CLab/Environment/25-26/11/123-A	**Date:** 15/11/2025 07:22 PM
ULR No.: TC-1690425000003677F	

Test Report-Water (Environment)

Field Sample ID		BR-0104957		
Sample collected by (Officer Name)		FO-Mumbai III(Yogesh Gore) (SRO-Mumbai III)	Location of sample collection	Powai Lake - Near Floating Aeration
Seal No.:		239	Method of sample collection	Grab
Sample Collection	Date	06/11/2025	Total No. of Containers	1
	Time	03:15 PM	Nature/Description of Sample	Lake

Lab ID		**MPCB/CLab/ENV/25-26/516**	Sample condition	-
Received by lab	Date	07/11/2025	Analysis Started On	07/11/2025 04:14 PM
	Time	03:31 PM	Analysis Completed On	15/11/2025 07:19 PM
Sample recived by (Name & Designation)		Dr P D Khadkikar (Senior Scientific Officer)		

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Sr.No	Parameter	Results	Unit	Test Method
1	pH@25 degree C	7.5		APHA 24th Edition 4500-H+B, Pg. No. 473-478: 2023
2	Biochemical Oxygen Demand (BOD) 3 days at 27 degree C	26.0	mg/l	IS 3025 (Part 44):2023
3	Chloride	19.49	mg/l	APHA 24th Edition 4500-Cl- B, Pg. No. 340-341: 2023
4	Chemical Oxygen Demand (COD)	84.0	mg/l	APHA 24th Edition 5220B Page No.544, 545: 2023
5	Dissolved Oxygen	3.5	mg/l	IS 3025 (Part38) :1989 Reaffirmed 2014 Reaffirmed 2019
6	Hardness (total)	96.00	mg/l	APHA 24th Edition 2340-C, Pg. No. 124-126: 2023
7	Hardness (Magnesium)	22.00	mg/l	APHA 24th Edition 3500-MgB, Pg. No.274: 2023
8	Oil & Grease	BDL	mg/l	APHA 24th Edition 5520-B, Pg. No. 572-574: 2023

Remarks: Nil

Approved & Reviewed By

Dr P D Khadkikar
Senior Scientific Officer,
I/c Central Laboratory,
MPCB, Navi Mumbai. (Authorized Signatory)

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2. Abbreviations: - BDL=Below Detectable limit, N.D.=Not Detected, N.A.= Not Analyzed
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Repot Outward No.: MPCB/CLab/Environment/25-26/11/123-B
Date: 15/11/2025 07:22 PM

Client/Industry/location Name & Address

Powai Lake - Near Floating Aeration

Analysis Report-Water (Environment)

Sample Details

Field Sample ID :	BR-0104957
Laboratory Sample Code :	MPCB/CLab/ENV/25-26/516
Sample Details (Water/Air/HW) :	Water
Sampling Method(s) :	Grab
Sample Volume Received :	2.5 lit can
Sample Collected By :	FO-Mumbai III(Yogesh Gore) (SRO-Mumbai III)
Seal No. :	239
Type of Industry / Location details :	
Sample Collected On :	Nov 6 2025 03:15:00:000PM

Sr.No	Parameter	Result	Unit	Method of analysis
1	Total Dissolved Solids(TDS)	213.0	mg/l	APHA24 thEdition 2540-C, Page No. 145: 2023
2	Cyanide	BDL	mg/l	
3	Fluoride	0.14	mg/l	
4	Nitrate Nitrogen	1.80	mg/l	
5	Sulphate	6.87	mg/l	APHA 24th Edition 4500-SO4 E (Turbidimetric Method)
6	Aluminium	NA	mg/l	
7	Arsenic	NA	mg/l	
8	Cadmium	BDL	mg/l	APHA 24th Edition 3111B, Pg. No. 205-206: 2023
9	Copper	BDL	mg/l	APHA 24th Edition 3111B, Pg. No. 205-206: 2023
10	Lead	BDL	mg/l	APHA 24th Edition 3111B, Pg. No. 205-206: 2023
11	Manganese	BDL	mg/l	APHA 24th Edition 3111B, Pg. No. 205-206: 2023
12	Mercury (Processing & Analysis)	NA	mg/l	APHA 24th Edition 3112 B
13	Zinc	BDL	mg/l	APHA 24th Edition 3111B, Pg. No. 205-206: 2023

Remark: Nil

Report Type: final

Report generated on: 15/11/2025 07:19 PM

Complied by: Sharmila Bhirud

Approved by: Dr P D Khadkikar

Reviewed on Date: 15/11/2025 07:22 PM

Reviewed by: Dr P D Khadkikar

Dr P D Khadkikar
Senior Scientific Officer,
I/c Central Laboratory,
MPCB, Navi Mumbai.
(Authorized Signatory)

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NABL Accreditation:- ISO/IEC 17025:2017, TC-16904	Issue Date: 10/10/2025 Validity: 09/10/2029
Certification Standards:- ISO 45001: 2018, 944015/r1-S-1	Issue Date: 26/02/2024 Validity: 25/02/2027
MoEF Recognition: Legal 42(3)/87	Issue Date: 17/05/2021 Validity: 16/05/2026

Test Report No.: MPCB/CLab/Environment/25-26/11/124-A	**Date:** 15/11/2025 07:22 PM
ULR No.: TC-1690425000003678F	

Test Report-Water (Environment)

Field Sample ID		BR-0104956		
Sample collected by (Officer Name)		FO-Mumbai III(Yogesh Gore) (SRO-Mumbai III)	Location of sample collection	H2/Bldg No. 3 Near Quarter no. 17-24
Seal No.:		239	Method of sample collection	Grab
Sample Collection	Date	06/11/2025	Total No. of Containers	1
	Time	03:00 PM	Nature/Description of Sample	Nala

Lab ID		**MPCB/CLab/ENV/25-26/515**	Sample condition	-
Received by lab	Date	07/11/2025	Analysis Started On	07/11/2025 04:14 PM
	Time	03:31 PM	Analysis Completed On	15/11/2025 07:20 PM
Sample recived by (Name & Designation)		Dr P D Khadkikar (Senior Scientific Officer)		

Sr.No	Parameter	Results	Unit	Test Method
1	pH@25 degree C	6.8		APHA 24th Edition 4500-H+B, Pg. No. 473-478: 2023
2	Biochemical Oxygen Demand (BOD) 3 days at 27 degree C	115.0	mg/l	IS 3025 (Part 44):2023
3	Chloride	45.49	mg/l	APHA 24th Edition 4500-Cl- B, Pg. No. 340-341: 2023
4	Chemical Oxygen Demand (COD)	268.0	mg/l	APHA 24th Edition 5220B Page No.544, 545: 2023
5	Dissolved Oxygen	NIL	mg/l	IS 3025 (Part38) :1989 Reaffirmed 2014 Reaffirmed 2019
6	Hardness (total)	86.00	mg/l	APHA 24th Edition 2340-C, Pg. No. 124-126: 2023
7	Hardness (Magnesium)	30.00	mg/l	APHA 24th Edition 3500-MgB, Pg. No.274: 2023
8	Oil & Grease	3.6	mg/l	APHA 24th Edition 5520-B, Pg. No. 572-574: 2023

Remarks: Nil

Approved & Reviewed By

Dr P D Khadkikar
Senior Scientific Officer,
I/c Central Laboratory,
MPCB, Navi Mumbai. (Authorized Signatory)

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Repot Outward No.: MPCB/CLab/Environment/25-26/11/124-B
Date: 15/11/2025 07:22 PM

Client/Industry/location Name & Address

H2/Bldg No. 3 Near Quarter no. 17-24

Analysis Report-Water (Environment)

Sample Details

Field Sample ID :	BR-0104956
Laboratory Sample Code :	MPCB/CLab/ENV/25-26/515
Sample Details (Water/Air/HW) :	Water
Sampling Method(s) :	Grab
Sample Volume Received :	2.5 lit can
Sample Collected By :	FO-Mumbai III(Yogesh Gore) (SRO-Mumbai III)
Seal No. :	239
Type of Industry / Location details :	
Sample Collected On :	Nov 6 2025 03:00:00:000PM

Sr.No	Parameter	Result	Unit	Method of analysis
1	Total Dissolved Solids(TDS)	352.0	mg/l	APHA24 thEdition 2540-C, Page No. 145: 2023
2	Cyanide	BDL	mg/l	
3	Fluoride	0.09	mg/l	
4	Nitrate Nitrogen	0.82	mg/l	
5	Sulphate	8.60	mg/l	APHA 24th Edition 4500-SO4 E (Turbidimetric Method)
6	Aluminium	NA	mg/l	
7	Arsenic	NA	mg/l	
8	Cadmium	BDL	mg/l	APHA 24th Edition 3111B, Pg. No. 205-206: 2023
9	Copper	BDL	mg/l	APHA 24th Edition 3111B, Pg. No. 205-206: 2023
10	Lead	BDL	mg/l	APHA 24th Edition 3111B, Pg. No. 205-206: 2023
11	Manganese	0.06	mg/l	APHA 24th Edition 3111B, Pg. No. 205-206: 2023
12	Mercury (Processing & Analysis)	NA	mg/l	APHA 24th Edition 3112 B
13	Zinc	BDL	mg/l	APHA 24th Edition 3111B, Pg. No. 205-206: 2023

Remark: Nil

Report Type: final

Report generated on: 15/11/2025 07:20 PM

Complied by: Sharmila Bhirud

Approved by: Dr P D Khadkikar

Reviewed on Date: 15/11/2025 07:22 PM

Reviewed by: Dr P D Khadkikar

Dr P D Khadkikar
Senior Scientific Officer,
I/c Central Laboratory,
MPCB, Navi Mumbai.
(Authorized Signatory)

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Central Laboratory.
Central Laboratory, Maharashtra Pollution Control Board, P-3, "Nirmal Bhavan", MIDC Industrial Area, Mahape, Navi Mumbai- 400 710, Tel : 022-67195031
e-mail : icclab@mpcb.gov.in
website : http://mpcb.gov.in

TC-11959

NABL Accreditation:- ISO/IEC 17025:2017, TC-11959	Issue Date: 24/07/2023 Validity: 23/07/2025
Certification Standards:- ISO 45001: 2018, 944015/r1-S-1	Issue Date: 26/02/2024 Validity: 25/02/2027
MoEF Recognition: Legal 42(3)/87	Issue Date: 17/05/2021 Validity: 16/05/2026

Test Report No.: MPCB/CLab/Environment/25-26/08/50-A	**Date:** 22/08/2025 05:11 PM
ULR No.: TC-1195925000002038F	

Test Report-Water (Environment)

Field Sample ID		BR-0100031		
Sample collected by (Officer Name)		FO-Mumbai III(Yogesh Gore) (SRO-Mumbai III)	Location of sample collection	H2/Bldg No. 3 Near Quarter no. 17-24
Seal No.:		220	Method of sample collection	Grab
Sample Collection	Date	12/08/2025	Total No. of Containers	1
	Time	02:00 PM	Nature/Description of Sample	Nala

Lab ID		**MPCB/CLab/ENV/25-26/351**	Sample condition	-
Received by lab	Date	13/08/2025	Analysis Started On	13/08/2025 05:27 PM
	Time	05:08 PM	Analysis Completed On	22/08/2025 02:22 PM
Sample recived by (Name & Designation)		Dr P D Khadkikar (Senior Scientific Officer)		

Sr.No	Parameter	Results	Unit	Test Method
1	pH@25 degree C	7.0		APHA 24th Edition 4500-H+ B (Electrometric Method)
2	Suspended Solids (SS)	51.0	mg/l	APHA 24 th Edition 2540-D
3	Biochemical Oxygen Demand (BOD)	68.0	mg/l	IS 3025 (Part 44)
4	Chloride	48.48	mg/l	APHA 24th Edition 4500-Cl B
5	Chemical Oxygen Demand (COD)	156.0	mg/l	IS 3025 (Part 58)
6	Oil & Grease	BDL	mg/l	APHA 24th Edition 5520 B

161 **Remarks: Nil**

Approved & Reviewed By

Dr P D Khadkikar
Senior Scientific Officer,
I/c Central Laboratory,
MPCB, Navi Mumbai. (Authorized Signatory)

Note :
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MAHARASHTRA POLLUTION CONTROL BOARD

Phone : 022-67195031 Email : icclab@mpcb.gov.in Website : http://mpcb.gov.in	"Your Service is our Duty"	**Central Laboratory** Central Laboratory, Maharashtra Pollution Control Board, P-3, "Nirmal Bhavan", MIDC Industrial Area, Mahape, Navi Mumbai- 400 710

Repot Outward No.: MPCB/CLab/Environment/25-26/08/50-B
Date: 22/08/2025 05:11 PM

Analysis Report-Water (Environment)

Client/Industry/location Name & Address
H2/Bldg No. 3 Near Quarter no. 17-24

Sample Details	
Field Sample ID :	BR-0100031
Laboratory Sample Code :	MPCB/CLab/ENV/25-26/351
Sample Details (Water/Air/HW) :	Water
Sampling Method(s) :	Grab
Sample Volume Received :	2.5 Lit Can
Sample Collected By :	FO-Mumbai III(Yogesh Gore) (SRO-Mumbai III)
Seal No. :	220
Type of Industry / Location details :	
Sample Collected On :	Aug 12 2025 02:00:00:000PM

Sr.No	Parameter	Result	Unit	Method of analysis
1	Total Dissolved Solids(TDS)	394.0	mg/l	APHA 24th Edition 2540 C
2	Detergent	0.27	mg/l	
3	Sulphide	0.04	mg/l	

Remark: Nil

Report Type: final

Report generated on: 22/08/2025 02:22 PM

Complied by: Sharmila Bhirud

Approved by: Dr P D Khadkikar

Reviewed on Date: 22/08/2025 05:11 PM

Reviewed by: Dr P D Khadkikar

Dr P D Khadkikar
Senior Scientific Officer,
I/c Central Laboratory,
MPCB, Navi Mumbai.
(Authorized Signatory)

* Electronic report does not require signature

Note :
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2. Abbreviations: - BDL=Below Detectable limit, N.D.=Not Detected, N.A.= Not Analyzed
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*** End of the Report ***

Annexure-3

Item No.01 (Court No. 1)

BEFORE THE NATIONAL GREEN TRIBUNAL
SPECIAL BENCH

(By Video Conferencing)

Original Application No. 68/2021(WZ)

Vanshakti & Anr. Applicant(s)

Versus

Municipal Corporation of Greater Mumbai & Ors. Respondent(s)

Date of hearing: 12.01.2022

CORAM: HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON
HON'BLE MR. JUSTICE SUDHIR AGARWAL, JUDICIAL MEMBER
HON'BLE MR. JUSTICE BRIJESH SETHI, JUDICIAL MEMBER
HON'BLEMR. SAIBAL DASGUPTA, EXPERT MEMBER

Applicant: Mr. Mr. Zaman Ali, Advocate

Respondent(s): Mr. Aspi Chinoy, Sr. Counsel with Mr. Sameer Khale, Advocates for R-1
Ms. Nidhi Choudhari, District Collector, Mumbai Suburban District
Mr. Rahul Garg, Advocate for MoEF& CC
Mr. D.M. Gupte, Advocate for R-5 & 6
Mr. Mukesh Verma, Advocate for R-7
Mr. Aniruddha S. Kulkarni, Advocate for MPCB & State Environment Department

ORDER

The Issue – Case of the Applicants

1. Grievance in this application is against pollution of Powai Lake in the Eastern suburb of Mumbai and failure of authorities to take remedial action. According to the applicants, the sources of pollution are discharge of effluents and sewage, illegal reclamation for construction and dumping of debris. The lake is home to scheduled species of wildlife as per Schedule to the Wild Life Protection Act, 1972 (WPA). The

statutory authorities have failed to discharge their obligation under the 'Public Trust' doctrine. The area of lake is 210 hectares as per Central Institute of Fisheries Education, with catchment area of 6.61 sq. kms. Powai Lake is one of immense ecological importance, home to several protected species of birds and animals and the water of the lake has many dependents for various purposes.

2. The applicant has impleaded Municipal Corporation of Greater Mumbai (MCGM), Maharashtra Tourism Development, Urban Development Department, Maharashtra Pollution Control Board, Maharashtra State Forest Department, Central Pollution Control Board, Ministry of Environment, Forest and Climate Change (MoEF&CC) and District Collector, Mumbai Suburban District as respondents.

3. It is stated that MCGM and Maharashtra Tourism Development have undertaken construction of a cycling and jogging track inside the boundaries of the lake. Powai Lake is well known to have a population of Marsh crocodiles, which is protected under Schedule-I of WPA and is listed as "vulnerable" on the IUCN Red List. There is thriving population of crabs, insects, worms, fish and their eggs, lizards, snakes, frogs and their eggs, birds and their eggs and nestlings (nesting), molluscs and rodents on which the birds and animals are dependent for food in Powai Lake ecosystem. According to the Urban Wetland/Water Bodies Management Guidelines, 2021 prepared by the National Mission for Clean Ganga, it is recorded that 40% of Powai Lake has disappeared. Powai Lake has faced deterioration of its water quality, which was recorded in a 2020 study titled "Past, Present and Future of Powai Lake, (Mumbai) and Revival through- Holistic Analysis. Dissolved Oxygen (DO) level in Powai lake, which is essential for survival of flora and fauna, has

had a declining trend at alarming rate since several decades. Water spread area of the lake has had a shrinkage trend due to the heavy pollution. The temporal satellite data of the years 1973 and 2014 with a gap of 31 years, as shown in the aforementioned 2020 study, indicates decrease by 26% of water spread area. Various storm water drains empty into the lake. The floating Water Hyacinth (or Hydrophyte Eichornia) has colonized water areas near these drains, which is a clear biological indicator that sewage is infesting these areas. This has an adverse effect on fisheries in Powai lake which has been associated with the increase in growth of aquatic weeds and water hyacinth due to serious water pollution. A 2018 study on the Fisheries of the lake, conducted by Central Institute of Fisheries Education, Versova, Mumbai, has recorded the effects of pollution in Powai Lake and its aquatic life. Highly polluted and deteriorated state of Powai Lake has been recognized as early as 1995, when Powai Lake was included in the National Lake Conservation Plan ("NLCP") by the MoEF&CC. A Detailed Feasibility Report (DPR) was prepared by MoEF&CC and sum of Rs. 6.62 crores was sanctioned as grant to Respondent No.1, in June 2001 for implementation of the scheme on priority. As per the audit report of restoration and cleaning work at Powai Lake prepared by the Comptroller and Auditor General of India for the period of July 2010 to February 2011, ("Report No. 21 of 2011-12"), it is reported that the project was declared completed by MoEF&CC and National River Conservation Directorate (NRCD) despite non-submission of project completion report along with final utilization certificate by the MCGM to MoEF&CC, and further, the final payment of the contractor was yet to be paid which indicated that the project was still ongoing. NLCP merged with National Wetland Conservation Programme, which has existed for the protection of wetlands since 1986,

to become a unified scheme National Plan for Conservation of Aquatic Eco-systems ("NPCA") in February, 2013. Guidelines for the Conservation of Aquatic Eco-systems, 2019, which is applicable for all water bodies, lakes and wetlands, either artificial or permanent, provides that the wetland is to be managed so that it is sustained in a sound ecological health, retains biodiversity and provides the expected ecosystem services in an efficient and effective manner. As per a Standing Committee on Water Resources Report dated 26.06.2016, Powai Lake was included in the NPCA and was approved a cost of Rs. 28.57 crores with Rs. 18.675 crores released till date. Water quality test of Powai Lake was carried out on 03.09.2021 and 16.09.2021 by procuring water samples from 5 different areas of Powai Lake and the results reveal that the water of the lake is not even upto the legal standards for bathing, or propagation of wildlife and fisheries, which it is currently being used for, let alone the standards for drinking water. In view of the grave threat posed by the administration of Glyphosate in Powai Lake ecosystem, on 13.09.2021 the Applicant No. 2 has made a representation to MCGM (Respondent No. 1), MPCB (Respondent No. 4), the Maharashtra Forest Department (Respondent No. 5), the Wildlife Wing of the Maharashtra Forest Department (Respondent No. 6), the Environment Department of Government of Maharashtra (Respondent No. 7), CPCB (Respondent No. 8) and MoEF&CC (Respondent No. 9), informing them about the toxicological side effects of the administration of Glyphosate on the flora and fauna of the lake ecosystem. Vide notice dated 16.09.2021, issued by the MPCB to MCGM, MPCB has taken notice of the long term adverse effects of the administration of Glyphosate on aquatic/marine life and environment, and has consequently directed Respondent No.1 to stop the spraying of Glyphosate Chemical in Powai Lake. Powai Lake has been

inventorised and mapped as a Wetland under the National Wetlands Atlas prepared by Space Application Centre (SAC), Ahmedabad for the MoEF&CC. In the case of *Vanashakti vs. Union of India (PIL No. 87 of 2013)* which pertained to illegal constructions in wetland areas, the High Court of Bombay passed an order dated 14.10.2013 directing that no reclamation and any kind of construction shall be allowed in wetlands areas as identified and covered under the Wetland Atlas prepared by the Central Government, without the leave of the Court.

4. The Applicants have submitted following short-term suggestions for restoration and conservation of Powai Lake, in addition to suggestions provided by domain experts in studies annexed to the present Application:

(i) Creation of a sump near Powai Lake and diverting the sewage therein, to be transported to Bhandup Sewage Treatment Plant (STP), located at a distance of 5 kilometres from Powai Lake;

(ii) Setting up of a dedicated website portal for progress on restoration of Powai lake;

(iii) Installation of permanent online water quality systems at various locations inside Powai Lake that will inter alia provide accurate daily data of toxicity levels, BOD and COD levels, Dissolved Oxygen levels;

(iv) Installation of phytoremediation platforms at all storm water outfalls and entry points of sewage into Powai Lake;

(v) Installation of 24x7 CCTV monitoring cameras at locations frequented by people/tourists;

(vi) Installation of warning signboards on hefty wines for polluting the lake;

(vii) Creating basking islands in the lake to allow crocodiles to bask and provide grasslands on the edges of the lake for the crocodiles to lay eggs;

(viii) Take steps to remove or control invasive species of fish that threaten the native fish species. Fisheries experts maybe roped in for the same;

(ix) Maintain buffer zone of at least 50 meters around Powai Lake wherein no new construction activity of any kind is to be allowed except for the purposes of conservation of the Lake;

(x) Utilisation of Natural Treatment Systems, specifically CW4Reuse technology, which has been identified in the aforementioned 2018 study titled "Science & Technology Agenda for Blue-Green Spaces Inspired by Citizen Science: Case for Rejuvenation of Powai Lake" as most suitable for Powai Lake and its surrounding urban area, in view of the need to improve blue-green balance. CW4Reuse technology is most suitable for expansion of green patches on the landward side of the lake-front and surface runoff can also be reduced due to its natural filtering effects;

(xi) MCGM to take assistance from Powai Police Station to stop illegal commercial fishing activities inside Powai Lake,

(xii) MCGM to consult Forest Department, IIT-Bombay, CPCB and NEERI for preparing a long-term Plan to maintain the pristine levels of Powai Lake. Such an Action Plan may include, demarcation of areas of polluted areas in Powai Lake, recommend restrictions on anthropogenic activities (e.g., fishing, religious rituals, cattle rearing), and

implement in situ methods for restoration measures such as using floating constructed wetlands;

(xiii) A dedicated Powai Lake Restoration and Conservation Department may be constituted to strictly monitor the progress of restoration and its maintenance thereafter

(xiv) Implementing recommendations of CPCB in its "Indicative Guidelines for Restoration of Water Bodies, 2019", which includes-

a) Physical treatment approaches such as Aeration, wastewater diversion, periodic de-weeding and sediment dredging, proper maintenance of drainage channels or feeder channels, which would help increase DO levels;

b) Chemical treatment approaches such as Flocculation to increase PH levels;

c) In- situ techniques such as using aquatic plants such as water hyacinth, use of aquatic animals and other biological techniques may be used to decompose, transform and absorb water pollutants.

5. The applicant has filed copies of studies/media reports/photographs including:-

1. Media report titled "Member of HC appointed panel seeks to halt reclamation work near Mumbai's Powai lake" published on 20.08.2021 in Hindustan Times.

2. Paper titled "Diversity and Distribution of Macrophytes in Powai Lake, Mumbai" presented by researchers from Central Institute of Fisheries Education in 2014 at Conference "LAKE14: Conference on Conservation and Sustainable Management of Wetland Ecosystems in Western Ghats".

3. Report titled "Powai and its birds" published in 2021 by LIT Bombay

4. Relevant extracts from the report titled "Study of the Biodiversity of Indian Institute of Technology Bombay Campus" published in October, 2009 by World Wildlife Fund (WWF)

5. Relevant extracts from Urban Wetland/Water Bodies Management Guidelines, 2021

6. Report titled "Past, Present and Future of Powai Lake, [Mumbai] And Revival Through – Holistic Analysis" published in 2020 in Journal of Emerging Technologies and Innovative Research

7. Photographs of such excessive weed growth and Water Hyacinth on Powai Lake on 14.08.2021 and satellite image depicting areas of Powai lake covered in water hyacinth

8. Media report titled "Over 50,000 Ganesha idols immersed in Mumbai" published on 28.09.2015 in The Hindu

9. Report on background of Powai Lake by researchers from World Wildlife Fund (WWF) in 2011

10. Study titled "Science & Technology Agenda for Blue-Green Spaces Inspired by Citizen Science: Case for Rejuvenation of Powai Lake" published on 08.09.2021 in Sustainability Journal

11. Relevant extracts from the study titled "Fish Community Structure and Trophic Status - A Measure of Ecological Degradation: A Case Study from Powai Lake Mumbai" published in 2018 in International Journal of Ecology and Environmental Sciences

12. Media reports titled "Illegal fishing still plagues Powai lake" dated 11.06.2017 and titled "Poachers responsible for

crocodiles' dwindling population at Powai: Activists" dated 07.04.2016 published in DNA India

13. Media report titled "Pollution leads to decline in native fish population in Powai lake" dated 25.06.2016 published in Hindustan Times

14. Relevant extracts from the study titled "Ecological impacts of common cap and the African sharp tooth cash A review" published by Department of Aquaculture and Fisheries Science, Lilongwe University of Agriculture and Natural Resources

15. Study titled "State of Water Quality of Two Tropical Urban Lakes Located at Mumbai Megacity" published in 2015 in International Journal of Science and Research

16. Paper titled "Strategy for Conservation and Management of Urban Lakes in Mumbai" presented at the 16th World Lake Conference in 2016

17. Latest report dated March 2014 on Powai Lake Conservation Project under National Lake Conservation Plan published by Environment Department of Government of Maharashtra

18. Relevant extracts of "Report No. 21 of 2011-12" by Comptroller and Auditor General of India

19. Relevant extracts from the Tenth Report of the Standing Committee On Water Resources, Ministry Of Water Resources, River Development And Ganga Rejuvenation titled "Repair, Renovation and Restoration of Water Bodies-Encroachment on Water Bodies and Steps Required to Remove the Encroachment and Restore the Water Bodies" for the years 2015-2016

20. Media report titled "BMC unveils plan to revive Powai lake by 2019" dated 1930.2016 published in DNA News

21. Relevant extracts from the stud titled "The environmental impacts of glyphosate" published in June, 2013 by Friends of the Earth Europe

22. Relevant extracts of National Wetlands Atlas: Maharashtra by Space Applications Centre (ISRO) and Maharashtra Remote Sensing Applications Centre (MRSAC)

23. Media report titled "As heavy rains lash Mumbai, city's Powai lake starts overflowing" dated 12.06.2021 published in Asia News International

24. Media reports titled "Crocodile kills man at Powai lake" dated 27.08.2021 published in Hindustan Times

25. "Advisory on Conservation and Restorationof Water Bodies in Urban Areas".

Procedural History

6. The matter was taken up by the Tribunal on 01.10.2021 and notice was issued to the respondents. Thereafter, on 26.11.2021, the Tribunal noted pendency of *PIL No.23928/2021* against cycling and jogging tracks around “Powai Lake” and vide interim order dated 01.11.2021 restrained the concerned Official Respondents from putting up the proposed cycling and jogging tracks. The matter was deferred to today to enable the parties to file their respective versions.

Version of the Respondents

7. Reply has been filed by some of the contesting respondents to which a brief reference may be made. The MCGM acknowledges the pollution of the lake due to buildings and habitations and inability to remedy the situation inspite of efforts made. Relevant extracts from the reply are reproduced below:-

"4. *Regarding the paras/ portions of the Application dealing with the need to revive and protect Powai lake from the ingress of sewage and Hyacinth growth:*

(a) Powai Lake is an MCGM created, human-made lake, planned as an anti-famine measure for Mumbai City (then Bombay). It was sanctioned by the Standing Committee in November 1889 and built by the Municipal Corporation by 1891. The water in Powai Lake has been severely polluted and after several unsuccessful attempts to purify it, the water finally declared unfit for drinking purposes in 1893.The issues related to the poor quality of water still persist today coupled with excessive silting, sewage ingress and extended hyacinth growth, leading to eutrophication of the lake water. Hereto annexed and marked as Exhibit 'A' is the copy of Affirmation by MCGM that, Powai Lake water is not used for drinking purpose.

(a) Powai Lake exists in an urban setting and several structures have been built on the immediate periphery of the lake including IIT hostel blocks, IIT accommodation buildings and canteen, the Renaissance Hotel and Convention Centre, the Lakeside Chalet Mumbai Marriott, and leased properties of HE department. In the present situation, only about 2 kin (20% only) out of the 10.2 km circumferential of this public asset i.e. Powai Lake is accessible to the general public. As stated above IIT has made a motorable lake front road along the periphery of the part of Powai Lake adjacent to its property which is not open to public as community space. The IIT, the Renaissance Hotel and other private Lessees have, in the absence of lake front access, virtually monopolized the lake front and in effect prevented proper access to the Powai Lake even to MCGM Staff. Furthermore, the existing kuccha pathway along the Renaissance compound wall is being misused by lumpen elements and drug abusers. Due to the lack of a proper pathway access and unlit areas, illegal and anti-social activities are suspected to be carried out along the banks of the lake.

(b) The Public Project of Rejuvenation and Reinvigoration of the Physical and Natural Environment of Powai Lake, Mumbai" is being undertaken by MCGM at Powai Lake to enable a sustainable rejuvenation and reinvigoration of the lake - its water, biodiversity and adjacent physical environment.

(c) MCGM has been putting all efforts to improve Powai Lake and its surrounding for quite a long time. Several measures are being implemented to alleviate the natural environment of Powai Lake and improve the quality of the lake water. One of the major challenges is to increase the dissolved oxygen levels (DO) and reduce the bio-chemical oxygen demand (BOD) for the sustenance of the aquatic life. MCGM has installed a barge mounted sub-surface aerator with two aspirators and intends to further install seven non- invasive, single Jet Floating Aerator type fountains which shall assist in transferring oxygen from the atmosphere into the water through enriched water droplets. These will beautify and

revive the lake itself. Hereto annexed and marked as Exhibit 'B' The chart of BOD/COD and Do levels in Powai Lake per MCGM-SCADA.

(d) MCGM has initiated several interceptors and rerouting measures to prevent sewage ingress into the lake. This Sewage ingress has led to the proliferation of rapidly growing hyacinth, estimated at 290,000 cu mtrs, hindering the survival of aquatic life due to reduced sunlight penetration, and leading to water loss through transpiration. Hyacinth areas are also breeding grounds for mosquitoes and mosquito-related illnesses. Water hyacinth, up to 5% of the water surface, can be tolerated because it purifies water by absorption of sewage. But currently, the hyacinth is occupying more than 20% of the water area, rendering it necessary to remove the hyacinth cover. MCGM has been carrying out regular programs for the removal of hyacinth.

(e) With the above-mentioned three measures in place i.e. improved aeration to increase dissolved oxygen levels, sewage ingress interception and removal of hyacinth, the quality of water will be substantially improved, and consequently the flora and fauna will be able to survive and thrive, vastly rejuvenating the natural environment of Powai Lake.

(f) As the above mentioned environmental projects for water improvement are underway, the lake surrounds need to be remodeled to gain access for maintenance and upkeep, and for the community as a public recreation space. Presently the IIT Mumbai, the Renaissance Hotel and other private Lessees have, in the absence of lake front access being made available, virtually prevented access to the Powai Lake front. Furthermore, the existing kuccha pathway along the Renaissance compound wall is being misused by lumpen elements and drug abusers. The proposed walkway is essential for the proper safeguarding and maintenance of Powai Lake inasmuch as it will enable MCGM's maintenance Department and staff to have ready access to all portions of the lake front. MCGM staff can then take steps to prevent sewage being dumped into the lake either directly by culverts/pies or by joining sewage pipes through storm water drains.

(5) Regarding the proposed walkway and cycle path around the edge of Powai lake:

(a) There is a dearth of community recreation spaces in the eastern suburbs of Greater Mumbai, and there is practically no major community open space in this part of the city. At less than 2 sq.m. per capita, public developed open space is a much sought-after resource in Mumbai. In the suburbs, with over 10 million populations, this number falls down even lower, to less than 1 sqm per person. Powai Lake, with its 10.2 km of waterfront, offers an opportunity to create a large community open space for the citizens of Mumbai. The perimeter of the lake is roughly three times the length of

Marine Drive and five times that of Worli Sea Face. Powai Lake, after rejuvenation, has the potential of becoming a major community open space. The Respondents submit that by developing the proposed walkway along the periphery of the Powai Lake, the Respondents will create an ecological destination which is accessible to the common citizen/ public.

(b) *The Respondents say and submit that the proposed cycle path and walkway closely follows the alignment of the existing motorable lake front road of IIT Mumbai and thereafter the Renaissance Hotel compound wall and pathway. Hereto Annexed and Marked Exhibit C is a Google map view of the entire Powai Lake showing the existing promenade, the portion adjacent to the IIT Mumbai property, the portion adjacent to the Renaissance hotel property and the portion that is adjacent to the MCGM Deer Park and Garden.*

(c) *The proposed walkway will be situated substantially in the Natural Area beyond the perimeter of Powai Lake. Only some limited portions fall in areas which are covered by water during the monsoon season and the few months thereafter. The installation of the walkway does not entail any reclamation or construction. As set out hereinafter in order not to impede the flow of water into the lake as also the flow of lake waters during the monsoon months, the walkway is to be developed using gabion technology, which is porous and does not prevent the flow of water. The Gabion Technology consists of placing PVC coated galvanized iron wire mesh baskets in place, containing stones of various sizes, without any joinery, fixing or cement mortar. These wire baskets containing stones of diverse sizes are merely placed on the surface, without there being any foundation, or other means used to fix it to the earth. On top of the gabion wall there will be a thin layer of cement board/synthetic composite board and macadam/ tar to enable walking/ cycling. There is no dumping of debris into the lake, nor any reclamation in the lake. Gabion technology does not involve any construction or reclamation. In the absence of cement or mortar, the gabion wall is porous and the gaps between the gabion stones allows and does not prevent the flow of water. Gabions also provide refuge for small aquatic life and have the potential of becoming a breeding ground for small and micro aquatic life. The Applicants allegations of reclamation, dumping of boulders and construction in the lake and its immediately surrounding areas are accordingly false and are denied.*

(d) *For the development of the walkway, no trees are proposed to be cut. Whenever required the walkway and cycle track will be separated' to go around trees. Only seasonal rank vegetation will be removed. The Applicant's allegation of cutting / uprooting of trees are factually incorrect and is denied. A detailed numbering of trees falling in the vicinity of the alignment of the proposed walkway has been carried out for recording purposes and with a view to protecting the trees in - situ. Only trees which have been uprooted due to Cyclone Tauktae and stormy monsoon conditions will be removed after*

taking due permissions. In the rarest of rare occasions, if felling of a particular tree is absolutely unavoidable, the same will be done only with prior approval of appropriate authority.

(e) The MCGM has constituted an Expert Committee comprising an Environmental specialist, environmental scientist, herpetologist, limnologist and a marine biologist to guide the MCGM and oversee the process of making boardwalk using the said Gabion technology. The Committee of Experts comprises the following notable experts

- *Dr. Rakesh Kumar, Environmental Scientist, CSIR (Chairperson)*
- *Dr. Deepak Apte, Environment Specialist and Marinez (Member)*
- *Dr. PramodSalaskar, Environment Specialist on Powai Lake (Member)*
- *Shri. KedarBhide, Herpetologist (Member)*
- *IIT Bombay Representative, Prof. D. N. Singh (Member)*
- *Shri. Hydraulic Engineer, MCGM (Secretary)*

The committee has had periodic meetings and is currently guiding the project work.

(f) The MCGM will soon make available an online platform, with the history of Powai Lake, detailing out the proposals which addresses the concerns of the citizens in a Frequently Asked Questions format. The platform will provide an overview of the project. The MCGM is committed to making the process inclusionary in nature and encourages public participation. The MCGM has and will address further concerns and issues, if any, in a diligent manner, as the project, at its core, is for holistic public access to the lake front area."

8. The stand of the Collector, Mumbai Suburban District in the capacity of Member Secretary, State Wetland Authority is that the issue of cycling track inside the boundary of Powai Lake is pending before the Bombay High Court, as already mentioned. The lake is a wetland as per National Wetland Atlas. The State Wetland Authority has constituted an expert committee headed by Secretary, Environment Maharashtra to check the compliance status. However, the lake has not yet been notified as 'wetland' under the Wetlands (Conservation and Management) Rules, 2017 (the Wetland Rules, 2017). The expert Committee is in the process of finalization of its report.

9. The stand of the State PCB is that flowing of sewage from Perubagh *nalla*, Culverter No.6&7 and IIT open *nalla* into Powai lake was noticed on visit to the lake on 17.12.2021 by the officials of MCGM. MCGM officials informed that the work of diverting the sewage line to main sewer line is in progress. Around periphery of Powai lake, the cycling and jogging track gabion work about 100 mtrs is completed at compound of Renaissance Hotel, Powai lake. It is further informed that presently the work of gabion is stopped. Ganesh idol immersion in Powai lake is at Ganesh Ghat and Pawarwadi. They have provided artificial pond for idol immersion in 'S' Ward area. Domestic effluent from the unsewered nearby area located around the periphery of Powai lake is entering into lake through two *nallas*. Also, 18 gates are provided at SWD around the periphery of lake. Due to leakages at gate no.6 & 7 some meagre quantity of effluent is observed entering the lake. Respondent-Board has issued directions u/s 33A of the Water (Prevention & Control of Pollution) Act, 1974 and u/s 31A of the Air (Prevention & Control of Pollution) Act, 1974 to MCGM vide letter dated 15/12/2021 to take necessary precautionary measures to avoid ingress of treated/untreated sewage into Powai Lake & divert to nearby STP and strictly follow the guidelines for idol immersion dated 12/05/2020 issued by Central Pollution Control Board. Officials of the Respondent Board at Mumbai have collected water samples of Powai Lake on 16/12/2021. The analysis results of said samples compared with -the primary water quality criteria for bathing water, which shows that the parameters are almost within limit, except marginal exceedance observed for BOD parameter (3.2 mg/l) at Ganeshgat location.

10. CPCB has stated that regulations have been issued on the subject of idol immersion only in artificial tanks/ponds with liner made with well graded/highly impervious clay or eco synthetic liner, after removing all flowers, leaves and artificial ornaments. Lime or alum or any other equivalent coagulant should be added in designated temporary lined pond/tank as pre-treatment option for ensuring settling of solids. Water quality as per monitoring carried on 18.04.2017 was found to be as follows:-

> *"a. The Physico- chemical and microbiological characteristics of water samples of lake shows that the measured pH value was ranging from 8.2 to 8.7 and the conductivity was ranging from 320.5 to 344.2 µS/ cm, which indicate the presence c normal range of dissolved solids in ionized form.*
>
> *b. The Dissolved Oxygen (DO) were ranging from 0.0 mg/l to 5.4 mg/l, TDS was ranging from 308 mg/l to 328 mg/l, COD were ranging from 96 mg/l to 496 mg/1 and the Biochemical Oxygen Demand (BOD) were ranging from 7 mg/l to 150 mg/l. The results are indicating that there is organic contamination in the lake.*
>
> *c. Other parameters measured were Total hardness, Chlorides, Sulfates, Alkalinity, Ammonia; Fluoride etc. are also present. The values were higher and water quality was poor. The reasons for the poor quality of water may be attributed huge discharge of sewage from surrounding population, immersion of Idols during festivals and other anthropogenic activities.*
>
> *d. The water of the Lake is not being used for any purpose other than recreation. If compared with standard limit of use category. The water of the lake is fit for only irrigation.*
>
> *e. The microbiological characteristics of water samples of lake reveals that the measured Total Coliform values were ranging from IT MPN100ml to >1600 MPN/100ml and the Faecal - Coliform values were ranging from 1600 MPN/100ml, which indicate the presence of Total and Faecal Coliform may be due to the wastewater coming from drains"*

11. There are indicative guidelines for restoration of water body issued by the CPCB. There is a further statement that the conservation plan was prepared and funds were sanctioned for implementation. The State PCB also passed a scheme for restoration of water bodies.

Consideration by the Tribunal

12. We have heard learned counsel for the applicant, MCGM, CPCB, State PCB, MoEF&CC and the Collector in person, perused the record and given our due consideration to the issue.

13. There can be no dispute about need for restoring and maintaining the lake to its pristine position. No untreated sewage can be allowed to be discharged. The statutory mandate of Water (Prevention and Control of Pollution) Act, 1974, principles of 'Sustainable Development', 'Public Trust' doctrine as well as other statutory provisions applicable, including the Municipal Corporation Act and the Rules need to be complied. MCGM has to exercise its statutory powers to prevent discharge of sewage. The Wetland Authority under the Wetland Rules, 2017 has to ensure compliance of statutory plan for demarcation of prohibited and regulatory areas around the lake. Reference in this regard may also be made to judgements of the Hon'ble Supreme Court in Paryavaran Suraksha v UOI, (2017) 5 SCC 326 and M.K. Balakrishnan vs. UOI, (2017) 7 SCC 805. The Wildlife Department is required to take action in terms of the WPA. The State PCB and the CPCB have to take action as regulators to prevent and remedy environmental norms. Apart from specific statutory provisions of Water, Air, WPA, EP Acts and Rules, powers under Section 133 of the Cr.P.C, sections 268 to 271 IPC and Section 3 of the PMLA Act, 2002 read with the Schedule to the Act can also be invoked wherever necessary. There is thus no inadequacy of powers available with the statutory regulators.

Conclusion and Directions

14. As shown by the pleadings referred to above, ground situation is far from satisfactory. While the issue of track pending before the High

Court needs no comment at this stage, as that aspect can be dealt with in the said pending proceedings, there is need to deal with the unremedied pollution, having potential for damage to the environment and the wildlife. Water quality of the lake can lead to killing of fish, affecting the crocodile nestling sites, dependent of fish. Though certain initiatives are said to have been taken for restoration/revival of the lake and prevention of damage to the environment, the steps so far taken are not adequate and desired results are yet to be achieved. There is thus need to continue sustained efforts by the State authorities as well as civil society and to maintain constant vigilance. There is also need to take coercive measures to enforce environmental norms by way of coordinated efforts of all the statutory regulators, wherever necessary. Primary responsibility remains of the MCGM, the Wetland Authority and the Forest Department (Wildlife Division). Local Police may also have to take responsibility. Similarly, the Environment Department of Maharashtra has also to take pro-active action. Since the primary issue is of compliance of laid down norms by the statutory regulators, all that is required is to issue directions to the said authorities to perform their duty. It may be necessary to constitute a Joint Committee for coordinated action.

15. Accordingly, we constitute an eight-member joint Committee comprising of MoEF&CC, Regional Office, Nagpur, CPCB, Regional Office, Pune, Commissioner, MCGM, Collector, Mumbai Eastern Suburban Area, DCP of the area (to be designated by Commissioner of Police, Mumbai), Chief Wildlife Warden, Maharashtra, Director Environment, Maharashtra and the State PCB. The nodal agency for coordination and compliance will be the State PCB and the State Wetland Authority. Meeting of Joint Committee may be held preferably within two weeks.

Except for site visit, the Committee may meet in person or through video conferencing, as may be required. The Committee may prepare its action plan covering all aspects of environment in the light of earlier studies and plans, as may be updated in the light of current ground situation. The plan may provide for mode of execution, monitoring mechanism and budget allocation. The Joint Committee may meet once every month to oversee the execution at least for one year and thereafter, at such intervals as it may find necessary. The minutes of the meeting may be uploaded on the website of the State Wetland Authority. It will be open to the applicant or any other citizen to give their suggestions/ representations to the Committee for its consideration. The Committee may particularly take steps to ensure compliance of Wetland Rules, 1972 and other Environmental Rules, including, steps to prevent discharge of sewage or any other effluents and monitor water quality to protect fish and other aquatic fauna and distinct sites of the marsh crocodile. It may have mechanism for assessing water quality monitoring at strategic locations, exploring possibilities of installing aeration systems, prohibiting use of phosphate bearing detergents and other measures required to be taken. The Committee may refer the action plan and relevant directions of the Tribunal passed in OA No. 125/2017, *Court on its own Motion vs. State of Karnataka* vide order dated 12.03.2021 with regard to remediation of Bellanduru lake at Bangalore. The Committee will be free to coopt/consult/associate any other expert/institution.

The Application is disposed of. If any grievance survives, it will be open to the aggrieved parties to take remedies in accordance with law.

A copy of this order be forwarded to the MoEF&CC, Regional Office, Nagpur, CPCB, Regional Office, Pune, Commissioner, MCGM, Collector,

Mumbai Eastern Suburban Area, Commissioner of Police, Mumbai, Chief Wildlife Warden, Maharashtra, Director Environment, Maharashtra and the State PCB by email for compliance.

Adarsh Kumar Goel, CP

Sudhir Agarwal, JM

Brijesh Sethi, JM

Saibal Dasgupta, EM

January 12, 2022
Original Application No. 68/2021(WZ)
AB

Email **NISHCHAL C**

Fw: Minutes of the 2nd Meeting of Joint Committee. **Annexure-4**

From : sromumbai3@mpcb.gov.in Wed, Apr 20, 2022 03:55 PM
Subject : Fw: Minutes of the 2nd Meeting of Joint Committee. 2 attachments
To : dyhemaintes he <dyhemaintes.he@mcgm.gov.in>
Cc : romumbai@mpcb.gov.in, NISHCHAL C <nischal.cpcb@nic.in>, mc@mcgm.gov.in, Narendra D. Toke <dir1.mev-mh@nic.in>, Shri. V N Ambade <apccfcentral-ngp-mef@gov.in>

NGT Issue/IMP

MOM of second meeting of Joint Committee for compliance of the order dated-12.01.2022 passed by the Hon'ble National Green Tribunal (WZ), Pune in Original Application No. 68/2021 (WZ) filed by Vanshakti & Anr. Vs. Municipal Corporation of Greater Mumbai & Ors. were communicated vide mail dated 15.03.2022.

You are once again requested to furnish information called upon by the committee members during the meeting dated 7.03.2022, as mentioned in the MOM (decision).

Regards

Sub-Regional Officer Mumbai3 ,
Maharashtra Pollution Control Board ,
Kalpataru Point, 1st Floor, Sion East
Mumbai – 400022

From: RO Mumbai <romumbai@mpcb.gov.in>
Sent: 15 March 2022 18:25
To: apccfcentral-ngp-mef@gov.in <apccfcentral-ngp-mef@gov.in>; nischal.cpcb@nic.in <nischal.cpcb@nic.in>; Collector mumbai suburban <collectormsd@gmail.com>; Principal Chief Conservator of Forests (Wildlife), Maharashtra State, Nagpur <pccfwlngp@mahaforest.gov.in>; CCF Mangrove cell <ccfmmumbai@gmail.com>; Narendra D. Toke <dir1.mev-mh@nic.in>; dyhemaintes.he@mcgm.gov.in <dyhemaintes.he@mcgm.gov.in>; PERIYASAMY VELRASU <Amc.projects@mcgm.gov.in>; mc@mcgm.gov.in <mc@mcgm.gov.in>; dcpzone10@gmail.com <Dcpzone10@gmail.com>
Cc: SRO Mumbai 3 <sromumbai3@mpcb.gov.in>
Subject: Minutes of the 2nd Meeting of Joint Committee.

Sir,

Enclosed herewith copy of Minutes of the 2nd meeting of Joint Committee for compliance of the order dated-12.01.2022 passed by the Hon'ble National Green Tribunal (WZ), Pune in Original Application No. 68/2021 (WZ) filed by Vanshakti & Anr. Vs. Municipal Corporation of Greater Mumbai & Ors.

Thanks & Regards,

(Sanjay R. Bhosale)
Regional Officer, Mumbai
Maharashtra Pollution Control Board
Mumbai.

Revised MOM 07.03.2022.pdf
35 KB

ADDENDUM MOM-15.03.2022.pdf
306 KB

From : romumbai@mpcb.gov.in Tue, Mar 15, 2022 06:25 PM

Subject : Minutes of the 2nd Meeting of Joint Committee. 2 attachments

To : Shri. V N Ambade <apccfcentral-ngp-mef@gov.in>, NISHCHAL C <nischal.cpcb@nic.in>, collectormsd@gmail.com, Principal Chief Conservator of Forests (Wildlife), Maharashtra State, Nagpur <pccfwlngp@mahaforest.gov.in>, ccfmmumbai@gmail.com, Narendra D. Toke <dir1.mev-mh@nic.in>, dyhemaintes he <dyhemaintes.he@mcgm.gov.in>, Amc projects <Amc.projects@mcgm.gov.in>, mc@mcgm.gov.in, Dcpzone10@gmail.com

Cc : sromumbai3@mpcb.gov.in

Sir,

Enclosed herewith copy of Minutes of the 2nd meeting of Joint Committee for compliance of the order dated-12.01.2022 passed by the Hon'ble National Green Tribunal (WZ), Pune in Original Application No. 68/2021 (WZ) filed by Vanshakti & Anr. Vs. Municipal Corporation of Greater Mumbai & Ors.

Thanks & Regards,

(Sanjay R. Bhosale)
Regional Officer, Mumbai
Maharashtra Pollution Control Board
Mumbai.

"SAVE PAPER"-THINK BEFORE YOU PRINT!
POWER BEHIND ENVIRONMENT...M.P.C.B.

Revised MOM 07.03.2022.pdf
35 KB

ADDENDUM MOM-15.03.2022.pdf
306 KB

MINUTES OF THE FIRST MEETING OF JOINT COMMITTEE CONSTITUTED FOR COMPLIANCE OF THE ORDER DATED 12/01/2022 PASSED BY THE HON'BLE NATIONAL GREEN TRIBUNAL (WZ), PUNE IN ORIGINAL APPLICATION NO. 68/2021 (WZ) TITLED AS VANSHAKTI & ANR VS. MUNICIPAL CORPORATION OF GREATER MUMBAI & ORS.

The Hon'ble NGT in the aforesaid matter vide order dated 12/01/2022 constituted an eight-member joint committee comprising of MoEF&CC, Regional Office, Nagpur, CPCB, Regional Office, Pune, Commissioner, MCGM, Collector, Mumbai Eastern Suburban Area, DCP of the area (to be designated by Commissioner of Police, Mumbai), Chief Wildlife Warden, Maharashtra, Director Environment, Maharashtra and the State PCB as members. The nodal agency for coordination and compliance will be the State PCB and the State Wetland Authority. Grievance in the application is against pollution of Powai Lake in the Eastern suburb of Mumbai and failure of authorities to take remedial action. The applicant mentioned that the sources of pollution are discharge of effluents and sewage, illegal reclamation for construction and dumping of debris. Copy of the said order dated 12/01/2022 of Hon'ble NGT is given at **Annexure-I**. Thereafter the Tribunal considered the matter based on the pleadings made by various respondents agencies and the Tribunal vide order dated 12/01/2022 mentioned that though certain initiatives are said to have been taken for restoration/revival of the lake and prevention of damage to the environment, the steps so far taken are not adequate and desired results are yet to be achieved. Also, mentioned that there is need to continue sustained efforts by the State authorities as well as civil society and to maintain constant vigilance. Further, to take coercive measures to enforce environmental norms by way of coordinated efforts of all the statutory regulators, wherever necessary. The operative directions of the Hon'ble NGT to the aforesaid joint committee in brief are as follows;

1. To prepare an action plan covering all aspects of environment in the light of earlier studies and plans, as may be updated in the light of current ground situation.
2. The action plan may provide for mode of execution, monitoring mechanism and budget allocation.
3. To take steps to ensure compliance of Wetland Rules, 1972 and other Environmental Rules, including, steps to prevent discharge of sewage or any other effluents and to monitor water quality to protect fish and other aquatic fauna and distinct sites of the marsh crocodile.
4. Mechanism for assessing water quality monitoring at strategic locations, exploring possibilities of installing aeration systems, prohibiting use of phosphate bearing detergents and other measures.
5. The Joint Committee may meet once every month to oversee the execution at least for one year and thereafter, at such intervals as it may find necessary

The Tribunal vide aforesaid order mentioned that the minutes of the meeting may be uploaded on the website of the State Wetland Authority. Also, mentioned that the Committee will be free to coopt/consult/associate any other expert/institution.

In compliance with aforesaid order of the Hon'ble NGT, the eight-member joint committee has been constituted by MPCB vide no. MPCB/RO/220222FTS0200, dated 02/02/2022 as below:

(i) Regional director or his representative from MoEF&CC, Regional Office – Member
(ii) Representative from CPCB, Regional Office, Pune – Member
(iii) Municipal Commissioner, MCGM of his representative – Member
(iv) District Collector, Mumbai Suburban District or his representative – Member
(v) Deputy Police Commissioner (to be designated by Commissioner of Police, Mumbai) or his representative – Member
(vi) Chief Wildlife Warden, Maharashtra – Member
(vii) Director Environment, Maharashtra – Member
(viii) Regional Officer, MPCB, Mumbai – Member Convener

First meeting of the joint committee was held on 16/02/2022 through video conferencing. List of participants present in the aforesaid joint committee meeting is given at **Annexure-II.**

Representative from MPCB, Mumbai welcomed all the members of the joint committee and invitee participants**.** He briefed about the issue of Powai Lake pollution and explained regarding constitution of Joint Committee for compliance of the order dated 12/01/2022 passed by the Hon'ble National Green Tribunal (WZ), Pune in Original Application No. 68/2021 (WZ) and also about the operative directions of the Hon'ble NGT to the joint committee.

Representative from CPCB, Regional Directorate-Pune briefed about the earlier study carried-out by CPCB for assessment of water quality of Powai Lake. Also, referring to the Hon'ble NGT matter vide order dated 12/03/2021 in OA No. 125/2017, Court on its own Motion vs. State of Karnataka, he briefed about the action plan which has been prepared and implemented with regard to remediation of Bellanduru Lake at Bangalore. Further, briefed about the indicative guidelines prepared by CPCB for Restoration of Water Bodies in compliance to Hon'ble NGT orders in O. A. No 325/2015 titled as Lt. Col. Sarvadaman Singh Oberoi Vs UOI & Ors. He suggested that such action plans may be referred while preparing action plan for Powai Lake.

Representative from MoEF&CC mentioned that the earlier study reports and analysis reports of Powai Lake shall be compiled, referred and made available to the joint committee for preparation of action plan for Powai Lake.

Representative from Dept. of Environment mentioned that besides the present Hon'ble NGT matter similar matter pertaining to the pollution and allied issue of Powai Lake is being dealt by Hon'ble High Court of Bombay wherein the Hon'ble High Court has issued stay order on the work of jogging track, around the Powai Lake which is proposed by MCGM. Accordingly, the action plan may be prepared as per order of Hon'ble NGT vide dated 12/01/2022.

Representative from Wildlife Department mentioned about the present discharge of sewage into Powai Lake and expressed that it should be restricted and discharge of sewage may be stopped completely. Also, expressed that all committee members may visit Powai Lake during the month of March, 2022 to verify the present situation.

Representative from MCGM mentioned about recent stay order by the Hon'ble High court of Bombay for work of jogging track around Powai Lake. He mentioned about the Expert Committee constituted by MCGM comprising of environmental specialist, environmental scientist, herpetologist, limnologist and a marine biologist for guiding the MCGM and oversee the process of making boardwalk using the Gabion technology Further mentioned that the proposed project of jogging track around the Powai Lake is environment friendly and MCGM shall be briefing through a presentation about the proposed project.

Representative from District Collector, Mumbai Suburban District mentioned that the joint committee may hear in the form of presentation from MCGM about the proposed project of developing jogging track around the Powai Lake before visiting the Powai Lake. Also, given instructions to MCGM to arrange for presentation to the joint committee.

Meeting concluded with vote of thanks to the dais.

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Annexure-I

Item No.01 (Court No. 1)

BEFORE THE NATIONAL GREEN TRIBUNAL
SPECIAL BENCH

(By Video Conferencing)

Original Application No. 68/2021(WZ)

Vanshakti & Anr. Applicant(s)

Versus

Municipal Corporation of Greater Mumbai & Ors. Respondent(s)

Date of hearing: 12.01.2022

CORAM: HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON
HON'BLE MR. JUSTICE SUDHIR AGARWAL, JUDICIAL MEMBER
HON'BLE MR. JUSTICE BRIJESH SETHI, JUDICIAL MEMBER
HON'BLEMR. SAIBAL DASGUPTA, EXPERT MEMBER

Applicant: Mr. Mr. Zaman Ali, Advocate

Respondent(s): Mr. Aspi Chinoy, Sr. Counsel with Mr. Sameer Khale, Advocates for R-1
Ms. Nidhi Choudhari, District Collector, Mumbai Suburban District
Mr. Rahul Garg, Advocate for MoEF& CC
Mr. D.M. Gupte, Advocate for R-5 & 6
Mr. Mukesh Verma, Advocate for R-7
Mr. Aniruddha S. Kulkarni, Advocate for MPCB & State Environment Department

ORDER

The Issue – Case of the Applicants

1. Grievance in this application is against pollution of Powai Lake in the Eastern suburb of Mumbai and failure of authorities to take remedial action. According to the applicants, the sources of pollution are discharge of effluents and sewage, illegal reclamation for construction and dumping of debris. The lake is home to scheduled species of wildlife as per Schedule to the Wild Life Protection Act, 1972 (WPA). The

statutory authorities have failed to discharge their obligation under the 'Public Trust' doctrine. The area of lake is 210 hectares as per Central Institute of Fisheries Education, with catchment area of 6.61 sq. kms. Powai Lake is one of immense ecological importance, home to several protected species of birds and animals and the water of the lake has many dependents for various purposes.

2. The applicant has impleaded Municipal Corporation of Greater Mumbai (MCGM), Maharashtra Tourism Development, Urban Development Department, Maharashtra Pollution Control Board, Maharashtra State Forest Department, Central Pollution Control Board, Ministry of Environment, Forest and Climate Change (MoEF&CC) and District Collector, Mumbai Suburban District as respondents.

3. It is stated that MCGM and Maharashtra Tourism Development have undertaken construction of a cycling and jogging track inside the boundaries of the lake. Powai Lake is well known to have a population of Marsh crocodiles, which is protected under Schedule-I of WPA and is listed as "vulnerable" on the IUCN Red List. There is thriving population of crabs, insects, worms, fish and their eggs, lizards, snakes, frogs and their eggs, birds and their eggs and nestlings (nesting), molluscs and rodents on which the birds and animals are dependent for food in Powai Lake ecosystem. According to the Urban Wetland/Water Bodies Management Guidelines, 2021 prepared by the National Mission for Clean Ganga, it is recorded that 40% of Powai Lake has disappeared. Powai Lake has faced deterioration of its water quality, which was recorded in a 2020 study titled "Past, Present and Future of Powai Lake, (Mumbai) and Revival through- Holistic Analysis. Dissolved Oxygen (DO) level in Powai lake, which is essential for survival of flora and fauna, has

had a declining trend at alarming rate since several decades. Water spread area of the lake has had a shrinkage trend due to the heavy pollution. The temporal satellite data of the years 1973 and 2014 with a gap of 31 years, as shown in the aforementioned 2020 study, indicates decrease by 26% of water spread area. Various storm water drains empty into the lake. The floating Water Hyacinth (or Hydrophyte Eichornia) has colonized water areas near these drains, which is a clear biological indicator that sewage is infesting these areas. This has an adverse effect on fisheries in Powai lake which has been associated with the increase in growth of aquatic weeds and water hyacinth due to serious water pollution. A 2018 study on the Fisheries of the lake, conducted by Central Institute of Fisheries Education, Versova, Mumbai, has recorded the effects of pollution in Powai Lake and its aquatic life. Highly polluted and deteriorated state of Powai Lake has been recognized as early as 1995, when Powai Lake was included in the National Lake Conservation Plan ("NLCP") by the MoEF&CC. A Detailed Feasibility Report (DPR) was prepared by MoEF&CC and sum of Rs. 6.62 crores was sanctioned as grant to Respondent No.1, in June 2001 for implementation of the scheme on priority. As per the audit report of restoration and cleaning work at Powai Lake prepared by the Comptroller and Auditor General of India for the period of July 2010 to February 2011, ("Report No. 21 of 2011-12"), it is reported that the project was declared completed by MoEF&CC and National River Conservation Directorate (NRCD) despite non-submission of project completion report along with final utilization certificate by the MCGM to MoEF&CC, and further, the final payment of the contractor was yet to be paid which indicated that the project was still ongoing. NLCP merged with National Wetland Conservation Programme, which has existed for the protection of wetlands since 1986,

to become a unified scheme National Plan for Conservation of Aquatic Eco-systems ("NPCA") in February, 2013. Guidelines for the Conservation of Aquatic Eco-systems, 2019, which is applicable for all water bodies, lakes and wetlands, either artificial or permanent, provides that the wetland is to be managed so that it is sustained in a sound ecological health, retains biodiversity and provides the expected ecosystem services in an efficient and effective manner. As per a Standing Committee on Water Resources Report dated 26.06.2016, Powai Lake was included in the NPCA and was approved a cost of Rs. 28.57 crores with Rs. 18.675 crores released till date. Water quality test of Powai Lake was carried out on 03.09.2021 and 16.09.2021 by procuring water samples from 5 different areas of Powai Lake and the results reveal that the water of the lake is not even upto the legal standards for bathing, or propagation of wildlife and fisheries, which it is currently being used for, let alone the standards for drinking water. In view of the grave threat posed by the administration of Glyphosate in Powai Lake ecosystem, on 13.09.2021 the Applicant No. 2 has made a representation to MCGM (Respondent No. 1), MPCB (Respondent No. 4), the Maharashtra Forest Department (Respondent No. 5), the Wildlife Wing of the Maharashtra Forest Department (Respondent No. 6), the Environment Department of Government of Maharashtra (Respondent No. 7), CPCB (Respondent No. 8) and MoEF&CC (Respondent No. 9), informing them about the toxicological side effects of the administration of Glyphosate on the flora and fauna of the lake ecosystem. Vide notice dated 16.09.2021, issued by the MPCB to MCGM, MPCB has taken notice of the long term adverse effects of the administration of Glyphosate on aquatic/marine life and environment, and has consequently directed Respondent No.1 to stop the spraying of Glyphosate Chemical in Powai Lake. Powai Lake has been

inventorised and mapped as a Wetland under the National Wetlands Atlas prepared by Space Application Centre (SAC), Ahmedabad for the MoEF&CC. In the case of *Vanashakti vs. Union of India (PIL No. 87 of 2013)* which pertained to illegal constructions in wetland areas, the High Court of Bombay passed an order dated 14.10.2013 directing that no reclamation and any kind of construction shall be allowed in wetlands areas as identified and covered under the Wetland Atlas prepared by the Central Government, without the leave of the Court.

4. The Applicants have submitted following short-term suggestions for restoration and conservation of Powai Lake, in addition to suggestions provided by domain experts in studies annexed to the present Application:

(i) Creation of a sump near Powai Lake and diverting the sewage therein, to be transported to Bhandup Sewage Treatment Plant (STP), located at a distance of 5 kilometres from Powai Lake;

(ii) Setting up of a dedicated website portal for progress on restoration of Powai lake;

(iii) Installation of permanent online water quality systems at various locations inside Powai Lake that will inter alia provide accurate daily data of toxicity levels, BOD and COD levels, Dissolved Oxygen levels;

(iv) Installation of phytoremediation platforms at all storm water outfalls and entry points of sewage into Powai Lake;

(v) Installation of 24x7 CCTV monitoring cameras at locations frequented by people/tourists;

(vi) Installation of warning signboards on hefty wines for polluting the lake;

(vii) Creating basking islands in the lake to allow crocodiles to bask and provide grasslands on the edges of the lake for the crocodiles to lay eggs;

(viii) Take steps to remove or control invasive species of fish that threaten the native fish species. Fisheries experts maybe roped in for the same;

(ix) Maintain buffer zone of at least 50 meters around Powai Lake wherein no new construction activity of any kind is to be allowed except for the purposes of conservation of the Lake;

(x) Utilisation of Natural Treatment Systems, specifically CW4Reuse technology, which has been identified in the aforementioned 2018 study titled "Science & Technology Agenda for Blue-Green Spaces Inspired by Citizen Science: Case for Rejuvenation of Powai Lake" as most suitable for Powai Lake and its surrounding urban area, in view of the need to improve blue-green balance. CW4Reuse technology is most suitable for expansion of green patches on the landward side of the lake-front and surface runoff can also be reduced due to its natural filtering effects;

(xi) MCGM to take assistance from Powai Police Station to stop illegal commercial fishing activities inside Powai Lake,

(xii) MCGM to consult Forest Department, IIT-Bombay, CPCB and NEERI for preparing a long-term Plan to maintain the pristine levels of Powai Lake. Such an Action Plan may include, demarcation of areas of polluted areas in Powai Lake, recommend restrictions on anthropogenic activities (e.g., fishing, religious rituals, cattle rearing), and

implement in situ methods for restoration measures such as using floating constructed wetlands;

(xiii) A dedicated Powai Lake Restoration and Conservation Department may be constituted to strictly monitor the progress of restoration and its maintenance thereafter

(xiv) Implementing recommendations of CPCB in its "Indicative Guidelines for Restoration of Water Bodies, 2019", which includes-

a) Physical treatment approaches such as Aeration, wastewater diversion, periodic de-weeding and sediment dredging, proper maintenance of drainage channels or feeder channels, which would help increase DO levels;

b) Chemical treatment approaches such as Flocculation to increase PH levels;

c) In- situ techniques such as using aquatic plants such as water hyacinth, use of aquatic animals and other biological techniques may be used to decompose, transform and absorb water pollutants.

5. The applicant has filed copies of studies/media reports/photographs including:-

1. Media report titled "Member of HC appointed panel seeks to halt reclamation work near Mumbai's Powai lake" published on 20.08.2021 in Hindustan Times.

2. Paper titled "Diversity and Distribution of Macrophytes in Powai Lake, Mumbai" presented by researchers from Central Institute of Fisheries Education in 2014 at Conference "LAKE14: Conference on Conservation and Sustainable Management of Wetland Ecosystems in Western Ghats".

3. Report titled "Powai and its birds" published in 2021 by LIT Bombay

4. Relevant extracts from the report titled "Study of the Biodiversity of Indian Institute of Technology Bombay Campus" published in October, 2009 by World Wildlife Fund (WWF)

5. Relevant extracts from Urban Wetland/Water Bodies Management Guidelines, 2021

6. Report titled "Past, Present and Future of Powai Lake, [Mumbai] And Revival Through – Holistic Analysis" published in 2020 in Journal of Emerging Technologies and Innovative Research

7. Photographs of such excessive weed growth and Water Hyacinth on Powai Lake on 14.08.2021 and satellite image depicting areas of Powai lake covered in water hyacinth

8. Media report titled "Over 50,000 Ganesha idols immersed in Mumbai" published on 28.09.2015 in The Hindu

9. Report on background of Powai Lake by researchers from World Wildlife Fund (WWF) in 2011

10. Study titled "Science & Technology Agenda for Blue-Green Spaces Inspired by Citizen Science: Case for Rejuvenation of Powai Lake" published on 08.09.2021 in Sustainability Journal

11. Relevant extracts from the study titled "Fish Community Structure and Trophic Status - A Measure of Ecological Degradation: A Case Study from Powai Lake Mumbai" published in 2018 in International Journal of Ecology and Environmental Sciences

12. Media reports titled "Illegal fishing still plagues Powai lake" dated 11.06.2017 and titled "Poachers responsible for

crocodiles' dwindling population at Powai: Activists" dated 07.04.2016 published in DNA India

13. Media report titled "Pollution leads to decline in native fish population in Powai lake" dated 25.06.2016 published in Hindustan Times

14. Relevant extracts from the study titled "Ecological impacts of common cap and the African sharp tooth cash A review" published by Department of Aquaculture and Fisheries Science, Lilongwe University of Agriculture and Natural Resources

15. Study titled "State of Water Quality of Two Tropical Urban Lakes Located at Mumbai Megacity" published in 2015 in International Journal of Science and Research

16. Paper titled "Strategy for Conservation and Management of Urban Lakes in Mumbai" presented at the 16th World Lake Conference in 2016

17. Latest report dated March 2014 on Powai Lake Conservation Project under National Lake Conservation Plan published by Environment Department of Government of Maharashtra

18. Relevant extracts of "Report No. 21 of 2011-12" by Comptroller and Auditor General of India

19. Relevant extracts from the Tenth Report of the Standing Committee On Water Resources, Ministry Of Water Resources, River Development And Ganga Rejuvenation titled "Repair, Renovation and Restoration of Water Bodies-Encroachment on Water Bodies and Steps Required to Remove the Encroachment and Restore the Water Bodies" for the years 2015-2016

20. Media report titled "BMC unveils plan to revive Powai lake by 2019" dated 1930.2016 published in DNA News

21. Relevant extracts from the stud titled "The environmental impacts of glyphosate" published in June, 2013 by Friends of the Earth Europe

22. Relevant extracts of National Wetlands Atlas: Maharashtra by Space Applications Centre (ISRO) and Maharashtra Remote Sensing Applications Centre (MRSAC)

23. Media report titled "As heavy rains lash Mumbai, city's Powai lake starts overflowing" dated 12.06.2021 published in Asia News International

24. Media reports titled "Crocodile kills man at Powai lake" dated 27.08.2021 published in Hindustan Times

25. "Advisory on Conservation and Restorationof Water Bodies in Urban Areas".

Procedural History

6. The matter was taken up by the Tribunal on 01.10.2021 and notice was issued to the respondents. Thereafter, on 26.11.2021, the Tribunal noted pendency of *PIL No.23928/2021* against cycling and jogging tracks around “Powai Lake” and vide interim order dated 01.11.2021 restrained the concerned Official Respondents from putting up the proposed cycling and jogging tracks. The matter was deferred to today to enable the parties to file their respective versions.

Version of the Respondents

7. Reply has been filed by some of the contesting respondents to which a brief reference may be made. The MCGM acknowledges the pollution of the lake due to buildings and habitations and inability to remedy the situation inspite of efforts made. Relevant extracts from the reply are reproduced below:-

"4. *Regarding the paras/ portions of the Application dealing with the need to revive and protect Powai lake from the ingress of sewage and Hyacinth growth:*

(a) Powai Lake is an MCGM created, human-made lake, planned as an anti-famine measure for Mumbai City (then Bombay). It was sanctioned by the Standing Committee in November 1889 and built by the Municipal Corporation by 1891. The water in Powai Lake has been severely polluted and after several unsuccessful attempts to purify it, the water finally declared unfit for drinking purposes in 1893.The issues related to the poor quality of water still persist today coupled with excessive silting, sewage ingress and extended hyacinth growth, leading to eutrophication of the lake water. Hereto annexed and marked as Exhibit 'A' is the copy of Affirmation by MCGM that, Powai Lake water is not used for drinking purpose.

(a) Powai Lake exists in an urban setting and several structures have been built on the immediate periphery of the lake including IIT hostel blocks, IIT accommodation buildings and canteen, the Renaissance Hotel and Convention Centre, the Lakeside Chalet Mumbai Marriott, and leased properties of HE department. In the present situation, only about 2 kin (20% only) out of the 10.2 km circumferential of this public asset i.e. Powai Lake is accessible to the general public. As stated above IIT has made a motorable lake front road along the periphery of the part of Powai Lake adjacent to its property which is not open to public as community space. The IIT, the Renaissance Hotel and other private Lessees have, in the absence of lake front access, virtually monopolized the lake front and in effect prevented proper access to the Powai Lake even to MCGM Staff. Furthermore, the existing kuccha pathway along the Renaissance compound wall is being misused by lumpen elements and drug abusers. Due to the lack of a proper pathway access and unlit areas, illegal and anti-social activities are suspected to be carried out along the banks of the lake.

(b) The Public Project of Rejuvenation and Reinvigoration of the Physical and Natural Environment of Powai Lake, Mumbai" is being undertaken by MCGM at Powai Lake to enable a sustainable rejuvenation and reinvigoration of the lake - its water, biodiversity and adjacent physical environment.

(c) MCGM has been putting all efforts to improve Powai Lake and its surrounding for quite a long time. Several measures are being implemented to alleviate the natural environment of Powai Lake and improve the quality of the lake water. One of the major challenges is to increase the dissolved oxygen levels (DO) and reduce the bio-chemical oxygen demand (BOD) for the sustenance of the aquatic life. MCGM has installed a barge mounted sub-surface aerator with two aspirators and intends to further install seven non- invasive, single Jet Floating Aerator type fountains which shall assist in transferring oxygen from the atmosphere into the water through enriched water droplets. These will beautify and

revive the lake itself. Hereto annexed and marked as Exhibit 'B' The chart of BOD/COD and Do levels in Powai Lake per MCGM-SCADA.

(d) MCGM has initiated several interceptors and rerouting measures to prevent sewage ingress into the lake. This Sewage ingress has led to the proliferation of rapidly growing hyacinth, estimated at 290,000 cu mtrs, hindering the survival of aquatic life due to reduced sunlight penetration, and leading to water loss through transpiration. Hyacinth areas are also breeding grounds for mosquitoes and mosquito-related illnesses. Water hyacinth, up to 5% of the water surface, can be tolerated because it purifies water by absorption of sewage. But currently, the hyacinth is occupying more than 20% of the water area, rendering it necessary to remove the hyacinth cover. MCGM has been carrying out regular programs for the removal of hyacinth.

(e) With the above-mentioned three measures in place i.e. improved aeration to increase dissolved oxygen levels, sewage ingress interception and removal of hyacinth, the quality of water will be substantially improved, and consequently the flora and fauna will be able to survive and thrive, vastly rejuvenating the natural environment of Powai Lake.

(f) As the above mentioned environmental projects for water improvement are underway, the lake surrounds need to be remodeled to gain access for maintenance and upkeep, and for the community as a public recreation space. Presently the IIT Mumbai, the Renaissance Hotel and other private Lessees have, in the absence of lake front access being made available, virtually prevented access to the Powai Lake front. Furthermore, the existing kuccha pathway along the Renaissance compound wall is being misused by lumpen elements and drug abusers. The proposed walkway is essential for the proper safeguarding and maintenance of Powai Lake inasmuch as it will enable MCGM's maintenance Department and staff to have ready access to all portions of the lake front. MCGM staff can then take steps to prevent sewage being dumped into the lake either directly by culverts/pies or by joining sewage pipes through storm water drains.

(5) Regarding the proposed walkway and cycle path around the edge of Powai lake:

(a) There is a dearth of community recreation spaces in the eastern suburbs of Greater Mumbai, and there is practically no major community open space in this part of the city. At less than 2 sq.m. per capita, public developed open space is a much sought-after resource in Mumbai. In the suburbs, with over 10 million populations, this number falls down even lower, to less than 1 sqm per person. Powai Lake, with its 10.2 km of waterfront, offers an opportunity to create a large community open space for the citizens of Mumbai. The perimeter of the lake is roughly three times the length of

Marine Drive and five times that of Worli Sea Face. Powai Lake, after rejuvenation, has the potential of becoming a major community open space. The Respondents submit that by developing the proposed walkway along the periphery of the Powai Lake, the Respondents will create an ecological destination which is accessible to the common citizen/ public.

(b) The Respondents say and submit that the proposed cycle path and walkway closely follows the alignment of the existing motorable lake front road of IIT Mumbai and thereafter the Renaissance Hotel compound wall and pathway. Hereto Annexed and Marked Exhibit C is a Google map view of the entire Powai Lake showing the existing promenade, the portion adjacent to the IIT Mumbai property, the portion adjacent to the Renaissance hotel property and the portion that is adjacent to the MCGM Deer Park and Garden.

(c) The proposed walkway will be situated substantially in the Natural Area beyond the perimeter of Powai Lake. Only some limited portions fall in areas which are covered by water during the monsoon season and the few months thereafter. The installation of the walkway does not entail any reclamation or construction. As set out hereinafter in order not to impede the flow of water into the lake as also the flow of lake waters during the monsoon months, the walkway is to be developed using gabion technology, which is porous and does not prevent the flow of water. The Gabion Technology consists of placing PVC coated galvanized iron wire mesh baskets in place, containing stones of various sizes, without any joinery, fixing or cement mortar. These wire baskets containing stones of diverse sizes are merely placed on the surface, without there being any foundation, or other means used to fix it to the earth. On top of the gabion wall there will be a thin layer of cement board/synthetic composite board and macadam/ tar to enable walking/ cycling. There is no dumping of debris into the lake, nor any reclamation in the lake. Gabion technology does not involve any construction or reclamation. In the absence of cement or mortar, the gabion wall is porous and the gaps between the gabion stones allows and does not prevent the flow of water. Gabions also provide refuge for small aquatic life and have the potential of becoming a breeding ground for small and micro aquatic life. The Applicants allegations of reclamation, dumping of boulders and construction in the lake and its immediately surrounding areas are accordingly false and are denied.

(d) For the development of the walkway, no trees are proposed to be cut. Whenever required the walkway and cycle track will be separated' to go around trees. Only seasonal rank vegetation will be removed. The Applicant's allegation of cutting / uprooting of trees are factually incorrect and is denied. A detailed numbering of trees falling in the vicinity of the alignment of the proposed walkway has been carried out for recording purposes and with a view to protecting the trees in - situ. Only trees which have been uprooted due to Cyclone Tauktae and stormy monsoon conditions will be removed after

taking due permissions. In the rarest of rare occasions, if felling of a particular tree is absolutely unavoidable, the same will be done only with prior approval of appropriate authority.

(e) The MCGM has constituted an Expert Committee comprising an Environmental specialist, environmental scientist, herpetologist, limnologist and a marine biologist to guide the MCGM and oversee the process of making boardwalk using the said Gabion technology. The Committee of Experts comprises the following notable experts

- *Dr. Rakesh Kumar, Environmental Scientist, CSIR (Chairperson)*
- *Dr. Deepak Apte, Environment Specialist and Marinez (Member)*
- *Dr. PramodSalaskar, Environment Specialist on Powai Lake (Member)*
- *Shri. KedarBhide, Herpetologist (Member)*
- *IIT Bombay Representative, Prof. D. N. Singh (Member)*
- *Shri. Hydraulic Engineer, MCGM (Secretary)*

The committee has had periodic meetings and is currently guiding the project work.

(f) The MCGM will soon make available an online platform, with the history of Powai Lake, detailing out the proposals which addresses the concerns of the citizens in a Frequently Asked Questions format. The platform will provide an overview of the project. The MCGM is committed to making the process inclusionary in nature and encourages public participation. The MCGM has and will address further concerns and issues, if any, in a diligent manner, as the project, at its core, is for holistic public access to the lake front area."

8. The stand of the Collector, Mumbai Suburban District in the capacity of Member Secretary, State Wetland Authority is that the issue of cycling track inside the boundary of Powai Lake is pending before the Bombay High Court, as already mentioned. The lake is a wetland as per National Wetland Atlas. The State Wetland Authority has constituted an expert committee headed by Secretary, Environment Maharashtra to check the compliance status. However, the lake has not yet been notified as 'wetland' under the Wetlands (Conservation and Management) Rules, 2017 (the Wetland Rules, 2017). The expert Committee is in the process of finalization of its report.

9. The stand of the State PCB is that flowing of sewage from Perubagh *nalla*, Culverter No.6&7 and IIT open *nalla* into Powai lake was noticed on visit to the lake on 17.12.2021 by the officials of MCGM. MCGM officials informed that the work of diverting the sewage line to main sewer line is in progress. Around periphery of Powai lake, the cycling and jogging track gabion work about 100 mtrs is completed at compound of Renaissance Hotel, Powai lake. It is further informed that presently the work of gabion is stopped. Ganesh idol immersion in Powai lake is at Ganesh Ghat and Pawarwadi. They have provided artificial pond for idol immersion in 'S' Ward area. Domestic effluent from the unsewered nearby area located around the periphery of Powai lake is entering into lake through two *nallas*. Also, 18 gates are provided at SWD around the periphery of lake. Due to leakages at gate no.6 & 7 some meagre quantity of effluent is observed entering the lake. Respondent-Board has issued directions u/s 33A of the Water (Prevention & Control of Pollution) Act, 1974 and u/s 31A of the Air (Prevention & Control of Pollution) Act, 1974 to MCGM vide letter dated 15/12/2021 to take necessary precautionary measures to avoid ingress of treated/untreated sewage into Powai Lake & divert to nearby STP and strictly follow the guidelines for idol immersion dated 12/05/2020 issued by Central Pollution Control Board. Officials of the Respondent Board at Mumbai have collected water samples of Powai Lake on 16/12/2021. The analysis results of said samples compared with -the primary water quality criteria for bathing water, which shows that the parameters are almost within limit, except marginal exceedance observed for BOD parameter (3.2 mg/l) at Ganeshgat location.

10. CPCB has stated that regulations have been issued on the subject of idol immersion only in artificial tanks/ponds with liner made with well graded/highly impervious clay or eco synthetic liner, after removing all flowers, leaves and artificial ornaments. Lime or alum or any other equivalent coagulant should be added in designated temporary lined pond/tank as pre-treatment option for ensuring settling of solids. Water quality as per monitoring carried on 18.04.2017 was found to be as follows:-

> *"a. The Physico- chemical and microbiological characteristics of water samples of lake shows that the measured pH value was ranging from 8.2 to 8.7 and the conductivity was ranging from 320.5 to 344.2 µS/ cm, which indicate the presence c normal range of dissolved solids in ionized form.*
>
> *b. The Dissolved Oxygen (DO) were ranging from 0.0 mg/l to 5.4 mg/l, TDS was ranging from 308 mg/l to 328 mg/l, COD were ranging from 96 mg/l to 496 mg/1 and the Biochemical Oxygen Demand (BOD) were ranging from 7 mg/l to 150 mg/l. The results are indicating that there is organic contamination in the lake.*
>
> *c. Other parameters measured were Total hardness, Chlorides, Sulfates, Alkalinity, Ammonia; Fluoride etc. are also present. The values were higher and water quality was poor. The reasons for the poor quality of water may be attributed huge discharge of sewage from surrounding population, immersion of Idols during festivals and other anthropogenic activities.*
>
> *d. The water of the Lake is not being used for any purpose other than recreation. If compared with standard limit of use category. The water of the lake is fit for only irrigation.*
>
> *e. The microbiological characteristics of water samples of lake reveals that the measured Total Coliform values were ranging from IT MPN100ml to >1600 MPN/100ml and the Faecal - Coliform values were ranging from 1600 MPN/100ml, which indicate the presence of Total and Faecal Coliform may be due to the wastewater coming from drains"*

11. There are indicative guidelines for restoration of water body issued by the CPCB. There is a further statement that the conservation plan was prepared and funds were sanctioned for implementation. The State PCB also passed a scheme for restoration of water bodies.

Consideration by the Tribunal

12. We have heard learned counsel for the applicant, MCGM, CPCB, State PCB, MoEF&CC and the Collector in person, perused the record and given our due consideration to the issue.

13. There can be no dispute about need for restoring and maintaining the lake to its pristine position. No untreated sewage can be allowed to be discharged. The statutory mandate of Water (Prevention and Control of Pollution) Act, 1974, principles of 'Sustainable Development', 'Public Trust' doctrine as well as other statutory provisions applicable, including the Municipal Corporation Act and the Rules need to be complied. MCGM has to exercise its statutory powers to prevent discharge of sewage. The Wetland Authority under the Wetland Rules, 2017 has to ensure compliance of statutory plan for demarcation of prohibited and regulatory areas around the lake. Reference in this regard may also be made to judgements of the Hon'ble Supreme Court in Paryavaran Suraksha v UOI, (2017) 5 SCC 326 and M.K. Balakrishnan vs. UOI, (2017) 7 SCC 805. The Wildlife Department is required to take action in terms of the WPA. The State PCB and the CPCB have to take action as regulators to prevent and remedy environmental norms. Apart from specific statutory provisions of Water, Air, WPA, EP Acts and Rules, powers under Section 133 of the Cr.P.C, sections 268 to 271 IPC and Section 3 of the PMLA Act, 2002 read with the Schedule to the Act can also be invoked wherever necessary. There is thus no inadequacy of powers available with the statutory regulators.

Conclusion and Directions

14. As shown by the pleadings referred to above, ground situation is far from satisfactory. While the issue of track pending before the High

Court needs no comment at this stage, as that aspect can be dealt with in the said pending proceedings, there is need to deal with the unremedied pollution, having potential for damage to the environment and the wildlife. Water quality of the lake can lead to killing of fish, affecting the crocodile nestling sites, dependent of fish. Though certain initiatives are said to have been taken for restoration/revival of the lake and prevention of damage to the environment, the steps so far taken are not adequate and desired results are yet to be achieved. There is thus need to continue sustained efforts by the State authorities as well as civil society and to maintain constant vigilance. There is also need to take coercive measures to enforce environmental norms by way of coordinated efforts of all the statutory regulators, wherever necessary. Primary responsibility remains of the MCGM, the Wetland Authority and the Forest Department (Wildlife Division). Local Police may also have to take responsibility. Similarly, the Environment Department of Maharashtra has also to take pro-active action. Since the primary issue is of compliance of laid down norms by the statutory regulators, all that is required is to issue directions to the said authorities to perform their duty. It may be necessary to constitute a Joint Committee for coordinated action.

15. Accordingly, we constitute an eight-member joint Committee comprising of MoEF&CC, Regional Office, Nagpur, CPCB, Regional Office, Pune, Commissioner, MCGM, Collector, Mumbai Eastern Suburban Area, DCP of the area (to be designated by Commissioner of Police, Mumbai), Chief Wildlife Warden, Maharashtra, Director Environment, Maharashtra and the State PCB. The nodal agency for coordination and compliance will be the State PCB and the State Wetland Authority. Meeting of Joint Committee may be held preferably within two weeks.

Except for site visit, the Committee may meet in person or through video conferencing, as may be required. The Committee may prepare its action plan covering all aspects of environment in the light of earlier studies and plans, as may be updated in the light of current ground situation. The plan may provide for mode of execution, monitoring mechanism and budget allocation. The Joint Committee may meet once every month to oversee the execution at least for one year and thereafter, at such intervals as it may find necessary. The minutes of the meeting may be uploaded on the website of the State Wetland Authority. It will be open to the applicant or any other citizen to give their suggestions/ representations to the Committee for its consideration. The Committee may particularly take steps to ensure compliance of Wetland Rules, 1972 and other Environmental Rules, including, steps to prevent discharge of sewage or any other effluents and monitor water quality to protect fish and other aquatic fauna and distinct sites of the marsh crocodile. It may have mechanism for assessing water quality monitoring at strategic locations, exploring possibilities of installing aeration systems, prohibiting use of phosphate bearing detergents and other measures required to be taken. The Committee may refer the action plan and relevant directions of the Tribunal passed in OA No. 125/2017, *Court on its own Motion vs. State of Karnataka* vide order dated 12.03.2021 with regard to remediation of Bellanduru lake at Bangalore. The Committee will be free to coopt/consult/associate any other expert/institution.

The Application is disposed of. If any grievance survives, it will be open to the aggrieved parties to take remedies in accordance with law.

A copy of this order be forwarded to the MoEF&CC, Regional Office, Nagpur, CPCB, Regional Office, Pune, Commissioner, MCGM, Collector,

Mumbai Eastern Suburban Area, Commissioner of Police, Mumbai, Chief Wildlife Warden, Maharashtra, Director Environment, Maharashtra and the State PCB by email for compliance.

Adarsh Kumar Goel, CP

Sudhir Agarwal, JM

Brijesh Sethi, JM

Saibal Dasgupta, EM

January 12, 2022
Original Application No. 68/2021(WZ)
AB

Annexure-II

S. no.	Name of the participants	Department
1.	Shri Suresh Kumar Adapa, Scientist 'E'	MoEF&CC, Nagpur
2.	Shri Nishchal C., Scientist 'D'	CPCB, Regional Directorate - Pune
3.	Smt. Nidhi Chaudhary, District Collector, Mumbai Suburban District	District Collectorate, Govt. of Maharashtra
4.	Shri Sunil Limaye, Principal Chief Conservator of Forest (Wild life)	Wildlife Department, Govt. of Maharashtra
5.	Shri Narendra Toke, Director	Environment Department, Govt. of Maharashtra
6.	Shri Jaywant Hazare, I/c Regional Officer	MPCB Regional Office, Mumbai
7.	Officers from MCGM	MCGM, Mumbai

ADDENDUM TO THE MINUTES OF THE FIRST MEETING OF JOINT COMMITTEE CONSTITUTED FOR COMPLIANCE OF THE ORDER DATED 12/01/2022 PASSED BY THE HON'BLE NATIONAL GREEN TRIBUNAL (WZ), PUNE IN ORIGINAL APPLICATION NO. 68/2021 (WZ) TITLED AS VANSHAKTI & ANR VS. MUNICIPAL CORPORATION OF GREATER MUMBAI & ORS.

The Hon'ble NGT in the aforesaid matter vide order dated 12/01/2022 constituted an eight-member joint committee comprising of MoEF&CC, Regional Office, Nagpur, CPCB, Regional Office, Pune, Commissioner, MCGM, Collector, Mumbai Eastern Suburban Area, DCP of the area (to be designated by Commissioner of Police, Mumbai), Chief Wildlife Warden, Maharashtra, Director Environment, Maharashtra and the State PCB as members. The nodal agency for coordination and compliance will be the State PCB and the State Wetland Authority. Grievance in the application is against pollution of Powai Lake in the Eastern suburb of Mumbai and failure of authorities to take remedial action. The applicant mentioned that the sources of pollution are discharge of effluents and sewage, illegal reclamation for construction and dumping of debris. Copy of the said order dated 12/01/2022 of Hon'ble NGT is given at **Annexure-I**. Thereafter the Tribunal considered the matter based on the pleadings made by various respondents agencies and the Tribunal vide order dated 12/01/2022 mentioned that though certain initiatives are said to have been taken for restoration/revival of the lake and prevention of damage to the environment, the steps so far taken are not adequate and desired results are yet to be achieved. Also, mentioned that there is need to continue sustained efforts by the State authorities as well as civil society and to maintain constant vigilance. Further, to take coercive measures to enforce environmental norms by way of coordinated efforts of all the statutory regulators, wherever necessary. The operative directions of the Hon'ble NGT to the aforesaid joint committee in brief are as follows;

1. To prepare an action plan covering all aspects of environment in the light of earlier studies and plans, as may be updated in the light of current ground situation.
2. The action plan may provide for mode of execution, monitoring mechanism and budget allocation.
3. To take steps to ensure compliance of Wetland Rules, 1972 and other Environmental Rules, including, steps to prevent discharge of sewage or any other effluents and to monitor water quality to protect fish and other aquatic fauna and distinct sites of the marsh crocodile.
4. Mechanism for assessing water quality monitoring at strategic locations, exploring possibilities of installing aeration systems, prohibiting use of phosphate bearing detergents and other measures.
5. The Joint Committee may meet once every month to oversee the execution at least for one year and thereafter, at such intervals as it may find necessary

The Tribunal vide aforesaid order mentioned that the minutes of the meeting may be uploaded on the website of the State Wetland Authority. Also, mentioned that the Committee will be free to coopt/consult/associate any other expert/institution.

In compliance with aforesaid order of the Hon'ble NGT, the eight-member joint committee has been constituted by MPCB vide no. MPCB/RO/220222FTS0200, dated 02/02/2022 as below:

(i) Regional director or his representative from MoEF&CC, Regional Office – Member
(ii) Representative from CPCB, Regional Office, Pune – Member
(iii) Municipal Commissioner, MCGM of his representative – Member
(iv) District Collector, Mumbai Suburban District or his representative – Member
(v) Deputy Police Commissioner (to be designated by Commissioner of Police, Mumbai) or his representative – Member
(vi) Chief Wildlife Warden, Maharashtra – Member
(vii) Director Environment, Maharashtra – Member
(viii) Regional Officer, MPCB, Mumbai – Member Convener

First meeting of the joint committee was held on 16/02/2022 through video conferencing. List of participants present in the aforesaid joint committee meeting is given at **Annexure-II.**

Representative from MPCB, Mumbai welcomed all the members of the joint committee and invitee participants**.** He briefed about the issue of Powai Lake pollution and explained regarding constitution of Joint Committee for compliance of the order dated 12/01/2022 passed by the Hon'ble National Green Tribunal (WZ), Pune in Original Application No. 68/2021 (WZ) and also about the operative directions of the Hon'ble NGT to the joint committee.

Representative from CPCB, Regional Directorate-Pune briefed about the earlier study carried-out by CPCB for assessment of water quality of Powai Lake. Also, referring to the Hon'ble NGT matter vide order dated 12/03/2021 in OA No. 125/2017, Court on its own Motion vs. State of Karnataka, he briefed about the action plan which has been prepared and implemented with regard to remediation of Bellanduru Lake at Bangalore. Further, briefed about the indicative guidelines prepared by CPCB for Restoration of Water Bodies in compliance to Hon'ble NGT orders in O. A. No 325/2015 titled as Lt. Col. Sarvadaman Singh Oberoi Vs UOI & Ors. He suggested that such action plans may be referred while preparing action plan for Powai Lake.

Representative from MoEF&CC mentioned that the earlier study reports and analysis reports of Powai Lake shall be compiled, referred and made available to the joint committee for preparation of action plan for Powai Lake.

Representative from Dept. of Environment mentioned that besides the present Hon'ble NGT matter similar matter pertaining to the pollution and allied issue of Powai Lake is being dealt by Hon'ble High Court of Bombay wherein the Hon'ble High Court has issued stay order on the work of jogging track, around the Powai Lake which is proposed by MCGM. Accordingly, the action plan may be prepared as per order of Hon'ble NGT vide dated 12/01/2022.

Representative from Wildlife Department mentioned about the present discharge of sewage into Powai Lake and expressed that it should be restricted and discharge of sewage may be stopped completely. Also, expressed that all committee members may visit Powai Lake during the month of March, 2022 to verify the present situation.

Representative from MCGM mentioned about recent stay order by the Hon'ble High court of Bombay for work of jogging track around Powai Lake. He mentioned about the Expert Committee constituted by MCGM comprising of environmental specialist, environmental scientist, herpetologist, limnologist and a marine biologist for guiding the MCGM and oversee the process of making boardwalk using the Gabion technology Further mentioned that the proposed project of jogging track around the Powai Lake is environment friendly and MCGM shall be briefing through a presentation about the proposed project.

Representative from District Collector, Mumbai Suburban District mentioned that the joint committee may hear in the form of presentation from MCGM about the proposed project of developing jogging track around the Powai Lake before visiting the Powai Lake. Also, given instructions to MCGM to arrange for presentation to the joint committee.

Meeting concluded with vote of thanks to the dais.

Annexure-II

S. no.	Name of the participants	Department
1.	Shri Suresh Kumar Adapa, Scientist 'E'	MoEF&CC, Nagpur
2.	Shri Nishchal C., Scientist 'D'	CPCB, Regional Directorate - Pune
3.	Smt. Nidhi Chaudhary, District Collector, Mumbai Suburban District	District Collectorate, Govt. of Maharashtra
4.	Shri Sunil Limaye, Principal Chief Conservator of Forest (Wild life)	Wildlife Department, Govt. of Maharashtra
5.	Shri Narendra Toke, Director	Environment Department, Govt. of Maharashtra
6.	Shri Jaywant Hazare, I/c Regional Officer	MPCB Regional Office, Mumbai
7.	Officers from MCGM	MCGM, Mumbai

Item No.01 (Court No. 1)

BEFORE THE NATIONAL GREEN TRIBUNAL
SPECIAL BENCH

(By Video Conferencing)

Original Application No. 68/2021(WZ)

Vanshakti & Anr. Applicant(s)

Versus

Municipal Corporation of Greater Mumbai & Ors. Respondent(s)

Date of hearing: 12.01.2022

CORAM: HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON
HON'BLE MR. JUSTICE SUDHIR AGARWAL, JUDICIAL MEMBER
HON'BLE MR. JUSTICE BRIJESH SETHI, JUDICIAL MEMBER
HON'BLEMR. SAIBAL DASGUPTA, EXPERT MEMBER

Applicant: Mr. Mr. Zaman Ali, Advocate

Respondent(s): Mr. Aspi Chinoy, Sr. Counsel with Mr. Sameer Khale, Advocates for R-1
Ms. Nidhi Choudhari, District Collector, Mumbai Suburban District
Mr. Rahul Garg, Advocate for MoEF& CC
Mr. D.M. Gupte, Advocate for R-5 & 6
Mr. Mukesh Verma, Advocate for R-7
Mr. Aniruddha S. Kulkarni, Advocate for MPCB & State Environment Department

ORDER

The Issue – Case of the Applicants

1. Grievance in this application is against pollution of Powai Lake in the Eastern suburb of Mumbai and failure of authorities to take remedial action. According to the applicants, the sources of pollution are discharge of effluents and sewage, illegal reclamation for construction and dumping of debris. The lake is home to scheduled species of wildlife as per Schedule to the Wild Life Protection Act, 1972 (WPA). The

statutory authorities have failed to discharge their obligation under the 'Public Trust' doctrine. The area of lake is 210 hectares as per Central Institute of Fisheries Education, with catchment area of 6.61 sq. kms. Powai Lake is one of immense ecological importance, home to several protected species of birds and animals and the water of the lake has many dependents for various purposes.

2. The applicant has impleaded Municipal Corporation of Greater Mumbai (MCGM), Maharashtra Tourism Development, Urban Development Department, Maharashtra Pollution Control Board, Maharashtra State Forest Department, Central Pollution Control Board, Ministry of Environment, Forest and Climate Change (MoEF&CC) and District Collector, Mumbai Suburban District as respondents.

3. It is stated that MCGM and Maharashtra Tourism Development have undertaken construction of a cycling and jogging track inside the boundaries of the lake. Powai Lake is well known to have a population of Marsh crocodiles, which is protected under Schedule-I of WPA and is listed as "vulnerable" on the IUCN Red List. There is thriving population of crabs, insects, worms, fish and their eggs, lizards, snakes, frogs and their eggs, birds and their eggs and nestlings (nesting), molluscs and rodents on which the birds and animals are dependent for food in Powai Lake ecosystem. According to the Urban Wetland/Water Bodies Management Guidelines, 2021 prepared by the National Mission for Clean Ganga, it is recorded that 40% of Powai Lake has disappeared. Powai Lake has faced deterioration of its water quality, which was recorded in a 2020 study titled "Past, Present and Future of Powai Lake, (Mumbai) and Revival through- Holistic Analysis. Dissolved Oxygen (DO) level in Powai lake, which is essential for survival of flora and fauna, has

had a declining trend at alarming rate since several decades. Water spread area of the lake has had a shrinkage trend due to the heavy pollution. The temporal satellite data of the years 1973 and 2014 with a gap of 31 years, as shown in the aforementioned 2020 study, indicates decrease by 26% of water spread area. Various storm water drains empty into the lake. The floating Water Hyacinth (or Hydrophyte Eichornia) has colonized water areas near these drains, which is a clear biological indicator that sewage is infesting these areas. This has an adverse effect on fisheries in Powai lake which has been associated with the increase in growth of aquatic weeds and water hyacinth due to serious water pollution. A 2018 study on the Fisheries of the lake, conducted by Central Institute of Fisheries Education, Versova, Mumbai, has recorded the effects of pollution in Powai Lake and its aquatic life. Highly polluted and deteriorated state of Powai Lake has been recognized as early as 1995, when Powai Lake was included in the National Lake Conservation Plan ("NLCP") by the MoEF&CC. A Detailed Feasibility Report (DPR) was prepared by MoEF&CC and sum of Rs. 6.62 crores was sanctioned as grant to Respondent No.1, in June 2001 for implementation of the scheme on priority. As per the audit report of restoration and cleaning work at Powai Lake prepared by the Comptroller and Auditor General of India for the period of July 2010 to February 2011, ("Report No. 21 of 2011-12"), it is reported that the project was declared completed by MoEF&CC and National River Conservation Directorate (NRCD) despite non-submission of project completion report along with final utilization certificate by the MCGM to MoEF&CC, and further, the final payment of the contractor was yet to be paid which indicated that the project was still ongoing. NLCP merged with National Wetland Conservation Programme, which has existed for the protection of wetlands since 1986,

to become a unified scheme National Plan for Conservation of Aquatic Eco-systems ("NPCA") in February, 2013. Guidelines for the Conservation of Aquatic Eco-systems, 2019, which is applicable for all water bodies, lakes and wetlands, either artificial or permanent, provides that the wetland is to be managed so that it is sustained in a sound ecological health, retains biodiversity and provides the expected ecosystem services in an efficient and effective manner. As per a Standing Committee on Water Resources Report dated 26.06.2016, Powai Lake was included in the NPCA and was approved a cost of Rs. 28.57 crores with Rs. 18.675 crores released till date. Water quality test of Powai Lake was carried out on 03.09.2021 and 16.09.2021 by procuring water samples from 5 different areas of Powai Lake and the results reveal that the water of the lake is not even upto the legal standards for bathing, or propagation of wildlife and fisheries, which it is currently being used for, let alone the standards for drinking water. In view of the grave threat posed by the administration of Glyphosate in Powai Lake ecosystem, on 13.09.2021 the Applicant No. 2 has made a representation to MCGM (Respondent No. 1), MPCB (Respondent No. 4), the Maharashtra Forest Department (Respondent No. 5), the Wildlife Wing of the Maharashtra Forest Department (Respondent No. 6), the Environment Department of Government of Maharashtra (Respondent No. 7), CPCB (Respondent No. 8) and MoEF&CC (Respondent No. 9), informing them about the toxicological side effects of the administration of Glyphosate on the flora and fauna of the lake ecosystem. Vide notice dated 16.09.2021, issued by the MPCB to MCGM, MPCB has taken notice of the long term adverse effects of the administration of Glyphosate on aquatic/marine life and environment, and has consequently directed Respondent No.1 to stop the spraying of Glyphosate Chemical in Powai Lake. Powai Lake has been

inventorised and mapped as a Wetland under the National Wetlands Atlas prepared by Space Application Centre (SAC), Ahmedabad for the MoEF&CC. In the case of *Vanashakti vs. Union of India (PIL No. 87 of 2013)* which pertained to illegal constructions in wetland areas, the High Court of Bombay passed an order dated 14.10.2013 directing that no reclamation and any kind of construction shall be allowed in wetlands areas as identified and covered under the Wetland Atlas prepared by the Central Government, without the leave of the Court.

4. The Applicants have submitted following short-term suggestions for restoration and conservation of Powai Lake, in addition to suggestions provided by domain experts in studies annexed to the present Application:

(i) Creation of a sump near Powai Lake and diverting the sewage therein, to be transported to Bhandup Sewage Treatment Plant (STP), located at a distance of 5 kilometres from Powai Lake;

(ii) Setting up of a dedicated website portal for progress on restoration of Powai lake;

(iii) Installation of permanent online water quality systems at various locations inside Powai Lake that will inter alia provide accurate daily data of toxicity levels, BOD and COD levels, Dissolved Oxygen levels;

(iv) Installation of phytoremediation platforms at all storm water outfalls and entry points of sewage into Powai Lake;

(v) Installation of 24x7 CCTV monitoring cameras at locations frequented by people/tourists;

(vi) Installation of warning signboards on hefty wines for polluting the lake;

(vii) Creating basking islands in the lake to allow crocodiles to bask and provide grasslands on the edges of the lake for the crocodiles to lay eggs;

(viii) Take steps to remove or control invasive species of fish that threaten the native fish species. Fisheries experts maybe roped in for the same;

(ix) Maintain buffer zone of at least 50 meters around Powai Lake wherein no new construction activity of any kind is to be allowed except for the purposes of conservation of the Lake;

(x) Utilisation of Natural Treatment Systems, specifically CW4Reuse technology, which has been identified in the aforementioned 2018 study titled "Science & Technology Agenda for Blue-Green Spaces Inspired by Citizen Science: Case for Rejuvenation of Powai Lake" as most suitable for Powai Lake and its surrounding urban area, in view of the need to improve blue-green balance. CW4Reuse technology is most suitable for expansion of green patches on the landward side of the lake-front and surface runoff can also be reduced due to its natural filtering effects;

(xi) MCGM to take assistance from Powai Police Station to stop illegal commercial fishing activities inside Powai Lake,

(xii) MCGM to consult Forest Department, IIT-Bombay, CPCB and NEERI for preparing a long-term Plan to maintain the pristine levels of Powai Lake. Such an Action Plan may include, demarcation of areas of polluted areas in Powai Lake, recommend restrictions on anthropogenic activities (e.g., fishing, religious rituals, cattle rearing), and

implement in situ methods for restoration measures such as using floating constructed wetlands;

(xiii) A dedicated Powai Lake Restoration and Conservation Department may be constituted to strictly monitor the progress of restoration and its maintenance thereafter

(xiv) Implementing recommendations of CPCB in its "Indicative Guidelines for Restoration of Water Bodies, 2019", which includes-

a) Physical treatment approaches such as Aeration, wastewater diversion, periodic de-weeding and sediment dredging, proper maintenance of drainage channels or feeder channels, which would help increase DO levels;

b) Chemical treatment approaches such as Flocculation to increase PH levels;

c) In- situ techniques such as using aquatic plants such as water hyacinth, use of aquatic animals and other biological techniques may be used to decompose, transform and absorb water pollutants.

5. The applicant has filed copies of studies/media reports/photographs including:-

1. Media report titled "Member of HC appointed panel seeks to halt reclamation work near Mumbai's Powai lake" published on 20.08.2021 in Hindustan Times.

2. Paper titled "Diversity and Distribution of Macrophytes in Powai Lake, Mumbai" presented by researchers from Central Institute of Fisheries Education in 2014 at Conference "LAKE14: Conference on Conservation and Sustainable Management of Wetland Ecosystems in Western Ghats".

3. Report titled "Powai and its birds" published in 2021 by LIT Bombay

4. Relevant extracts from the report titled "Study of the Biodiversity of Indian Institute of Technology Bombay Campus" published in October, 2009 by World Wildlife Fund (WWF)

5. Relevant extracts from Urban Wetland/Water Bodies Management Guidelines, 2021

6. Report titled "Past, Present and Future of Powai Lake, [Mumbai] And Revival Through – Holistic Analysis" published in 2020 in Journal of Emerging Technologies and Innovative Research

7. Photographs of such excessive weed growth and Water Hyacinth on Powai Lake on 14.08.2021 and satellite image depicting areas of Powai lake covered in water hyacinth

8. Media report titled "Over 50,000 Ganesha idols immersed in Mumbai" published on 28.09.2015 in The Hindu

9. Report on background of Powai Lake by researchers from World Wildlife Fund (WWF) in 2011

10. Study titled "Science & Technology Agenda for Blue-Green Spaces Inspired by Citizen Science: Case for Rejuvenation of Powai Lake" published on 08.09.2021 in Sustainability Journal

11. Relevant extracts from the study titled "Fish Community Structure and Trophic Status - A Measure of Ecological Degradation: A Case Study from Powai Lake Mumbai" published in 2018 in International Journal of Ecology and Environmental Sciences

12. Media reports titled "Illegal fishing still plagues Powai lake" dated 11.06.2017 and titled "Poachers responsible for

crocodiles' dwindling population at Powai: Activists" dated 07.04.2016 published in DNA India

13. Media report titled "Pollution leads to decline in native fish population in Powai lake" dated 25.06.2016 published in Hindustan Times

14. Relevant extracts from the study titled "Ecological impacts of common cap and the African sharp tooth cash A review" published by Department of Aquaculture and Fisheries Science, Lilongwe University of Agriculture and Natural Resources

15. Study titled "State of Water Quality of Two Tropical Urban Lakes Located at Mumbai Megacity" published in 2015 in International Journal of Science and Research

16. Paper titled "Strategy for Conservation and Management of Urban Lakes in Mumbai" presented at the 16th World Lake Conference in 2016

17. Latest report dated March 2014 on Powai Lake Conservation Project under National Lake Conservation Plan published by Environment Department of Government of Maharashtra

18. Relevant extracts of "Report No. 21 of 2011-12" by Comptroller and Auditor General of India

19. Relevant extracts from the Tenth Report of the Standing Committee On Water Resources, Ministry Of Water Resources, River Development And Ganga Rejuvenation titled "Repair, Renovation and Restoration of Water Bodies-Encroachment on Water Bodies and Steps Required to Remove the Encroachment and Restore the Water Bodies" for the years 2015-2016

20. Media report titled "BMC unveils plan to revive Powai lake by 2019" dated 1930.2016 published in DNA News

21. Relevant extracts from the stud titled "The environmental impacts of glyphosate" published in June, 2013 by Friends of the Earth Europe

22. Relevant extracts of National Wetlands Atlas: Maharashtra by Space Applications Centre (ISRO) and Maharashtra Remote Sensing Applications Centre (MRSAC)

23. Media report titled "As heavy rains lash Mumbai, city's Powai lake starts overflowing" dated 12.06.2021 published in Asia News International

24. Media reports titled "Crocodile kills man at Powai lake" dated 27.08.2021 published in Hindustan Times

25. "Advisory on Conservation and Restorationof Water Bodies in Urban Areas".

Procedural History

6. The matter was taken up by the Tribunal on 01.10.2021 and notice was issued to the respondents. Thereafter, on 26.11.2021, the Tribunal noted pendency of *PIL No.23928/2021* against cycling and jogging tracks around “Powai Lake” and vide interim order dated 01.11.2021 restrained the concerned Official Respondents from putting up the proposed cycling and jogging tracks. The matter was deferred to today to enable the parties to file their respective versions.

Version of the Respondents

7. Reply has been filed by some of the contesting respondents to which a brief reference may be made. The MCGM acknowledges the pollution of the lake due to buildings and habitations and inability to remedy the situation inspite of efforts made. Relevant extracts from the reply are reproduced below:-

"4. *Regarding the paras/ portions of the Application dealing with the need to revive and protect Powai lake from the ingress of sewage and Hyacinth growth:*

(a) Powai Lake is an MCGM created, human-made lake, planned as an anti-famine measure for Mumbai City (then Bombay). It was sanctioned by the Standing Committee in November 1889 and built by the Municipal Corporation by 1891. The water in Powai Lake has been severely polluted and after several unsuccessful attempts to purify it, the water finally declared unfit for drinking purposes in 1893.The issues related to the poor quality of water still persist today coupled with excessive silting, sewage ingress and extended hyacinth growth, leading to eutrophication of the lake water. Hereto annexed and marked as Exhibit 'A' is the copy of Affirmation by MCGM that, Powai Lake water is not used for drinking purpose.

(a) Powai Lake exists in an urban setting and several structures have been built on the immediate periphery of the lake including IIT hostel blocks, IIT accommodation buildings and canteen, the Renaissance Hotel and Convention Centre, the Lakeside Chalet Mumbai Marriott, and leased properties of HE department. In the present situation, only about 2 kin (20% only) out of the 10.2 km circumferential of this public asset i.e. Powai Lake is accessible to the general public. As stated above IIT has made a motorable lake front road along the periphery of the part of Powai Lake adjacent to its property which is not open to public as community space. The IIT, the Renaissance Hotel and other private Lessees have, in the absence of lake front access, virtually monopolized the lake front and in effect prevented proper access to the Powai Lake even to MCGM Staff. Furthermore, the existing kuccha pathway along the Renaissance compound wall is being misused by lumpen elements and drug abusers. Due to the lack of a proper pathway access and unlit areas, illegal and anti-social activities are suspected to be carried out along the banks of the lake.

(b) The Public Project of Rejuvenation and Reinvigoration of the Physical and Natural Environment of Powai Lake, Mumbai" is being undertaken by MCGM at Powai Lake to enable a sustainable rejuvenation and reinvigoration of the lake - its water, biodiversity and adjacent physical environment.

(c) MCGM has been putting all efforts to improve Powai Lake and its surrounding for quite a long time. Several measures are being implemented to alleviate the natural environment of Powai Lake and improve the quality of the lake water. One of the major challenges is to increase the dissolved oxygen levels (DO) and reduce the bio-chemical oxygen demand (BOD) for the sustenance of the aquatic life. MCGM has installed a barge mounted sub-surface aerator with two aspirators and intends to further install seven non- invasive, single Jet Floating Aerator type fountains which shall assist in transferring oxygen from the atmosphere into the water through enriched water droplets. These will beautify and

revive the lake itself. Hereto annexed and marked as Exhibit 'B' The chart of BOD/COD and Do levels in Powai Lake per MCGM-SCADA.

(d) MCGM has initiated several interceptors and rerouting measures to prevent sewage ingress into the lake. This Sewage ingress has led to the proliferation of rapidly growing hyacinth, estimated at 290,000 cu mtrs, hindering the survival of aquatic life due to reduced sunlight penetration, and leading to water loss through transpiration. Hyacinth areas are also breeding grounds for mosquitoes and mosquito-related illnesses. Water hyacinth, up to 5% of the water surface, can be tolerated because it purifies water by absorption of sewage. But currently, the hyacinth is occupying more than 20% of the water area, rendering it necessary to remove the hyacinth cover. MCGM has been carrying out regular programs for the removal of hyacinth.

(e) With the above-mentioned three measures in place i.e. improved aeration to increase dissolved oxygen levels, sewage ingress interception and removal of hyacinth, the quality of water will be substantially improved, and consequently the flora and fauna will be able to survive and thrive, vastly rejuvenating the natural environment of Powai Lake.

(f) As the above mentioned environmental projects for water improvement are underway, the lake surrounds need to be remodeled to gain access for maintenance and upkeep, and for the community as a public recreation space. Presently the IIT Mumbai, the Renaissance Hotel and other private Lessees have, in the absence of lake front access being made available, virtually prevented access to the Powai Lake front. Furthermore, the existing kuccha pathway along the Renaissance compound wall is being misused by lumpen elements and drug abusers. The proposed walkway is essential for the proper safeguarding and maintenance of Powai Lake inasmuch as it will enable MCGM's maintenance Department and staff to have ready access to all portions of the lake front. MCGM staff can then take steps to prevent sewage being dumped into the lake either directly by culverts/pies or by joining sewage pipes through storm water drains.

(5) Regarding the proposed walkway and cycle path around the edge of Powai lake:

(a) There is a dearth of community recreation spaces in the eastern suburbs of Greater Mumbai, and there is practically no major community open space in this part of the city. At less than 2 sq.m. per capita, public developed open space is a much sought-after resource in Mumbai. In the suburbs, with over 10 million populations, this number falls down even lower, to less than 1 sqm per person. Powai Lake, with its 10.2 km of waterfront, offers an opportunity to create a large community open space for the citizens of Mumbai. The perimeter of the lake is roughly three times the length of

Marine Drive and five times that of Worli Sea Face. Powai Lake, after rejuvenation, has the potential of becoming a major community open space. The Respondents submit that by developing the proposed walkway along the periphery of the Powai Lake, the Respondents will create an ecological destination which is accessible to the common citizen/ public.

(b) The Respondents say and submit that the proposed cycle path and walkway closely follows the alignment of the existing motorable lake front road of IIT Mumbai and thereafter the Renaissance Hotel compound wall and pathway. Hereto Annexed and Marked Exhibit C is a Google map view of the entire Powai Lake showing the existing promenade, the portion adjacent to the IIT Mumbai property, the portion adjacent to the Renaissance hotel property and the portion that is adjacent to the MCGM Deer Park and Garden.

(c) The proposed walkway will be situated substantially in the Natural Area beyond the perimeter of Powai Lake. Only some limited portions fall in areas which are covered by water during the monsoon season and the few months thereafter. The installation of the walkway does not entail any reclamation or construction. As set out hereinafter in order not to impede the flow of water into the lake as also the flow of lake waters during the monsoon months, the walkway is to be developed using gabion technology, which is porous and does not prevent the flow of water. The Gabion Technology consists of placing PVC coated galvanized iron wire mesh baskets in place, containing stones of various sizes, without any joinery, fixing or cement mortar. These wire baskets containing stones of diverse sizes are merely placed on the surface, without there being any foundation, or other means used to fix it to the earth. On top of the gabion wall there will be a thin layer of cement board/synthetic composite board and macadam/ tar to enable walking/ cycling. There is no dumping of debris into the lake, nor any reclamation in the lake. Gabion technology does not involve any construction or reclamation. In the absence of cement or mortar, the gabion wall is porous and the gaps between the gabion stones allows and does not prevent the flow of water. Gabions also provide refuge for small aquatic life and have the potential of becoming a breeding ground for small and micro aquatic life. The Applicants allegations of reclamation, dumping of boulders and construction in the lake and its immediately surrounding areas are accordingly false and are denied.

(d) For the development of the walkway, no trees are proposed to be cut. Whenever required the walkway and cycle track will be separated' to go around trees. Only seasonal rank vegetation will be removed. The Applicant's allegation of cutting / uprooting of trees are factually incorrect and is denied. A detailed numbering of trees falling in the vicinity of the alignment of the proposed walkway has been carried out for recording purposes and with a view to protecting the trees in - situ. Only trees which have been uprooted due to Cyclone Tauktae and stormy monsoon conditions will be removed after

taking due permissions. In the rarest of rare occasions, if felling of a particular tree is absolutely unavoidable, the same will be done only with prior approval of appropriate authority.

(e) The MCGM has constituted an Expert Committee comprising an Environmental specialist, environmental scientist, herpetologist, limnologist and a marine biologist to guide the MCGM and oversee the process of making boardwalk using the said Gabion technology. The Committee of Experts comprises the following notable experts

- *Dr. Rakesh Kumar, Environmental Scientist, CSIR (Chairperson)*
- *Dr. Deepak Apte, Environment Specialist and Marinez (Member)*
- *Dr. PramodSalaskar, Environment Specialist on Powai Lake (Member)*
- *Shri. KedarBhide, Herpetologist (Member)*
- *IIT Bombay Representative, Prof. D. N. Singh (Member)*
- *Shri. Hydraulic Engineer, MCGM (Secretary)*

The committee has had periodic meetings and is currently guiding the project work.

(f) The MCGM will soon make available an online platform, with the history of Powai Lake, detailing out the proposals which addresses the concerns of the citizens in a Frequently Asked Questions format. The platform will provide an overview of the project. The MCGM is committed to making the process inclusionary in nature and encourages public participation. The MCGM has and will address further concerns and issues, if any, in a diligent manner, as the project, at its core, is for holistic public access to the lake front area."

8. The stand of the Collector, Mumbai Suburban District in the capacity of Member Secretary, State Wetland Authority is that the issue of cycling track inside the boundary of Powai Lake is pending before the Bombay High Court, as already mentioned. The lake is a wetland as per National Wetland Atlas. The State Wetland Authority has constituted an expert committee headed by Secretary, Environment Maharashtra to check the compliance status. However, the lake has not yet been notified as 'wetland' under the Wetlands (Conservation and Management) Rules, 2017 (the Wetland Rules, 2017). The expert Committee is in the process of finalization of its report.

9. The stand of the State PCB is that flowing of sewage from Perubagh *nalla*, Culverter No.6&7 and IIT open *nalla* into Powai lake was noticed on visit to the lake on 17.12.2021 by the officials of MCGM. MCGM officials informed that the work of diverting the sewage line to main sewer line is in progress. Around periphery of Powai lake, the cycling and jogging track gabion work about 100 mtrs is completed at compound of Renaissance Hotel, Powai lake. It is further informed that presently the work of gabion is stopped. Ganesh idol immersion in Powai lake is at Ganesh Ghat and Pawarwadi. They have provided artificial pond for idol immersion in 'S' Ward area. Domestic effluent from the unsewered nearby area located around the periphery of Powai lake is entering into lake through two *nallas*. Also, 18 gates are provided at SWD around the periphery of lake. Due to leakages at gate no.6 & 7 some meagre quantity of effluent is observed entering the lake. Respondent-Board has issued directions u/s 33A of the Water (Prevention & Control of Pollution) Act, 1974 and u/s 31A of the Air (Prevention & Control of Pollution) Act, 1974 to MCGM vide letter dated 15/12/2021 to take necessary precautionary measures to avoid ingress of treated/untreated sewage into Powai Lake & divert to nearby STP and strictly follow the guidelines for idol immersion dated 12/05/2020 issued by Central Pollution Control Board. Officials of the Respondent Board at Mumbai have collected water samples of Powai Lake on 16/12/2021. The analysis results of said samples compared with -the primary water quality criteria for bathing water, which shows that the parameters are almost within limit, except marginal exceedance observed for BOD parameter (3.2 mg/l) at Ganeshgat location.

10. CPCB has stated that regulations have been issued on the subject of idol immersion only in artificial tanks/ponds with liner made with well graded/highly impervious clay or eco synthetic liner, after removing all flowers, leaves and artificial ornaments. Lime or alum or any other equivalent coagulant should be added in designated temporary lined pond/tank as pre-treatment option for ensuring settling of solids. Water quality as per monitoring carried on 18.04.2017 was found to be as follows:-

> *"a. The Physico- chemical and microbiological characteristics of water samples of lake shows that the measured pH value was ranging from 8.2 to 8.7 and the conductivity was ranging from 320.5 to 344.2 µS/ cm, which indicate the presence c normal range of dissolved solids in ionized form.*
>
> *b. The Dissolved Oxygen (DO) were ranging from 0.0 mg/l to 5.4 mg/l, TDS was ranging from 308 mg/l to 328 mg/l, COD were ranging from 96 mg/l to 496 mg/1 and the Biochemical Oxygen Demand (BOD) were ranging from 7 mg/l to 150 mg/l. The results are indicating that there is organic contamination in the lake.*
>
> *c. Other parameters measured were Total hardness, Chlorides, Sulfates, Alkalinity, Ammonia; Fluoride etc. are also present. The values were higher and water quality was poor. The reasons for the poor quality of water may be attributed huge discharge of sewage from surrounding population, immersion of Idols during festivals and other anthropogenic activities.*
>
> *d. The water of the Lake is not being used for any purpose other than recreation. If compared with standard limit of use category. The water of the lake is fit for only irrigation.*
>
> *e. The microbiological characteristics of water samples of lake reveals that the measured Total Coliform values were ranging from IT MPN100ml to >1600 MPN/100ml and the Faecal - Coliform values were ranging from 1600 MPN/100ml, which indicate the presence of Total and Faecal Coliform may be due to the wastewater coming from drains"*

11. There are indicative guidelines for restoration of water body issued by the CPCB. There is a further statement that the conservation plan was prepared and funds were sanctioned for implementation. The State PCB also passed a scheme for restoration of water bodies.

Consideration by the Tribunal

12. We have heard learned counsel for the applicant, MCGM, CPCB, State PCB, MoEF&CC and the Collector in person, perused the record and given our due consideration to the issue.

13. There can be no dispute about need for restoring and maintaining the lake to its pristine position. No untreated sewage can be allowed to be discharged. The statutory mandate of Water (Prevention and Control of Pollution) Act, 1974, principles of 'Sustainable Development', 'Public Trust' doctrine as well as other statutory provisions applicable, including the Municipal Corporation Act and the Rules need to be complied. MCGM has to exercise its statutory powers to prevent discharge of sewage. The Wetland Authority under the Wetland Rules, 2017 has to ensure compliance of statutory plan for demarcation of prohibited and regulatory areas around the lake. Reference in this regard may also be made to judgements of the Hon'ble Supreme Court in Paryavaran Suraksha v UOI, (2017) 5 SCC 326 and M.K. Balakrishnan vs. UOI, (2017) 7 SCC 805. The Wildlife Department is required to take action in terms of the WPA. The State PCB and the CPCB have to take action as regulators to prevent and remedy environmental norms. Apart from specific statutory provisions of Water, Air, WPA, EP Acts and Rules, powers under Section 133 of the Cr.P.C, sections 268 to 271 IPC and Section 3 of the PMLA Act, 2002 read with the Schedule to the Act can also be invoked wherever necessary. There is thus no inadequacy of powers available with the statutory regulators.

Conclusion and Directions

14. As shown by the pleadings referred to above, ground situation is far from satisfactory. While the issue of track pending before the High

Court needs no comment at this stage, as that aspect can be dealt with in the said pending proceedings, there is need to deal with the unremedied pollution, having potential for damage to the environment and the wildlife. Water quality of the lake can lead to killing of fish, affecting the crocodile nestling sites, dependent of fish. Though certain initiatives are said to have been taken for restoration/revival of the lake and prevention of damage to the environment, the steps so far taken are not adequate and desired results are yet to be achieved. There is thus need to continue sustained efforts by the State authorities as well as civil society and to maintain constant vigilance. There is also need to take coercive measures to enforce environmental norms by way of coordinated efforts of all the statutory regulators, wherever necessary. Primary responsibility remains of the MCGM, the Wetland Authority and the Forest Department (Wildlife Division). Local Police may also have to take responsibility. Similarly, the Environment Department of Maharashtra has also to take pro-active action. Since the primary issue is of compliance of laid down norms by the statutory regulators, all that is required is to issue directions to the said authorities to perform their duty. It may be necessary to constitute a Joint Committee for coordinated action.

15. Accordingly, we constitute an eight-member joint Committee comprising of MoEF&CC, Regional Office, Nagpur, CPCB, Regional Office, Pune, Commissioner, MCGM, Collector, Mumbai Eastern Suburban Area, DCP of the area (to be designated by Commissioner of Police, Mumbai), Chief Wildlife Warden, Maharashtra, Director Environment, Maharashtra and the State PCB. The nodal agency for coordination and compliance will be the State PCB and the State Wetland Authority. Meeting of Joint Committee may be held preferably within two weeks.

Except for site visit, the Committee may meet in person or through video conferencing, as may be required. The Committee may prepare its action plan covering all aspects of environment in the light of earlier studies and plans, as may be updated in the light of current ground situation. The plan may provide for mode of execution, monitoring mechanism and budget allocation. The Joint Committee may meet once every month to oversee the execution at least for one year and thereafter, at such intervals as it may find necessary. The minutes of the meeting may be uploaded on the website of the State Wetland Authority. It will be open to the applicant or any other citizen to give their suggestions/ representations to the Committee for its consideration. The Committee may particularly take steps to ensure compliance of Wetland Rules, 1972 and other Environmental Rules, including, steps to prevent discharge of sewage or any other effluents and monitor water quality to protect fish and other aquatic fauna and distinct sites of the marsh crocodile. It may have mechanism for assessing water quality monitoring at strategic locations, exploring possibilities of installing aeration systems, prohibiting use of phosphate bearing detergents and other measures required to be taken. The Committee may refer the action plan and relevant directions of the Tribunal passed in OA No. 125/2017, *Court on its own Motion vs. State of Karnataka* vide order dated 12.03.2021 with regard to remediation of Bellanduru lake at Bangalore. The Committee will be free to coopt/consult/associate any other expert/institution.

The Application is disposed of. If any grievance survives, it will be open to the aggrieved parties to take remedies in accordance with law.

A copy of this order be forwarded to the MoEF&CC, Regional Office, Nagpur, CPCB, Regional Office, Pune, Commissioner, MCGM, Collector,

Mumbai Eastern Suburban Area, Commissioner of Police, Mumbai, Chief Wildlife Warden, Maharashtra, Director Environment, Maharashtra and the State PCB by email for compliance.

Adarsh Kumar Goel, CP

Sudhir Agarwal, JM

Brijesh Sethi, JM

Saibal Dasgupta, EM

January 12, 2022
Original Application No. 68/2021(WZ)
AB

MINUTES OF THE SECOND MEETING OF JOINT COMMITTEE CONSTITUTED FOR COMPLIANCE OF THE ORDER DATED 12/01/2022 PASSED BY THE HON'BLE NATIONAL GREEN TRIBUNAL (WZ), PUNE IN ORIGINAL APPLICATION NO. 68/2021 (WZ) TITLED AS VANSHAKTI & ANR VS. MUNICIPAL CORPORATION OF GREATER MUMBAI & ORS.

The Minutes of first meeting of joint committee constituted for compliance of the order dated 12.01.2022 passed by the Hon'ble National Green Tribunal (WZ), Pune in Original application No. 68/2021 (WZ) titled as Vanshakti & Anr Vs. Municipal corporation of Greater Mumbai & Ors was held on 16/02/2022, circulated to all joint committee members for concurrence and upon receipt of concurrence, the same was finalized. Further, addendum for the first meeting of the joint committee was considered w.r.t. detailed deliberation of ToR of joint committee for the proposed action plans and suggestions made by the joint committee members were confirmed.

Second meeting of the joint committee was held on 07/03/2022 at MCGM Headquarter, 2nd Floor Conference Hall Annex Building, Head Office, CSMT-Mumbai. List of participants present in the aforesaid joint committee meeting is given at **Annexure-I.**

Shri. P. Velrasu, IAS, Additional Municipal Commissioner (Project) welcomed all the joint committee members, invitee participants and briefed about historical background of Powai Lake and the present concerned issues as below;

Powai Lake is a manmade lake, constructed in the year 1891 and the Lake water was polluted since begging. Hence it was declared as unfit for drinking purpose in the year 1893. Further, mentioned that the Lake water is being used only for industrial uses and cattle sheds. He pointed out that discharge of untreated sewage from the surrounding areas into the Powai Lake through 19 no. of culverts causing the pollution problems and growth of water hyacinth.

He highlighted the major corrective measures taken by the MCGM for intercepting the discharge of sewage from the surrounding areas into the Powai Lake and subsequent diversion of such intercepted sewage into existing sewerage network and treatment at Bhandup STP (comprising of aerated lagoons). Also, informed that MCGM has proposed to construct a cycle/walking track around the periphery of the lake. The total length of cycle/walking track is about 10 Km. He further, mentioned that a PIL has been filed by Shri Omkar Supekar before the Hon'ble High Court of Bombay, PIL no. 23928 of 2021, Omkar Supekar & Anr. Vs MCGM & Ors. regarding the proposal of construction of cycle/walking track project by the MCGM, which is pending before the Hon'ble High Court of Bombay.

As per the suggestion given by the joint committee member i.e. Smt. Nidhi Chaudhary, District Collector, Mumbai Suburban District during the first joint committee meeting which was held on 16/02/2022; Shri Pankaj Joshi, Consulting Architect, MCGM made a presentation before the joint committee regarding the proposed project of cycle/walking track around the periphery of Powai Lake and also highlighted about various measures taken by MCGM for rejuvenation of Powai Lake. Accordingly, the joint committee heard the presentation made by MCGM.

He informed that the proposed cycle/walking track shall be constructed by using gabion technology. Further, highlighted about the works carried-out by MCGM w.r.t. interception of sewage entering into Powai Lake and diverting into existing sewerage network for treatment at Bhandup STP.

He highlighted about the initiatives taken by MCGM for rejuvenation of Powai Lake viz. installation of new mobile barge mounted sub surface aerator,(introduced in May 2019); installation of 06 no. of real time monitoring stations for monitoring of dissolved oxygen ; installation of 04 no. of jet fountains; installation of 07 no. of jet flow aerators (installed 05 nos. & 02 nos. are in progress) and also water hyacinth removal by means of mechanical operation.

Meeting concluded with vote of thanks to the dais.

Thereafter, in compliance to the aforesaid Hon'ble NGT order dated 12/01/2022, the joint committee visited the Powai Lake along with the MCGM officials. Accordingly, based on the preliminary information shared by the MCGM and followed by site visit; the joint committee made the following observations and findings, which are given as below.

1. MCGM has provided total 19 no. of culverts along the periphery of Powai Lake for regulation of storm water in and around Adi Shankaracharya Road and Peruwadi area into Powai Lake, which serves a main recharge of water to Powai Lake.

2. As per the survey carried-out by MCGM during 2016, it was estimated that about 10.9 MLD of sewage is being entering into Powai Lake through the aforesaid 19 no. of culverts and also through some of the natural drains, from the adjoining areas viz. Adi Shankaracharya Road, Peruwadi slum pockets, NITE campus and IIT campus etc.

3. Erstwhile due to non-availability/non-installation of STP for treatment of sewage generated from the surrounding areas of Powai Lake, situated along the Adi Shankaracharya Road, Peruwadi slum pockets, NITE campus and IIT campus,

which were directly entering into the Powai Lake. Later, MCGM initiated intercepting the sewage coming from Adi Shankaracharya Road and diverted into existing sewerage network for treatment at Bhandup STP, comprising of aeration lagoons. However, MCGM has not quantified the sewage being diverted into Bhandup STP. Further, as informed by MCGM officials due to ongoing metro rail project work on the Adi Shankaracharya Road, sewerage header lines were damaged, as a result the sewage is being entering into Powai Lake through the culverts meant for the regulation of storm water.

Besides, this MCGM has initiated intercepting sewage generating from Perubaug slum pockets and NITE campus @ 4.14 MLD and diverting into newly commissioned sewage pumping station (established in May, 2021) at Peruwadi, which is being presently discharged into Mithi River without treatment. As informed, MCGM is in process of commissioning of new 8 MLD STP at Powai, which is expected to be made operational w.e.f. June, 2022. The sewage generating from the aforesaid locations viz. Perubaug slum pockets and NITE campus are proposed to be treated in the new 8 MLD STP.

4. Out of 19 no. of culverts, 15 no. of culverts were found with sewage ingress into the Powai Lake especially from the areas located along Adi Shankaracharya Road, partly from Perubaugh area and major quantity of sewage is being entering into Powai Lake through the IIT campus @ 2.2 MLD, reportedly generated from the slum pockets situated upstream of IIT campus.

5. Mobile barge mounted sub surface aerator, jet fountains, jet flow aerators and mechanical water hyacinth removal machine was in operation.

Decisions:

After detailed discussions, following decisions were taken by the joint committee.

a) Commissioner – MCGM was requested to appoint a nodal officer to coordinate among various intra department for collection and dissemination of information to the joint committee. Accordingly, Shri Rajesh Tamhane, Deputy Hydraulic Engineer was appointed as a nodal officer for coordination.

b) MCGM to provide the zonal map of sewerage network of the areas around Powai Lake including the area in sq-km covered with and without sewerage network for each ward-wise/area-wise and status of its connectivity to STP for treatment if any; Details on action plan for establishment of sewerage network for un-sewered area and its connectivity to STP for treatment including diversion of sewage from sewered area into STP for treatment.

c) MCGM to carry-out the detailed reconnaissance survey for identification of locations and estimation of present quantity of sewage being flowing into Powai Lake through the existing culverts and natural drains if any;

d) MCGM to carryout reconnaissance survey to quantify water consumption, sewage generation, mode of conveyance/existing sewerage network and treatment provided by IIT campus (including hostel campus).

e) Connectivity and dissemination of real time monitoring results of DO levels of Powai Lake at public domain i.e. website of MCGM.

*****

Annexure-I

S. no.	Name of the participants	Department
1.	Shri P. Velrasu, IAS Additional Municipal Commissioner (Project),	MCGM, Mumbai
2.	Shri Suresh Kumar Adapa, Scientist 'E'	MoEF&CC, Nagpur
3.	Shri Nishchal C., Scientist 'D'	CPCB, Regional Directorate - Pune
4.	Shri Padmakr Rokade, SDO, Representative of District Collector, Mumbai Suburban District	District Collectorate, Govt. of Maharashtra
5.	Shri Narendra Toke, Director	Environment Department, Govt. of Maharashtra
6.	Shri Sanjay Bhosale, Regional Officer	MPCB Regional Office, Mumbai
7.	Shri Rajesh Tamhane, Deputy Hydraulic Engineer	MCGM, Mumbai
8.	Officers from MCGM	MCGM, Mumbai

Email **NISHCHAL C**

Minutes of 3rd meeting of Joint Committee for compliance (Powai Lake) of the order dated-12.01.2022 passed by the Hon'ble National Green Tribunal (WZ), Pune in Original Application No. 68/2021 (WZ) filed by Vanshakti & Anr. Vs. MCGM...

From : romumbai@mpcb.gov.in — Mon, Jul 04, 2022 05:16 PM

Subject : Minutes of 3rd meeting of Joint Committee for compliance (Powai Lake) of the order dated-12.01.2022 passed by the Hon'ble National Green Tribunal (WZ), Pune in Original Application No. 68/2021 (WZ) filed by Vanshakti & Anr. Vs. MCGM... — 1 attachment

To : padmakarrokade@gmail.com, Shri. V N Ambade <apccfcentral-ngp-mef@gov.in>, NISHCHAL C <nischal.cpcb@nic.in>, collectormsd@gmail.com, Principal Chief Conservator of Forests (Wildlife), Maharashtra State, Nagpur <pccfwlngp@mahaforest.gov.in>, ccfmmumbai@gmail.com, Narendra D. Toke <dir1.mev-mh@nic.in>, dyhemaintes he <dyhemaintes.he@mcgm.gov.in>, Amc projects <Amc.projects@mcgm.gov.in>, mc@mcgm.gov.in, Dcpzone10@gmail.com

Cc : sromumbai3@mpcb.gov.in

Sir,

Enclosed herewith copy of Minutes of 3rd meeting of Joint Committee (Powai Lake) for compliance of the order dated-12.01.2022 passed by the Hon'ble National Green Tribunal (WZ), Pune in Original Application No. 68/2021 (WZ) filed by Vanshakti & Anr. Vs. Municipal Corporation of Greater Mumbai & Ors. for suggestions may be communicated by return email.

Thanks & Regards,

(Sanjay R. Bhosale)
Regional Officer, Mumbai
Maharashtra Pollution Control Board
Mumbai.

Minutes .pdf
1 MB

Minutes of the 3rd meeting of Joint Committee for compliance of the order dated-12.01.2022 passed by the Hon'ble National Green Tribunal (WZ), Pune in Original application No. 68/2021 (WZ) filed by Vanshakti & Anr Vs. Municipal corporation of Greater Mumbai & Ors.

Date: 25.04.2022.
Venue: Video conference.

Members Present

1. **Mr. Suresh Kumar Adapa**
   Scientist 'E', MOEF & CC, Nagpur.
2. **Mr. Nishchal C,**
   Scientist 'D', CPCB, Pune.
3. **Mr. Narendra Toke**
   Director, Environment Department, Govt. of Maharashtra.
4. **Mr. Sanjay Bhosale, Regional Officer, MPCB, Mumbai**
5. **Mr. Sandeep Thorat,**
   Tahasildar, Collector Office Mumbai Suburbs
6. **Mr. Rajesh Tamhane,**
   Dy. Hydraulic Engineer, MCGM
7. **Mr. Malawe,**
   Executive Engineer, MCGM
8. **Mr. S. S. Dholam,**
   Sub Regional Officer, Mumbai-III, MPC Board.

1. Today third meeting of the committee was held through video conferencing.

2. **Mr. S.S. Dholam, Sub Regional Officer, MPC Board, Mumbai** briefed about the proceeding and decision taken during of the second meeting of the committee. Member of the committee had sought information from MCGM wrt. Zonal Map of sewerage network of the area around Powai Lake, details on action plan for establishment of sewerage network for un-sewered area and its connectivity to STP from treatment, including diversion of sewage from sewerd area into STP for treatment. MCGM to carry out detail reconnaissance survey for identification of locations and estimation of present quantity of sewage being flowing into Powai Lake, qualification of water consumption, sewage generation, mode of conveyance, treatment provided by IIT campus. Cconnectivity and dissemination of real time monitoring results of DO levels of Powai Lake at Public domain. It was informed that information from MCGM is not yet received.

3. **Mr. Rajesh Tamhane, Dy. Hydraulic Engineer, MCGM-**
Informed that one internal meeting of MCGM officers was conducted, regarding information to be submitted to committee. Drawings regarding zonal map of sewage network around Powai Lake are ready and shall be shared in due course.

4. **Mr. Malawe, Executive Engineer, MCGM-**
Plans showing unsewered area in the periphery of Powai Lake is being submitted.

5. **Mr. Rajesh Tamhane, Dy. Hydraulic Engineer, MCGM-**
Informed to submit information in few days period.

6. **Mr. Nishchal C, Scientist 'D', CPCB-**
Appealed to MCGM that information required shall be submitted to committee at the earliest so that committee can take review of the same and shall prepare action plant accordingly. MPCB to take follow up with MCGM for submission of information.

7. **Mr. Narendra Toke, Director, Environment Department, Govt. of Maharashtra-**
These two issue are diffesant. As per Hon'ble NGT Order, mandate of the committee is to deal with pollution of Powai Lake due to discharge of sewage effluent from MCGM area. Hence discussion of committee meeting may be restricted to this aspect. as per NGT order. As far as, issue of jogging track is concerned, there is already one ongoing petition in Hon'ble High Court, Mumbai. Hence both issues may not be intermingled.

8. **Mr. Narendra Toke, Director, Environment Department, Govt. of Maharashtra-**
We shall restrict our discussion to Powai Lake pollution issue, as per mandate of Hon'ble NGT Order. We will make a note in today's meeting minutes that this committee is constituted as per Hon'ble NGT order dated-12.01.2022, having specific mandate, beyond this mandate committee cannot work. MPCB may communicate accordingly to complainant, Vanashakti.

9. **Mr. Sanjay Bhosale, Regional Officer, Mumbai-**
Suggested that MCGM shall submit requisite information on priority, may be in two or three days.

10. **Mr. Narendra Toke, Director, Environment Department, Govt. of Maharashtra-**
MPCB may draw timeline for data submission by MCGM. Same may be mentioned in minutes of meeting. All member shall adhere to timeline.

11. **Mr. Nishchal C, Scientist 'D', CPCB-**
MCGM shall submit information as per fixed timeline. Thereafter committee can frame action plan as per mandate of NGT order. MPCB and MCGM shall co-ordinate among themselves for submission of information.

12. **Mr. Rajesh Tamhane, Dy. Hydraulic Engineer, MCGM-**
Required information shall be submitted in two days period.

13. **Mr. Sujit Dholam, Sub-Regional Officer, MPC Board, Mumbai,**
We may fix timeline for submission of information from MCGM as 27.04.2022.

14. **Mr. Narendra Toke, Director, Environment Department, Govt. of Maharashtra-**
As agreed upon by MCGM, we may fix timeline as 27.04.2022 for submission of information. MPCB may verify and communicate the information submitted by MCGM to all committee member by 02.05.2022.

15. **Mr. Rajesh Tamhane, Dy. Hydraulic Engineer, MCGM-**
MCGM need to carry out survey for submission of information of untreated sewage being discharge through existing culverts. Preliminary survey carried out by MCGM, Detail quantitative surrey shall be carried out by third party agency. Information available with MCGM shall be shared with committee.

16. **Mr. Narendra Toke, Director, Environment Department, Govt. of Maharashtra-**
Available information shall be assessed. So that same can be incorporated in draft report.

Decision-
As per timeline decided MCGM shall submit information by 27.04.2022 to MPCB. After verification of information, MPCB shall communicate the information to committee members by 02.05.2022. Additional timeline for submission of additional information, MCGM may submit in writting, which can be reviewed in next meeting.

Meeting concluded with vote of thanks to the dais.

(Sanjay Bhosale)
Regional Officer-Mumbai

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Re: Detailed action plan for Stopping of sewage ingress in Powai Lake

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Sir,

This office has received a mail on 18.03.2025 from your office in which it is requested to submit detailed comprehensive report regarding the action taken/implemented toward short term & long term action plan restoration & conservation of Powai Lake as Hon'ble NGT matter O.A. no.68/2021, order on dtd.12.01.2021.

In this regard, BMC is taking continuous efforts for the restoration and conservation of the Powai lake by undertaking certain measures as follows:

1. **Long term measures:**
    1. For stopping sewage ingress into Powai lake, Ch.Eng(Sewaerage Project) has invited a tender. Detailed information regarding the tender work is attached herewith for your reference.
2. **Short Term Measures:**
    1. **Hyacinth removal work:**
        - Hyacinth removal work is being carried out in a phase wise manner.
        - In the 1st phase, 25730 MT Hyacinth was removed from 08.03.2024 to 06.10.2024.
        - In the 2nd phase, maintenance of the Powai lake is in process for the period of 18 months from 15.10.2024 by removing newly regrown hyacinth quantity which is estimated 266MT for a month. However, due to inflow of Sewage ingress through various culverts into lake, rapid and abnormal regrowth of hyacinth is very high than the actual qty. of hyacinth being removed from lake every month as a maintenance part in second phase.
    2. **Dissolved Oxygen(DO) Monitoring system:**
        - Dissolved Oxygen monitoring has been installed inside the powai lake to aerate the lake water and improve the dissolved oxygen levels in the lake water as well as to monitor it.
        - This is being done by using Barge mounted aspirator type aeration system.

Submitted please.

Thanks & regards,

Dy.HE(Maint.)

From: PURUSHOTTAM L MALWADE <he@mcgm.gov.in>
Sent: 19 March 2025 13:01
To: MANGESH M SHEWALE_Additional <dyhe01pc.he@mcgm.gov.in>; SUSHIL MARUTI CHAVAN <dyhemaintes.he@mcgm.gov.in>; eewwpr@gmail.com <eewwpr@gmail.com>
Subject: Detailed action plan for Stopping of sewage ingress in Powai Lake

BRIHANMUMBAI MUNICIPAL CORPORATION

Sewerage Project Department 26 MAR 2025

4036

Sub: - Detection of ingress, interception and diversion of DWF (Sewage/Sludge) and stopping of sewage ingress in Powai Lake, in 'S' ward.

Ref:- Email received from Dy.HE.(Maintenance) dtd.21.03.2025

With reference to above subject matter, this office remarks as follows.

To abate the sewer ingress in Powai Lake, considering the existing topography, flow generation, feasibility, site conditions, and recommendations of consultant this office has prepared tender for work of detection of ingress, interception and diversion of DWF (Sewage/Sludge) and stopping of sewage ingress in Powai Lake, in 'S' ward. Wherein intercepted DWF will be diverted partly to propose STP plant and treated water will be discharged in to Powai Lake to preserve the bio diversity and to maintain lake water balance and existing STP plant at Perubaug and remaining DWF will be diverted to existing sewer line along JVLR.

Proposal-1

Providing and laying of different dia. sewer pipe by Open cut & HDD method along with Interceptors for diversion of DWF along Powai Lake in 'S' Ward.

Tender for Proposal 1 is uploaded on (Maha tenders) (https// mahatenders.gov.in) website under bid no. 2025_MCGM_1154364_1 and its schedule is tabulated as under: -

Description	**Schedule**
Date of Issue and sale of Tender	28/02/2025 from 11:00 Hrs
Last date & time for sale of tender	28/03/2025 till 16:00 Hrs
Submission of Packet A, B & Packet C (Online) & Receipt of Bid Security Deposit	28/03/2025 till 16:00 Hrs
Opening of Packet A & B	04/04/2025 after 15:00 Hrs
Opening of Packet C	05/05/2025 after 15:00 Hrs
Estimate cost including O&M	Rs. 39,37,09,524.00
Time period of the work	18 months (excluding Monsoon)

Proposal -2

'Designing, Providing, Constructing and Commissioning modernized and fully automated Sewage Treatment Plant of 8 MLD capacity on Design Build Operate (DBO), along with 03 years of Operation and Maintenance after DLP at Powai abandoned sewage pumping station Location and discharge the treated water into Powai Lake, in 'S' Ward.'

Tender for Proposal 2 is uploaded on (Maha tenders) (https// mahatenders.gov.in) website under bid no. 2025_MCGM_1156409_1 and its schedule is tabulated as under: -

Description	**Schedule**
Date of Issue and sale of Tender	05/03/2025 from 11:00 Hrs
Last date & time for sale of tender	31/03/2025 till 16:00 Hrs
Submission of Packet A, B & Packet C (Online) & Receipt of Bid Security Deposit	31/03/2025 till 16:00 Hrs
Opening of Packet A	02/04/2025 after 15:00 Hrs
Opening of Packet B	11/04/2025 after 15:00 Hrs
Opening of Packet C	05/05/2025 after 15:00 Hrs
Estimate cost including O&M	Rs. 135,39,22,063.00
Time period of the work	24 months (excluding Monsoon)

After completion of laying of sewer line, construction Interceptors chambers and installation of the STP, the same will be handed over to Ch.E.(SO) to carry out the operation and maintenance of sewer line , Interceptors chambers and STP.

For your information and further necessary action please.

दि.[illegible].25.03.2025

Dy.Ch.E(S.P.) P&D

Dy.H.E(Maintenance)

Flow Measurement at flood gates

Sr. No	Gate no	Flow (MLD)	Remark
1	Gate no 1	0.5	Continuous sewage flow
2	Gate no 2	0.5	Continuous sewage flow
3	Gate no 3	-	No DWF observed
4	Gate no 4,5	1	Continuous sewage flow
5	Gate no 6,7	0.5	Continuous sewage flow
6	Gate no 8,9	0.5	Continuous sewage flow
7	Gate no 10	-	No DWF observed
8	Gate no 11,12	1.5	Continuous sewage flow
9	Gate no 13,14	3.7	Continuous sewage flow
10	Gate no 15,16	3.8	Continuous sewage flow
11	Gate no 17,18	4	Continuous sewage flow
	Total	**15.85 MLD**	
1	Perubaug Inlets	2 MLD	Continuous sewage flow

SHORT TERM MEASURES

Details about works taken in hand by BMC's Hydraulic Engineers Department:

1) **Upkeeping of Powai Lake by removing hyacinth by using harvester machine and transporting it for disposal at dumping location arranged by the contractor –**
   A. Details of work carried out in recent past i.e. from March 2024 to July 2025
      a) 1st Phase of work – Upkeeping of Powai Lake
      b) Date of commencement – 07.03.2025
      c) Date of Completion – 06.10.2025
      d) Qty. of hyacinth removed – 24985 MT

      e) 2nd Phase of work – Maintenance of Powai Lake
      f) Date of commencement – 14.10.2025
      g) Date of completion – 30.07.2025
      h) Qty. of hyacinth removed – 7780 MT

   B. Details of proposed work
      a) Qty. proposed to be removed from Lake – 24000 MT
      b) Time Period – 12 Months (Including Monsoon)
      c) e-Tender procedure is in progress to appoint contractor
      d) Tentative date of commencement of work – 15.10.2025

2) **Work of biennial operation and non-comprehensive maintenance of Aeration & Dissolve Oxygen (DO) Monitoring system installed at Powai Lake –**
   a) The aeration system contains barge mounted two nos. of 32 KVA D.G. set and two sets of aeration system
   b) The motor boat is kept on shore of Powai Lake for daily operation and to carry out maintenance activities.
   c) 60 HP barge engine mounted for movement of the barge in Powai Lake
   d) The six nos. of floating D.O. monitors are kept around in the Powai Lake to determine D.O. of lake water
   e) The D.O. monitors are continuously collects and transfer its data to AEOC(TM) Ghatkopar office computer time to time.
   f) Maintenance team comprises of Engineer, Operator, Helper and security guard.

3) **Cleaning maintenance of Nisarg Udyan and Promenade at Powai Lake along Aadi Shankaracharya Marg –**
   a) Dust bins are installed at both the immersion points which are Ganeshghat & Pawarwadi and at regular interval along lake promenade pathway
   b) Cleanliness and sweeping work is along lake promenade
   c) Awareness boards are also installed along lake promenade
   d) CCTV system is also working 24 X 7 for safety purpose

Detection of ingress, interception and diversion of DWF (Sewage / Sludge) and stopping of sewage ingress in Powai lake, in S ward

- As per the directions of **Hon'ble NGT** to abate the pollution of natural bodies due to discharge of untreated DWF through SWD in Lake this office has proposed the work of detection of ingress, interception and diversion of DWF (Sewage / Sludge) and stopping of sewage ingress in Powai Lake, in S ward
- Consultant M/s. TUSPL has prepared DPR and tender (Proposal 1 and Proposal 2)
- **Proposal 1** (will be carried out by Dyche (SP)Construction)
  - Flow around 8.0 MLD from Gate 1 to 14 will be intercepted and diverted to proposed 8 MLD STP @ abandoned Powai sewage pumping station location by providing interceptors and laying sewer line under gravity system.
    Length of sewer line: - 1909 mtr (laying by HDD method)
    Nos of Interceptor: - 09 nos
  - Flow around 8.0 MLD from Gate 15 to 18 will be intercepted and diverted to rob hole on 800 mm existing sewer line along JVLR by providing interceptors and laying sewer line under gravity system. Also, a provision will made to divert this 8 MLD DWF to proposed STP as an alternate arrangement by laying sewer line under gravity system.
    Length of sewer line: - 942 mtr (laying by HDD method)
    Nos of Interceptor: - 02 nos
  - Flow around 2.0 MLD from Peru Baug will be intercepted and diverted to Peru Baug pumping station which sends the flow to 9 MLD STP @ Mithi river by providing interceptors and laying sewer line under gravity system.
    Length of sewer line: - 205 mtr (laying by open cut method)
    Nos of Interceptor: - 02 nos

Total length of Sewer line: - 3056 mtr

Total nos of interceptors: - 13 nos

Civil work: - Rs. 30,26,06,959.00

Operation and Maintenance of interceptor (6 years) :- Rs. 9,11,02,565.00

Total estimated cost for Proposal 1:- Rs. 39,37,09,524.00

LOA was issued to the Lowest contractor on 20.06.2025

- **Proposal 2** (will be carried out by Dyche (SP) M&E)

  Construction of 8 MLD STP at abandoned Powai sewage pumping station location and discharge the treated water into Powai lake to help to maintain the water balance and preserve the aquatic life / bio diversity in lake along with O & M .

  Construction and commissioning of STP

  - Demolition of existing structures at STP
  - Compound Wall for STP
  - Treated Water Discharge line 600 meters
  - Wet Well
  - GFS Glass Tank
  - 8 MLD STP & Pre-Treatment Unit - M&E work including all required civil works
  - MBR System including sludge management system
  - Instrumentation Works
  - Electro-chlorination Disinfection System
  - Pre-Treatment Unit - Commissioning & Trial Run
  - MBR System - Commissioning & Trial Run
  - Electro-chlorination Disinfection System - Commissioning & Trial Run
  - Pre-Treatment Unit - Comp O&M (3 Years DLP + 3 years Non-DLP)
  - MBR System - Comp O&M (3 Years DLP + 3 years Non-DLP)
  - Electro-chlorination Disinfection System - Comp O&M (3 Years DLP + 3 years Non-DLP)
  - O&M of Instrumentation Works (3 Years DLP + 3 years Non-DLP)
  - Disposal of Dried sludge

Construction of STP (Capital Cost) : - Rs. 64,88,88,888.00

Commissioning and O & M of STP (6 years): - Rs. 4,00,00,000.00

Total estimated cost for Proposal 2

including O&M: - Rs. 68,88,88,888.00

Tender is re-invited on 20.06.2025
Packet A & B opening is on 30.06.2025
Packet C opening is on 08.07.2025

Brihanmumbai Municipal Corporation

Sewerage Projects Department

Preparation of DPR for ingress detection, interception & diversion of DWF of Powai Lake in 'S' ward.

Revised - Detailed Project Report

Submitted By:
Tandon Urban Solutions Pvt Ltd.,
701, Harbhajan Building,
CST Road, Santacruz (East), Mumbai – 400098.

March 2025

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Abbreviations

1.	DPR	Detailed Project Report
2.	STP	Sewerage Treatment Plant
3.	SPS	Sewerage Pumping Station
4.	MLD	Million Litre Per Day
5.	RCC Pipe NP	Reinforced Cement Concrete Pipe – Non-Pressure
6.	GRP	Glass Fibre Reinforced Plastic Pipe
7.	DI	Ductile Iron Pipe
8.	GI	Galvanized Iron
9.	PVC-U	Poly Vinyl Chloride un plasticized
10.	CC Road	Cement Concrete Road
11.	BOD	Bio Chemical Oxygen Demand
12.	COD	Chemical oxygen Demand
13.	TSS	Total Suspended Solids
14.	LPCD	Litre Per Capita Per Day
15.	SOR	Schedule of Rates
16.	PC	Precast Concrete
17.	AC	Asbestos Cement
18.	SW	Stoneware Pipe
19.	PSC	Pre stressed Cement Concrete
20.	u-PVC	Un plasticized Poly Vinyl Chloride
21.	HDPE	High Density Polyethylene
22.	DWF	Dry Weather Flow
23.	CPHEEO	Central Public Health Engineering and EnvironmentOrganization
24.	SCADA	Supervisory Control and Data Acquisition
25	NGT	National Green Tribunal
26.	ULB	Urban Local Body

1 Introduction

Mumbai, formerly **Bombay**, city, capital of Maharashtra state, south-western India. It is the country's financial and commercial centre and its principal port on the Arabian Sea. It was originally a cluster of sevenislands. Located on Maharashtra's coast, Mumbai is India's most-populous city, and it is one of the largest and most densely populated urban areas in the world. Mumbai is located on the western sea coast of India from 18° 53' North to 19° 16' North Latitude and from 72° East to 72° 59' East Longitude. It was originally a cluster of seven islands. Later on, these islands were joined to form present Mumbai. The total land of Greater Mumbai identified in Earlier Draft Development Plan 2034 (EDDP) was 458.28 sq. km. The Municipal Corporation of Greater Mumbai (Brihanmumbai Municipal Corporation), however, was the Planning Authority of area that was more modest, since about 8.76% of the cited area fell under the jurisdiction of Special Planning Authorities (SPA). Three such SPA exists in Greater Mumbai- MMRDA, SRA, MIDC. The EDDP therefore prepared a development plan for 434.55 sq.km. Total area specified by Surveyor General is 603 sq.km. this includes territorial waters extended into sea up to 12 nautical miles measured from appropriate base line. Its maximum width is 17 km. (East to West) and length is 42 km. (North to South).

1.1 Introduction of Powai Lake

Powai Lake is an artificial lake, situated in Mumbai. The city suburb called Powai shares its name with the lake. Indian Institute of Technology Bombay, one of the premier institutions of science and technology in India, is located to the east of the lake. Another famous institution, the National Institute of Industrial Engineering (NITIE), is also located close to the lake. Well

planned commercial complex including with Housing complexes and hotels like Hiranandani development is well established within the periphery of lake. The important business centres are established within the area eventually population around the lake has thus substantially increased over the years.

The Powai Lake has gone through many stages of water quality degradation. The lake water which usedto supply drinking water for Mumbai has been declared unfit for drinking purpose. The lake remains atourist attraction.

Mumbai, Konkan, Pune, Nashik, Nagpur, Amravati, Aurangabad and two special purpose boards viz. Mumbai Building Repairs and Reconstruction Board and Mumbai Slum Improvement Board.

1.2 Silent Features of Powai Lake

- Powai lake is Located to the south east to Vihar lake, has a surface area of 210 hectares and contributing catchment area of 620.8 hectares.
- With an average depth of 5 m, it has a gross storage at FSL of 1200 million gallons. The lake has a maximum depth of about 6 m and minimum of 3 m and stores water of non-potable purpose.
- The average Water capacity of Powai Lake is 8,38,591 m3
- BMC decided to take up the project to rejuvenate the Powai Lake in which stage one work is proposed as interception & diversion and respective treatment of the sewage.
- The location of the treatment plant is available at the BMC's existing abundant sewage pumping station, which is in the possession of BMC and a suitable location to treat the coming sewage from various flood gates having direct ingress in the Powai Lake.

Figure 1 Powai Lake Key Map

1.3 History of Powai Lake

The plot of land that now comprises Powai Lake was initially leased to Dr. Scott in 1799, which included several villages such as Koprikhud, Paspoli, Tiandaj, Saki, and Tungave. After Dr. Scott's demise in 1816, the plot was transferred to the British Government in 1826.

In 1843, they leased it to Framaji Kavasji Powai, a prominent Parsi merchant and Vice-President of the Agricultural and Horticultural Society of Western India. The Powai Estate remained under his family's ownership until the British Government took possession of it in the late 19th century.

The Powai valley scheme was taken up in 1890 on a tributary of the Mithi River as an emergency measure to mitigate the anticipated water famine in 1891.

The project was completed in 1890 at a cost of over Rs. 6,50,000. The resulting lake initially provided two million gallons of water per day, making it a significant contributor to Mumbai's drinking water supply.

The lake was officially inaugurated by the British in 1891 as a means to address the growing demand for drinking water in the city.

However, as the years passed, the lake's water quality began to dwindle. In 1919, a significant investment was made to restore the water supply, but even this effort ultimately fell short. As a result, the lake was leased to the Western India Fishing Association.

The association utilized the lake for pisciculture (fish farming), angling, and other recreational activities. This led to the establishment of an individual organization called the Bombay Presidency Angling Association (now known as The Maharashtra State Angling Association). IIT Campus around Powai Lake had established in 1958.

In 1991, the Maharashtra State Angling Association amended its constitution to prioritize the preservation of Powai Lake.

- **Flora and Fauna at Powai Lake**

The lake Powai is home to the Balsam bushes. These pink-purple bushes could be seen spread around the lake. The lake also has a rich fauna culture. Scores of Crocodiles are seen often on the shores. Besides, there are Spot-Billed Suck, White-Throated and Small Blue Kingfishers, Dove, Sunbirds, Jacanas, Red-Vented, White-browned Bulbuls, Indian Pond Herons, Egret, Peregrine Falcon, Hoopoe, Butterflies, honey bees are often seen.

- **Hydrology:**

The silent hydrological aspects of Powai Lake are as follows:

- ✓ Catchment area of Powai Lake = 6.61 Sq. Km.
- ✓ Average annual rainfall in catchment area of Powai Lake = 2540 mm [1000 inches]
- ✓ Altitude of ground surface, surrounding of Powai Lake = 585 m
- ✓ Maximum depth of Powai Lake = 12 m
- ✓ Minimum depth of Powai Lake = 03 m
- ✓ Water spread area of Powai Lake = 2.10 Sq. Km. [520 acre]

The Powai Lake overflows after sixty days of moderate rainfall through Powai dam since long and still continued also, at present.

- **Lake Sedimentation**

Lake sedimentation has been tremendous in Powai Lake since long. It is due to the construction waste disposal from residential complex, Industrial development. The study conducted in 1995, has revealed that, 4,500 Lakh Cubic meter of silt type material has been deposited in Lake since its inception.

- **Lake Water Quality**

The Dissolved Oxygen [DO] level in Powai Lake has decline trend at alarming rate, which is essential for survival of aquatic organism. It has been monitored during three different periods, with the following observation:

  - During 1961-1963, DO level = 2.80 to 7.80 mg/litre.
  - During 1972-1977, DO level = 4.00 to 12.40 mg/ litre.
  - During 1979-1980, DO level = 1.70 to 07.90 mg/litre.

- **References:**

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1.4 About Project

The project envisaged various activities like Interception & Diversion, In-situ remediation, Solid waste management. Considering the project requirement various activities are initiated for which the Detailed survey and join Site visit were conducted in the presence of client. The focus has been made to understand the hurdles in the project. Majorly it is found that the domestic sewage is directly overflowing in the Powai Lake through the various Storm water Inlets. There are 19 storm water inlets available at sit on which the Flood Gates are installed. In view of above the technical teams like Sewerage Operations, Sewerage Projects, MSDP, SWD, Ward Office,

Maintenance have contributed their views about the existing infrastructure developed and the requirement of the Proposed infrastructure.

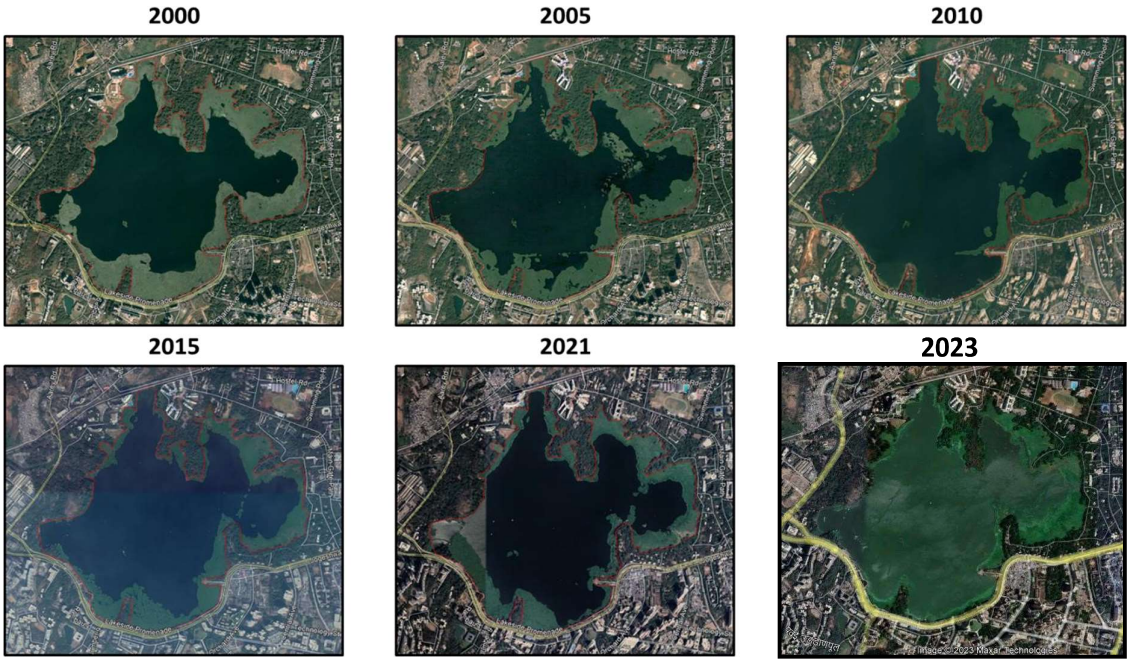

Figure 2 Powai Lake Transformation from 2000 to 2023

1.5 Source of Pollution

Prior to being a capital city, Mumbai was a small country town with very basic infrastructure facilities. The over-flow from the septic tanks is lead to storm water drains, also the waste from kitchens & bathroom is lead to existing drainage system. As a result, over time, the water in many water bodies, nalas and rivers around the city are highly contaminated and polluted resulting in adverse health effects like incidence of water borne diseases like diarrhoea and gastroenteritis etc. This demonstrates the unsavoury and adverse health consequence of dense rapid urbanization and increased commercial activities without support of adequate sewerage and drainage system.

Unsewered areas housing low-income groups are serviced by 'pit latrines' or septic tanks at individual household/ community levels. Overflows from septic tanks are discharged into the river through open drains. Data on grossly polluting non-point source of pollution have been presented along with water used, effluent generated, solid waste generated and mode of disposal of waste.

Presently the 19 number of Storm Water gates are observed to be discharging the sewage from 11 numbers of locations directly into the lake.

2 Site assessments & field investigations

This chapter includes general introduction of various survey undertaken by TUSPL for the work of 'Preparation of DPR & Tender purpose. Detailed surveys like reconnaissance survey & topographical survey were carried out for entire project area. The physical characteristics of the area has to be investigated by conducting a total station survey. Also, the water quality analysis and flow measurement studies were carried out in fair Dry season.

2.1 Reconnaissance survey:

A reconnaissance survey was conducted in order to gain a better understanding of the area's terrain, features, and characteristics. The team of surveyors made observations about elevation gradients, soil type, water courses, vegetation cover and other such features. They alsocollected aerial imagery and took detailed geological overviews that can later be used as referencepoints for further investigations. This data will be compiled in reports to aid decision makers as theywork to create plans for utilities and infrastructure development or potential land use changes. Overall, the reconnaissance survey was an important step towards making informed decisions when it comes to environmental management issues.

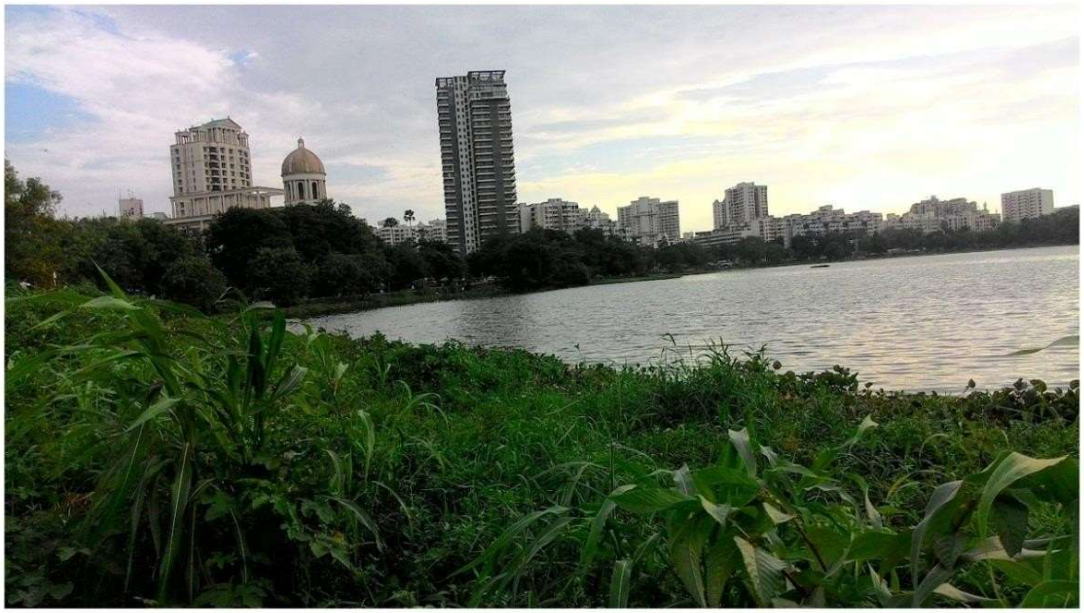

Figure 3 Vegetation Growth Around the Powai Lake

Figure 4 High Density Residential and Commercial Development along Powai Lake

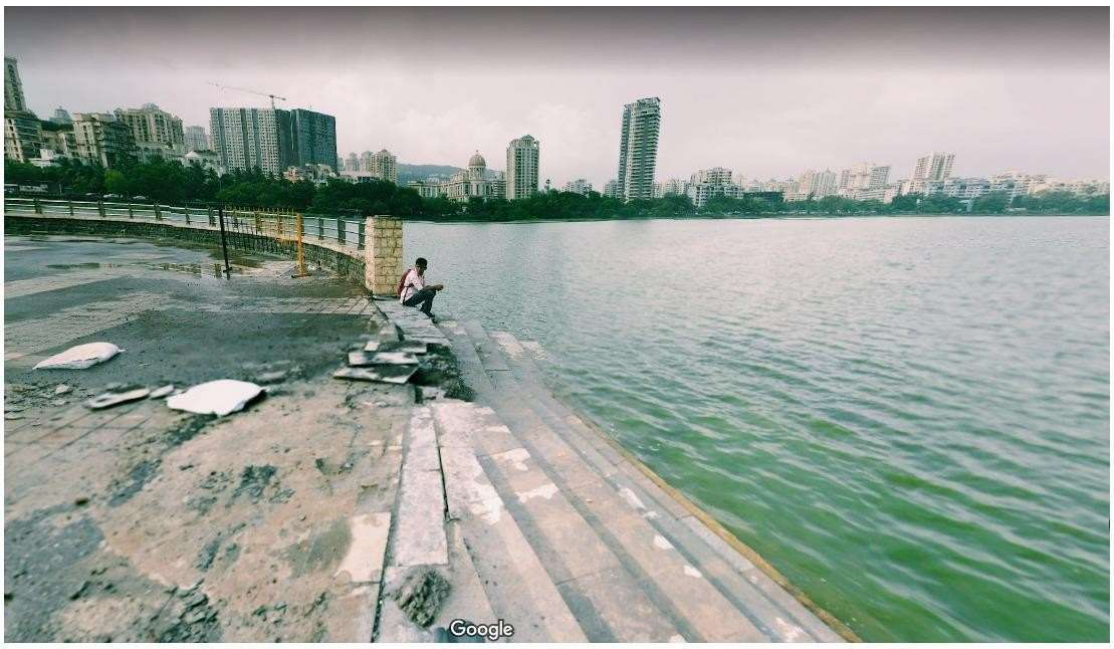

Figure 5 Ghat along the Powai Lake

Figure 6 Hyacinth Growth in Powai Lake at the Sewer Inlet Point

2.2 Total Station survey:

The physical characteristics of the area is done & investigated by conducting a total station survey of **roads width & length with elevation such as DP roads, Culvert,** natural drainage channels, Nalas etc.

2.3 GIS mapping:

To understand the feasibility of interconnection of the utilities and to create the interface of different utilities such as **existing buildings, Nalas, pumping stations, DP roads, existing road structure**. GIS based survey layouts which includes all the survey details of **topographic survey, existing roads, existing sewer line, buildings, pumping stations and Nalas.**

2.4 Drone Survey:

Interpreting a drone survey for entire Powai Lake helps to get clear aerial view of the project area and spot any obstructions in the same that could cause problems.

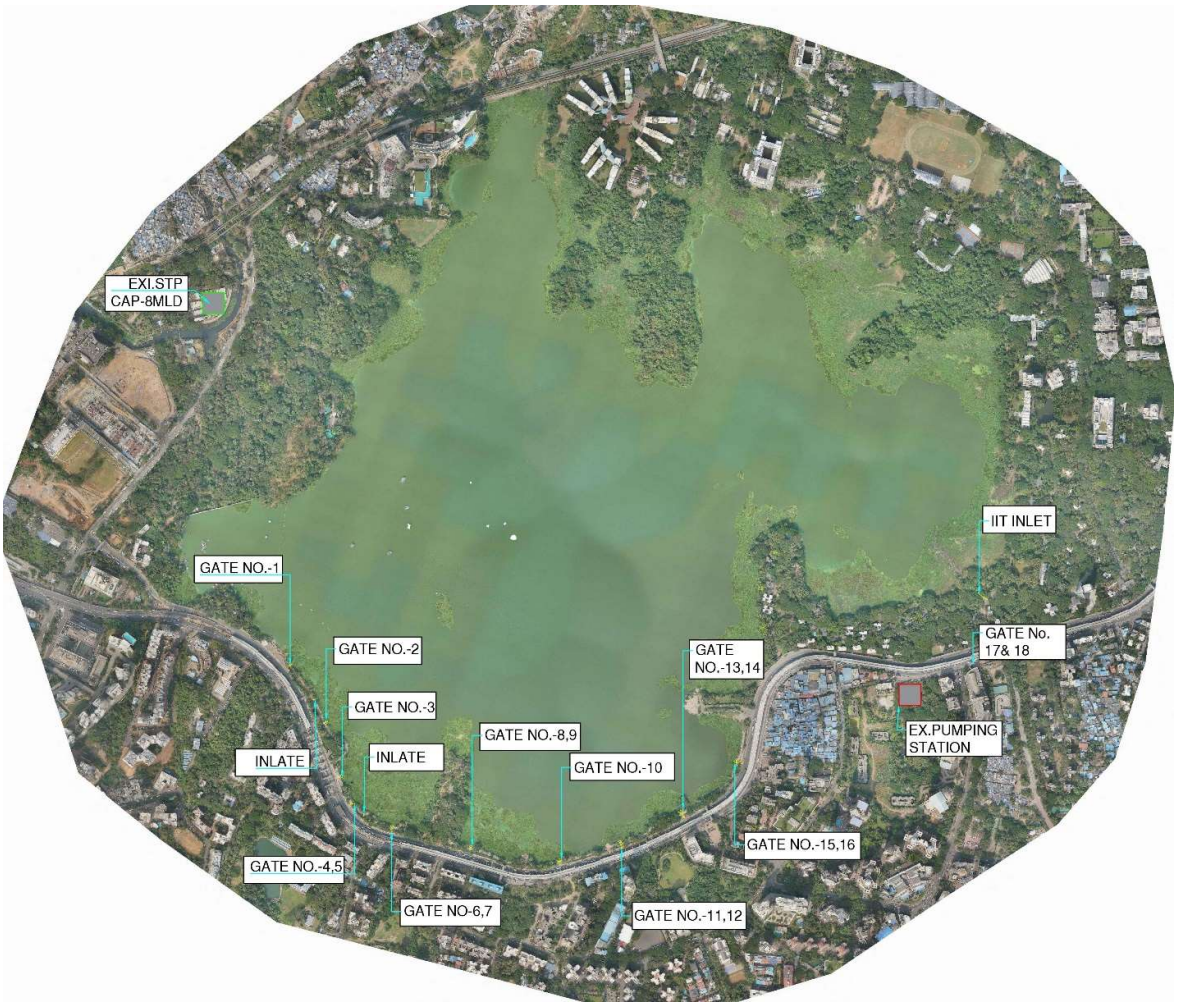

Figure 7 Drone imagery

2.5 Flow Measurement Details

The flow measurement at each individual location was carried out in dry season, the observations made during the survey time are given below based on which the proposed scheme is getting designed.

Table 1 Flood Gate-wise Sewage Flows

Sr. No	Gate no	Flow (MLD)	Remark
1	Gate no 1	0.5	Continuous sewage flow
2	Gate no 2	0.5	Continuous sewage flow
3	Gate no 3	-	No DWF observed
4	Gate no 4,5	1	Continuous sewage flow
5	Gate no 6,7	0.5	Continuous sewage flow
6	Gate no 8,9	0.5	Continuous sewage flow

Sr. No	Gate no	Flow (MLD)	Remark
7	Gate no 10	-	No DWF observed
8	Gate no 11,12	1.5	Continuous sewage flow
9	Gate no 13,14	3.7	Continuous sewage flow
10	Gate no 15,16	3.8	Continuous sewage flow
11	Gate no 17,18	4	Continuous sewage flow
	Total	**15.85 MLD**	

2.6 Water Quality Analysis

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Lab accredited by NABL – ISO 17025:2017 valid up to 26.12.2023
Plot No.PAP-A-283 & PAP-A-284, Trans Thane Creek Industrial Area, Village Mahape, Navi Mumbai– 400710, Maharashtra, India.
Email- info@paryakshan.com, Visit us at: www.paryakshan.com
TC-10171

TEST REPORT - WATER

Test Report Number	**PPL/2023/W-046**	**ULR No. TC101712300000000110F**	**Report Date: 28/03/2023**
Name of the Customer	Tandon Urban Solution Pvt. Ltd.		
Address	701, Harbhajan Building, Kalina Santacruz (E)		
Order Reference Number	As per PO -verbal		
NABL Validity	Up to 26/12/2023		

Sample ID number	PPL/04-23/W-46		
Sample Type	Waste Water		
Sample Location	Gate no.1 to 18, Per Baug, Hostel		
Sample Collected By	Client	**Sampling Method**	-
Sample Container	Plastic Can	**Sample Quantity**	1L
Sampling Date	18/03/2023	**Sample Received Date**	20/03/2023
Analysis Start Date	20/03/2023	**Analysis End Date**	28/03/2023

RESULTS OF ANALYSIS

Sr. No.	Parameter	Unit	Location							
			Gate No. 8,9	Gate No. 11,12	Gate No. 1	Gate No. 13,14	Gate No.17,18	Gate No. 4,5	Peru Baug	IIT Hostel
1	Total Dissolved Solids	mg/L	205	268	298	371	426	358	420	48
2	Total Suspended Solids	mg/L	210	223	150	235	305	288	325	35
3	Nitrate, as NO_3^--N	mg/L	0.33	0.43	0.68	0.83	0.45	0.37	0.42	0.11
4	Phosphate as PO_4^{3-}	mg/L	8.41	15.22	5.05	4.59	12.75	19.03	11.2	1.25
5	pH Value	–	7.01	7.09	7.89	7.4	7.51	7.29	7.48	7.1
6	Electrical Conductivity at 25°C	mS/cm	1.304	1.425	1.161	1.547	1.821	1.541	1.101	0.065
7	Biochemical Oxygen Demand, BOD, 3 days @ 27°C	mg/L	42	48	28	55	61	57	72	2
8	Chemical Oxygen Demand, C.O.D.	mg/L	65	81	59	121	105	130	113	7
9	Cyanide, as CN^-	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

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Email- info@paryakshan.com, Visit us at: www.paryakshan.com

Sr. No.	Parameter	Unit	Location							
			Gate No. 8,9	Gate No. 11,12	Gate No. 1	Gate No. 13,14	Gate No.17,18	Gate No. 4,5	Peru Baug	IIT Hostel
10	Total Organic Carbon	mg/L	13	18	6	17	31	10	28	5
11	Calcium Hardness as $CaCO_3$	mg/L	42.24	40.32	28.8	101.76	86.4	57.6	61.2	11
12	Arsenic, as As	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
13	Mercury, as Hg	mg/L	<0.005	<0.005	>0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Note:
1. The report shall not be reproduced except in full, without approval of the laboratory
2. The results apply to the sample as received.
3. The results relate only to the items tested
4. M/s Paryakshan Laboratory Pvt. Ltd can take legal action against any attempt to misuse this test report.

Prepared by
Name: U.H.Vaidya
Date 28/8/23

Checked by
Name: Mrs. R.A.Kulkarni
Date 28/03/2023

Authorized Signatory
Name: Mrs.B.S.Kashelkar
Date 28/03/2023

PARYAKSHAN LABORATORY PVT. LTD.

END OF REPORT

Wastewater quality analysis involves examining physical, chemical, and biological characteristics to assess treatment efficiency, environmental impact, and compliance with regulations. The waste water quality analysis was done in dry season and the analysis results are shown above.

2.7 Flood Gate wise observations:

2.7.1 Flood Gate 1

At Gate 1, Continuous flow has been observed.

Observations:

a) The direct disposal of Solid waste has been observed.

b) The bushes and Hyacinth growth were observed because of direct sewage intrusion through Gate No 1 of SWD.

c) Heavy silt, debris, solid waste is deposited within the SWD outfall and in the channel as well.

d) Damaged existing storm water drains adjacent to pathway.

e) As per discussion it was understood that the sewer lines on the upstream of SWD Outfall are damaged due to ongoing projects executed on JVLR and Sewage of damaged lines are diverted to Storm water drains opening to Powai Lake.

f) Aerations using Fountain has observed near Gate no 1.

g) Missing of Dustbins due to which the Solid waste is observed on the promenade.

h) Debris of boat are also thrown away within the lake.

Photograph of the location:

Figure 8 Location of Gate 1

Figure 9 Information of existing Plate of Gate 1

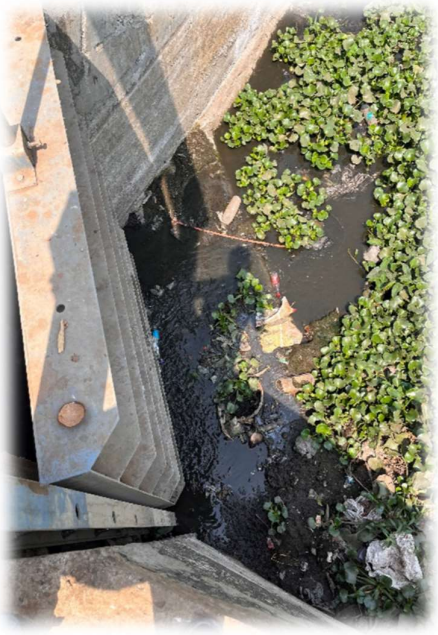


Figure 10 Silt deposit & Growth of Bushes Hyacinth at Gate 1

Figure 11 Solid Waste stuck at Gate 1

2.7.2 Flood Gate 2

At Gate 2, Continuous flow was observed.

Observations:

a) The direct disposal of Solid waste has been observed.

b) The bushes were observed because of direct sewage intrusion through Gate No 2 of SWD.

c) Heavy silt, debris, solid waste is deposited within the SWD outfall and in the channel as well.

d) Damaged existing storm water drains adjacent to pathway.

e) Missing of Dustbins due to which the Solid waste is observed on the promenade.

Photograph of the location:

Figure 12 Location of Gate No. 2

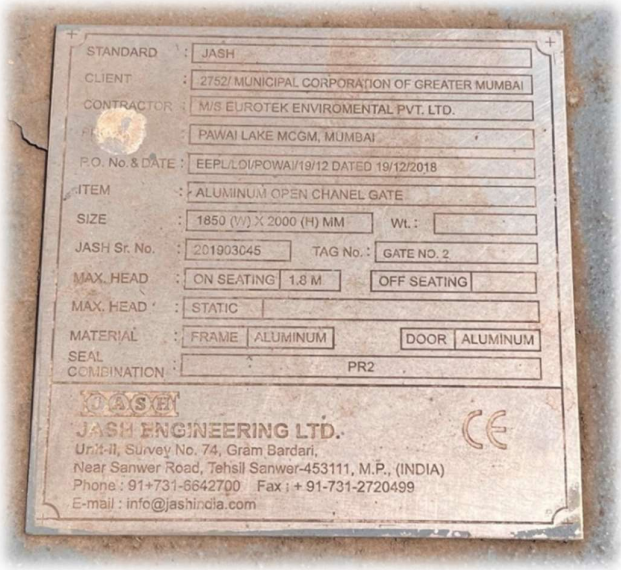


Figure 13 Information of existing Plate of Gate 2

Figure 14 Solid waste dumping & silt deposit at Gate 2

2.7.3 Flood Gate 3

At Gate 3, no sewage flow was observed. At this location the flow coming from Ram Baug slum is connected to L ward sewer line.

Observations:

a) The direct disposal of Solid waste has been observed.

b) The bushes were observed because of direct sewage intrusion through Gate No 3 of SWD.

c) Heavy silt, debris, solid waste is deposited within the SWD outfall and in the channel as well.

d) Damaged existing storm water drains adjacent to pathway.

e) Missing of Dustbins due to which the Solid waste is observed on the promenade.

f) Unutilised open spaces have been observed.

Photograph of the location:

Figure 15 Location of Gate 3

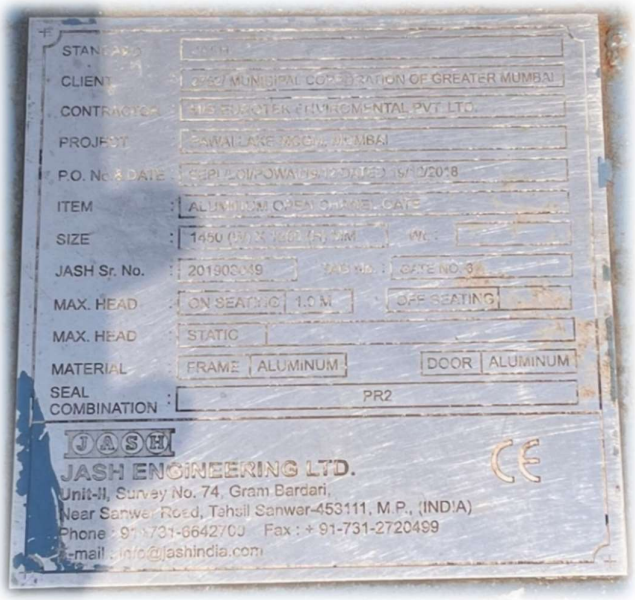


Figure 16 Information of existing Plate of Gate 3

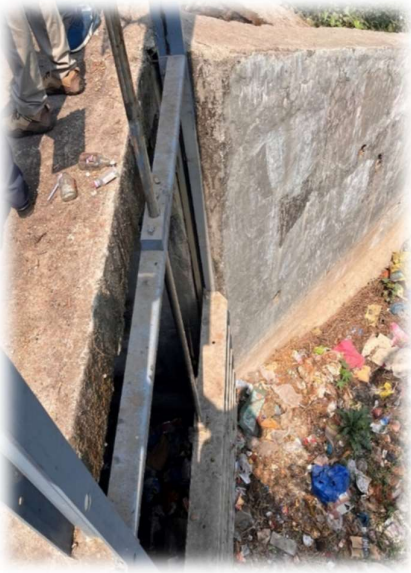


Figure 17 Solid waste dumping at Gate 3

Figure 18 Unutilised open space near Gate 3

2.7.4 Flood Gate 4 & 5

At Gate 4 & 5, the Dry Weather flow was observed.

Observations:

a) The direct disposal of Solid waste has been observed.

b) The bushes were observed because of direct sewage intrusion through Gates SWD.

c) Heavy silt, debris, solid waste is deposited within the SWD outfall and in the channel as well.

d) Damaged existing storm water drains adjacent to pathway.

e) Missing of Dustbins due to which the Solid waste is observed on the promenade.

Photograph of the location:

Figure 19 Location of Gate 4 & 5

Figure 20 Plants grown at Gate 3 & 4

Figure 21 Plastic waste in channel at Gate 3 & 4

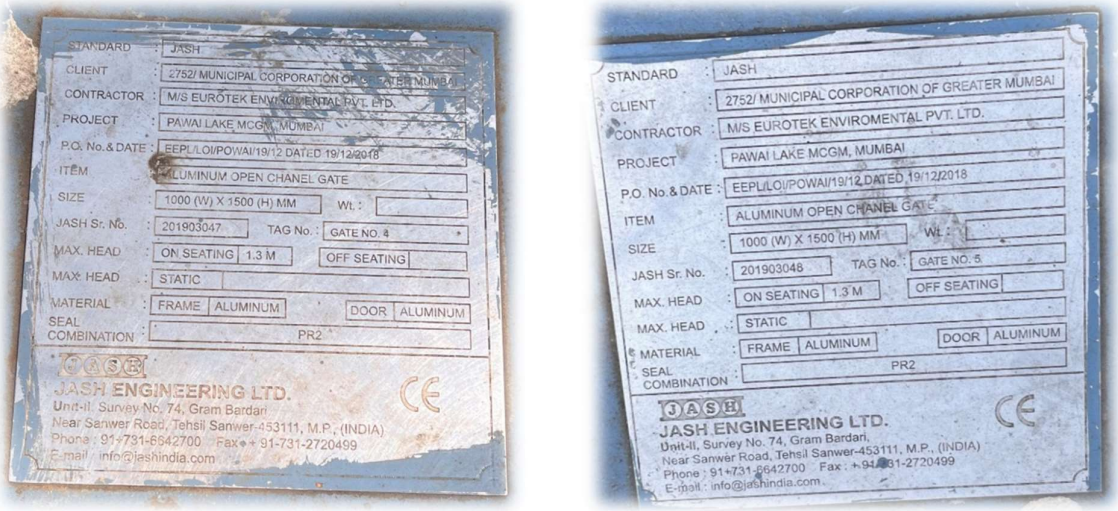


Figure 22 Information of existing Plates of Gate 4 & 5 Details

2.7.5 Flood Gate No. 6 & 7:

At Gate no. 6 & 7 flow was observed.

Observations:

a) The direct disposal of Solid waste has been observed.

b) As per discussion, it has been observed that Gates are operating in Monsoon and at the time of peak hours.

c) The bushes were observed because of direct sewage intrusion through Gates of SWD.

d) Heavy silt, debris, solid waste is deposited within the SWD outfall and in the channel as well.

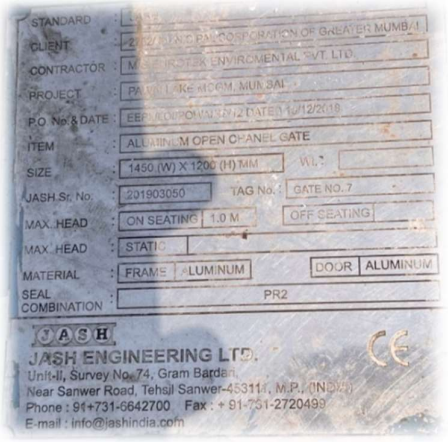
e) Damaged existing storm water drains adjacent to pathway.

f) Broken Nirmalya Dustbin has been observed

g) Missing of Dustbins due to which the Solid waste is observed on the promenade.

Photograph of the location:

Figure 23 Location of Gate 6 & 7



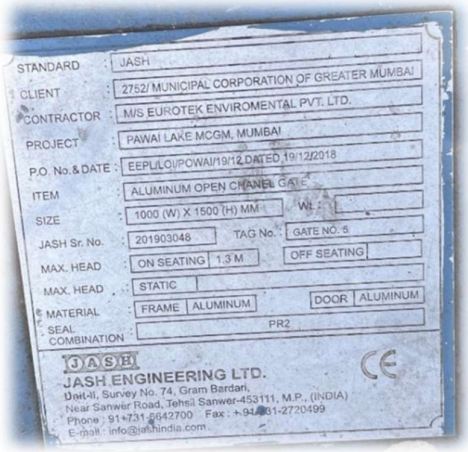


Figure 24 Information of existing Plates of Gate 6 & 7

Figure 19 Solid waste Dumping at gate 6 & 7

Figure 25 Unutilised open space & broken Nirmalya dustbin at Gate 6 & 7

2.7.6 Flood Gate 8 & 9

At Gate 8 & 9, Continuous flow was observed.

Observations:

a) The direct disposal of Solid waste has been observed.

b) The bushes were observed because of direct sewage intrusion.

c) The bore well was observed nearby.

d) Heavy silt, debris, solid waste is deposited within the SWD outfall and in the channel as well.

e) Damaged existing storm water drains adjacent to pathway.

f) Missing of Dustbins due to which the Solid waste is observed on the promenade.

Photograph of the location:

Figure 26 Location of Gate 8 & 9

Figure 27 Information of existing Plates of Gate 8 & 9

Figure 28 Sewage Flow

2.7.7 Flood Gate 10

At Gate 10, there was no sewage flow observed but the collection of Solid waste was observed.

Observations:

a) The direct disposal of Solid waste has been observed.

b) The bushes were observed because of direct sewage intrusion through Gate No 10 of SWD.

c) The bore well was observed nearby.

d) Heavy silt, debris, solid waste is deposited within the SWD outfall and in the channel as well.

e) Damaged existing storm water drains adjacent to pathway.

f) Missing of Dustbins due to which the Solid waste is observed on the promenade.

Photograph of the location:

Figure 29 Location of Gate 10

Figure 30 Information of existing Plate of Gate 10

Figure 31 Damaged Drain near Gate 10

Figure 32 Solid Waste Dumping at Gate 10

2.7.8 Gate 11 & 12

At Gate 11 & 12, Continuous flow was observed.

Observations:

a) The direct disposal of Solid waste has been observed.

b) The bushes were observed because of direct sewage intrusion.

c) Heavy silt, debris, solid waste is deposited within the SWD outfall and in the channel as well.

d) Damaged existing storm water drains adjacent to pathway.

e) Damaged Railing has been observed.

f) Missing of Dustbins due to which the Solid waste is observed on the promenade.

Photograph of the location:

Figure 33 Location of Gate 11

Figure 34 Location of Gate 12

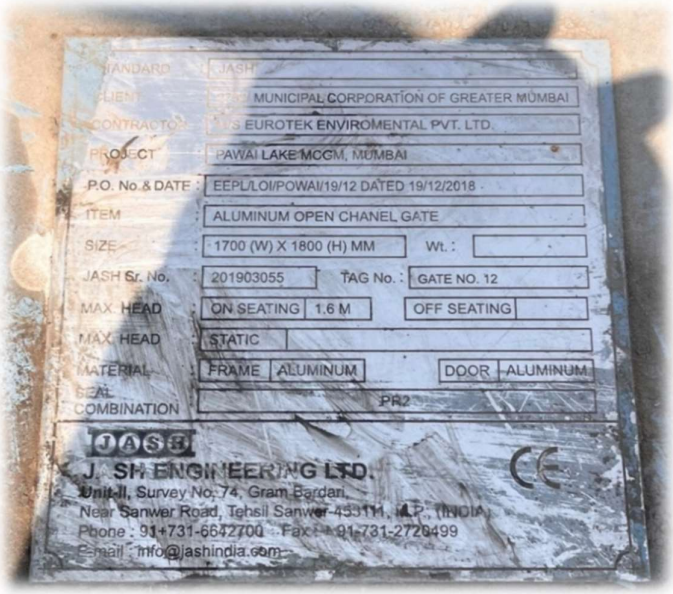


Figure 35 Information of existing Plate of Gate 12

Figure 36 Sewage flow at Gate 11 & 12

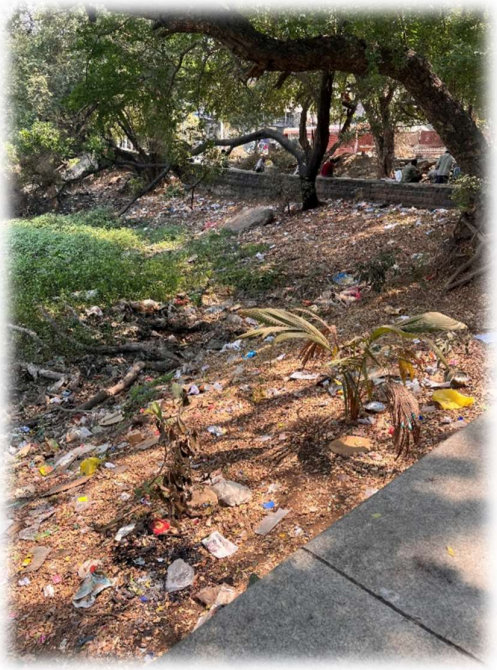


Figure 37 Solid waste at Gate 11 & 12

2.7.9 Gate 13 & 14

At Gate 13 & 14, steady flow observed.

Observations:

a) The direct disposal of Solid waste has been observed.

b) The bushes were observed because of direct sewage intrusion.

c) Heavy silt, debris, solid waste is deposited within the SWD outfall and in the channel as well.

d) Damaged existing storm water drains adjacent to pathway.

e) Missing of Dustbins due to which the Solid waste is observed on the promenade.

Figure 38 Location of Gate no 13 & 14

Figure 39 Steady flow

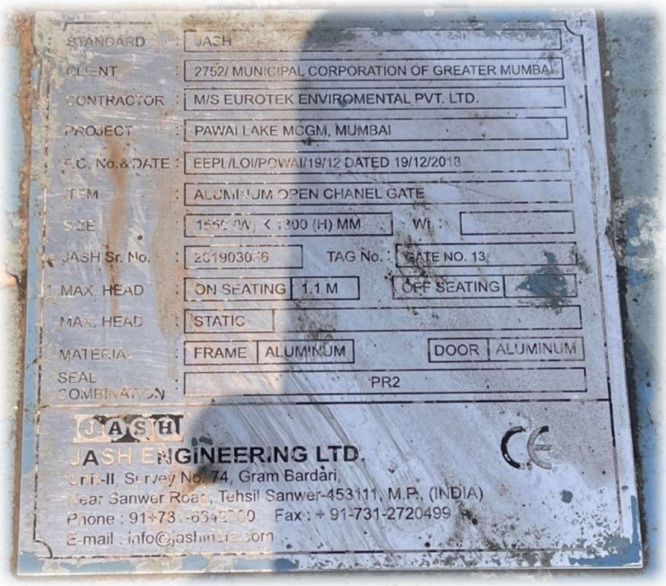


Figure 40 Information of existing Plate of Gate 13

2.7.10 Gate 15 & 16

At Gate 15 & 16, Continuous flow was observed.

Observations:

a) The direct disposal of Solid waste has been observed.

b) The bushes were observed because of direct sewage intrusion.

c) Heavy silt, debris, solid waste is deposited within the SWD outfall and in the channel as well.

d) Damaged existing storm water drains adjacent to pathway.

e) Missing of Dustbins due to which the Solid waste is observed on the promenade.

Photograph of the location:

Figure 41 Location of Gate 15 & 16

Figure 42 Information of existing Plates of Gate 15 & 16

Figure 43 Solid waste dumping at gate 15 & 16

2.7.11 Gate No. 17 & 18:

At Gate no. 17 &18, excessive Sewage flow was observed at this location.

Observations:

a) The direct disposal of Solid waste has been observed.

b) As per discussion, the flow from Gate 17 & 18 (Powai Plaza) is connecting through close drain and opening at IIT Premises and connecting to Powai Lake.

c) Source of sewage at Gate 17 & 18 are Swami Narayan and Hiranandani Gaothan.

d) The bushes were observed because of direct sewage intrusion.

e) Heavy silt, debris, solid waste is deposited within the SWD outfall and in the channel

as well.

f) Damaged existing storm water drains adjacent to pathway.

g) Missing of Dustbins due to which the Solid waste is observed on the promenade.

Photograph of the location:

The team observed that right in front of Powai Plaza there are Gate No. 17 & 18 which is connected to IIT Main Gate premises. Excessive Sewage flow was observed at this location. The source of sewage at Powai Plaza are Swami Narayan and Hiranandani Gaothan.

Figure 44 Location of Gate No 17 & 18

Figure 45 Opening of SWD in IIT premises

Figure 46 Flow of Gate 17 & 18 going to Powai Lake from IIT premises

2.7.12 Flood Gate No. 19:

Due to inaccessibility, Gate 19 has not been visited.

2.7.13 Peru Baug Pumping

At Peru Baug, 3 Inlets were observed.

Observations

As per discussion the sewage is coming from Peru Baug, NITIE Institute and Westin Hotel. About 4 MLD flow is getting pumped and send to get treated to 8 MLD STP of Mithi.

Photograph of the location:

Figure 47 Peru Baug pumping

Figure 48 NITIE & Westin Hotel Outlet

Figure 49 Peru Baug Outlet

2.7.14 Bore wells

During Site visit 3 bore wells were observed

Observations

The bore well was observed at Gate 2 and Gate 8 & 9

Figure 50 Bore well at Gate 2

Figure 51 Bore well at Gate 2

2.7.15 Overflow of Vihar Lake

The outfall near IIT Hostel was observed which discharges water into the Powai Lake. The discharge seems to be from the Vihar lake and is also can be checked from the water quality reports attached with the DPR. Therefore, the same has not been considered in the sewer line project.

3 Project constraints & Proposed Scheme

During the survey and the study of earlier data available about the project areas, following the key issues identified as a result of the survey study –

There are many possible technologies out there which can be adopted for Incurring the problem which arise due to inflow of Dry weather flow (sewage/Sludge) and for interception & divergence of the same.

3.1 Identified Issues

- Existing Sewer lines are damaged and unrepairable because of the various construction activities of metro as well as roads.
- Sewage is entering directly into the storm water drains which eventually enters into Powai Lake through the flood gates.
- The sewage of nearby unsewered slum areas like Sri Ganesh Nagar, Gundappa Chawl & Dalit Muslim welfare society etc. is discharging in the storm water drains, which is eventually discharging to Powai Lake.
- Land availability for proposed treatment plan.

3.2 Identification of Sewage Ingress Points

There is total 19 number of Flood Gates present at Powai Lake along JVLR side. All these locations were surveyed for water quality and flow measurement which is described above in the DPR. It was concluded that out of 11 locations, total 9 number of locations carry sewage directly into the lake.

It was observed during the flow measurement study that around 16 MLD flow is being discharged into the Powai Lake through these flood gates.

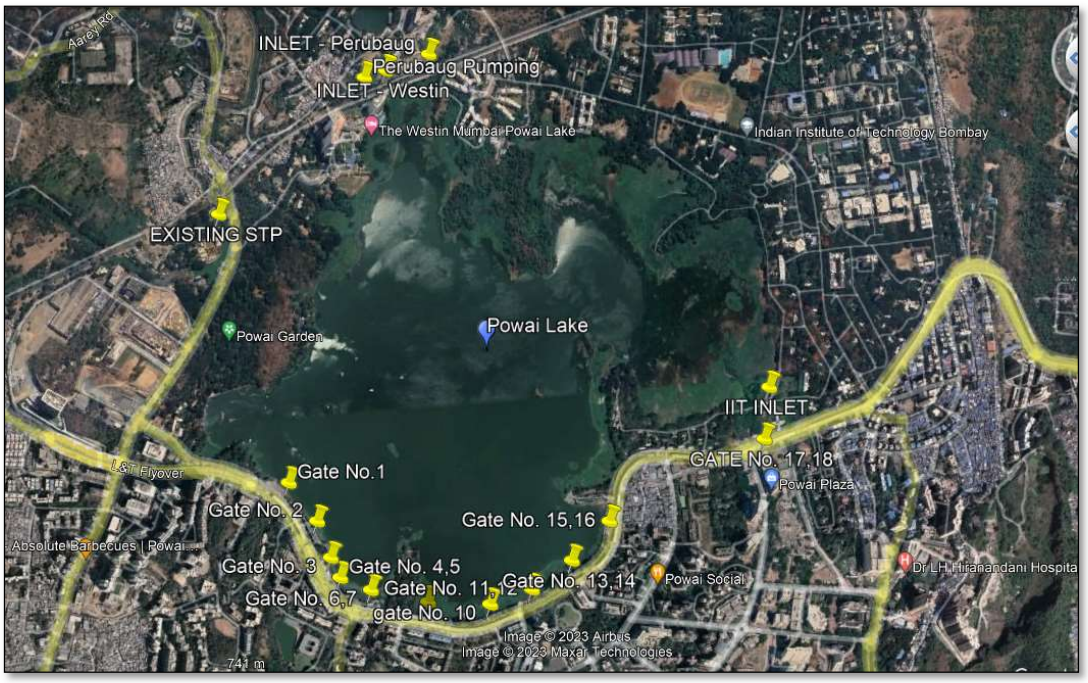


Figure 52 Various key locations around Powai Lake

Table 2 Location Details of Flood Gates

Sr No	Gate Number	Zone	Easting	Northing
1	Gate-1	43Q	278904.33 m E	2115842.41 m N
2	Gate-2	43Q	278986.00 m E	2115710.00 m N
3	Gate-3	43Q	279019.92 m E	2115588.24 m N
4	Gate-4 & 5	43Q	279045.00 m E	2115521.00 m N
5	Gate-6 & 7	43Q	279141.00 m E	2115472.00 m N
6	Gate-8 & 9	43Q	279323.52 m E	2115416.05 m N
7	Gate-10	43Q	279524.55 m E	2115389.57 m N
8	Gate-11 & 12	43Q	279664.45 m E	2115424.46 m N
9	Gate-13 & 14	43Q	279803.30 m E	2115504.98 m N
10	Gate-15 & 16	43Q	279937.38 m E	2115619.95 m N
11	Gate-17 & 18	43Q	280468.66 m E	2115836.93 m N

3.3 Existing Sewage Line condition

Considering the ongoing works of Metro line along JVLR and various utilities passing through the existing concrete road, it seems to be difficult to repair the existing damaged sewage lines along the road. Considering the site conditions and feasibility, the interception and diversion is possible only at gate location along the promenade. Also, as per the information collected from the department and verifications done at site the existing micro line of 800 mm dia starting from Powai Pumping Station is flowing with full capacity ahead the junction of LBS road. Considering all the collected information, instructions received from BMC time to time and feasibility at site, following solution is proposed for the sewage ingress issue at the lake.

3.4 Proposed Scheme

3.4.1 Design of Sewage flow

- The theoretical sewage flow of existing sewer lines and adjoining slums to Powai Lake is as below:

Table 3 Theoretical Sewage Flow Calculations

Area Name	Area contributing (sq. m)	Area contributing (HA)	Avg.Density Huts / Hac	Total Huts	No. of People /huts	Current Population
Shri. Ganesh Nagar 1&2	40,493.53	4.049	750.0	3,037	5	15,185
Sainath Nagar	33,711.03	3.371	750.0	2,528	5	12,642
Chaitanya Nagar	75,163.74	7.516	750.0	5,637	5	28,186
Swaminarayan Nagar	53,541.41	5.354	750.0	4,016	5	20,078
Total Slum				**15,218**		**76,091**

Note : Population Projection by Area Density Method

Note : Reference- Density data from SRA

Slums Area Name	Current Population	Projected Population	Water Supply Rate (LPCD) 135%	Sewage Generation (MLD) = 80 % of Water Supplied (MLD)	Infiltration	Total Projected Flow (MLD)
Shri. Ganesh Nagar 1&2	15,185	27,941	135	3.02	5%	3.17
Sainath Nagar	12,642	23,766	135	2.57	5%	2.70
Chaitanya Nagar	28,186	52,990	135	5.72	5%	6.01
Swaminarayan Nagar	20,078	37,747	135	4.08	5%	4.28
				Total		**16.15**

- Details of Slums contributing sewage to Powai Lake is as shown in the figure below:

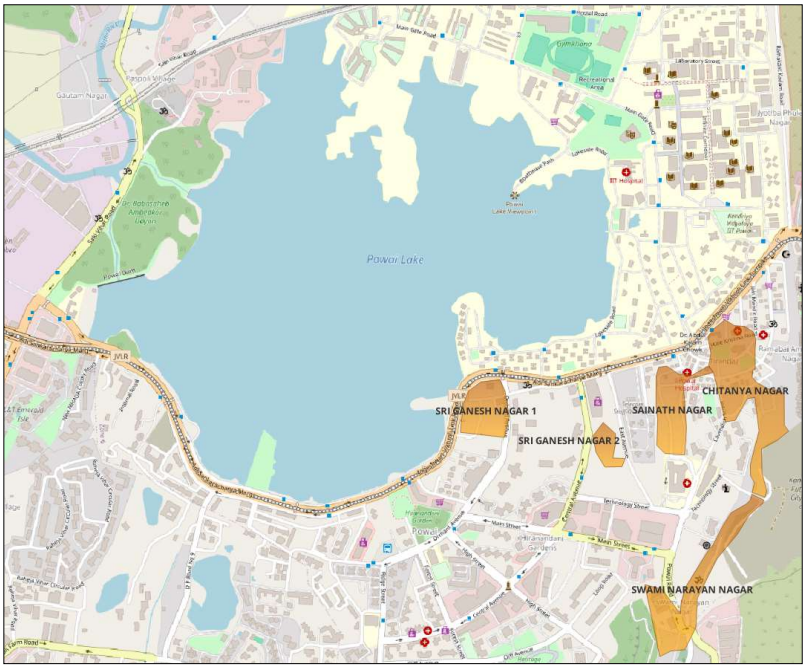


Figure 53 Map showing Slum Pockets around Powai Lake

3.4.1.1 Gate wise sewage flow

Gate-wise sewage flows are mentioned below-

Table 4 Flood Gate-wise Sewage Flows

Sr. No	Gate no	Flow (MLD)	Remark
1	Gate no 1	0.5	Continuous sewage flow
2	Gate no 2	0.5	Continuous sewage flow
3	Gate no 3	-	No DWF observed
4	Gate no 4,5	1	Continuous sewage flow
5	Gate no 6,7	0.5	Continuous sewage flow
6	Gate no 8,9	0.5	Continuous sewage flow
7	Gate no 10	-	No DWF observed
8	Gate no 11,12	1.5	Continuous sewage flow
9	Gate no 13,14	3.7	Continuous sewage flow
10	Gate no 15,16	3.8	Continuous sewage flow
11	Gate no 17,18	4	Continuous sewage flow
	Total	**15.85 MLD**	
12	Outfall near Perubaug area	2	Continuous sewage flow

3.4.2 Following three proposals are suggested in the project

Considering the existing topography, flow generations, feasibility, site conditions and directions of BMC time to time the proposed solution is mentioned below:

3.4.2.1 Proposal -1 (Diversion to existing sewer system)

Flow of around 7.8 MLD from Gate No 15 to Gate No 18 will be diverted to existing micro tunnel line of 800 mm dia near Powai Plaza of length 705m having Diameters of 400 mm to 630 mm.

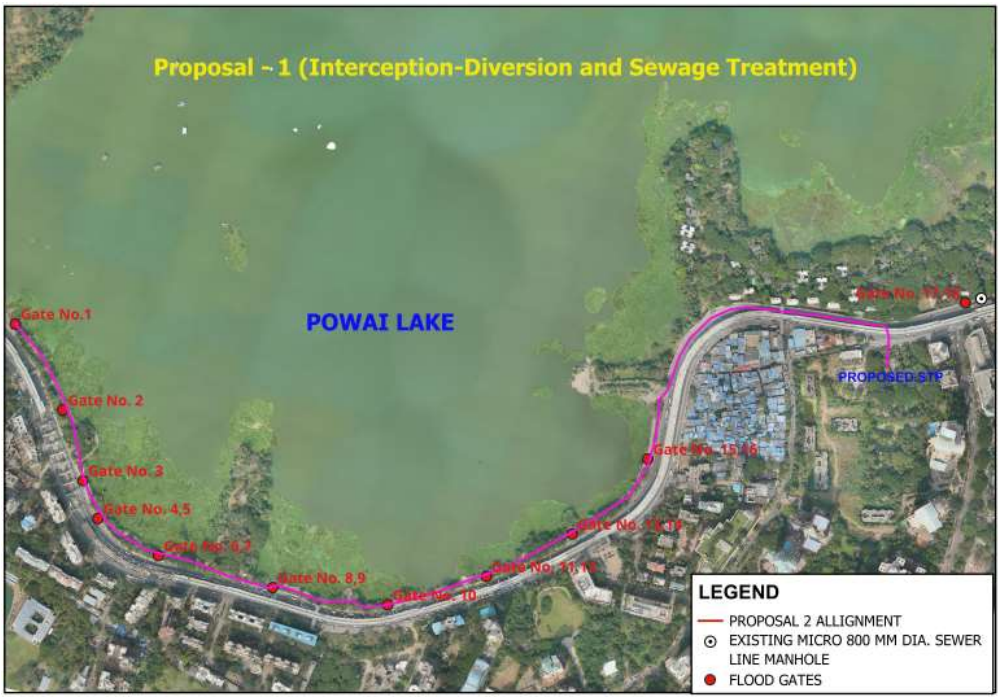


Figure 54 Proposal 1 Layout

3.4.2.2 Proposal -2 (Interception-Diversion and Sewage Treatment)

Flow of around 8.2 MLD from Gate No 1 to Gate No 14 will be Intercepted and diverted to a proposed STP at abandoned Powai Sewage Pumping Station with the help of sewer line of length 1911 m having Diameter of 315 mm to 630mm.

Figure 55 Proposal 2 Layout

3.4.2.3 Proposal -3 (Interception-Diversion of Non-Point Sources)

Flow from non-point sources is proposed to be tapped at the boundary of the lake through interception and diversion arrangement. These intercepted flows will be diverted to the Peru Baug Pumping station which sends the flow to the Mithi River 8 MLD STP with the help of sewer line of length 200 m having diameter of 315 mm.

Figure 56 Proposal 3 Layout

3.5 List of Major Project components

Following is the list of major components of various proposals suggested in the DPR is as below:

Table 5 List of Proposed components in Proposal 1

Sr. No.	Component	Description
1	Sewage Diversion Line	Length - 703.4 m. by Open-cut method
2	Interception and diversion arrangement	2 no. of I&D including coarse screen and Gate arrangement

Table 6 List of Proposed components in Proposal 2

Sr. No.	Component	Description
1	Sewage Diversion Line	Length - 1910 m. by HDD method
2	Interception and diversion arrangement	9 no. of I&D on Flood gates from 1 to 14 including coarse screen and Gate arrangement
3	Demolition	Demolition of existing civil & steel structures at STP plot as per directions of BMC
4	Pre-Treatment	Appropriate Primary Treatment before or in the wet well as per approved design with 6 years of O&M
5	Instrumentation Works	2 set of analysers (one at inlet and one at outlet of STP which includes pH, COD, BOD, TSS, TOC, TDS, ORP, DO, Ammonical Nitrogen, Nitrate, Phosphate, O&G, Fluoride, Chloride, Total Residual Chlorine, Free Residual Chlorine, Toxicity Monitoring including with SCADA system) and single set of Total Coliform analyser and Odour control system with 6 years of O&M
6	Wet well	15m Depth with 8 MLD capacity
7	STP	MBR Technology with 8 MLD capacity with Electro chlorination Disinfection system with 6 years of O&M
8	Treated water discharge line	Total Length - 700 m. (600m. Length by Open-cut method and 100m. length by HDD method for Road Crossing
9	Compound wall for STP plot	Length - 370 m. with 1.5m height

Table 7 List of Proposed components in Proposal 3

Sr. No.	Component	Description
1	Sewage Diversion Line	Length - 221.5 m. by HDD method
2	Interception and diversion arrangement	2 no. of I&D on Flood gates from 15 to 18 including coarse screen and Gate arrangement

3.6 Scope of work

Broadly the scope of work includes the measures to curb the pollution caused due to direct discharge of untreated sewage into the Powai Lake.

The scope of the work in short includes the following but not limited to -

- Study of earlier master plans & various related reports, drawings if any in connection with the sources of dry weather flows

- Preliminary and detail topographic survey including Total Station for project area
- To carry out survey of Roads such as DP roads, existing roads etc
- To carry out survey of existing Sewerage disposal systems and utilities such culverts, nallas, etc.
- Site Clearing, Excavation, Levelling, Grading and Backfilling Activities
- Sample geotechnical investigations as per requirement.
- Hydraulic modelling/simulation and planning of sewers/pumping station, STP etc
- To study technical feasibility and economic viability of the project
- Detailed planning and detailed design of STP's compliant with CPCB/ MPCB specified requirements in consultation with the original equipment manufacturer (OEM) of membrane in order to ensure that the plant performance is in accordance with the objectives of the project outlined in the bid document.
- The MBR system shall be designed with all the necessary automation, instrumentation and integrated with the other STP Process Units
- The bidders have to submit the MOU with the technology provider, of the STP having the proven MBR Based technology experience and facilities for designing and manufacturing of the key components of the STP capable of producing Effluent (product water) of the prescribed standards in the tenders
- Successful bidder along with the technology provider whose Memorandum of Understanding (MOU) has been submitted at the time of bidding shall comply the following engineering details for the design approvals.
    - Detailed Sizing, Design and Engineering of all treatment units, buildings, structures, and equipment (including all civil, mechanical, electrical, architectural, instrumentation, control, automation, and SCADA components)
    - Preparation of GA Drawings, Site Layout, Unit Process/Equipment/Facility/Building layouts, Hydraulic Profile, Process Flow Diagram, Process and Instrumentation Diagram (P&ID)
    - Submission of Process and Hydraulic Design for approval which shall fulfil the latest CPHEEO manual standards of Recycling and reuse of waste water for gardening
- Design and Construction of all Civil Structures and Building Works including deep well as instructed by BMC

- Design, supply, installation, testing and commissioning followed by operation and maintenance for a period of 06 years including asset replacement and renewal of necessary items of SCADA Automation of the entire STP, Sewage collection, pumping and integration with the STP treatment units, operation of all the pumps at various locations
- The instrumentation shall be designed to analyse and monitor following parameters (but not restricted to):
  - ✓ For Inlet of STP: pH Analyzer, COD, BOD, TSS, TOC Analyzer, Total coliform Analyzer, Nitrate and Ammonical Nitrogen Analyser.
  - ✓ For outlet of STP: pH Analyzer, COD, BOD, TSS, TOC Analyzer, Total coliform Analyzer, Nitrate and Ammonical Nitrogen Analyser, Toxicity monitoring system
  - ✓ The contractor may opt for any type analyser combined or individually for plant.
- Design, Construction and Commissioning of Bypass Lines
- The whole STP premises should have a well-designed Landscapes, tree plantations, Tiled path ways, Proper Safety hand railings at all Units, area lighting for the whole plant area and must have well-designed sewage & drainage system
- Unique characteristics that the bidder is proposing shall be shown separately to clarify intent. Architectural floor plans showing the proposed layout of rooms and spaces, building elevations showing proposed finishes and materials, and code requirements. It should include Mechanical plans showing the proposed equipment layout and interconnecting piping.
- The Contractor shall submit architectural Designs and Concepts along with the technical proposal of the tender and after obtaining comments from BMC along the detail engineering drawings. The architectural design proposals for Sewerage Treatment Plant for interior and exterior architecture along with an appropriate landscaping scheme.
- The contractor shall give statement of Architectural factors in the design in relation to locality and surrounding
- Architectural work shall include walls, roof, flooring and floor finish, roof water proofing, down water pipes, windows, ventilators, doors, glazing, equipment access doors, painting and other ornamental works
- The contractor shall Horticultural, arboriculture, and architecture elements for boundary wall lawns, green walls, ground covers, rockeries, creepers & climbers, shrubs, flower

beds planters at all levels of the building, indoor plants and other pot plants within the Sewerage treatment plant

- The contractor must have installation along the paths, fountains and other hard landscape features in the garden area including decorative electrical fittings and lights etc
- Odour control mechanism needs to be installed which can remove the foul order if emitted from plant even during Maintainace period
- Signage and warning boards all buildings and treatment units shall be provided with sign boards indicating the name and function of these
- Contractor should design the plant in such a manner that the Vehicular approach shall be provided from entry and exist point of Sewage treatment plant up to the centrifuge building, Blower Room for execution and Operation and maintenance point of View and for Fire Fighting System, movement of Tools & Tackles for handling of equipment during maintenance
- Submission of Detailed Engineering Designs, Drawings, Process Calculations, Data Sheets as per bid requirements
- Submission of Operation and Maintenance Manuals
- The Contractor should note that the Sewage Collection System and STPs will be constructed under single contract. The Contractor shall familiarize himself with the schedule for the Sewage Collection System conveying wastewater to that STP and monitor the progress on a regular basis. All components of the plant shall be adequately secured, protected, maintained, and exercised according to manufacturers' instructions during contract period.
- Providing Training Services to Employer's Personnel
- Contractor has to take the third-party approval of process and hydraulic design from IIT Bombay /NEERI as instructed by Engineer In charge. The Fees for third party approval of IIT/ NEERI shall be borne by the BMC.
- Preparation and Submission of As-Built drawings for all Civil, Mechanical, Electrical, Instrumentation, SCADA Works.
- Store room shall be constructed as per need of the project and as instructed by engineer In charge.
- Working of STP should be such as to meet the required effluent quality parameters given in the tender document

- Real time monitoring of all required parameters of STPs and online analysis of effluent parameters shall be available with the help of relevant technology to the BMC officers through mobile app as directed by engineer-in-charge
- Contractor shall submit total electric load for STPs along with the bid in 'Packet B'
- Payment of electricity charges during operations of STP and associated infrastructures like pumping etc. shall be directly paid to the respective Power Distribution Company by the BMC upto the approved consumption of power by BMC from time to time.
- The penalty due to lagging or leading power factor will be paid by contractor. Also, if the maximum demand exceeds than the designed load submitted by the contractor, payment for excess load will be paid by contractor.
- Day to day and periodic maintenance of all the equipment's shall be done
- List of working Staff at STP along with the organization chart shall be given
- Construction of temporary structures and cofferdam as necessary
- Safety rules, regulations and arrangements shall be followed by the contractor as per the standard safety guidelines
- Contractor shall keep plant area clean and maintained.
- Regular (Weekly or as and when required) testing of parameters (BOD, COD, DO, TDS, pH, TSS etc.) shall be done from NABL accredited laboratory.
- Instruments calibration and testing shall be done
- The cost of water, chemicals shall be bear by the Contractor
- Contractor shall submit Contractor's All Responsibility (CAR) and other required policy documents
- Transportation and disposal of Grit/sludge as instructed by Engineer In charge after appropriate sludge treatment required as per standards, at his own cost
- Contractor is responsible for taking all clearance required for execution of project
- It shall be the responsibility of contractor to control the odour by installing adequate odour control mechanism during entire operation period and maintain dB level during entire operation period as per the relevant government circular
- It is contractors' responsibility to maintain flow in laterals and periodical cleaning of inspection chambers as per directions of Engineer in charge by using mechanical means
- Removal of encroachment, obstructions falling along work as per discretion of BMC

- Co-ordination for obtaining permissions and approval of all concerned agencies including Electrical Inspector, Safety Office, Tree authority, CRZ Regulatory Authority, Pollution Control Boards, Service Providers all expenses and fees connected with permissions and approvals shall be borne by the bidder
- Detailed technical design report covering all aspects of scope of work
- To do planning and designing of sewer network by gravity or any suitable method along with treatment plant (with pumping stations, rising mains if necessary)
- Preparation of GFC (Good for Construction) drawings
- Execution of all Civil, Mechanical, Electrical, Instrumentation, SCADA Works at Site including Construction, Erection, Testing along with required foundations.
- Necessary provision for temporary flow diversion
- Construction of Internal Plant Roads, Curbs, Pavements, Parking Spaces, Compound Wall, and RCC Storm Water Drains wherever required as per site conditions and as instructed by Engineer In charge
- Provision of CCTV surveillance and Fire safety provision including sprinkler systems as per CFO requirements including with O&M period
- Plantation and Landscaping work as per the site condition and as instructed by Engineer In charge.
- Ownership rights of treated water shall be vested with the BMC
- To obtain all the necessary permissions required for execution of the project
- To prepare L-sections showing invert levels, ground levels, manhole details of proposed sewer lines (Main/Branch sewer lines) and also same for existing sewer lines if any.
- Desired discharge Parameters of the treatment plant as per the Pollution Control Board guidelines are as follows –

Sr. no.	Parameters	Unit	Quality Parameter of Treated Water
1	Bio chemical Oxygen Demand (BODs)	mg/l	< 3
2	Chemical Oxygen demand (COD)	mg/l	< 50
3	Total Suspended Solids (TSS)	mg/l	< 10
4	Color		Colorless
5	Total Nitrogen (TN)	mg/l	< 10

Sr. no.	Parameters	Unit	Quality Parameter of Treated Water
6	Total Phosphorus	mg/l	< 1.0
7	pH		6.5-8.5
8	Oil and Grease	mg/l	<10
9	Fecal Coliform	MPN/100 ml	Below Detectable Level
10	Odour		No noticeable offensive odor
11	Temperature	^{o}C	Ambient

4 Design Consideration (Hydraulics)

4.1 Design Criteria

This system design is essentially based on design criteria based on present practice as spelt in the manual on sewerage and sewage treatment published by CPHEEO, manuals and codes of other nations, studies reported in literature and papers in journals etc. Where possible, changes are suggested to evolve a more efficient design to effect economy in cost, within the constraints of an acceptable performance level for individual components and without comprising engineering.

4.2 Sewage Generation

The sewage flow is considered as 85% of the net water supplied to the consumer. Considering 135 LPCD water supply, the rate of sewage generation works out as 114.75 LPCD and the same has been adopted. Summary of Projected Population and Sewage Flow of town is given in Table

4.3 Design period

Sewerage projects are normally designed to meet the requirements over a period of 30 years after their completion. However, the period of 30 years may be modified in respect of certain components of the project depending on their useful life or the facility for carrying out extensions when required and rate of interest, so that expenditure far ahead of its utilization is avoided. Here the sewer network has been designed for 30 years including trunk mains, laterals and sewer pipes.

4.4 Peak factor

The rate of flow of sewage varies from season to season (seasonal or monthly variation), from day to day (daily variation) and from hour to hour (hourly variation). For design of sewers maximum or peak flow rates are adopted. The value of peak factor (ratio of maximum flow to average flow) depends on the contributing population and the values recommended in the Manual on Sewerage and Sewage Treatment prepared by CPHEEO are given below

Table 8 Peak factors for Sewage Flow

Sr.no.	Contributing population	Peak factor
1	Up to 20000	3
2	20,000 – 50,000	2.50
3	50,000 – 75,000	2.25
4	Above 75,000	2

4.5 Water supply rate

Recommended per capita water supply for designing as per CPHEEO manual are as follows:

Table 9 Water supply details

Sr. No.	Classification of town/ cities	Recommended maximum water supply
1	Town provided with piped water supply without sewerage system	70 LPCD
2	Cities provided with piped water supply where sewerage system existing	135 LPCD
3	Metropolitan and mega cities	150 LPCD

4.6 Minimum size of sewer

Minimum pipe diameter recommended in CPHEEO manual is 150 mm except that in hilly areas, where extreme slopes are prevalent, 100 mm can be used. Some states have started adopting minimum diameter as 200 mm or even 250 mm. The logic is i) Maintenance of sewer system is generally not good and 150 mm dia sewer will block frequently and remain un attended for some time ii) Quality of construction in smaller size RCC main such as 150 mm is not good iii) The sewerage system is not totally closed one and undesired waste such as solid waste and drains finds way in sewerage, making smaller size sewer lines more prone to frequent blocking iv) The cost of pipe line element is only about 15 percent of total project cost and increase in pipe size from minimum of 150 mm to minimum of 200 mm size will increase cost of project by 2 percent whereas flow capacity increases by more than 80 percent.

4.7 Pipe Material for Collection System.

Reinforced Cement Concrete (R.C.C.) pipes for size minimum 300 mm are proposed, with rubber gasket at joints are proposed for sewers. R.C.C. pipes are available in three classes i.e., NP2, NP3 and NP4. Cast-in-situ reinforced concrete sewers are constructed where they are more economical, or when non-standard sections are required, or when a special shape is required or when the headroom and working space are limited.

High Density Polyethylene HDPE pipes for sizes from 230 mm to 1000 mm can be used. The advantages of HDPE pipes offering smooth interior surfaces and offering relatively highest resistance to corrosion are recognized and they are available in solid wall. When laid in straight gradients without humps or depressions, they can easily offer longer life cycle. Methods of joints are usually fusion welded or flange jointed depending on straight runs or fittings.

4.8 Depth of flow

As per CPHEEO manual the maximum flow depth should be 0.8 full at ultimate peak flow for all pipe diameters.

4.9 Minimum cover

The minimum cover without protection has been proposed 1.00 m above the pipe. With adequate cement concrete encasing the cover can be suitably reduced. The maximum depth of sewer pipe can be kept as per site conditions to minimize the number of pumping stations. Normally the same has been kept 2-5 m.

4.10 Bedding

Bedding shall be designed corresponding to laying condition of sewer in trench, embankment or tunnel as per CPHEEO manual. Generally, sewers are laid in trenches by excavation in natural soil and then covered by refilling the trench to the original ground level. Four classes of beddings of A, B, C, and D are used for laying of sewers. Class A bedding may be either concrete cradle or concrete arch. Class B is bedding having a shaped bottom or compacted granular bedding with a carefully compacted backfill. Class C is an ordinary bedding having a shaped bottom or compacted granular bedding but with a lightly compacted backfill. Class D is one with flat bottom trench with no care being taken to secure compaction of backfill at the sides and immediately over the pipe and hence is not recommended. Class B or C bedding with compacted granular bedding is generally recommended. Shaped bottom is difficult and costly and hence not recommended. The pipe bedding material must be firm and not permit displacement of pipe.

4.11 Manhole

Manholes are proposed at every change of alignment, gradient or diameter, at head of all sewers and at every junction of sewers. The sewer shall be in a straight line between two manholes. The channels in manholes at junctions and bends shall be smooth with gradual transitions to avoid turbulence and deposition of solids. Manholes are usually constructed directly over the line of the sewer. They are circular, rectangular or square in shape. Manholes should be of such size that will allow necessary cleaning and inspection. The circular manholes have been proposed on all sewer lines. Poly elastomeric M S flats footrest has been provided for entry into manholes.

4.12 Spacing of manhole

For inspection, cleaning and testing of sewers, manholes shall be provided at every change of alignment, gradient, diameter, head of sewers and at junction of sewers. The spacing of manholes is given in-

Table 10 Manhole spacing details

Sewer size	Manhole spacing
Sewer < 900 mm	Maximum 30 m
900 –1,500mm	90 – 150 m
1,600 – 2,000 mm	150 – 200 m
> 2,000 mm	Up to 300 m

4.13 Size of Manhole

Manholes should be sized to allow necessary cleaning and inspection. The sizes are given in table 14 Circular manholes are stronger than rectangular and arch type manholes and thus these are preferred over rectangular as well as arch type manholes. The width/ diameter of the manhole should not be less than internal diameter of the sewer + 150 mm benching on both sides. A slab, generally of plain cement concrete at least 150 mm thick shall be provided at base to support the walls of the manhole and to prevent entry of ground water. The thickness of the base shall be suitably increased up to 300 mm, for manholes on large diameter sewers with adequate reinforcement provided to withstand excessive up lift pressures. For inspection, cleaning and testing of sewers, manholes shall be provided at every change of alignment, gradient, diameter, head of sewers and at junction of sewers. Various types of manholes and details are provided in CPHEEO manual.

Rectangular		Arch-type		Circular	
Depth	Size	Depth	Size	Depth	Size
< 900	900 x 800				
900 – 2,500	1,200 x 900			900 – 1,650	900
		>2,500	1,400 x 900	1,650 – 2,300	1,200
				2,300 – 9,000	1,500
				9,000 – 14,000	1,800

Source: CPHEEO Manual on Sewerage
Note: All dimensions are in millimeter

4.14 Drop manhole

As per CPHEEO manual Drop manhole to be provided when a sewer connects with another sewer, where the difference in level between water lines (peak flow levels) of main line and the invert level of branch line is more than 600mm or a drop of more than 600mm is required to be

given in the same line and it is uneconomical or impractical to arrange the connection within 600mm.

4.15 Nominal depth of sewers

Minimum depths of 1.8 m from ground for sewers have been kept as per CPHEEO manual and client's suggestion. It is recommended to adopt a general minimum depth of sewer as 1.8 to 2.0m.

4.16 Minimum Velocity

A minimum velocity of 0.6 m/s for present peak flow and 0.8 m/s at design peak flow is recommended for sanitary sewers. Thus, the sewers are designed on the assumption that although silting might occur at minimum flow, it would be flushed out during peak flow.

Table 11 Design velocities for Gravity Sewers

No	Criteria	Value
1	Minimum velocity at initial peak flow	0.6 m/s
2	Minimum velocity at ultimate peak flow	0.8 m/s
3	Maximum velocity	3 m/s

Source: WPCF, ASCE, 1982

4.17 Slopes of sewer

Table 12 Minimum Slope for Sanitary Sewers

Sewer Size (mm)	Minimum Slope		Sewer Size (mm)	Minimum Slope	
	As percent	As 1 in		As percent	As 1 in
150	0.6	170	375	0.15	670
200	0.40	250	450	0.12	830
250	0.28	360	≥525	0.10	1000
300	0.22	450			

4.18 Design Formula

The flow and velocity in the sewer have been calculated as per Manning's formula for open channel flow. The formula adopted for circular conduits as under: -

V= 1/n x R 2/3 x S 1/2

Where:

V= Velocity in meter/second. S= Slope or gradient of sewer. R= Hydraulic radius in meter.

N= Manning's coefficient of roughness.

Value of Manning's Coefficient:

Looking to the finishing of inner surface of pipes practically assuming good for outfall and fair for laterals, the value of 'n' has been adopted for type of sewers as under:

For SW pipes	=	0.012
For RCC Pipes 200 - 500 mm dia	=	0.011
For RCC Pipes above 500 mm dia	=	0.011
PVC pipes	=	0.011

4.19 Design parameters for proposed sewer line work

Table 13 Design Parameters for Proposed Sewer Line

Description	Design Parameter
The Design period	30 Years as per CPHEEO Manual
Sewage Contribution	85 % water supply including Kitchen waste 135 LPCD
Population Forecast	As per MHADA letter of tenements count and Proposed FSI given
Ground Water Infiltration	a minimum infiltration flow i.e., 5% of flow should be considered for designing.
Hydraulic Formula	Manning's formula has been adopted in design. It is suggested by Manual & is best for gravity flow in pipes
Peak Factor	PF as per manual is followed.
Depth of Flow in pipes	Not exceeding 0.8 full at ultimate peak flow
Self-Cleaning Velocity	Not less than 0.8 m/sec for peak flow but in initial stretches the minimum velocity cannot be achieved in design. Therefore, flushing system as CPHEEO Manual has been proposed in initial reaches, where velocity is less than desired.
Maximum Scouring Velocity	Restricted to 3 meters per second
House Sewer Connections	Provision of house connection for collection of waste water has been proposed from property line to manhole by PVC-U pipe.
Design calculation	On Excel computer sheet as per CPHEEO manual procedure.
Selection of Sewer Slopes	Guide line of CPHEEO Manuals and as per client provided slopes
Manholes	The provisions of manholes have been proposed as per guide lines given in CPHEEO Manual

Description	Design Parameter
Drop Arrangement	Drop arrangement is proposed where the laterals join the manholes of main sewer and difference between invert levels ofincoming and outgoing pipe is greater than 600 mm
Manholes Construction	Brick masonry manholes shall be constructed in brick masonryin cm (1:4) and plastered from both sides in 1:3 CM. Pre-cast RCC manholes have also been proposed.
Covers and Frames	The covers for circular manholes shall be with clear opening notless than 560mm. The manhole covers of pre-cast / Ferro- concrete are suitable to withstand heavy traffic loads as per IS standard.
Selection of Minimum Pipe	Though, CPHEEO manual and from client has recommended as 230 mm dia.
Size	pipe size as minimum for sewerage. However, minimum pipe size of 230 mm dia has been adopted
Pipe Material	RCC NP-4 / DWC pipes for sewer lines with granular bedding are proposed. From 230 mm to 1200 mm size, DWC pipe has been proposed for 230 mm and 300 mm sewer line as an alternative pipe material. This combination will help in laying sewer in densely populated area/ market & busy roads to reduce the public inconvenience for longer period. PVC-U pipe as per IS: 15328 for property connection and DI K-7/9 pipe for nallah crossing should consider.

Description	Design Parameter
Structural Design of Sewers	The structural design of sewers will be done in accordance with the guideline of the manual of sewerage and sewage treatment and in accordance with IS Code 4127-1967, 783-1959. The load over pipe will be calculated of refilling material both under trench and culvert condition. If the load calculated by use of trench formula is more than the load calculated by the culvert formula, the latter will be taken as the load on the pipe in trench due to filling material. Load imposed where necessary, on the pipe due to surface load has been considered, depending upon the class of wheel load. Care will be taken to see that the field loads on the pipe leave a factor of safety of 1.5 over its corresponding supporting strength. If the worst combination of afield loading on the pipe is achieved, then it is assumed that the supporting strength of the pipe shall leave a factor of safety of 1.5. RCC pipes of class NP4 will be selected as suggested in the above criteria.
Ventilating Shaft	Pre-Cast concrete shaft of 9 m height at the spacing of 300 mtr. C/C is proposed
Construction of sewer	Construction of sewer is proposed as per Manual. Trench less technology is suggested.
Maintenance of sewer network	The sewer network proposed to be laid shall be maintained by the contractor as per instructions of the engineer in charge.
Schedule of Rates	The rates for estimates in general are as per MCGM SOR- 2022-2023.

5 Design Consideration (Mechanical)

5.1 Pumping Station:

The design and selection of pumps for a sewage pumping station involves a multi-disciplinary team of experts who have to work out every detail of the fluid, mechanical and electrical aspects in order to obtain a satisfactory design and operation of the pumping station. Different types of pumps have their own purposes and characteristics. There are a series of decisions that have to be taken while selecting and designing the pumps. The various factors considered while designing the pumping station are:

1. Determine location and purpose
2. Determine the required discharge (average and peak flows)
3. Determine the required lift or pressure increase, including the variations therein, as well as the transport distance
4. Determine the type of liquid
5. Determine in and outflow condition, etc.

5.2 Location:

Pumping stations are normally located at the lowest point of the area as they are intended to serve. They will frequently, therefore be found alongside the watercourses that drain the area as they are the natural lowest level.

Proper location of the pumping station requires a comprehensive study of the area to be served ensure that the entire area can be adequately drained. Special considerations have to be given undeveloped or developing areas to the probable future growth as the location of the pumping station will, in many cases, be determined by the future overall development of the area. The site should be aesthetically satisfactory.

The pumping station shall be located and constructed in such a manner that it will not be flooded at any time. The station should be easily accessible under all weather conditions.

5.3 Determination of Flows:

Having decided on the location of the pumping station, its purpose and the contributory area., the next stage is to calculate average and peak flows for the present day and a point in the future at "design horizon' Whilst in the structural sense, concrete structures are designed for 30-50 years, are normally sized to deal with the peak flow at a 30-year horizon.

5.4 Layout:

The layout of pumping stations will primarily depend upon the local conditions. In general, it is said that the layout of a pumping station is logic fit of all functions of the station with sufficient room to move between machinery for erection and maintenance purposes, but without unnecessary empty spaces either in horizontal plane or in vertical plane. In principle, flow lines shall be as short as possible and no unnecessary bends shall be present in the piping.

Spaces are required for the following units.

- Inlet chamber
- Screen chamber
- Main collection sump / Wet well
- Treatment tanks
- Valve chamber / dry well
- Transformer station
- Electrical panel room
- DG set room
- Operations office

Two type of pump house layout is considered based on type of pumps:

- Dry well and wet well for horizontal centrifugal pumps
- Wet well and valve chamber for submersible pumps

5.5 Sewage Treatment Technology:

5.5.1 Membrane Bioreactor (MBR)

The MBR supports a concentration between 6000-10000 mg/l of MLSS with the aid of membranes which draw out or force out water while retaining the biomass in the bioreactor. This implies that the secondary clarifiers and tertiary filtration become redundant.

The high microbial mass concentrations suspended in the reactor decelerate the oxygen transfer. Savings from the elimination of the secondary clarifier and tertiary filtration are more than offset by the cost of membranes which is an order of magnitude higher. The conspicuous advantages of the MBR are jeopardized by the short lives of membranes which give rise to substantial downstream costs along the time horizon.

This analysis when compared with that for other competing technology options the MBR is a proven technology as it is used in various Govt and private sector. MBR Requires the least footprint area and also can handle varying loads and still give a consistent desired output.

6 Recycle & Reuse

The option of reuse and recycle is also possible, so as the treated effluent can be use in nearby park / garden area, play area so that drinking water can be saved. The treatments Technology shall be selected accordingly so the output quality shall meet the desired outlet standards of reuse and recycle as per CPHEEO Manual and CPCB guidelines.

Table 14 Recycle and Re-use standards as per CPHEEO Manual

Sr. No	Parameters	Toilet Flushing	Fire Protection	Vehicle exterior washing	Non-contact impoundments	Landscaping, Horticulture & Agriculture			
						Horticulture, Golf Course	Crops		
							Non edible crops	Crops which are eaten	
								raw	cooked
1	Turbidity (NTU)	<2	<2	<2	<2	<2	AA	<2	AA
2	SS	Nil	Nil	Nil	Nil	Nil	30	Nil	30
3	TDS	2100							
4	pH	6.5 to 8.3							
5	Temperature (°C)	Ambient							
6	Oil & Grease	10	Nil	Nil	Nil	10	10	Nil	Nil
7	Minimum Residual Chlorine	1	1	1	0.5	1	Nil	Nil	Nil
8	Total Kjeldahl Nitrogen as N	10	10	10	10	10	10	10	10
9	BOD	10	10	10	10	10	20	10	20
10	COD	AA	AA	AA	AA	AA	30	AA	30
11	Dissolved Phosphorus as P	1	1	1	1	2	5	2	5
12	Nitrate Nitrogen as N	10	10	10	5	10	10	10	10
13	Fecal Coliform in 100 ml	Nil	Nil	Nil	Nil	Nil	230	Nil	230
14	Helminthic Eggs/litre	AA	AA	AA	AA	AA	<1	<1	<1
15	Colour	Colourless	Colourless	Colourless	Colourless	Colourless	AA	Colourless	Colourless
16	Odour	Aseptic which means not septic and no foul odour							

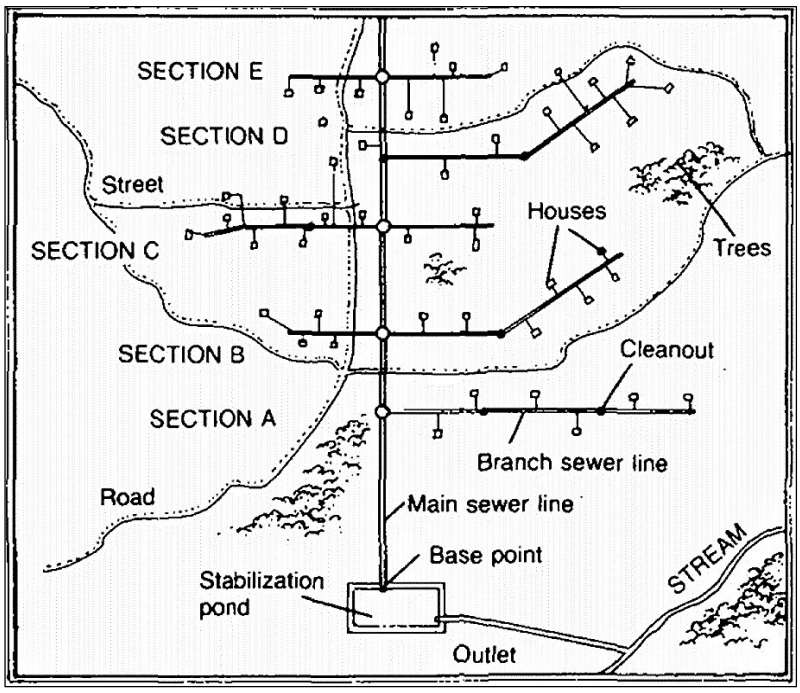
All units in mg/l unless specified; AA- as arising when other parameters are satisfied;

7 Construction Methodology

7.1 Conventional Gravity system

Conventional gravity sewers are large networks of underground pipes that convey black water, greywater and, in many cases, storm water from individual households to a (Semi-) Centralized Treatment facility, using gravity (and pumps when necessary). As pumps may be necessary if the landscape is very flat, or in hilly regions, they are mostly found in urban areas.

There are basically three types of sewer lines for conventional gravity sewers: primary, secondary and tertiary networks. The main line runs through the centre of the system, and all lines empty into it. It then carries wastewater to a semi-centralised or centralised treatment facility. Main lines generally have a diameter of 300 to 600 mm or above, and branch lines extend from them much like branches from the trunk of a tree. The sewage from one or more buildings are house laterals, usually of 100 mm in diameter, and empties into a branch line which usually also has a diameter of 200 to 300 mm. All sewer pipes are laid out in straight lines whenever possible and generally meet at right angles although the connection may be curved to ease the flow.



Benefits of gravity system

- No energy is required to operate the system as water is conveyed by gravity.
- No pump is required.
- Economical for long-term use.

- Simple operation
- Low maintains cost
- No energy cost

7.2 Trenchless Sewer Line Laying Technique

7.2.1 Horizontal Directional Drilling. (HDD)

Horizontal Directional Drilling (HDD) is a technique of installing subsurface pipelines, and utility conduits without trenches or other excavation. Using a directional drilling machine and its related attachments, it is possible to precisely drill along the desired bore path and back ream the necessary pipe to meet the utilities or telecommunications placement specifications.

In simple words, it is also known as directional boring, which refers to a novel approach for drilling sites to obtain oil while exerting less effort and energy than other directional drilling efforts. In projects where drilling companies choose to use horizontal drilling, a directional drilling machine is used to drill through a specific path that has been pre-determined.

Figure 57 HDD Machine Placement

7.2.2 Micro tunnelling Method

Micro tunnelling is a trenchless method of sewer construction. It is effective in soft, unstable, and wet soils and can crush large boulders. The tunnelling process is remotely controlled and can be used to install larger diameter pipes and longer pipe runs than the Jack and Bore method.

Crews dig a sending pit and a receiving pit to install a new sewer pipe. They place a micro tunnel boring machine in the sending pit and cut a hole underground horizontally from the sending pit to the receiving pit, without disturbing the surface above. As the machine drills the hole, a jacking rig functions like a jack hammer to push the new sewer pipe in place between the boring machine and the jacking rig.

The work involves the following steps:

- Dig a sending and a receiving pit to the required depth.
- Place a micro tunnel boring machine into the sending pit.
- Use the machine to cut a hole through the ground and push the new sewer pipe in place.
- Remove the micro tunnel boring machine and the jacking rig.
- Connect the new pipe to the existing public sewer.
- Cover open pits with steel plates—or secure the pits with fencing—at the end of each day as needed while work is in progress.
- Backfill pits with sand or gravel and apply temporary asphalt patches.
- Conduct quality control inspections.
- Complete permanent pavement restoration of patched pits after work passes inspections.

Figure 58 Typical Arrangement of Microtunneling

8 Execution Methodology

8.1 General

During construction full care needs to be taken for diverting traffic and for barricading and safety of the excavation sites. The excavated materials may have to be transported to other suitable sites (to maintain flow of traffic) and transported back for refilling of trenches, if required. All necessary tests should be listed and carried out with due diligence, and detailed in the technical specifications, manuals and IS codes: The surface drains should not be connected to the sewer systems as they also carry rain water, solid wastes and silt which tend to choke the sewers.

8.2 Priority in Sewer Construction Program

Priority in sewer laying should be in such a way that the system can be commissioned as soon as possible and early benefits can be delivered to the public. Works should be generally started at the downstream end of the systems i.e., from outfall to lateral. First priority shall be for STP, second for outfall sewer and then lateral and for other related works.

- A program should be developed for construction and commissioning according to the priorities.
- Necessary instructions should be issued by Engineer In-charge to the constructing agency that which lines should be taken up on a priority basis and shall also be ensured for the execution in accordance to the given priority.
- It should also be ensured that construction program should be prepared in practical manner. The following order of priorities may be kept into consideration:

8.3 Priorities in Lateral sewers

- Laterals which can be commissioned earlier i.e. In area where outfall/ main sewer laid and those areas covering maximum population from downstream to upstream
- Last priority to less populated areas (i.e., Less than 50% habitation)
- No laterals should be laid in areas where habitation has not developed in phase first.

8.4 Barricading, diversions, display boards for safety

The adequate & proper barricading shall be provided at site to have proper safety and facilitation to traffic / inhabitants in their day-to-day activities and should be decided by the Engineer in-charge to follow adequate safety measures based on prevailing site conditions.

It should be ensured that the barricading has been carried out properly and display boards for diversion, warning, work in progress, schedule of completion of activity in the area are displayed at required places and proper lighting arrangement at work sites are made during night for convenience & safety of the public. Proper safety arrangements in trenches, access to trench, proper stacking of construction material, immediate disposal of surplus excavated material should be ensured during construction.

- For excavated sites close to public roads/pathways, the area notice boards should have lights during night hours.
- Barriers or covering should be provided to excavations, shafts, pits and openings having a vertical fall distance of more than 2 meters, except during the period necessary for the access of persons and movement of plant, equipment and materials.

8.5 Shoring

As far as possible, the installation of shores should be done from the surface for sewers deeper than 1.5 M. The trench jack or horizontal braces should never be used as a ladder for getting in or out of a trench as they are not designed to take vertical load. Where shoring and shuttering for depth more than 1.5 M is to be provided the same shall be designed by contractor and shall be got approval from the engineer in-charge. At project formation stage it does not seem practical to generalize the design as many parameters affects the design load therefore where ever it is actually provided during construction stage.

8.6 Wooden shoring

Polling boards, walling and struts shall be suitably designed by the contractor during construction stage to meet different soil conditions that might be encountered in excavating trenches / pits. The horizontal and vertical spacing of struts shall be such that not only the sides of trenches shall be prevented from collapse but also easy lowering of pipe in trenches shall be ensured without creating undue obstructions for the excavation of the work. While taking out shoring planks, the hollows of any form must simultaneously be filled in with soft earth well rammed with rammers and with water. Engineer may order portions of shoring to be left in the trenches / pits at such places, where it is found absolutely necessary to do so as to avoid any damage which may be caused to buildings, cables, gas- mains, water mains, sewers, etc. in close proximity of the excavation, by pulling out the shoring from the excavations.

8.7 Removal of shoring

When the removal of shoring is planned, the possible collapse of trench sides should be anticipated. The newly installed utility line will then be safeguarded in the normal course by being covered with loose or compact fill before the shores are removed. If the trench is likely to cave in on removal of the shores, it can be filled up to the bottom with horizontal brace. It is a safe way for the worker to go down on the ladder and remove this brace, after which additional trench space can be filled up to the next horizontal brace or screw jack. If the trench is to stay after the removal of shoring, the ladder should not be removed till all work within the trench is completed and the newly installed utility line has been protected or covered.

8.8 Manholes

Design of sewerage networks is only indicative in respect of actual location of manhole and street chamber, which needs to be decided at the site as per site conditions. It is therefore required that before starting the work in a section, the location of manhole and street chamber should be decided, while deciding location of manhole chamber, it shall be ensured that no drinking water pipe line is passing through it.

8.9 Manhole Covers

The Manhole cover frame and outer frame shall be of CI

- It should be ensured that the manhole cover is of double seal as per drawing.
- Ferro cement cover on the manholes should be finished in all sides to avoid inconvenience or injury to the person going inside manhole.
- The cover should be fixed keeping the direction flow arrow towards the flow direction.

8.10 Backfilling and compaction in trenches.

Restoration of road, in case of trenches excavated for laying of sewer lines is a critical activity in the project. It should be taken care of that these excavated trenches are backfilled and compacted to required standards within the shortest possible time to avoid public inconvenience. Backfilling in prescribed thickness of layers & compaction to required density is very important. Proper care is therefore required to be taken at every level to ensure refilling of trench and restoration of road to desired standards. There should not be wide gap between the length of excavated trench and the refilling of trench in the works. This should be minimized and ensured that only minimum trench length is kept open with all safety measures.

The following procedure should be adopted for backfilling and compaction:

The trench should be refilled in the layers not more than 15 cm and should be compacted and rammed manually with rammer below 1.5 m depth (portion in which timbering is there) so as to achieve the desired dry density. The soil around the pipe and above up to 30 cm height shall be compacted carefully manually with rammer with watering as required.

8.11 Safety

In addition to the Cost, Time & Quality, the safety is also one of the important components of the construction management. The safety should not be compromised in any construction activity. The term "Safety" is defined as "A thing is provisionally categorized as safe if its risks are deemed known and, in the light of that knowledge, judged to be acceptable".

The most important ingredient in a safety program is the quality of the people and quality of their training. Safety is habit that can only be developed through repetition. Good habits are only developed by constant trainings in task in correct manner until the act is performed in a safe manner. It is therefore envisaged that stress shall be given on complying safety measures during construction and on-site training for the working staff.

8.12 Safety in Excavation and trenching

All trenches, 1.5 meters or more in depth shall at all times be supplied with at least one ladder for each 30 meters in length or fraction thereof.

- Ladder shall be extended from the bottom of the trench to at least 1 meter above surface of the ground. Sides of a trench which is 1.5 meters or more in depth shall be stepped back to give suitable slope, or securely held by timber bracing, so as to avoid the danger of sides collapsing. Excavated material shall not be placed within 1.5 meters of the edge of a trench or half of the depth of the trench, whichever is more.
- Cutting shall be done from top to bottom. Under no circumstances shall undermining or undercutting should be done/allowed.
- Minimum Check and Clear Edge of Trench -There is a tendency to dump the excavated material just on the edge of the trench when excavation is done manually. The material may slide back into the trench or apply additional load on shoring. A provision of clear berm of a width not less than one third of the final depth of excavation is recommended. In areas where this width of the berm is not feasible, the reduced berm width of not less

than one meter should be provided. It is always better to provide substantial toe board to prevent 'roll back' into the trench.

8.13 Handling of Plant and Machinery

- The excavation equipment should be parked at a distance of not less than the depth of the trench, or at least 6 meters away from excavated sides for trenches deeper than six meters.
- With the use of power shovels and draglines, the banks of trenches become Instable and thus dangerous for persons working nearby. These conditions should be watched and suitably remedied.
- The vehicles should not be permitted to be driven too close to the pit. Care should be taken for locating roads leading to or from the pit. While loading manually, the vehicle should not be taken too near the wall of the pit. Use of post legs will reduce the risk of accidents where the vehicle is reversed for loading.
- Workers should be provided with proper tools. Overlooking the importance of providing the right tools and protective gears for the job is perhaps the most serious risk to workers.
- Workers using tools should guard against the danger arising out of the sudden movement of material which may throw them off balance. They should be adequately spaced to avoid being accidentally struck by tools of others working nearby.

8.14 Access and Escape

The workers should be able to escape fast in the event of any mishap during excavation. It is recommended that one ladder should be provided for every length If 15 meters or fraction thereof in the case of relatively less hazardous work.

Quite often the pathways become slippery due to accumulation of mud, sand or gravel. This should be avoided. Further, the pathways should be strong enough to withstand the intended use.

8.15 Additional Precautions

The precautions should be taken of the power lines, cables during excavation and other operation. The alignment should be checked properly prior to excavation for any power cable etc.

- Ignorance and carelessness are major causes of accidents. Tendency to employ cheaper unskilled workers for jobs requiring proficiency and skill can lead to accident. This should not be permitted.
- Water for construction activities, rain water and water flowing in the drains are major cause of slides. Proper arrangement of diversion/ bailing out of such water should be done.

8.16 Safety in Construction during Monsoon

- Almost in all civil works, excavation and refilling of earth are common activities, which if not carefully executed may pose problems to the safety of works as well as passers-by and road users during the impending Monsoon. Normal to heavy rainfall event may affect our ongoing works in different manners. It should be our endeavour to ensure that such events do not prove to be problematic to people and structures in particular. Some of the probable occurrences are discussed below.
- The settlement in refilled trenches of sewerage and water supply lines may occur during monsoon. All Sites and the arrangements shall be inspected and shall be dealt effectively with the eventuality after a storm to identify such reaches and take immediate corrective action by refilling and compacting.
- The Labour team should be equipped with vehicle, gum boots, raincoats and T&P to tackle such situation during and after rains. Adequate quantities of earth, debris and gravel should be stacked at strategic places so that no time is lost in procuring such material.
- In trenches where pipe laying has been done and duly tested and approved, refilling should be done soon after and all surplus material relocated to safe disposal sites such that it does not obstruct traffic or waterways.
- The execution of works having deep excavation in smaller lanes and congested areas should be completed well before monsoon. The works of deep excavation during monsoon should not be preferably taken up or extensive care should be taken for execution of such works.
- All open ends of sewer lines should be firmly plugged to prevent debris from entering the line. Manhole covers of sewer lines should be fixed in place to avoid any harm to road users.

- Provision for safety engineer need to be taken in contract agreement for safe execution to avoid any incident.
- Provision for first aid box also need to be taken in contract agreement

8.17 Laying of Pipes

The laying of pipes and fittings / specials shall comply with all currently applicable statutes, regulations, standards and Codes. In particular, the following standards, unless otherwise specified herein, shall be referred. In all cases, the latest revision of the standards / Codes shall be referred to. If requirements of this Specification conflict with the requirements of the standards / Codes, this Specification shall govern.

8.18 Codes of practice

IS: 783	Code of Practice for Laying of Concrete Pipes.
IS: 311	Code of Practice for Laying of Cast Iron Pipes.
IS: 376	Safety Code for Excavation Work.
IS: 127	Code of Practice for Laying of Glazed Stoneware Pipes.
IS: 5822	Code of Practice for Laying of Welded Steel Pipes for Water Supply.
IS: 6530	Code of Practice for Laying of Asbestos Cement Pressure Pipes.

8.19 Excavation

The excavation of trenches and pits for manholes / chambers shall be carried out in accordance with the Specification and shall be done such that it does not get far ahead of the laying operation as approved by Engineer.

At every 30 meters interval and at every change in the gradient, sight rails shall be provided. The sight rails and boning rods for checking the excavation and inverts of the pipes shall be of the quality approved by the Engineer. The road metal and also the rubble packing shall first be stripped off for the whole width of the trench / pit and separately deposited in such place or places as may be determined by Engineer.

The material from excavation shall be deposited on either side of the trench leaving adequate clear distance from the edges of the trench and pit or as may be necessary to prevent the sides of the trench / pit to slip or fall or at such a distance and in such a manner so as to avoid covering fire hydrants, sluice values, manhole covers, etc. and so as to avoid abutting the wall or structure or causing inconvenience to the public and other service organization or otherwise as Engineer may direct.

All precautions shall be taken during excavation and laying operations to guard against possible damage to any existing structures/pipelines of water, gas, sewage etc.

Wherever a socket or collar of pipe or fitting / special occurs a grip is to be cut in the bottom of the trench or concrete bed to a depth of at least 75 mm below the bed of the pipe so that the pipe may have a fair bearing on its shaft and does not rest upon its socket. Such grip shall be of sufficient size in every respect to admit the hand, all around the socket in order to make the joint and the grip shall be maintained clear until the joint has been approved by Engineer.

The excess excavated material shall be carried away from site of works to a place up to a distance as directed by Engineer. This shall be done immediately so as not to cause any inconvenience to the public or traffic.

8.20 Refilling of trenches

Where the excavation is in rock shall be with the surplus soft soil from pits located in the nearby area where sewer line work is also in progress and soft soil is available, to handle otherwise situation lump sum provision for transportation of soft soil from suitable has been taken in BOQ.

The Standard trench section shall be allowed in general for excavation quantity to be measured for depth up to 3.5 m. The Width of trench as per standard trench section shall be Bc+200mm/Bc+500 mm for CC bedding/Granular bedding (where Bc is outer dia of pipe) at bottom of trench with offset of 75mm on either side at every 1.5 m depth. However, if the soil is loose and collapsible, timbering shall be done and if it is allowed to execute excavation in extra width, it shall be determined with the angle of repose of the soil and accordingly may be allowed. However, it shall be decision of the Engineer In-charge to decide whether excavation is allowed in extra width or timbering shall be done based on the economic criteria and site conditions.

Extra width for top 3.5m height may be allowed with total width of up to 4.0m or actual at site, whichever is lesser in case of excavation for higher depth (more than 3.5 m) and by mechanical means for taking the mechanical equipment (such as hydra etc) at appropriate depth to carry out excavation at depth more than 3.5 m with use of mechanical means. However, due care shall be taken by considering the road width available and danger to the adjacent structures but in no case extra width for excavation shall be allowed for depth more than 3.5m.

In congested streets/ lanes, it shall be preferred to carry out excavation work by manual means. However, in congested streets/ lanes or busy streets/ lanes, it shall be appropriate to carry out

excavation work in night and provision for excavation to be carried out in night with add extra rate has been taken in the estimates. In no case the foundation of other existing structure shall be exposed. The contractor shall get approval for any such situation that is likely to be arisen.

8.21 Minimum Earth Cover

If a profile is not furnished for a pipeline, the main will be constructed with a minimum earth cover of 1800 mm from the invert of the sewer except the shallow sewers governing the depth in initial reaches and rocky steep slope areas, unless otherwise indicated on plans and ordered by the Engineer.

8.22 Bedding

The bedding for pipe shall be provided as specified in the BOQ or as per direction of Engineer

As per CPHEEO manual following are the reference for class of bedding for conduits to be laid in trenches. In this project the bedding is of Granular sub base in all the case.

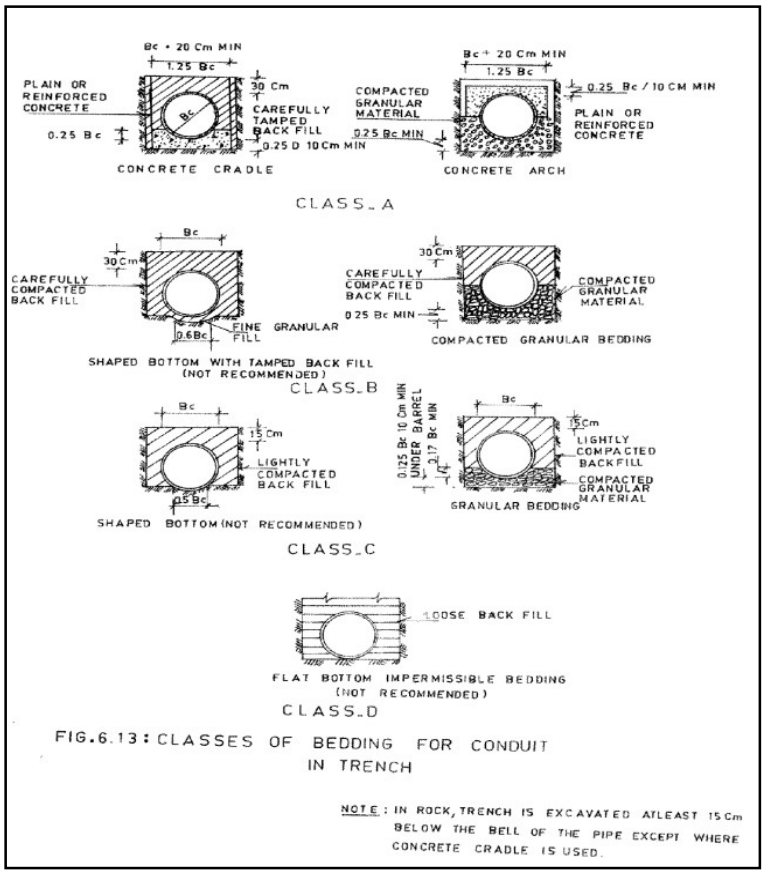


FIG.6.13: CLASSES OF BEDDING FOR CONDUIT IN TRENCH

NOTE: IN ROCK, TRENCH IS EXCAVATED ATLEAST 15 Cm BELOW THE BELL OF THE PIPE EXCEPT WHERE CONCRETE CRADLE IS USED.

8.23 Concrete cushion, embedment and encasement

Concrete embedmentand encasement wherever required, shall be constructed as directed by the Engineer. Where concrete bedding is to be placed beneath the pipeline, the sub-grade shall be prepared to dimensions as shown in the Drawings. The bottom of the trench may be sloped on the sides or kerbed, but the thickness of concrete shall be as specified in the Drawings or as directed by the Engineer. Dry mix will not be permitted.

For earth, granular material or concrete embedment, each pipe section shall have uniform bearing on the sub grade for the full length of the pipe barrel, suitable excavation shall be made to receive the pipe, bell or collar and allow adequate room for proper workmanship in making the joint. Adjustment to line and grade shall be made by scraping away or filling in with gravel or concrete and not by wedging or blocking up the bell. Pipe sockets and barrels shall be clean and free from dirt at the time of jointing.

The concrete for bedding portion will be mixed moist or damp to give a slump of not more than 25 mm and for sides and top portions of encasement, if specified, will be mixed to obtain a slump between 25 mm and 80 mm. All water in the trench must be disposed of prior to placing of concrete. There should be no cleavage line between the bedding concrete and the side embedment concrete. Clear out space shall be left for jointing and lowering pipe in place and bringing to grade by tamping under pipe or removing excess concrete under pipe. After the joint is made, the remainder of the concrete embedment may then be poured and thoroughly tamped to make bond with original concrete. Care must be exercised in tamping to prevent lifting of the pipe out of alignment or grade. Back filling shall be done in a careful manner and such time after the concrete cushion, embedment or encasement is placed, as not to damage the concrete in any way.

8.24 Temporary Stoppages of Work

At times when pipe laying is not in progress, or at the end of the day's work, the open ends of pipe shall be closed by a watertight plug or other means approved by Engineer. During the period that plug is on, the Contractor shall take proper precautions against floatation of the pipe owing to entry of water into the trench.

8.25 Testing and Commissioning

8.25.1 Water Tightness test

All hydraulic structures such as sewer lines, manholes etc., or any other liquid containers shall have to be tested for water tightness as specified in CPHEEO manual. Following shall be adopted for hydraulic testing of structure:

- Sewer line: - shall be tested in accordance to CPHEEO MANUAL
- Manhole: - shall be tested in accordance to CPHEEO MANUAL

8.26 Reinstatement of Road / Footpath

Reinstatement of road / footpath shall be done as per the requirements of local authorities and the relevant Specifications after the completion of work. The Road reinstatement shall be done for the width for which excavation has been carried out or as directed by engineer In charge. If the excavation of trench is done in extra width for which approval is not taken from the competent authority, payment for extra excavation and road restoration shall not be paid to the contractor, however, it will the responsibility of the contractor to re-instate the road. If any structure needs to be dismantled during the laying of sewer line shall be repaired to the original condition, however, prior approval shall be taken from the competent authority for payment purpose.

8.27 Clearing Of Site

All surplus materials, and all tools and temporary structures shall be removed from the site as directed by Engineer and the construction site left clean to the satisfaction of Engineer.

Measurement for pipes and fittings / specials shall be in accordance with the relevant clause(s) of Specification for particular types of pipes. Service lines if damaged during excavation shall be made good.

8.28 Manholes

The following standards, unless otherwise specified herein, shall be referred. In all cases, the latest revision of the Codes shall be referred to. If requirements of this Specification conflict with the requirements of the Codes and standards, this Specification shall govern.

IS: 111	Code of Practice for Ancillary Structures (Part I) - Manholes.
IS: 555	Cast Iron Steps for Manhole.
IS: 1077	Common Burnt Clay Building Bricks

IS: 3102	Classification of Burnt Clay Bricks.
IS: 395	Method of Sampling and Testing Clay Building Bricks.
IS: 2212	Code of Practice for Brick Work.

8.29 Bed concrete

The bed concrete shall be done in accordance to the specifications.

All materials shall conform to the relevant IS code and requirements laid in contract agreement. Erected and secured reinforcement shall be inspected and approved by Engineer prior to placement of concrete.

8.30 Workmanship

All bricks shall be thoroughly soaked in clean water for at least one hour immediately before being laid. The cement mortar for brick masonry work of manholes shall be in the proportion specified. Brick work 230 mm thick and over shall be laid in English Bond unless otherwise specified. 115 mm thick brick work shall be laid with stretchers. For laying bricks, a layer of mortar shall be spread over the full width of suitable length of the lower course. Each brick shall be pressed into the mortar and shoved into final position so as to embed the brick fully in mortar. Bricks shall be laid with frogs uppermost.

All brickwork shall be plumb, square and true to dimensions shown. Vertical joints in alternate courses shall come directly one over the other and be in line. Horizontal courses shall be levelled. The thickness of brick courses shall be kept uniform. For walls of thickness greater than 230 mm both faces shall be kept in vertical planes. All interconnected brickwork shall be carried out at nearly one level (so that there is uniform distribution of pressure on the supporting structure and no portion of the work shall be left more than one course lower than adjacent work. Where this is not possible, the work shall be raked back according to bond (and not saw toothed at an angle not exceeding 5o. But in no case the level difference between adjoining walls shall exceed

1.25 m. Workmanship shall conform to IS: 2212.

Brick shall be so laid that all joints are well filled with mortar. The thickness of joints shall not be less than 6 mm and not more than 10 mm. The face joints shall be raked to a minimum depth of 12 mm by raking tools daily during the progress of work when the mortar is still green, so as to provide a proper key for the plaster or pointing to be done. When plastering or pointing is not required to be done, the joints shall be uniform in thickness and be struck flush and finished at

the time of laying. The face of brickwork shall be cleaned daily and all mortar droppings removed. The surface of each course shall be thoroughly cleaned of all dirt before another course is laid on top. If mortar in the lower courses has begun to set, the joints shall be raked out to a depth of 12 mm before another course is laid. No extra payment will be made for raking joints.

8.31 Cement plaster work

All joints in masonry shall be raked to a depth of 12 mm with a hooked tool made for the purpose when the mortar is still green and in any case within 8 hours of laying. The surface to be rendered shall be washed with fresh clean water to make it free from all dirt, loose material, grease, etc. and thoroughly wetted for 6 hours before plastering work is commenced.

8.32 Pipe entering or leaving manhole

Wherever a pipe enters or leaves a manhole, PCC must be out to a proper form and must be laid around the upper end of the pipe so as to form an arch. All around the pipes, there shall be a joint of cement mortar 1:2, 13 mm thick between it and the bricks.

8.33 Measurement for manhole

The depth of manhole shall be measured from the top of cover to the invert level of the deepest outgoing sewer from the manhole.

8.34 Vent Shafts

Generally, Vent shafts shall be erected at places decided by EIC or as directed by Engineer. RCC Vent Shaft shall be connected to the nearest manhole shaft by 200 mm diameter RCC NP 3 pipe or as directed by Engineer with wire mesh cowl on top.

8.35 Traffic Diversion Plan

When the work of sewer line is in progress in narrow lanes of the town, the traffic diversion system in consultation with the local residents has to be planned as per the proposed execution time period of the lane or area under execution. Following points shall be kept in consideration while preparing the final diversion plan.

- The through traffic of town shall not have to follow narrow lanes to avoid heavy traffic jams.
- The traffic diversion also gives passage to inner circle resident of the area under execution.

- The traffic diversion shall be open only after checking the structural suitability of the road / drains on which/ on sides of which the proposed traffic flows.
- The traffic diversion boards with proposed timing and days be installed at required places.
- It should be ensured that the works executed shall be properly safe for the opening of the traffic prior to opening of traffic after execution of the work.
- The adequate & proper barricading shall be provided at site to have proper safety and facilitation to traffic / inhabitants in their day-to-day activities and should be decided by the Engineer in-charge to follow adequate safety measures based on prevailing site conditions.
- It should be ensured that the barricading has been carried out properly and display boards for diversion, warning, work in progress, schedule of completion of activity in the area are displayed at required places and proper lighting arrangement at work sites are made during night for convenience & safety of the public.

8.36 Construction Material

Construction material viz cement, aggregate, sand, brick, stone and steel are available in towns. RCC Pipes are also available in the nearby area of town. GRP & DWC Pipes and GRP manholes are not available in the town therefore contractor need to arrange for the same material of appropriate standard as approved by Engineer in charge.

8.37 Desilting operation

The following method shall be followed for the desilting of the sewers.

8.37.1 Desilting of Non man entry sewer:

Engaging the vehicle mounted combined jetting-cum-suction unit for the desilting of non-man entry sewer, which is capable of creating vacuum for sucking out dense waste / sludge like mud, slurry, grit etc. from the sewer line. High pressure cleaning system can jet water at about 100 to 140 bar, which can be adjustable as per the requirement by a control valve. By ensuring that no damage occur to the existing sewer. The concept of flushing with more water with less pressure shall be used for this cleaning operation. A specially designed rotary nozzle shall be used for the cleaning operation. High pressure water jet equipment will have about 120 meters long hose which will push the debris, sand in the opposite direction to the travel of the hose and the suction hose with suitable suction nozzle shall be used to remove all the debris, sand, sludge, etc., from the manhole into sludge tank. During the cleaning operation, manhole jack and hose guide

system shall be used wherever it is necessary to prevent damage to the high-pressure hose. The jetting & suction operation can be operated simultaneously for effective cleaning of the pipeline. The suction operation can continue till the sludge tank is filled with slurry, sludge, sand, etc. The safety valve provided inside the sludge tank will stop the operation once the high level is reached. Afterwards for discharge of the debris either this unit can move to the destination for dumping the debris or can transfer this material into another tanker for transportation to the site by blow operation or sludge can be transferred to barrels and the barrels can be transferred to the dump yard / treatment plant. As far as this process is concerned, the silt for drying either at site or any other place shall not be dump or stack. Various special nozzles for sewer cleaning and root cutting application shall be used. Wherever there is no approach to take the jetting cum suction unit, other conventional method for desilting shall be followed.

8.37.2 Desilting of man entry sewer:

The super sucker unit with payload carrier for desilting the man-entry sewer line shall be engaged. The equipment shall be provided with dewatering arrangement so that only silt / sludge shall be sent to the dumping yard. Through the existing manhole chamber necessary suction hose shall be sent for desilting operation. One end of the suction hose shall be connected to the specially designed suction nozzle for carrying out desilting operation and another end shall be connected to the vehicle mounted payload carrier tank to collect all the sludge, solid, debris, sand, silt, etc. The pay load carrier outlet pipe shall be connected to the vehicle mounted super sucker unit which generate high level of vacuum in the payload carrier tank. Super sucker unit will have diesel engine driven vacuum blower and specially designed cartridge filter and multicyclone, pneumatic control system, etc. Once this super sucker is operated it creates high level of vacuum inside the payload carrier through outlet hose. The payload carrier inlet pipe with necessary valve arrangement shall be connected to the suction hose through quick release coupling which shall be sent inside the manhole chamber for desilting operation. Desilting operation personnel with necessary safety gadgets will perform the desilting operation by proper manipulation of suction nozzle and hose inside the sewer pipe. Once the payload carrier is filled with sludge, silt, water and debris, etc., water shall be filtered back into the storm waterline by the dewatering arrangement and only the sludge and solid collected in the payload carrier shall be sent to the dumping yard. This operation shall be continuous till the silt in the entire stretch is cleaned completely. As far as our process is concerned, we will not dump or stack the silt for drying either at site or any other place. Once the first payload carrier is filled with silt, it shall be

sent for dumping and the second payload carrier shall be connected to the super sucker system so that the process can be continuous without any time loss. After dumping the silt in the dumping yard, the payload carrier shall be returned back for further collection of silts.

8.38 Sewer cleaning:

During desilting operation if there is any hard deposit of silt high-pressure water jetting system to dislodge the same shall be used. After desilting to remove any deposits inside the sewer line, a high-pressure water jet system with specially designed manipulator with nozzle for cleaning shall be used. High pressure cleaning system can jet water at about 100 to 140 bar which can be adjustable as per the requirement by control valve. It shall be ensured that no damage occur to the existing sewer. During the cleaning operation, manhole jack and hose guide system shall be used wherever it is necessary to prevent damage to the high-pressure hose. A trolley / truck mounted high-pressure water jet system for sewer cleaning shall be used. HP water jet system shall be consisting of high-pressure pump driven by diesel engine and necessary HP hose of about 120-meter length with suitable nozzles.

8.39 Internal condition survey & CCTV inspection:

After desilting and before starting lining works and pipe bursting work, a detailed inspection of sewer by CCTV System shall be done. This shall be executed with a CCTV camera, operated from the surface. At the same time, the depth of the manholes and the invert levels of the connected sewers shall be measured and indicated on the plan. After CCTV survey 2 copies of video tapes (colour, PAL format) / 2 copies on CD, 2 copies of the inspection and classification report including colour and still photographs shall be submitted. The reporting shall be according to the "Manual of sewer condition classification"

After cleaning, the sewer shall be surveyed using remote controlled CCTV video camera equipment. The camera unit has pan, tilt and zoom capability to enable close inspection of any points of interest. It shall be crawler mounted and positioned so that it shall be in the Denter of the pipe being surveyed. It shall be powered by cable from the surface, which also measures the chain age to enable location of specific points. The survey shall be recorded in MPEG format on DVD / videocassette which shall be allowed to prepare a detailed reporting and analysis.

The CCTV and video inspection shall be done before lining and also after lining.

Granite XP data collection and management software offering unmatched flexibility, customization and ease of operation shall be used. These software's shall be designed with asset-based architecture so it shall possible to navigate to a particular asset (e.g., pipe segment or manhole) and view all inspection. These software's should have the ability to support and synchronize with multiple data sources such as Microsoft access, oracle or SQL server.

These software's shall have the following advantages:

- View pipe graph in real time
- On screen report generation
- Search and filter data
- Random access to video frames instantly with the click of a mouse
- Synchronize with multiple data sources including Microsoft access, oracle and SQL server

List of Photographs For understanding:

1. Magnetic detector
2. Submergible sewer pumps
3. Pneumatic pipe plug
4. Desilting operation
5. High pressure water jet system
6. CCTV camera

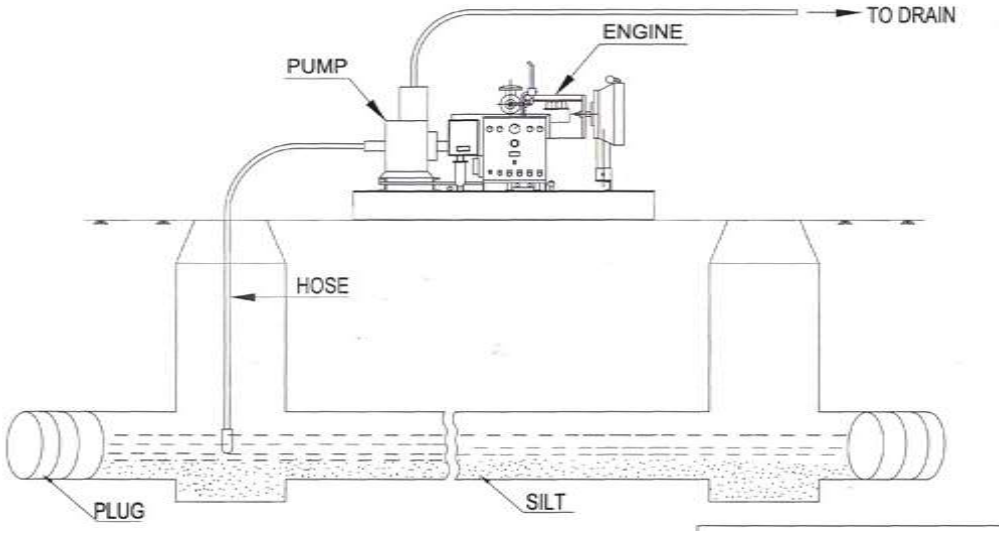
Figure 59 Magnetic detector

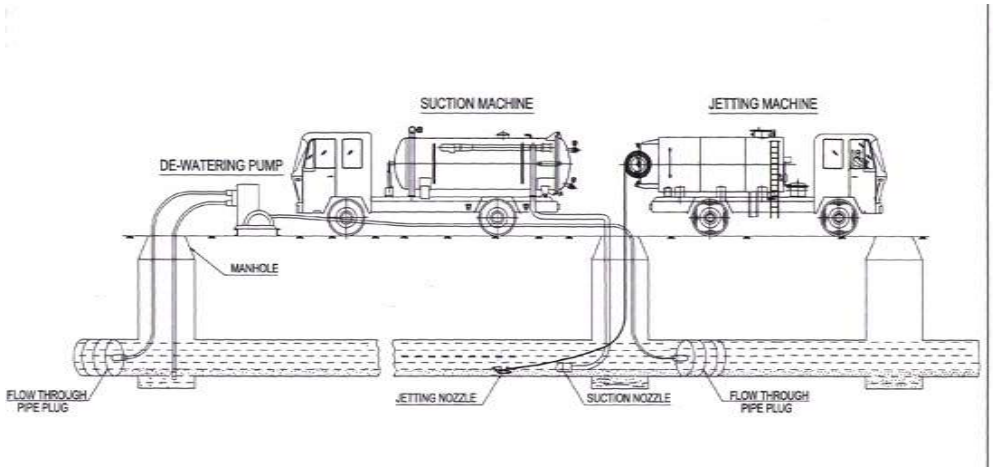
Figure 60 Pneumatic Pipe Plug

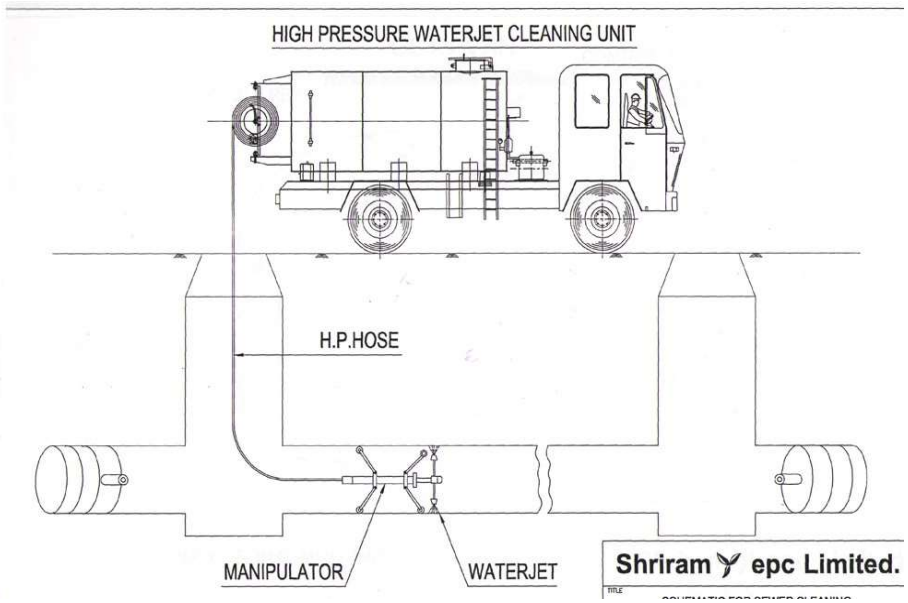
Figure 61 Desilting operation

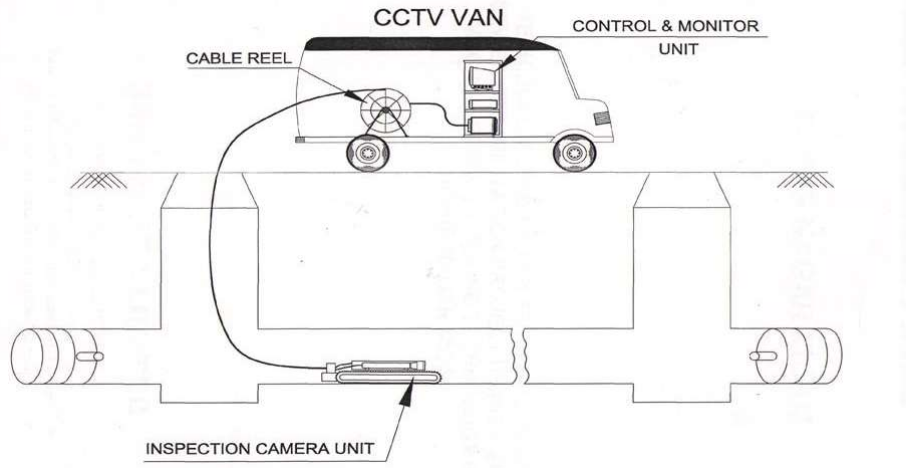
Figure 62 High pressure water jetting system

Figure 63 Control unit and monitor for CCTV






HIGH PRESSURE WATERJET CLEANING UNIT
H.P.HOSE
MANIPULATOR
WATERJET
Shriram epc Limited.


CCTV VAN
CONTROL & MONITOR UNIT
CABLE REEL
INSPECTION CAMERA UNIT

9 Operation and Maintenance

The operation and maintenance of the project is for 6 years from the date of completion and shall be responsibility of the executing agency and the monthly payment for system shall be made by BMC.

The operation and maintenance charges shall be borne by the contractor excluding the power charges which shall be paid by BMC and necessary condition is to be added in the bid documents.

The expected expenditure towards the operation and maintenance of the project shall be as under:

- For sewer line O&M is assumed on the basis of Past rates for similar works
- The O&M charges also include the training to Clients Staff responsible for O&M along with providing O&M manuals.

9.1 Inventory of assets

The assets created consequent upon completion of the project are required to be entered into assets record. This would facilitate the planning of operation and maintenance of the project too. The following fields need to be addressed in O&M of the project:

1. Regular physical inspections
2. Financial planning for yearly O&M
3. Maintenance schedules
4. Advance tendering

The assets created e.g., public sewer, chambers, pumping stations and STP shall be taken on assets record of the Municipal Council by the senior most Engineers. The assets shall be supervised by the engineering staff during the defect liability / maintenance period when the O&M would be with the executing agency. On completion of the defect liability / maintenance period, the assets created would be handed over to the respective line departments (ULB) for further O&M.

10 Environment and Social Impact Assessment

10.1 Introduction

Execution of a project is likely to bring changes in existing environment and social scenario in the project area / region. These changes are both negative and positive in nature. The project aims at achieving positive changes in the environment and to minimize the negative impacts by change is design and methodology of execution. The ultimate objective of environment assessment is making the project environment friendly and people friendly.

10.2 Water environment

There would be positive effect on water environment of the area due to execution of the project as the treated water discharges into stream or it can be utilized for irrigation purpose (BOD < 30). Pollution level of Powai Lake will be reduced due to reduction in incoming waste load in the streams.

10.3 Land environment

There is no likely adverse change in the land use pattern and quality of land in the project area.

10.4 Air environment

There is no likely adverse change in the air environment and quality of air in the project area.

10.5 Impact on Ecological Resources

There is no adverse impact on vegetation, wild life, and biodiversity due to execution of the project. No trees are required to be cut for execution of the project. Aquatic environment will improve due to reduction in water pollution level.

10.6 Social Impact

The project is basically an infrastructure development project. Infrastructural development, in whatever form, brings development in the area. Development of good hygienic conditions is foremost necessity for an area and the instant project is also that of improving the hygienic conditions of the Powai. Hygiene of lakes and rivers will improve the scenic value of place. It will create tourist spots for local as well as outside visitors. The project would facilitate easy disposal of waste water and would remove flooding and unhealthy environmental conditions in the town.

11 Cost Estimates

The Estimates in general; has been prepared using MCGM SOR-2022-23 however for non-SOR items such as STP, screens and gates etc. budgetary are invited by BMC from reputed vendors or technology providers and accordingly the estimates are prepared. The detailed Estimates are attached as annexure 2 in the DPR.

The cost estimates summary of proposed solutions is as follows:

Table 15 Abstract of cost estimates for Proposal 1 (Interception & Diversion to existing sewer system)

	Sr No	Component	Unit	Quantity	Cost
CAPEX	1	**Execution of gravity network by trenchless method including all allied works with successful trial and run.**			
	a.	Diversion to existing system	meters	751	6,04,56,064.00
	b.	Diversion to proposed STP	meters	1,909	16,29,17,756.00
	c.	Diversion to perubag pumping	meters	205	1,06,50,117.00
	d.	Provision of flow diversion to proposed STP from existing system diversion scheme	meters	191	1,74,95,992.00
	2	**Interception and diversion arrangement including all civil and mechanical works**			
	a.	Diversion to existing system	Nos	2	72,62,313.00
	b.	Diversion to proposed STP	Nos	9	3,62,79,553.00
	c.	Diversion to perubag pumping	Nos	2	75,45,164.00
		Total Capital Cost (A)			**30,26,06,959.00**
	3	**Operation & maintenance cost of the Interceptors**			
	a.	Diversion to existing system	Nos	2	1,39,29,940.00
	b.	Diversion to proposed STP	Nos	9	6,24,52,504.00
	c.	Diversion to perubag pumping	Nos	2	1,47,20,121.00
		Total O&M cost for 6 years (B)			**9,11,02,565.00**
		Total Project Cost			**39,37,09,524.00**

Table 16 Abstract of cost estimates for Proposal 2 (Sewage Treatment)

	Sr No	Component		Unit	Quantity	Cost
CAPEX	1	Demolition of existing structures at STP plot	Civil Works	Estimate	1	46,58,735.00
	2	Compound Wall for STP Plot		Estimate	1	63,57,181.00
	3	Treated Water Discharge line		meters	600	2,35,90,553.00
	4	Wet Well Civil Cost		Estimate	1	1,63,54,808.00
	5	GFS Glass Tank Cost		Quotation	1	4,80,00,000.00
	6	STP -Civil Works		Estimate	1	23,86,45,400.00
	7	Pre-Treatment Unit - M&E work including all required civil works	M&E Works (Quotations)	MLD	8	5,68,19,604.00
	8	MBR System including sludge management system		MLD	8	29,68,12,413.00
	9	Instrumentation Works (2 set of all except Total Coliform, UV & Odour Control)		Set	2	14,99,60,000.00
	10	Electro-chlorination Disinfection System		MLD	8	5,90,45,760.00
		Total Capital Cost (A)				**90,02,44,454.00**
OPEX	11	Pre Treatment Unit - Commissioning & Trial Run for 1 year	M&E Works (Quotations)	Quotation	1	45,59,616.00
	12	MBR System - Commissioning & Trial Run for 1 year		Quotation	1	1,60,90,621.00
	13	Electro-chlorination Disinfection System - Commissioning & Trial Run for 1 year		Quotation	1	5,90,458.00
	14	Pre Treatment Unit - Comp O&M (3 Years DLP + 3 years Non-DLP)		Years	6	7,13,53,212.00
	15	MBR System - Comp O&M (3 Years DLP + 3 years Non-DLP)		Years	6	9,94,73,682.00
	16	Electro-chlorination Disinfection System - Comp O&M (3 Years DLP + 3 years Non-DLP)		Years	6	3,36,03,239.00
	17	O&M of Instrumentation Works (3 Years DLP + 3 years Non-DLP)		Quotation	1	21,71,56,895.00
	18	Disposal of Dried sludge	Estimate	Years	6	1,08,49,886.00
		Total O&M cost for 6 years (3 Years DLP + 3 years Non-DLP) (B)				**45,36,77,609.00**
		Total Project Cost				**1,35,39,22,063.00**

12 Recommendations and Conclusions

I. The sewage is entering into the lake through the 11 number of storm water outfalls. The sewage is carrying solid waste material also along with it. It is proposed to have interception and diversion arrangement to arrest the solid waste and divert the sewage entering into the lake. The proposed Interception and diversion arrangement is proposed inside the lake premises only due to traffic problems on road side area.

II. As per the directions of Chief Engineer (SP) vide letter dated 04.10.2024, the part of intercepted sewage is to be diverted into the existing sewer network of BMC and part is to be treated in a proposed Sewage Treatment Plant. The treated sewage is to be discharged into the lake for maintaining the water level in non-monsoon period. It is suggested to upgrade the existing line on LBS to which the line carrying intercepted sewage is connected as it was observed to be running full during the site visit with BMC staff.

III. It is proposed to use MBR technology for Sewage treatment as per suggestions of TAC and the requirement of outlet water quality along with various advantages mentioned in the DPR. The proposal of providing the treated water to various user agencies is kept on hold as per directions of BMC, the complete treated water is proposed to be discharged into the lake for lake water balance.

IV. All the point as well as non-point sources of sewage ingress are identified along with BMC on site and have been considered in this DPR for interception and diversion of the arrested sewage.

V. The CPHEEO manual is followed in consideration of the 30 years of Horizon period for the design of Sewerage System.

VI. It is also recommended to get this project DPR vetted by third-party like IIT Bombay as far as the concept and cost of the project is concerned.

VII. We strongly advocate that the tenders shall be invited based on DBO basis and the associated risks like design, security of project components is transferred to the contractors.

ANNEXURE-I

(Detailed Estimates)

1. Cost Estimates of I&D Works for all proposals
2. Cost Estimates of proposed diversion lines
3. Cost Estimates of Treated Water Discharge Line
4. Cost Estimates of Wet Well Civil Works
5. Cost Estimates of Demolition of Existing civil and mechanical structures
6. Cost Estimates of Compound Wall for STP Plot
7. Comparison of STP Budgetary

ANNEXURE-II

(Detailed Drawings)

1. Proposal Key Maps
2. Proposal wise Plans
3. L-Sections of Proposed Diversion Lines
4. Typical Arrangement of Interception & Diversion Arrangement
5. GAD of Wet Well for STP

Annexure-6

MAHARASHTRA POLLUTION CONTROL BOARD

Regional Office, Mumbai

Phone : (022) - 24016239
Fax : (022)- 24015269
Email : romumbai@mpcb.gov.in
Visit At : http://mpcb.gov.in

Regional Office, Mumbai,
Kalpataru Point, 1st Floor, Sion Circle,
Sion (E), Mumbai- 400 022

No: MPCB/ROM/Direction/TB - 2112150001 **Date: 15/12/2021**

To,
M/s Assitant Muncipal Commisioner
S' ward Municipal Office Bld, 2Nd Floor,L.B.S Road,
Near Mangatram Petrol Pump, Bhandup West,
Mumbai, Maharashtra 400078..

Sub: Directions u/s 33A of the Water (Prevention & Control of Pollution) Act, 1974 31A of the Air (Prevention & Control of Pollution) Act, 1981

Ref:
1. Complaint from Shri. Manoj Mhatre, Govendi, Mumbai dated 20/09/2021.
2. Complaint received from Mr. Stalin D, Director Vanashakti dated 22/09/2021 regarding immersion of Ganesh idol into Powai Lake.
3. Complaint received through CPCB, RD Pune of Mr. Stalin D, Director Vanashakti dated 16/11/2021.
4. Hon'ble NGT matter O.A. No. 68/2021 field by Vanashakti and others V/s. MCGM and others with respect to pollution cause in Powai Lake.
5. Visit of Board officials along with MCGM official on 07/12/2021.

AND WHEREAS, this office was in receipt of above referred complaints at sr. No. 1 & 2 regarding contamination of lake water due to discharge of sewage effluent and immersion of Ganesh idols into the Powai Lake water.

AND WHEREAS, Board officials along with MCGM official had jointly visited to Powai Lake on 07/12/2021 and reported that there are total 18 water gate culverts along the boundary of Powai Lake for releasing the storm water through storm water drain into the lake.

AND WHEREAS, During the visit dated 07.12.2021, it is also observed that due to leakages from culvert No. 6 & 7 sewage through storm water drain found being discharged into Powai Lake water. Also, two nallas carrying domestic effluent from surrounding unsewered habitation area found discharging into the lake water.

2.

NOW THEREFORE, in exercise of the power confirmed by the Board upon me u/s 33A of the Water (Prevention & Control of Pollution) Act, 1974 following direction are issued –

1. MCGM shall take necessary precautionary measures to avoid ingress of treated/untreated sewage into Powai lake & same shall be diverted to nearby STP.
2. MCGM shall strictly follow the guidelines for idol immersion dated 12/05/2020 issued by Central Pollution Control Board for abetment of pollution of Powai lake water.

You are hereby directed to submit time bound program for complying above directions within seven days from the receipt of these directions, failure to this, it will be presumed that you have no say, and further necessary directions as deemed fit will be issued, which may please be noted.

For and on behalf of
Maharashtra Pollution Control Board.

(J. S. Hajare)
I/c Regional Officer, Mumbai

Copy submitted to:-
1. Asst. Secretary (Tech.), MPC Board, Sion, Mumbai – for information.

Copy to:
1) Sub Regional Officer, MPC Board, Mumbai -III
- He is directed to serve copy of direction to industry, take necessary follow-up towards compliance of the direction and submit report.
2) Master File.

MAHARASHTRA POLLUTION CONTROL BOARD

Ph. :- (022)- 24015269

Visit us at :- www.mpcb.gov.in.
e-mail : sromumbai3@mpcb.gov.in

"Your Service is our Duty"

Regional Officer Mumbai,
Kalpataru Point, 1st Floor,
Sion East Mumbai – 400022

BY R.P.A.D./FAX/HAND DELIVERY L. No: 122

Date: - 29/01/2025

To,
Assistant Commissioner.
Office No 203, 2nd Floor, S Ward Municipal Office,
LBS Marg, Bhandup West,
Mumbai – 400078.

Sub: - Directions under Section 33 A of Water (P & CP) Act, 1974 & Under Section 31 A of Air (P & CP) Act.1981.

Ref:- 1 Hon'ble NGT matter O.A. No.68/2021 filed by Vanashakti and other Vs MCGM and others with respect to Pollution cause in Powai Lake.
2.Visit of Board officials along with BMC officials on 17.01.2025.

WHEREAS, Hon'ble NGT matter O.A. No.68/2021 filed by Vanashakti and other Vs MCGM and others with respect to Pollution cause in Powai Lake.

AND WHEREAS, Board along with the Officials of BMC, IIT Powai representatives has jointly visited to Powai Lake on 17.01.2025 and following observations were made:-

1. There was a huge water hyacinth observed near the bank of Powai Lake at various locations.
2. Enough Nirmalya Pots are not observed at Lake.
3. Municipal Solid waste was found accumulated in huge quantities along lake side.
4. Adequate numbers of MSW collection dust bins are not observed at lake side.
5. It is seen that there are about 20 Culverts in the area.
6. During visit the Culvert No. 17 & 18 located on IIT Campus, the untreated sewage water was found discharged to the lake without any treatment.
7. Solid waste found litter near lake Garden site and at various location near lake. The collection and disposal of Solid waste by BMC found inadequate.

AND WHEREAS, Hon'ble NGT in the matter O.A. No. 68/2021 has considered that there is need for restoring and maintaining the lake to its pristine position. No untreated sewage can be allowed to be discharges. BMC must exercise its statutory powers to prevent discharge of sewage.

AND WHEREAS, as per Hon'ble NGT order 8 members Joint Committee has been Constituted vide office order no 01/22 dtd. 02.02.2022 and the Meeting was also held on dtd 16.02.2022 and 07.03.2022, 25.04.2022 & 12.07.2022.

AND WHEREAS till date BMC has not appointed the contractual agency, for the work stopping of sewage ingress in Powai Lake.

NOW THEREFORE, in exercise of the power confirmed by the Board upon me u/s 33A of the Water (Prevention and Control of Pollution) Act, 1974 following direction are issued: -

1. BMC to carry out the detailed reconnaissance survey for identification of locations and estimation of present quantity of sewage being flowing into Powai through the existing culverts and natural drains.
2. BMC shall take necessary precautionary measures to avoid ingress of untreated sewage into Powai Lake and same shall be diverted to nearby STP.
3. BMC shall the suitable measures for collection and disposal of solid waste disposal near the lake side and along lake within 7 days.
4. BMC shall take measures to monitor the quality of Powai Lake.
5. BMC shall strictly follow the guidelines for Idol immersion issued by CPCB for abetment of pollution of Powai Lake water.

You are hereby directed to submit the time bound program for complying above directions within 7 days from the receipt of these directions, failure to this will be presumed that you have no say, and further necessary directions as deemed fit will be issued, which may please be noted.

Ravindra B Andhale
Regional Officer – Mumbai

Copy for information to:-
Regional Officer (BMW), MPC. Board, Sion,Mumbai
Copy to: -
Sub Regional Officer, MPC. Board, Mumbai - 3
He is directed to serve copy of direction to BMC and take necessary follow – up towards compliance of the Direction

महाराष्ट्र शासन
अधीक्षक अभियंता
महाराष्ट्र अभियांत्रिकी संशोधन संस्था,
मेरी इमारत, दिंडोरी रोड, नाशिक -४२२००४
दूरध्वनी क्र.:-०२५३-२५३११५३ ई-मेल आयडी :- semerinashik@gmail.com, semeri.nashikwrd@maharashtra.gov.in

स्वातंत्र्याचा अमृत महोत्सव

जा.क्र.मअसंसं/संअकें/तां.शा.-३/ पवई / बृहन्मुंबई महानगरपालिका / ५७२ / सन २०२४ दि. २३/१०/२०२४

प्रति ,

उप जल अभियंता (परिरक्षण)
घाटकोपर वॉटर वर्क्स यार्ड,
कामा लेन, घाटकोपर (प.)
मुंबई -४०००८६

विषय :- हायब्रिड सर्वेक्षणाद्वारे बृहन्मुंबई महानगरपालिकेच्या **पवई** जलाशयाची साठवण क्षमता तपासणेबाबत (SRS आणि Bathymetric सर्वेक्षण तंत्र).

संदर्भ :- १) आपले कार्यालयीन पत्र जा. क्र. No. Dy. H.E/१५५/ Maint Dated ०६/०४/२०२२.

२) संपदा अभियांत्रिकी केंद्र, (मेरी), नाशिक या कार्यालयाचे आपल्या कार्यालयास पत्र जा.क्र. संअकें/ तां.शा-२/ क्षमता तपासणी/ तुळशी विहार पवई /३०७/ सन २०२२ दिनांक ०७/०४/२०२२.

३) आपले कार्यालयीन पत्र जा.क्र. No. Dy. H.E/४०२/Maint Dated १३/०४/२०२२.

४) संपदा अभियांत्रिकी केंद्र, (मेरी), नाशिक या कार्यालयाचे आपल्या कार्यालयास पत्र, आपल्या कार्यालयास पत्र जा.क्र. संअकें/ तां.शा-२/ क्षमता तपासणी/ पवई /७०५ / सन २०२२ दिनांक १४ /१० /२०२२.

५) या कार्यालयाचे आपल्या कार्यालयास पत्र जा.क्र. मअसंसं /संअकें /तां.शा.-१/ विहार, तुळशी, मोडकसागर,पवई/बृहन्मुंबई महानगरपालिका/८०१/ सन २०२२, दि.२९ /११/२०२२.

६) या कार्यालयाचे आपल्या कार्यालयास पत्र जा.क्र. मअसंसं /संअकें /तां.शा.-१/ विहार, तुळशी, मोडकसागर,पवई/बृहन्मुंबई महानगरपालिका/५२६/ सन २०२३, दि.१८/०७/२०२३.

Executive Engineer
Water Resource Department
Resources Engineering Centre, Nashik

उपरोक्त विषयांकित संदर्भ क्रमांक १ अन्वये आपल्या कार्यालयाने पवई जलाशयाचे गाळ सर्व्हेक्षण अभ्यास करणेबाबतची विनंती या कार्यालयास केली होती. संदर्भिय पत्र क्र. २ अन्वये संपदा अभियांत्रिकी केंद्र या विभागातील अधिकारी हे दिनांक ०८/०४/२०२२ रोजी प्रत्यक्ष क्षेत्रिय स्तरावर उपस्थितीत होते. उपस्थित अधिका-यांनी पवई तलावाच्या कामाची भौगोलिक सलग्नता तांत्रिक पाहणी आणि तलावांच्या बुडीत क्षेत्राची पाहणी केली. तद्नंतर सदर अधिकाऱ्यांनी आपल्या विभागातील अधिका-यांशी कामाबाबत चर्चा केली व तांत्रिक माहिती देण्याविषयी सांगितले. संदर्भिय पत्र क्र. ३ अन्वये आपल्या कार्यालयाने जलाशय गाळ सर्वेक्षणास्तव आवश्यक असलेली प्राथमिक माहिती संपदा अभियांत्रिकी केंद्र, या कार्यालयास उपलब्ध करून दिली.

सदर माहिती मध्ये फक्त महत्तम पातळीला पाण्याचे क्षेत्रफळ व क्षमता उपलब्ध असल्याने तसेच क्षेत्रीय कार्यालयाकडे परिपूर्ण माहिती उपलब्ध नसल्याने सदर प्रकल्पाची Feasibility अंतिम करता आली नाही.

पवई तलावाच्या गाळ सर्वेक्षणाबाबत बृहन्मुंबई महानगरपालिका व संपदा अभियांत्रिकी केंद्र या कार्यालयांचे आधिकारी यामध्ये दी. १४/१०/२०२२ रोजी बैठक झाली व त्याचे इतिवृत्त संदर्भीय पत्र क्र ४ ने आपल्या कार्यालयास कळविण्यात आले.

संदर्भीय पत्र क्र ५ ने सदर प्रकल्पाची अद्ययावत पाणी क्षमता अभ्यास खाजगी अभिकरण नेमून Bathymetry तंत्राने करता येईल. तथापि संस्थेत सद्यस्थितीत Bathymetry Technology उपलब्ध नसल्याने आपल्या कार्यालयामार्फत स्वंतत्र अभिकरण नेमुन Bathymetry सर्व्हेक्षण संबंधीत अभिकरणास दिल्यास त्यांचे संनियंत्रण व तांत्रिक प्रामाणिकरणाची जबाबदारी संपदा अभियांत्रिकी केंद्र, मेरी, नाशिक या विभागामार्फत सशुल्क पध्दतीने करु शकते असे कळविण्यात आले होते.

संदर्भिय पत्र क्रमांक ६ अन्वये पवई जलाशयाचे Bathymetry सर्वेक्षण हे महाराष्ट्र सागरी मंडळ जलआलेखक यांच्या कार्यालयाकडून करावे त्यासंदर्भात सदर कार्यालयास संपर्क साधून ३१ जुलै २०२३ पर्यंत आपली मागणी नोंदवावी व सदर Bathymetric सर्वेक्षण अहवालास सनियंत्रण व तांत्रिक प्रमाणीकरण महाराष्ट्र अभियांत्रिकी संशोधन संस्थेचे राहील व अंतिम अहवाल महाराष्ट्र अभियांत्रिकी संशोधन संस्थेद्वारे आपणांस देण्यात येईल असे आपल्या कार्यालयास कळविण्यात आले होते. तसेच संदर्भिय पत्र क्रमांक ६ अन्वये **टप्पा-२** पवई जलाशयाच्या गाळसर्वेक्षणचे व सनियंत्रण व तांत्रिक प्रमाणीकरणाचे शुल्क आपल्या **कार्यालयास कळविण्यात आले होते.**

त्या अनुषंगाने आपल्याद्वारे Bathymetric सर्वेक्षण, मेरी संस्थेच्या सनियंत्रणात व तांत्रिक प्रमाणीकरणाने स्वतंत्र अभिकरणाद्वारे पुर्ण करून त्याबाबतचा अहवाल आपण मेरी संस्थेला सादर केला.

Executive Engineer
Water Resource Department
Resources Engineering Centre, Nashik

संपदा अभियांत्रिकी केंद्र, या विभागाने सदर अभ्यास भारतीय मानक ब्युरो (BIS) IS १३६६५: १९९३ मधील मानका नुसार तसेच केंद्रीय जल आयोगाच्या निर्देशानुसार केला आहे. दिनांक ०२/०४/२०२४ रोजी जलाशयाची भूसत्य पाहाणी केली भूसत्य पाहाणीच्या दिवशी दिनांक ०२/०४/२०२४ रोजी धरणाची पाणी पातळी ५८.२०१ मी. इतकी होती.

तसेच या सर्वेक्षणाची व्याप्ती ही नियमीत सर्वेक्षणापेक्षा वेगळी आहे. सदर सर्वेक्षण हे भागशः सुदूर संवेदन तंत्राने आणि भागशः Bathymetry पद्धतीने करून एकत्रित केले आहे. सुदूर संवेदन तंत्राने पाणी पातळी (५८.२४० मी) ते पूर्ण संचय पातळी FRL (५९.४४० मी) साठी अभ्यास केला आहे तर पाणी पातळी (५४.००० मी) ते पाणी पातळी (५८.००० मी) पर्यंत अभ्यास हा Bathymetry पद्धतीने केला आहे.

सदर अभ्यासाचा अहवाल या पत्रासोबत दोन प्रतीत (DVD सह) देण्यात येत आहे.

सदर अभ्यासाचे अंतिम निरिक्षण पुढील प्रमाणे नोंदविण्यात येत आहे.

" या अभ्यासात पवई जलाशयाची एकूण साठवण क्षमता, सन २०२३-२४ साठी MDDL (५३.३४० मी) ते पूर्ण संचय पातळी FRL (५९.४४० मी) साठी ३.६९३ द.ल.घ.मी. इतकी आढळली. तर या पातळीच्या दरम्यानची मुळ एकूण संकल्पित साठवण क्षमता ५.४५५ द.ल.घ.मी. आहे."

हे आपल्या माहितीस्तव सस्नेह अग्रेषित.

स्थळप्रत - मा. अधीक्षक अभियंता, (मेरी), नाशिक यांना मान्य असे.

(सुनिल गायकवाड)
कार्यकारी अभियंता ,
संपदा अभियांत्रिकी केंद्र,
महाराष्ट्र अभियांत्रिकी संशोधन संस्था,
(मेरी), नाशिक-४२२००४

सोबत :- १. अभ्यास अहवाल -२ प्रतीत
२. DVD- १ नग

प्रत :- मा. महासंचालक, संकल्पन, प्रशिक्षण, जलविज्ञान,संशोधन व सुरक्षितता, मेरी, नाशिक यांना माहितीसाठी सविनय सादर.

प्रत :- कार्यकारी अभियंता, संपदा अभियांत्रिकी केंद्र, महाराष्ट्र अभियांत्रिकी संशोधन संस्था, नाशिक- ४ यांना माहितीसाठी व पुढील कार्यवाहीसाठी रवाना.

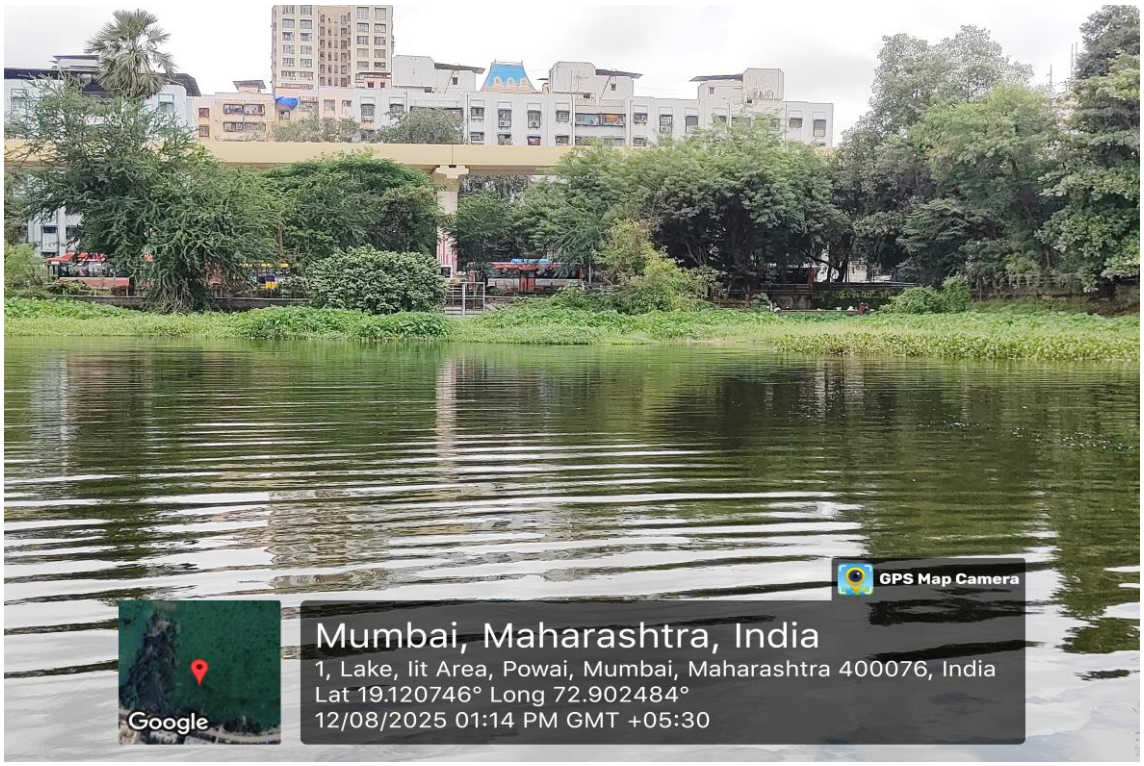
Executive Engineer ★ Water Resource Department ★ Resources Engineering Centre, Nashik

Annexure-8

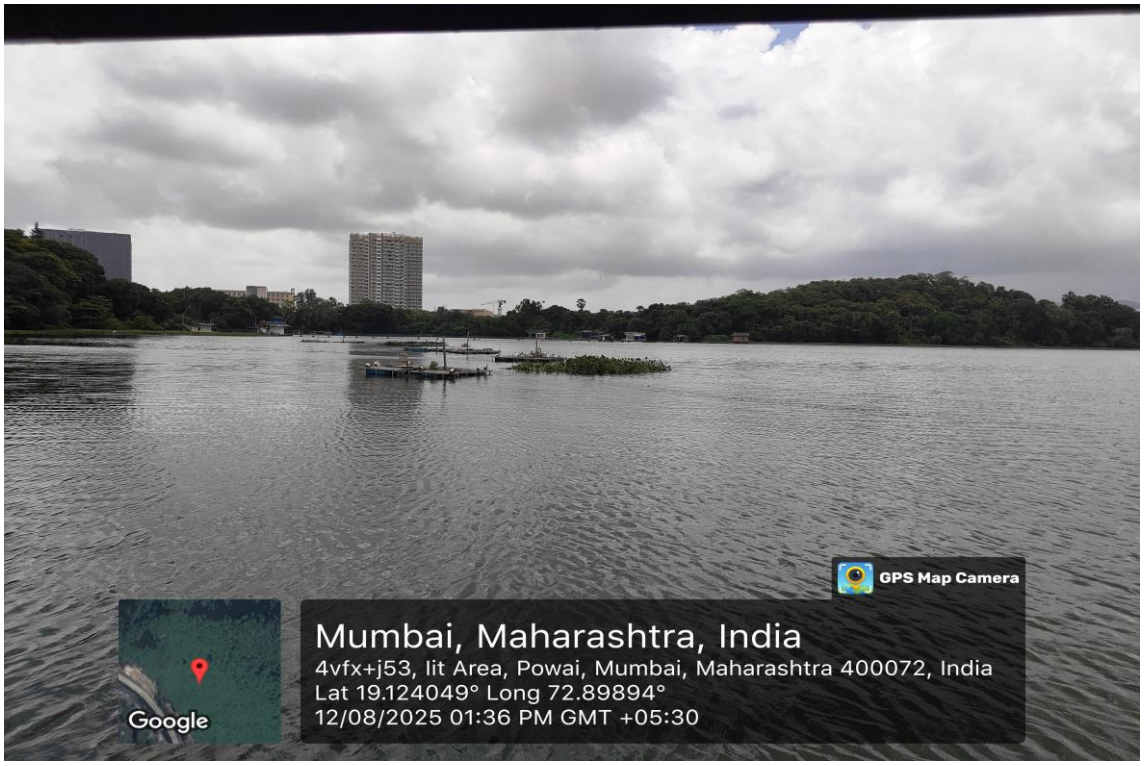
Photograph-1: Ingress of untreated sewage from culvert no. 1

Photograph-2: Ingress of untreated sewage from culverts along the Adi Shankaracharya Road and growth of water hyacinth along the banks of Powai Lake.

Photograph-3: Ingress of untreated sewage from culverts along the Adi Shankaracharya Road and growth of water hyacinth along the banks of Powai Lake.



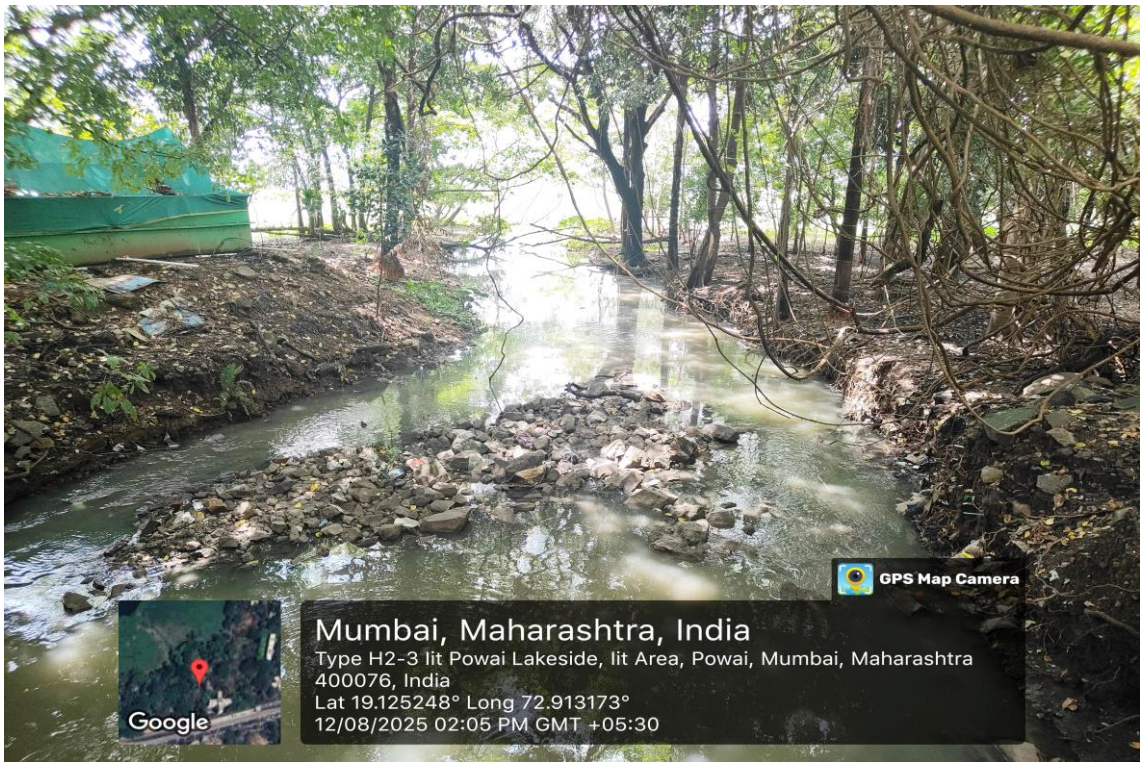
Photograph-4: Ingress of untreated sewage from culverts along the Adi Shankaracharya Road and growth of water hyacinth along the banks of Powai Lake.



Photograph-5: Real-time dissolved oxygen monitoring system installed in the Powai Lake.

Photograph-6: Maintenance of dissolved oxygen in Powai Lake through mobile barge-mounted sub surface aerators (with 32 KVA DG set & 60 HP barge engine).

Photograph-7: Ingress of untreated sewage from culvert nos. 17 & 18 (Powai Plaza) – opening at IIT Premises, which further outfalls into Powai Lake.



Photograph-8: Ingress of untreated sewage from culvert nos. 17 & 18 (Powai Plaza) – opening at IIT Premises, which further outfalls into Powai Lake.