Monitoring, Sampling and Analysis for Ambient Air Quality, Surface Water Quality and Ground Water Quality in Critically/Severely/Other Polluted

CHEMBUR

Post-Monsoon (December 2023 to February 2024)

Maharashtra Pollution Control Board

Kalptaru Point, Sion East, Mumbai – 400 022

Index

ABBREVIATIONS

CPCB	Central Pollution Control Board
MPCB	Maharashtra Pollution Control Board
CEPI	Comprehensive Environmental Pollution Index
EPA	Environmental Protection Act, 1986
APHA	American Public Health Association
ASTM	American Society for Testing and Materials
BIS	Bureau of Indian Standards
BLQ	Below the Limit of Quantification
CAAQMS	Continuous Ambient Air Quality Monitoring Station
CEMS	Continuous Emission Monitoring System
CETP	Common Effluent Treatment Plant
VOCs	Volatile Organic Compounds
MIDC	Maharashtra Industrial Development Corporation
NWMP	National Water Quality Monitoring Program
NAAQS	National Ambient Air Quality Standard
ZLD	Zero Liquid Discharge
CPA	Critically Polluted Area
SPA	Severely Polluted Area
OPA	Other polluted Area

1. Executive Summary

The Chembur CEPI area was monitored for Ambient Air Quality, Ground and Surface Waters quality and CEPI Score was calculated based on the Latest directions 120 of Letter No. B-29012/ESS (CPA)/2015-16 dated 26th April 2016 of Central Pollution Control Board (CPCB). Maharashtra Pollution Control Board (MPCB) has carried out monitoring at CPCB location with the additional locations of samplings for ambient air, surface and ground Water in consideration with the previous CEPI monitoring and covering the entire CEPI Impact Zone. The post monsoon monitoring was carried out during the period of December 2023 to February 2024 to verify the Ambient Air Quality, Surface water and Ground water.

The Ambient Air Quality stations were identified considering the upwind and cross wind direction in the CEPI impact area. All 12 parameters of NAAQS are well within the limit prescribed. The surface water of Chembur is contaminated as domestic waste water drain is also connected with the surface water and hence the quality of surface water could not able to compare with IS10500:2012 drinking water standards. In ground water, the concentrations of all parameters are well within the limit.

Based on the study report conducted by CPCB during the period January 2018, the CEPI score of Chembur region as per the revised guidelines was 54.67 (Ambient Air–52.25, Water-50.75, Land–10). In the CEPI score of CPCB, the concentration of PM_{10} and $PM_{2.5}$ are the main contribution in the increase in the score and this is mainly due to the AAQM stations fixed nearby the roadside where the maximum vehicular movements are happening due to which PM_{10} and $PM_{2.5}$ concentrations are more apart from the industrial emission sources. However, in the present study, overall CEPI score has been decreased significantly by 24% of the CPCB CEPI score. It is observed and calculated as 41.60 (Ambient Air - 26.50, Water – 40.00 and Land – 10.00).

Hence, the present CEPI report for Chembur for the Post-Monsoon season reveals a CEPI score of 41.60, indicating improvement in environmental health of the region. While air pollution efforts have shown significant progress, surface water contamination remains a concern. Over the years, the Maharashtra Pollution Control Board (MPCB) has actively worked to mitigate pollution in Chembur. MPCB's initiatives have led to improvements in air quality, highlighting their commitment to environmental stewardship. Moving forward, the report serves as a roadmap for policymakers and stakeholders to continue targeted interventions for sustainable development in the area.

2. Introduction

In the vibrant tapestry of India's industrial landscape, the state of Maharashtra stands as a testament to both the promise and perils of rapid economic development. With countless number of industrial clusters, Maharashtra has witnessed unprecedented growth and prosperity in recent decades. However, this surge in industrial activity has come at a significant environmental cost, with pollution emerging as a pressing concern in many regions across the state.

Simultaneously, the Comprehensive Environmental Pollution Index (CEPI) has emerged as a beacon of assessment and action in India's environmental landscape. Introduced as a standardized methodology for evaluating and addressing pollution in industrial clusters across the nation, the CEPI represents a significant step towards achieving the delicate balance between economic growth and environmental sustainability. Developed through collaborative efforts between environmental scientists, regulatory authorities, and community stakeholders, the CEPI serves as a vital instrument for identifying, prioritizing, and mitigating pollution in industrial areas. By systematically monitoring, sampling, and analyzing pollution parameters such as ambient air quality, surface water quality, and groundwater quality, the CEPI empowers policymakers and regulators to make informed decisions and allocate resources effectively.

In Maharashtra, where industrial activities drive economic growth and employment opportunities, the importance of the CEPI cannot be overstated. Through strategic monitoring, sampling, and analysis efforts, the CEPI aims to provide a comprehensive assessment of pollution levels and their impacts on environmental health in critically, severely, and other polluted industrial areas across the state.

Moreover, the application of the CEPI extends beyond mere assessment, serving as a catalyst for targeted interventions and regulatory enforcement in polluted industrial areas. By identifying pollution hotspots and vulnerable communities, the CEPI enables authorities to implement remedial measures, enforce pollution control norms, and monitor progress towards environmental sustainability.

In the following sections, we delve into the methodology, findings, and implications of both the CEPI assessment and the Monitoring, Sampling, and Analysis for Ambient Air Quality, Surface Water Quality, and Groundwater Quality in Polluted Industrial Areas of Chembur in Mumbai, Maharashtra. Chembur has been facing pollution problems and was recently ranked 46th in a list of the most polluted industrial clusters in India. Studies in Chembur have also found high levels of Copper, Chromium, Calcium, Arsenic and Mercury in ground water. Effluents from oil refineries, fertilizer plants and reactors located in Chembur are also said to have polluted sea water in Thane Creek and affected marine life. The main problem is the uncontrolled release of ammonia and nitrous oxides from the Rastriya chemical fertiliser complex. Although ammonia is easy to scrub, the problem seems to be due to improper operation of pollution control equipment and/or operation of the urea/ammonia complex way beyond the design capacity without augmentation of pollution control equipment. Measurement of ammonia /nox levels is the best way to establish this by constant ambient air analysis. The Deonar dumping ground in Deonar has caused health issues for the residents of Chembur. In 2008, around 40 residents of Chembur went on a hunger strike to protest

against the frequent fires and smoke. Again in 2012, the residents complained to the Brihanmumbai Municipal Corporation on the smoke coming out of the dumping ground, which has been affecting asthma patients.

The present report is also based on the revised CEPI version 2016. The index captures the various dimensions of environment including air, water and land. Comprehensive Environmental Pollution Index (CEPI), which is a rational number to characterize the environmental quality at a given location following the algorithm of source, pathway and receptor have been developed. The CEPI reports serve as a roadmap for targeted interventions, regulatory enforcement, and community engagement aimed at mitigating pollution and safeguarding public health in the area. Despite the persistent challenges, ongoing initiatives guided by the CEPI reports offer hope for addressing environmental concerns and fostering sustainable development in Chembur.

3. Scope of Work

The major scope of work includes:

I. The scope of the present study is to perform three (3) rounds of "Monitoring, Sampling and Analysis for Ambient Air Quality, VOCs in Ambient Air, Surface Water Quality & Ground Water Quality in selected Pollution Industrial Areas (PIAs) of Chembur, Maharashtra" with a gap of one or two days. The analysis of the collected samples was carried out by the standard methods (CPCB, BIS, APHA, USEPA).

II. To Collect health-related data in the CEPI region.

III. To calculate the Comprehensive Environmental Pollution Index (CEPI) Score as per Revised CEPI-2016 issued by Central Pollution Control Board (CPCB).

The sampling details and frequency of sampling in Ambient Air, VOCs, Surface Water and Ground Water are given in Table 3.1 and Table 3.2 respectively.

Table 3.1 Sampling Details of Mahad

Sampling Criteria	Total Sites	Monitoring Parameters
Ambient Air Quality	**08**	PM_{10}, $PM_{2.5}$, SO_2, NO_2, NH_3, O_3, C_6H_6, CO, BaP, Pb, Ni, As
Volatile Organic Compounds (VOCs)	**02**	Dichloromethane, Chloroform, Carbon Tetrachloride, Trichloroethylene, Bromodichloromethane, 1,3-Dichloropropane, 1,4-Dichlorobenzene, 1,3-Dichlorobenzene, 1,2-Dichlorobenzene, 1,2-Dibromo-3-Chloropropane, Napthalene, Bromobenzene,1,2,4-Trimethylbenzene, 2-Chlorotoluene, Tert-Butylbenzene, SEC-Butylbenzene, P-Isopropyl toluene, M-Xylene, P-Xylene, Styrene, Cumene 1,2,3-Trichloropropane, N-Propyl benzene, Dibromochloromethane, 1,2-Dibromoethane, Chlorobenzene, 1,1,1,2-Tetrachloroethane, Ethylbenzene, 1,1-Dichloropropylene, 1,2-Dichloroethane, 1,2-Dichloropropane, Trans-1,3-Dichloropropene, CIS 1,3-Dichloropropene, 1,1,2-Trichloroethane, Tetrachloroethylene, 1,3,5-Trimethylbenzene, N-Butylbenzene, 1,2,3-Trichlorobenzene, Hexachlorobutadiene, 1,2,4-Trichlorobenzene, 2,2-Dichloropropane, Dibromo methane, Toluene, O-Xylene, Bromoform, 1,1,2,2-Tetrachloroethane, 4-Chlorotoluene, 1,1-Dichloroethylene, Trans-1,2-Dichloroethylene, 1,1-Dichloroethane, CIS-1,2-

Sampling Criteria	Total Sites	Monitoring Parameters
		Dichloroethylene, Bromochloromethane, 1,1,1-Trichloroethane
Water Quality Monitoring	**Surface water - 06**	**(i) Simple Parameters** Sanitary Survey, General Appearance, Colour, Smell, Transparency and Ecological **(ii) Regular Monitoring Parameters** pH, O & G, Suspended Solids, DO, COD, BOD, TDS, Electrical Conductivity, Total Dissolved Solids, Nitrite–Nitrogen, Nitrate-Nitrogen, (NO_2+NO_3) total nitrogen, Free Ammonia, Total Residual Chlorine, Cyanide, Fluoride, Chloride, Sulphate, Sulphides, Total Hardness, Dissolved Phosphates, SAR, Total Coliforms, Faecal Coliform **(iii) Special Parameters** Total Phosphorous, TKN, Total Ammonia (NH_4+NH_3)-Nitrogen, Phenols, Surface Active Agents, Anionic detergents, Organo-Chlorine Pesticides, PAH, PCB and PCT, Zinc, Nickel, Copper, Hexa-valent Chromium, Chromium (Total), Arsenic (Total), Lead, Cadmium, Mercury, Manganese, Iron, Vanadium, Selenium, Boron **(iv) Bio-assay (zebra Fish)** Test – For specified samples only.
	Ground water - 06	

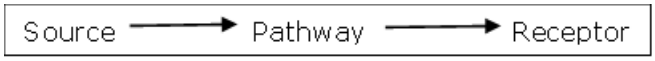
Table 3.2 Frequency of Sampling

	Parameter	Round of Sampling	Frequency in Each Round
A	**Ambient Air Quality Monitoring**		
1.	Particulate Matter (size less than 10 µm) or PM_{10}	03	3 Shifts of 8 hrs each
2.	Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	03	1 Shift of 24 hr
3.	Sulphur Dioxide (SO_2)	03	6 Shifts of 4 hrs each

	Parameter	Round of Sampling	Frequency in Each Round
4.	Nitrogen Dioxide (NO_2)	03	6 Shifts of 4 hrs each
5.	Ammonia (NH_3)	03	6 Shifts of 4 hrs each
6.	Ozone (O_3)	03	24 Shifts of 1 hr each
7.	Benzene (C_6H_6)	03	1 Shifts of 24 hrs
8.	Carbon Monoxide (CO)	03	24 Shifts of 1 hr each
9.	Benzo (a) Pyrene (BaP) – particulate phase only	03	3 Shifts of 8 hrs each
10.	Lead (Pb)	03	3 Shifts of 8 hrs each
11.	Arsenic (As)	03	3 Shifts of 8 hrs each
12.	Nickel (Ni)	03	3 Shifts of 8 hrs each
B	**Volatile Organic Compounds (VOCs)**		
	As mentioned in Table 3.1	03	3 Shifts of 24 hrs each
C	**Ground Water**		
	As mentioned in Table 3.1	03	01 sample at each round
D	**Surface Water**		
	As mentioned in Table 3.1	03	01 sample at each round

4. Methodology

The present report is based on the revised Comprehensive Environmental Pollution Index (CEPI) version 2016. The index captures the various dimensions of the environment including air, water and land. Comprehensive Environmental Pollution Index (CEPI) is a rational number, which is used to characterize the environmental quality at a given location. It is three-step process based on the algorithm of Source, Pathway and Receptor.



Ambient air stations, Surface water locations and Ground water locations were decided by the respective regional officers. The sampling was done in 3 rounds with an interval of one or two days at each location. Sampling has been done at the potentially polluted areas so as to arrive at the CEPI. This will further help the authorities to monitor the areas in order to improve the current status of their environmental components such as air and water quality data, ecological damage and visual environmental conditions.

AIR ENVIRONMENT

5. Air Environment

For studying the Air Environment of Chembur area, monitoring stations were identified considering the upwind and crosswind direction and all 12 parameters as per the notification of National Ambient Air Quality Standards (NAAQS) were carried out.

**Kindly note: Volatile Organic Compounds (VOCs) concentration is not detected in most of the Air samples collected; hence it is not shown in the graphs.*

In Chembur, eight locations have been monitored of checking the AAQ. All 12 parameters are observed well within the limits at all 8 locations monitored. Volatile Organic

Table 5.1 Details of Sampling Location of Ambient Air Quality Monitoring

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Near main gate BPCL	19°1'13.62"N	72°53'49.59"E	27.12.2023	29.12.2023	31.12.2023
2.	Ambapada Gaon	19°0'43.92"N	72°53'25.70"E	27.12.2023	29.12.2023	31.12.2023
3.	Nearby RCF main plant	19°2'5.62"N	72°53'31.98"E	27.12.2023	29.12.2023	31.12.2023
4.	BPCL sports club	19°1'44.07"N	72°53'43.66"E	27.12.2023	29.12.2023	31.12.2023
5.	HPCL Refinery Main Gate	19°1'11.79"N	72°53'49.63"E	27.12.2023	29.12.2023	31.12.2023
6.	Tata Power Colony	19°2'20.46"N	72°53'59.23"E	27.12.2023	29.12.2023	31.12.2023
7.	Eversmile Building	19°0'55.47"N	72°53'12.80"E	27.12.2023	29.12.2023	31.12.2023
8.	Near main gate Pepsico	19°1'12.26"N	72°53'59.12"E	27.12.2023	29.12.2023	31.12.2023

Table 5.2 Details of Sampling Location of Volatile Organic Compounds (VOCs) Monitoring

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Nearby RCF main plant	19°2'5.62"N	72°53'31.98"E	27.12.2023	29.12.2023	31.12.2023
2.	BPCL sports club	19°1'44.07"N	72°53'43.66"E	27.12.2023	29.12.2023	31.12.2023

Fig: Geographical Locations of Ambient Air Quality Monitoring

Fig: Geographical Locations of VOCs Monitoring

Table 5.3 Ambient Air Quality Monitoring Results

Parameters	Unit	Results			
		Near main gate BPCL	Ambapada Gaon	Nearby RCF main plant	BPCL sports club
Sulphur Dioxide (SO_2)	$\mu g/m^3$	BLQ	BLQ	BLQ	6.43
Nitrogen Dioxide (NO_2)	$\mu g/m^3$	37.40	21.40	21.80	29.60
Particulate Matter (size less than 10 µm) or PM_{10}	$\mu g/m^3$	73	85	73	78
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	$\mu g/m^3$	21	22	22	22
Ozone (O_3)	$\mu g/m^3$	BLQ	BLQ	BLQ	BLQ
Lead (Pb)	$\mu g/m^3$	BLQ	BLQ	0.02	BLQ
Carbon Monoxide (CO) (1h)	mg/m^3	1.08	1.14	1.13	1.18
Carbon Monoxide (CO) (8h)	mg/m^3	1.90	1.67	1.76	1.93
Ammonia (NH_3)	$\mu g/m^3$	31.80	BLQ	BLQ	20.50
Benzene (C_6H_6)	$\mu g/m^3$	2.48	2.03	2.57	2.20
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m^3	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m^3	0.72	1.18	0.70	BLQ
Nickel (Ni)	ng/m^3	BLQ	BLQ	4.11	3.34

Parameters	Unit	Results			
		HPCL Refinery Main Gate	Tata Power Colony	Eversmile Building	Near main gate Pepsico
Sulphur Dioxide (SO_2)	$\mu g/m^3$	5.36	BLQ	4.98	BLQ
Nitrogen Dioxide (NO_2)	$\mu g/m^3$	16.80	30.10	38.30	42.20
Particulate Matter (size less than 10 µm) or PM_{10}	$\mu g/m^3$	79	82	86	75
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	$\mu g/m^3$	21	22	25	20
Ozone (O_3)	$\mu g/m^3$	BLQ	BLQ	BLQ	BLQ
Lead (Pb)	$\mu g/m^3$	BLQ	BLQ	BLQ	BLQ

Parameters	Unit	Results			
		HPCL Refinery Main Gate	Tata Power Colony	Eversmile Building	Near main gate Pepsico
Carbon Monoxide (CO) (1h)	mg/m^3	1.00	0.95	1.10	0.89
Carbon Monoxide (CO) (8 h)	mg/m^3	1.61	1.70	2.10	1.59
Ammonia (NH_3)	$\mu g/m^3$	42.90	24.15	32.80	33.20
Benzene (C_6H_6)	$\mu g/m^3$	3.19	2.79	2.87	3.22
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m^3	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m^3	1.42	1.71	BLQ	BLQ
Nickel (Ni)	ng/m^3	3.18	BLQ	BLQ	6.15

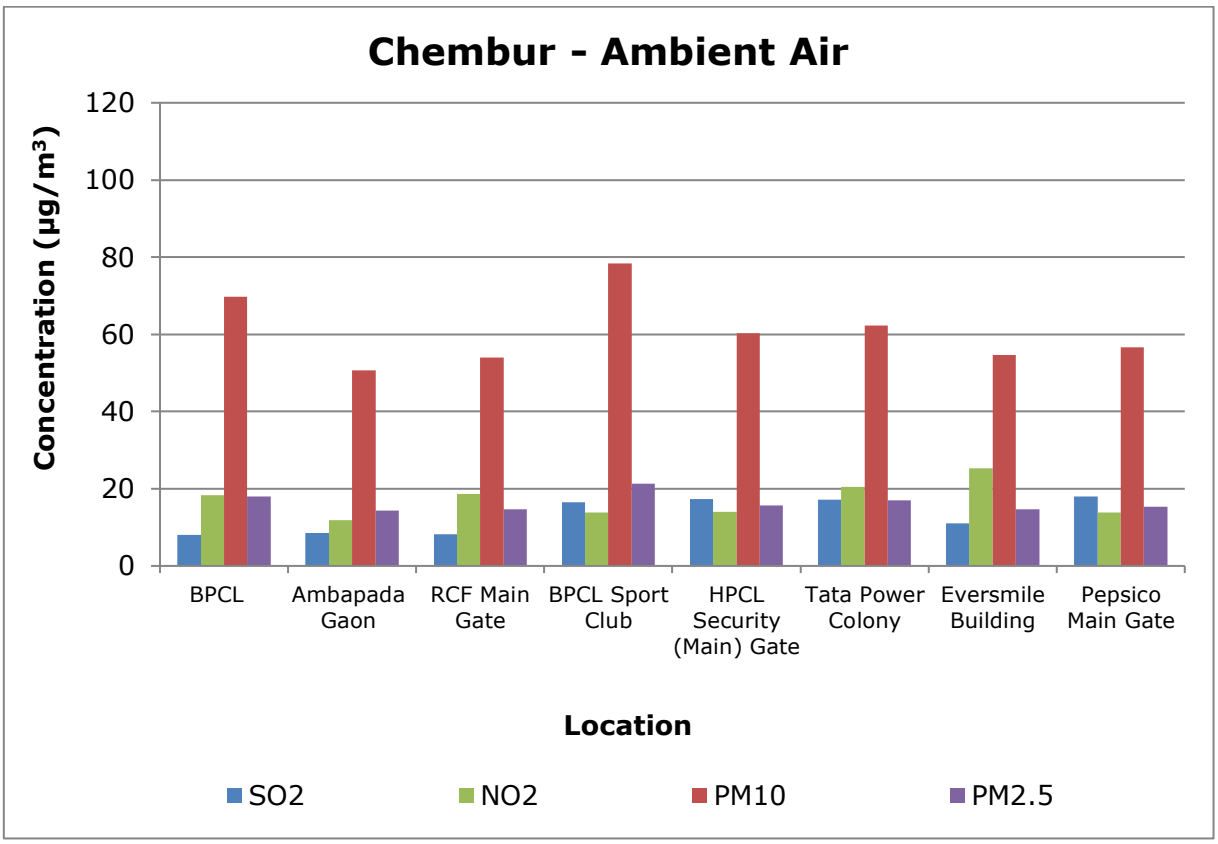
Table 5.4 Volatile Organic Compounds (VOCs) in Ambient Air Results

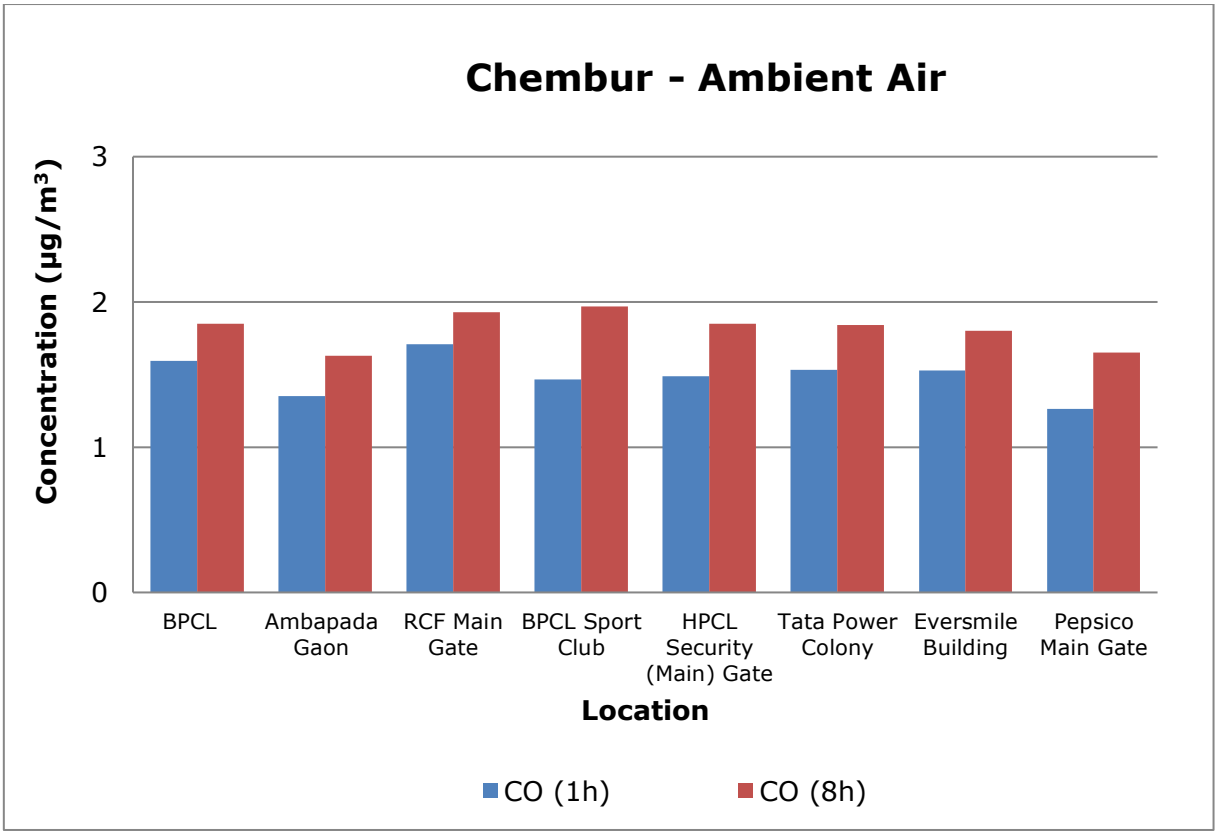
Parameters	Unit	Results	
		Nearby RCF main plant	BPCL sports club
Dichloromethane	$\mu g/m^3$	2.13	4.08
Chloroform	$\mu g/m^3$	0.55	1.03
Carbon Tetrachloride	$\mu g/m^3$	BLQ	BLQ
Trichloroethylene	$\mu g/m^3$	BLQ	BLQ
Bromodichloromethane	$\mu g/m^3$	BLQ	BLQ
1,3-Dichloropropane	$\mu g/m^3$	BLQ	BLQ
1,4-Dichlorobenzene	$\mu g/m^3$	5.63	BLQ
1,3-Dichlorobenzene	$\mu g/m^3$	9.45	8.02
1,2-Dichlorobenzene	$\mu g/m^3$	BLQ	BLQ
1,2-Dibromo-3-Chloropropane	$\mu g/m^3$	BLQ	BLQ
Napthalene	$\mu g/m^3$	BLQ	BLQ
Bromobenzene	$\mu g/m^3$	BLQ	BLQ
1,2,4-Trimethylbenzene	$\mu g/m^3$	BLQ	BLQ
2-Chlorotoluene	$\mu g/m^3$	BLQ	BLQ
Tert-Butylbenzene	$\mu g/m^3$	BLQ	BLQ

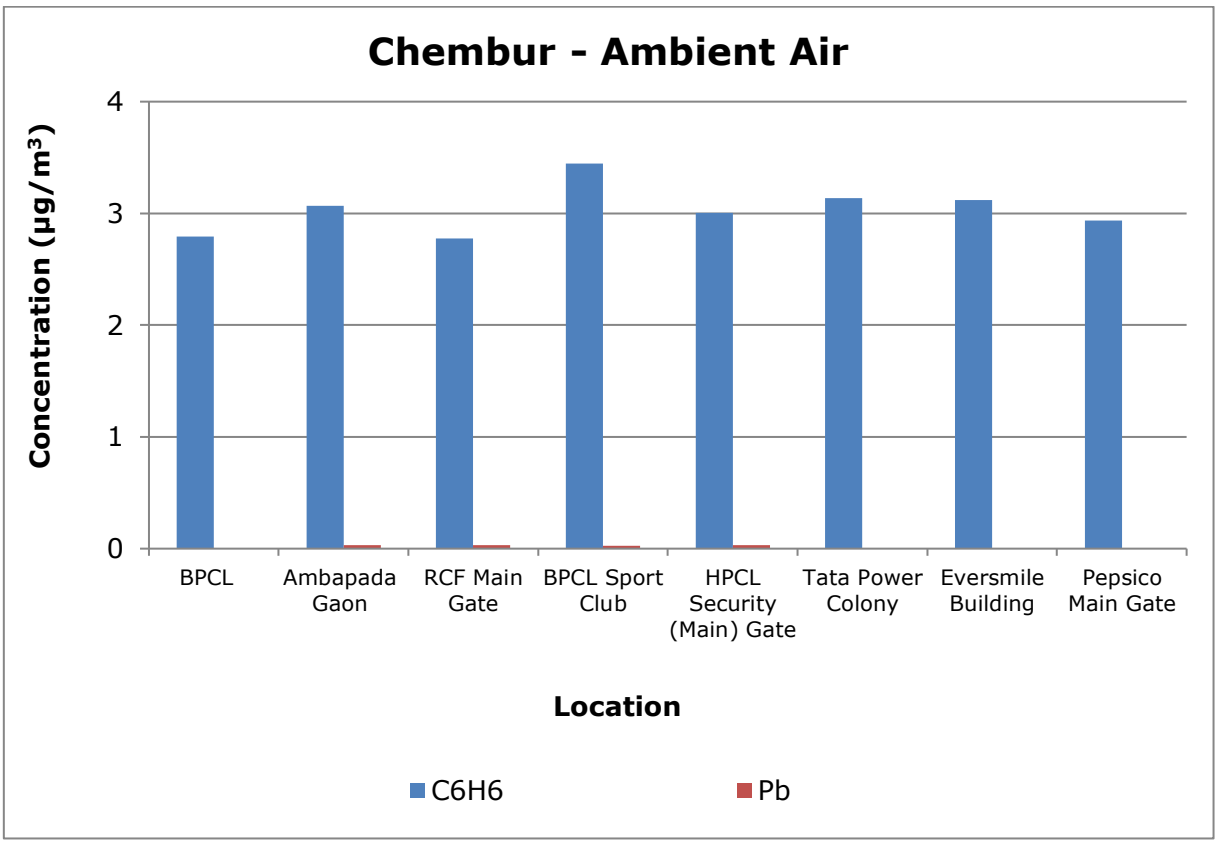
Parameters	Unit	Results	
		Nearby RCF main plant	BPCL sports club
SEC-Butylbenzene	µg/m³	BLQ	BLQ
P-Isopropyltoluene	µg/m³	BLQ	BLQ
M-Xylene	µg/m³	BLQ	BLQ
P-Xylene	µg/m³	BLQ	BLQ
Styrene	µg/m³	BLQ	BLQ
Cumene	µg/m³	BLQ	BLQ
1,2,3-Trichloropropane	µg/m³	BLQ	BLQ
N-Propylbenzene	µg/m³	BLQ	BLQ
Dibromochloromethane	µg/m³	BLQ	BLQ
1,2-Dibromoethane	µg/m³	BLQ	BLQ
Chlorobenzene	µg/m³	BLQ	3.20
1,1,1,2-Tetrachloroethane	µg/m³	BLQ	BLQ
Ethylbenzene	µg/m³	BLQ	BLQ
1,1-Dichloropropylene	µg/m³	BLQ	BLQ
1,2-Dichloroethane	µg/m³	0.74	0.85
1,2-Dichloropropane	µg/m³	BLQ	BLQ
Trans-1,3-Dichloropropene	µg/m³	BLQ	BLQ
CIS 1,3-Dichloropropene	µg/m³	BLQ	BLQ
1,1,2-Trichloroethane	µg/m³	BLQ	BLQ
Tetrachloroethylene	µg/m³	BLQ	BLQ
1,3,5-Trimethylbenzene	µg/m³	BLQ	BLQ
N-Butylbenzene	µg/m³	BLQ	BLQ
1,2,3-Trichlorobenzene	µg/m³	BLQ	BLQ
Hexachlorobutadiene	µg/m³	BLQ	BLQ
1,2,4-Trichlorobenzene	µg/m³	BLQ	BLQ
2,2-Dichloropropane	µg/m³	BLQ	BLQ
Dibromomethane	µg/m³	BLQ	BLQ
Toluene	µg/m³	BLQ	0.53

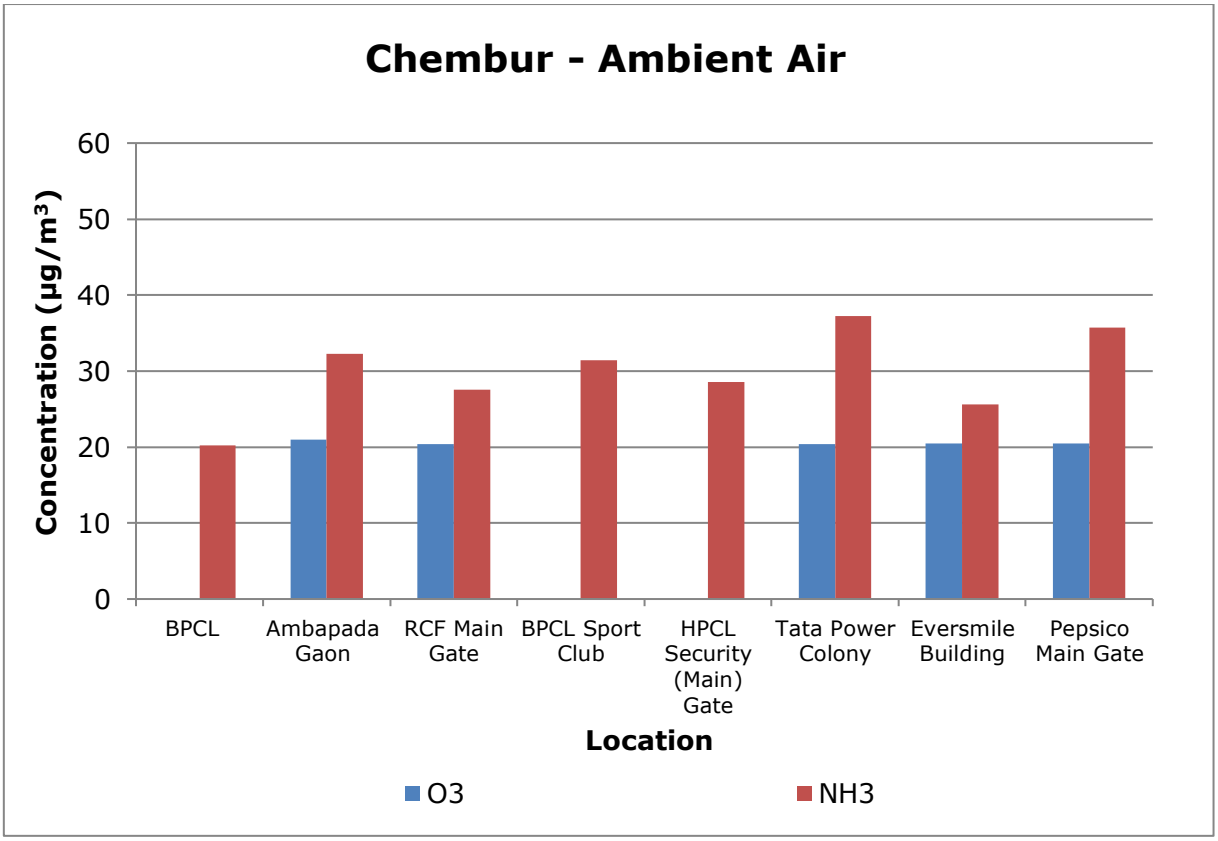
Parameters	Unit	Results	
		Nearby RCF main plant	BPCL sports club
O-Xylene	µg/m³	BLQ	BLQ
Bromoform	µg/m³	BLQ	BLQ
1,1,2,2-Tetrachloroethane	µg/m³	BLQ	BLQ
4-Chlorotoluene	µg/m³	BLQ	BLQ
1,1-Dichloroethylene	µg/m³	BLQ	BLQ
Trans-1,2-Dichloroethylene	µg/m³	BLQ	BLQ
1,1-Dichloroethane	µg/m³	BLQ	BLQ
CIS-1,2-Dichloroethylene	µg/m³	BLQ	BLQ
Bromochloromethane	µg/m³	BLQ	0.63
1,1,1-Trichloroethane	µg/m³	BLQ	BLQ

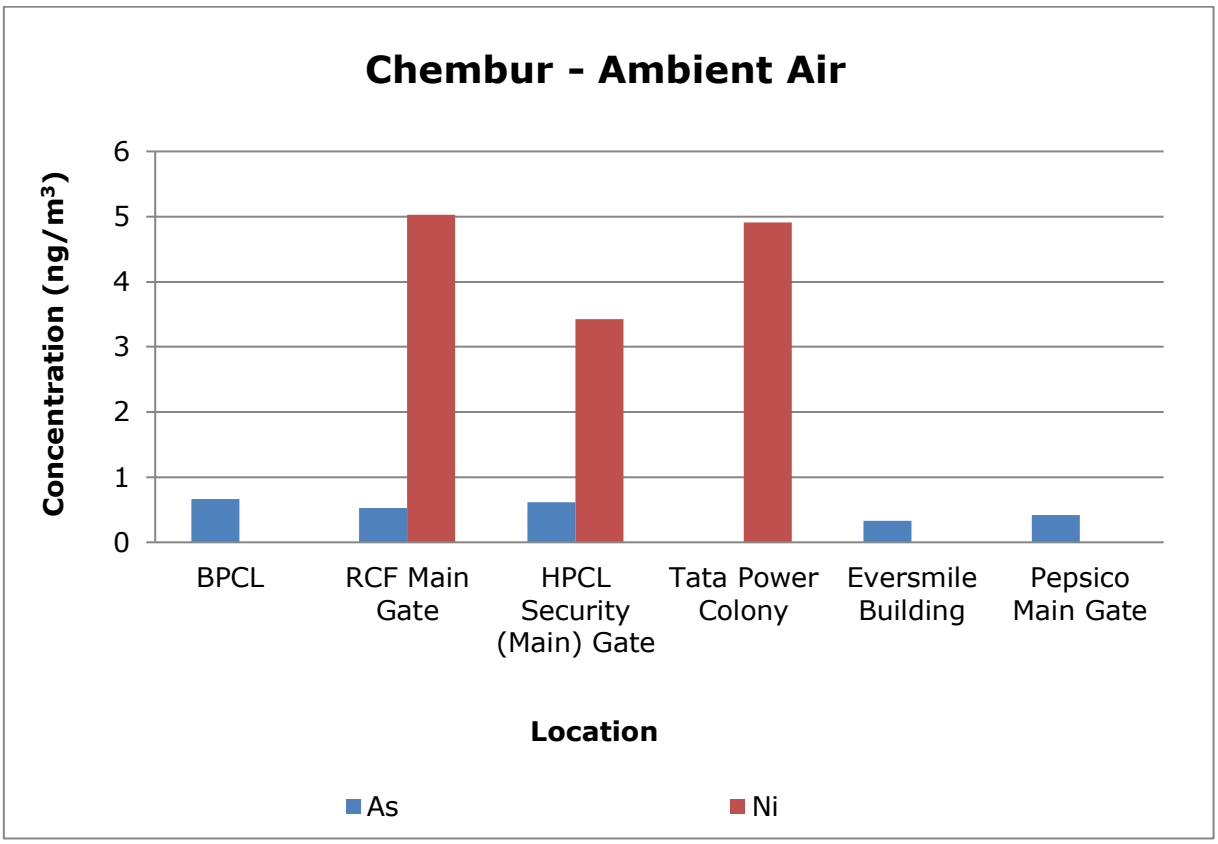
Graphs - Ambient Air Quality Monitoring of Chembur






Chembur - Ambient Air
Concentration (µg/m³)
4
3
2
1
0
BPCL
Ambapada Gaon
RCF Main Gate
BPCL Sport Club
HPCL Security (Main) Gate
Tata Power Colony
Eversmile Building
Pepsico Main Gate
Location
C6H6
Pb


Chembur - Ambient Air
Concentration (µg/m³)
60
50
40
30
20
10
0
BPCL
Ambapada Gaon
RCF Main Gate
BPCL Sport Club
HPCL Security (Main) Gate
Tata Power Colony
Eversmile Building
Pepsico Main Gate
Location
O3
NH3


Chembur - Ambient Air
Concentration (ng/m³)
6
5
4
3
2
1
0
BPCL
RCF Main Gate
HPCL Security (Main) Gate
Tata Power Colony
Eversmile Building
Pepsico Main Gate
Location
As
Ni

WATER ENVIRONMENT

6. Water Environment

For studying the water Environment of Chembur area, surface water was collected from Nallah, Lake, and River and CETP outlet. A total of 6 samples were collected from the Chembur region.

- All six water samples collected are acceptable in general appearance, colour and transparency. The smell was agreeable in all six samples collected.
- pH and suspended solids are well within the limits of all six samples collected.
- BOD was found to exceed the acceptable limit in all the water samples except pond water from RCF.
- 100% survival in Fish Bioassay was observed in 4 out of 6 samples collected.
- Metals like Arsenic, Nickel, Copper, Hexavalent Chromium (Cr^{6+}) etc. are observed either below the limit of quantification (BQL) or below their standard limits. However, iron is observed to exceed the permissible limit.
- Parameters like Total Residual Chlorine, Cyanide, Sulphide, Dissolved Phosphate, Total Ammonical Nitrogen and Phenolic compounds also met the criteria as prescribed by CPCB.
- Polynuclear aromatic hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB) are below the limit of quantification in all 6 samples collected.
- Organo Chlorine Pesticides are also below the limit of quantification in all 6 samples collected.

Table 6.1 Details of Sampling Location of Surface Water

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Pond water from RCF Ashish	19°2'14.62"N	72°54'17.54"E	27.12.2023	29.12.2023	31.12.2023
2.	Downstream near Mahul Jetty	19°0'50.64"N	72°53'5.91"E	27.12.2023	29.12.2023	31.12.2023
3.	Mahul jetty Middle stream	19°1'14.62"N	72°52'44.20"E	27.12.2023	29.12.2023	31.12.2023
4.	Pond water from Cherry Talab near Chembur police station	19°3'3.23"N	72°53'34.25"E	27.12.2023	29.12.2023	31.12.2023
5.	Ghatla pond water	19°3'21.11"N	72°54'22.40"E	27.12.2023	29.12.2023	31.12.2023
6.	Creek water near Ajmera Chembur	19°1'44.59"N	72°52'43.00"E	27.12.2023	29.12.2023	31.12.2023

Fig: Geographical Locations of Surface Water Sampling

Table 6.2 Results of Surface Water

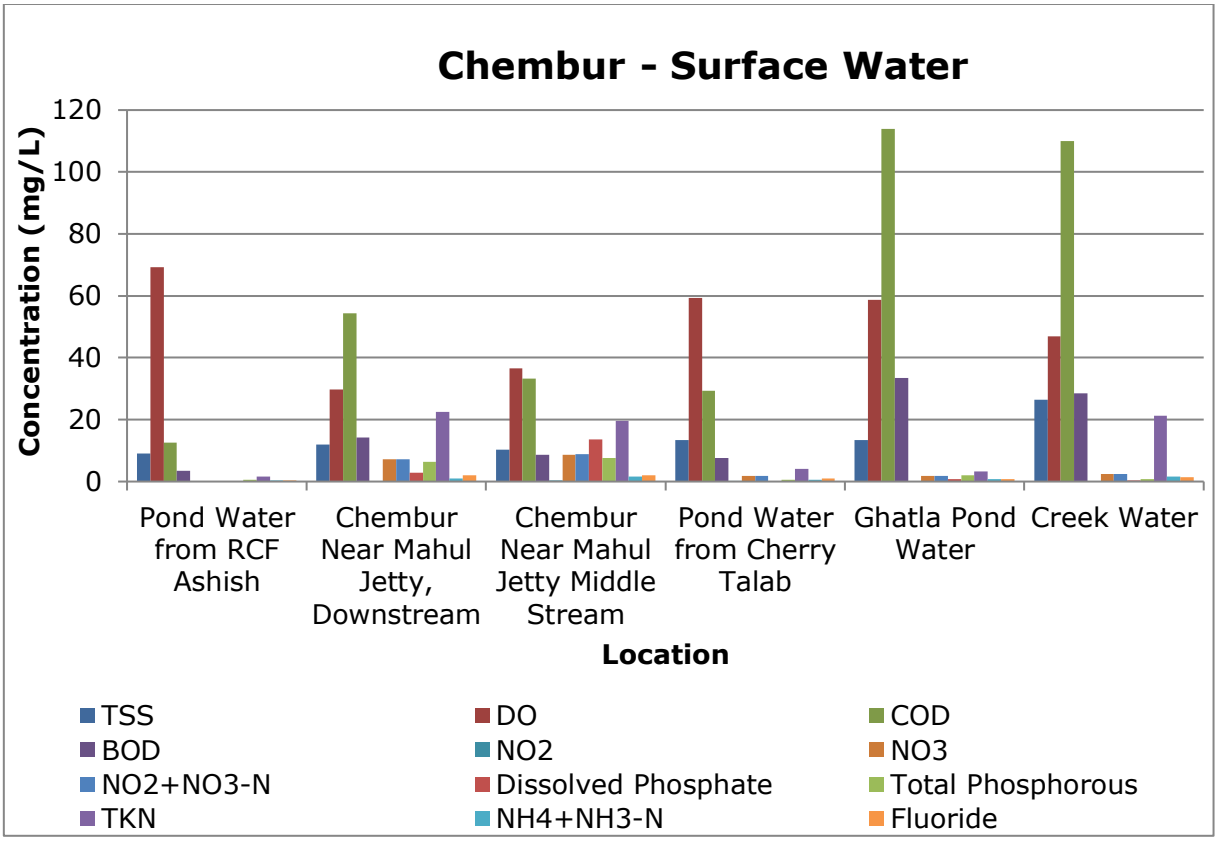
Parameters	Unit	Results					
		Pond water from RCF Ashish	**Downstream near Mahul Jetty**	**Mahul jetty Middle stream**	**Pond water from Cherry Talab near Chembur police station**	**Ghatla pond water**	**Creek water near Ajmera Chembur**
Sanitary Survey	-	Generally Clean neighbourhood	Generally Clean neighbourhood	Generally Clean neighbourhood	Generally Clean neighbourhood	Generally Clean neighbourhood	Generally Clean neighbourhood
General Appearance	-	No Floating matter	No Floating matter	No Floating matter	No Floating matter	No Floating matter	No Floating matter
Transparency	m	0.30	0.20	0.10	0.30	0.40	0.20
Temperature	°C	30	30	29	29	29	30
Colour	Hazen	1	1	2	4	4	2
Smell	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH	-	7.41	7.38	7.39	7.45	7.38	7.16

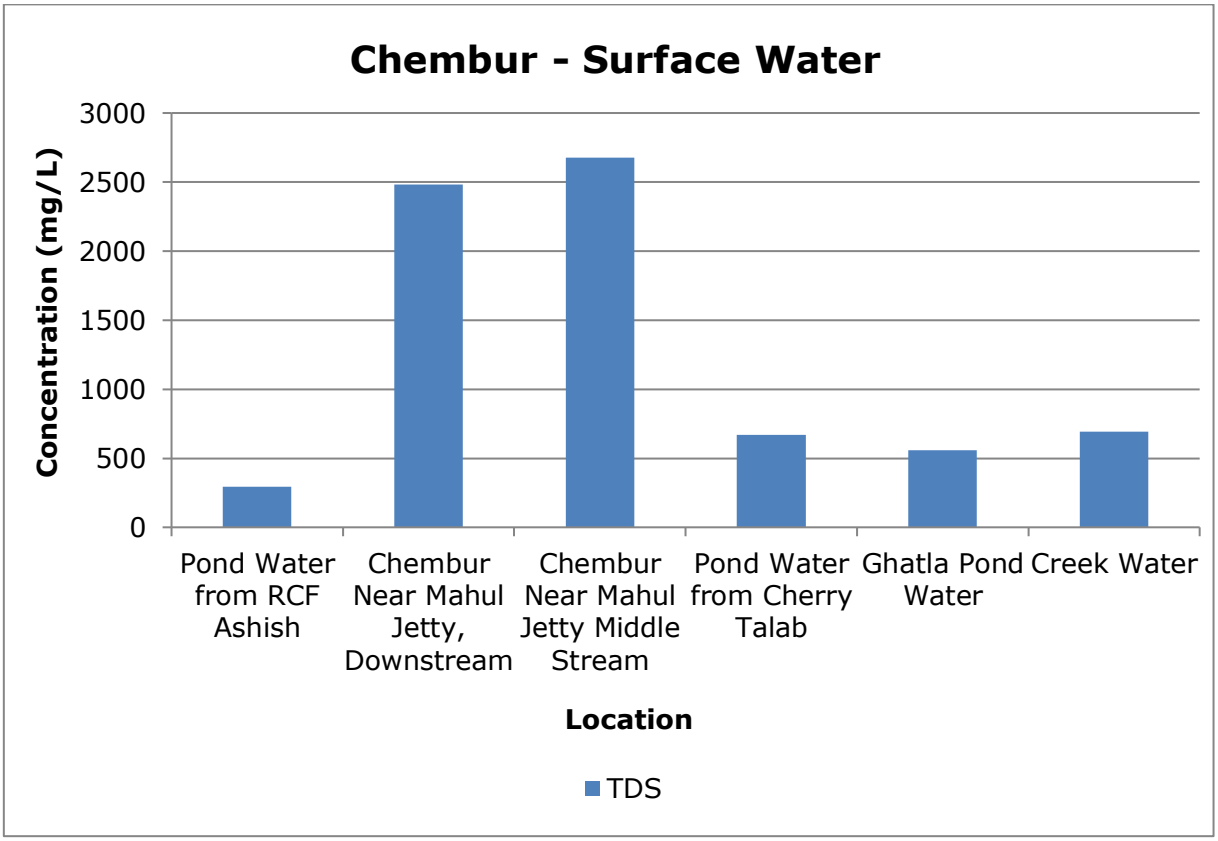
Parameters	Unit	Results					
		Pond water from RCF Ashish	Downstream near Mahul Jetty	Mahul jetty Middle stream	Pond water from Cherry Talab near Chembur police station	Ghatla pond water	Creek water near Ajmera Chembur
Oil & Grease	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Suspended Solids	mg/L	15	18	14	22	27	20
Total Dissolved Solids	mg/L	744	5710	6443	1011	1080	397
Dissolved Oxygen (% Saturation)	%	70	65	63	71	64	67
Chemical Oxygen Demand	mg/L	17	22	22	25	20	34
Biochemical Oxygen Demand (3 days,27°C)	mg/L	5	5	6	6	5	9
Electrical Conductivity (at 25 °C)	µmho/ cm	1326	10023	11297	1802	1928	707
Nitrite Nitrogen (as NO_2)	mg/L	0.04	0.81	0.81	0.04	0.39	0.205
Nitrate Nitrogen (as NO_3)	mg/L	2.13	3.94	3.70	1.51	3.93	3.34
(NO_2 + NO_3)-Nitrogen	mg/L	2.18	4.75	4.51	1.02	1.92	2.59
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	BLQ	0.077	0.075	BLQ	0.07	BLQ
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	1.07	1.63	1.90	1.4	1.40	0.6
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	1.12
Sodium Adsorption Ratio	-	0.79	1.45	2.56	0.89	0.95	1.44

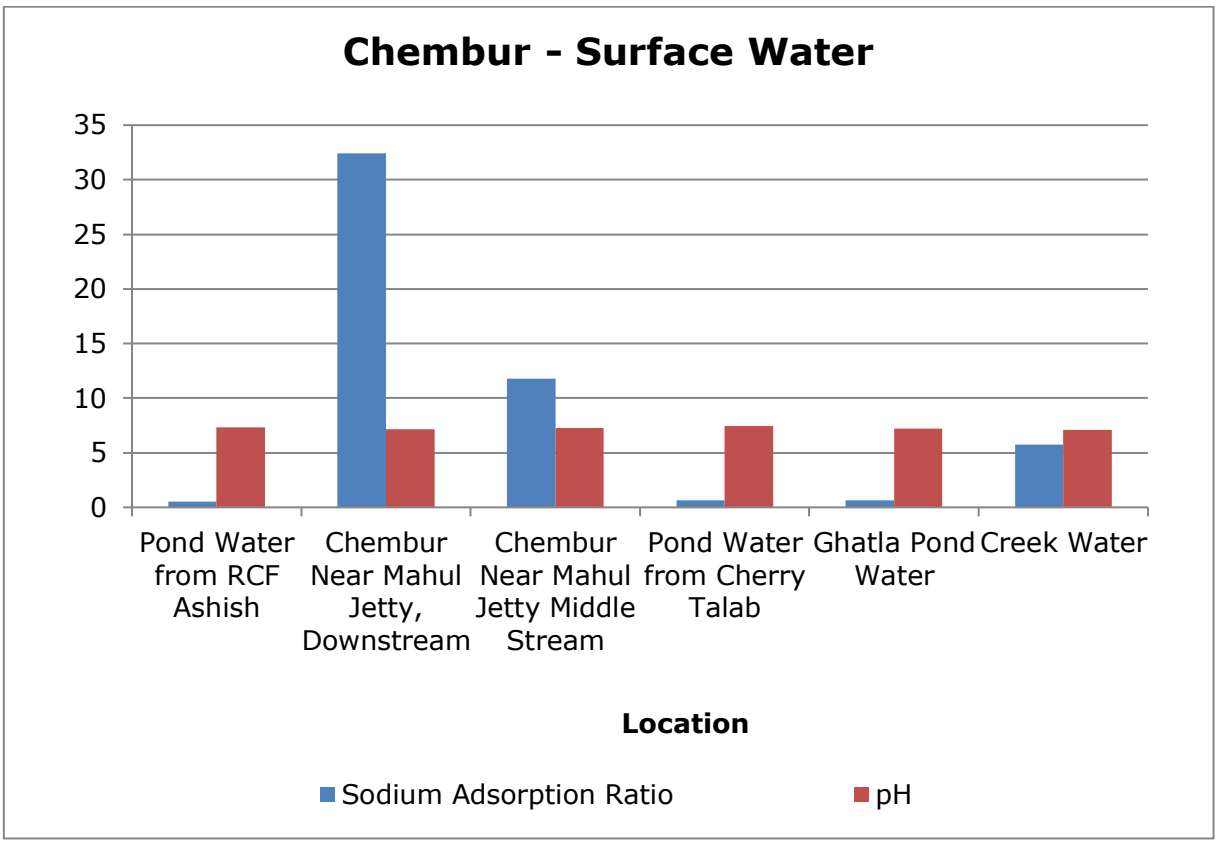
Parameters	Unit	Results					
		Pond water from RCF Ashish	Downstream near Mahul Jetty	Mahul jetty Middle stream	Pond water from Cherry Talab near Chembur police station	Ghatla pond water	Creek water near Ajmera Chembur
Total Coliforms	MPN Index/ 100 ml	1600	650	1260	1082	693	628
Faecal Coliforms	MPN Index/ 100 ml	1147	553	472	211	121	210
Total Phosphate (as P)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Kjeldahl Nitrogen (as N)	mg/L	0.93	1.08	1.08	1.20	1.87	1.64
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.20	0.31	0.30	0.38	0.47	0.37
Phenols (as C_6H_5OH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Anionic Detergents (as MBAS Calculated as LAS, mol.wt.288.38)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Organo Chlorine Pesticides	µg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Polynuclear aromatic hydrocarbons (as PAH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	BLQ	0.09	0.05	BLQ	BLQ	0.09
Nickel (as Ni)	mg/L	0.01	0.01	0.01	BLQ	BLQ	BLQ
Copper (as Cu)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Arsenic (as As)	mg/L	0.01	0.01	BLQ	0.01	0.01	0.01

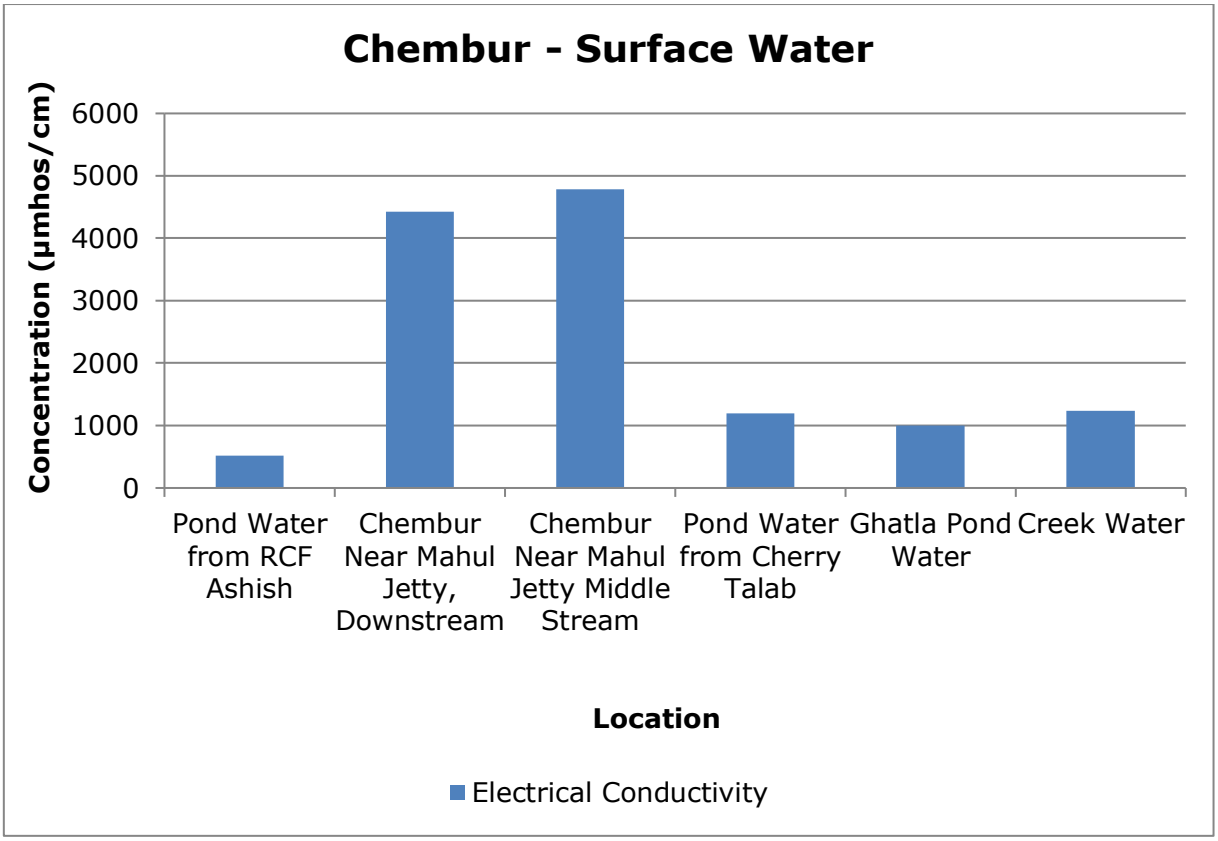
Parameters	Unit	Results					
		Pond water from RCF Ashish	Downstream near Mahul Jetty	Mahul jetty Middle stream	Pond water from Cherry Talab near Chembur police station	Ghatla pond water	Creek water near Ajmera Chembur
Lead (as Pb)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	0.07	0.19	0.16	0.133	0.09	0.06
Iron (as Fe)	mg/L	0.07	0.16	0.41	0.09	0.08	0.43
Vanadium (as V)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Selenium (as Se)	mg/L	0.01	0.02	0.02	0.02	0.02	0.01
Boron (as B)	mg/L	0.11	0.49	0.44	BLQ	0.24	BLQ
Total Nitrogen	mg/L	3.11	5.84	5.60	2.23	3.79	4.23
Bioassay Test on fish	% survival	97	100	100	97	100	100

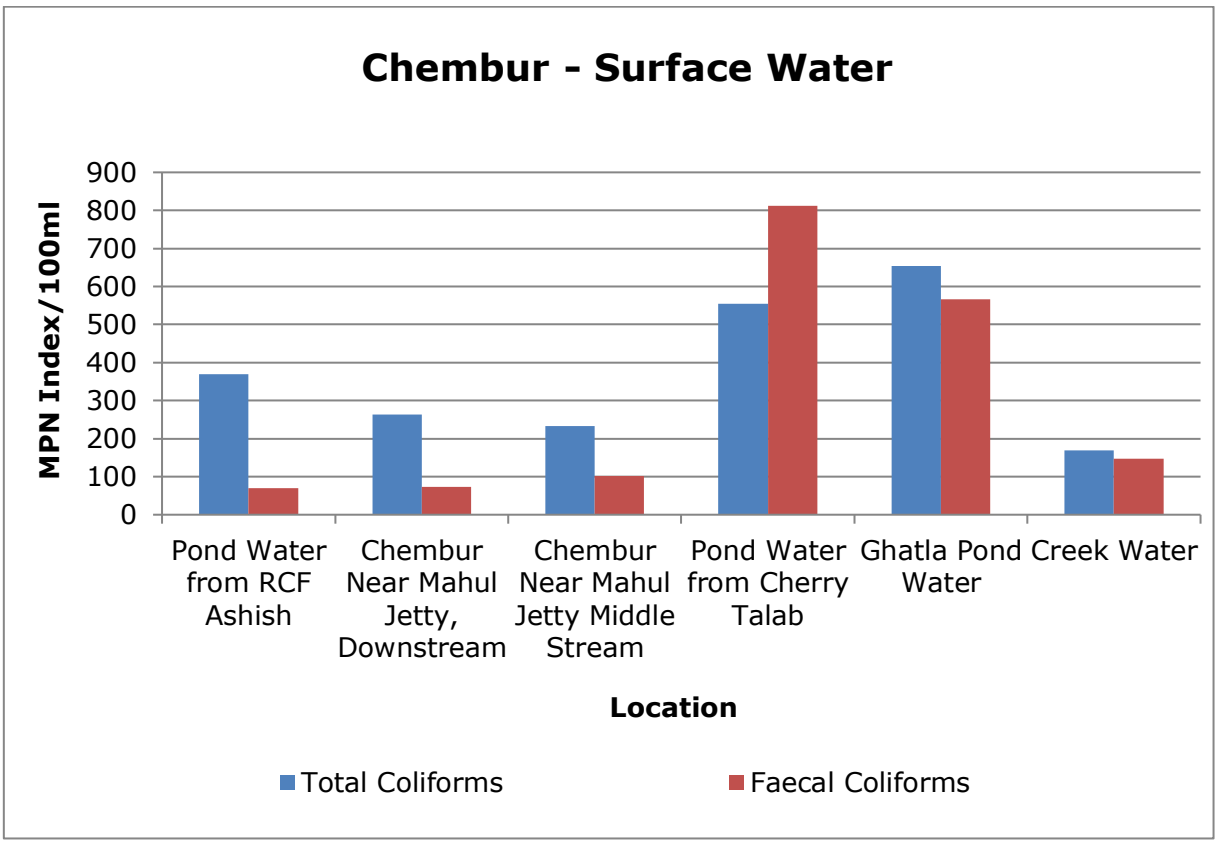
Graphs - Surface Water Quality of Chembur

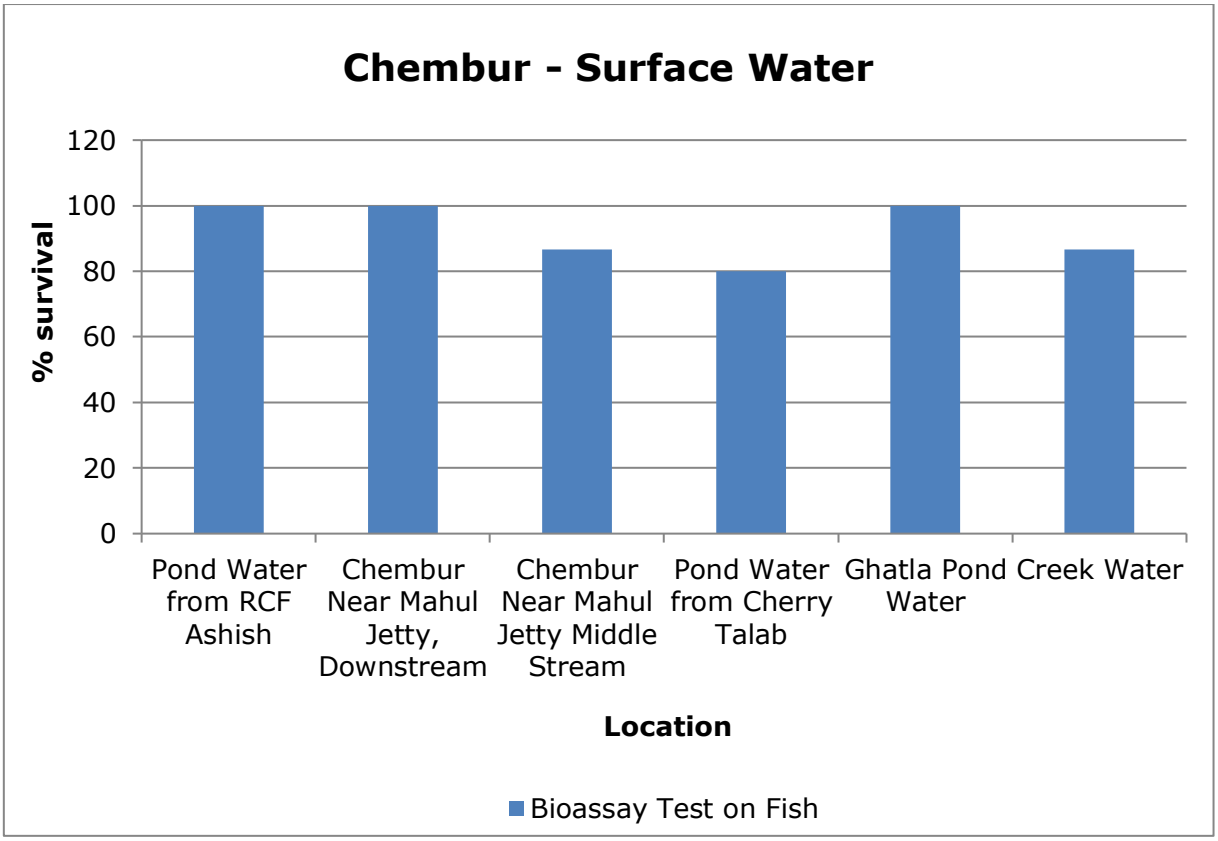





Chembur - Surface Water
35
30
25
20
15
10
5
0
Pond Water from RCF Ashish
Chembur Near Mahul Jetty, Downstream
Chembur Near Mahul Jetty Middle Stream
Pond Water from Cherry Talab
Ghatla Pond Water
Creek Water
Location
Sodium Adsorption Ratio
pH


Chembur - Surface Water
Concentration (µmhos/cm)
6000
5000
4000
3000
2000
1000
0
Pond Water from RCF Ashish
Chembur Near Mahul Jetty, Downstream
Chembur Near Mahul Jetty Middle Stream
Pond Water from Cherry Talab
Ghatla Pond Water
Creek Water
Location
Electrical Conductivity


Chembur - Surface Water
MPN Index/100ml
900
800
700
600
500
400
300
200
100
0
Pond Water from RCF Ashish
Chembur Near Mahul Jetty, Downstream
Chembur Near Mahul Jetty Middle Stream
Pond Water from Cherry Talab
Ghatla Pond Creek Water
Location
Total Coliforms
Faecal Coliforms


Chembur - Surface Water
% survival
120
100
80
60
40
20
0
Pond Water from RCF Ashish
Chembur Near Mahul Jetty, Downstream
Chembur Near Mahul Jetty Middle Stream
Pond Water from Cherry Talab
Ghatla Pond Creek Water
Location
Bioassay Test on Fish

LAND ENVIRONMENT

7. Land Environment

For studying the land Environment of Chembur area, ground water was collected from Bore well. A total of 6 samples were collected.

- All six water samples collected are acceptable in general appearance, colour, smell and transparency.
- pH, suspended solids, BOD, and COD were also well within the limits in all the samples.
- Electrical conductivity was also observed within the acceptable limits in all six water samples.
- 100% Fish survival was achieved in 5 water samples out of 6. In the water sample of Ambapada, 97% fish survival was observed.
- All metals like Arsenic, Nickel, Copper, Iron, Hexavalent Chromium (Cr^{6+}) etc. were observed either below the limit of quantification (BQL) or below their standard limits.
- Parameters like Total Residual Chlorine, Cyanide, Fluoride, Sulphide, Dissolved Phosphate, Total Ammonical Nitrogen and Phenolic compounds, also met the criteria as prescribed by CPCB.
- Polynuclear aromatic hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB) were below the detectable limit in all six samples collected.
- Organo Chlorine Pesticides are also below the limit of quantification in all six samples collected.

Table 7.1 Details of Sampling Location of Ground Water

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Hand pump water at Prayag Nagar	19°1'4.89"N	72°54'33.94"E	27.12.2023	29.12.2023	31.12.2023
2.	Well water at Prayag Nagar	19°1'11.10"N	72°54'31.93"E	27.12.2023	29.12.2023	31.12.2023
3.	Well water at Prayag Nagar Tabela	19°1'29.20"N	72°54'24.65"E	27.12.2023	29.12.2023	31.12.2023
4.	Well water at Laxmi Nagar	19°1'46.72"N	72°53'44.31"E	27.12.2023	29.12.2023	31.12.2023
5.	Well water at Ambapada	19°1'7.96"N	72°53'20.72"E	27.12.2023	29.12.2023	31.12.2023
6.	Well water Mahul Village	19°0'52.00"N	72°53'10.95"E	27.12.2023	29.12.2023	31.12.2023

Fig: Geographical Locations of Ground Water Sampling

Table 7.2 Results of Ground Water

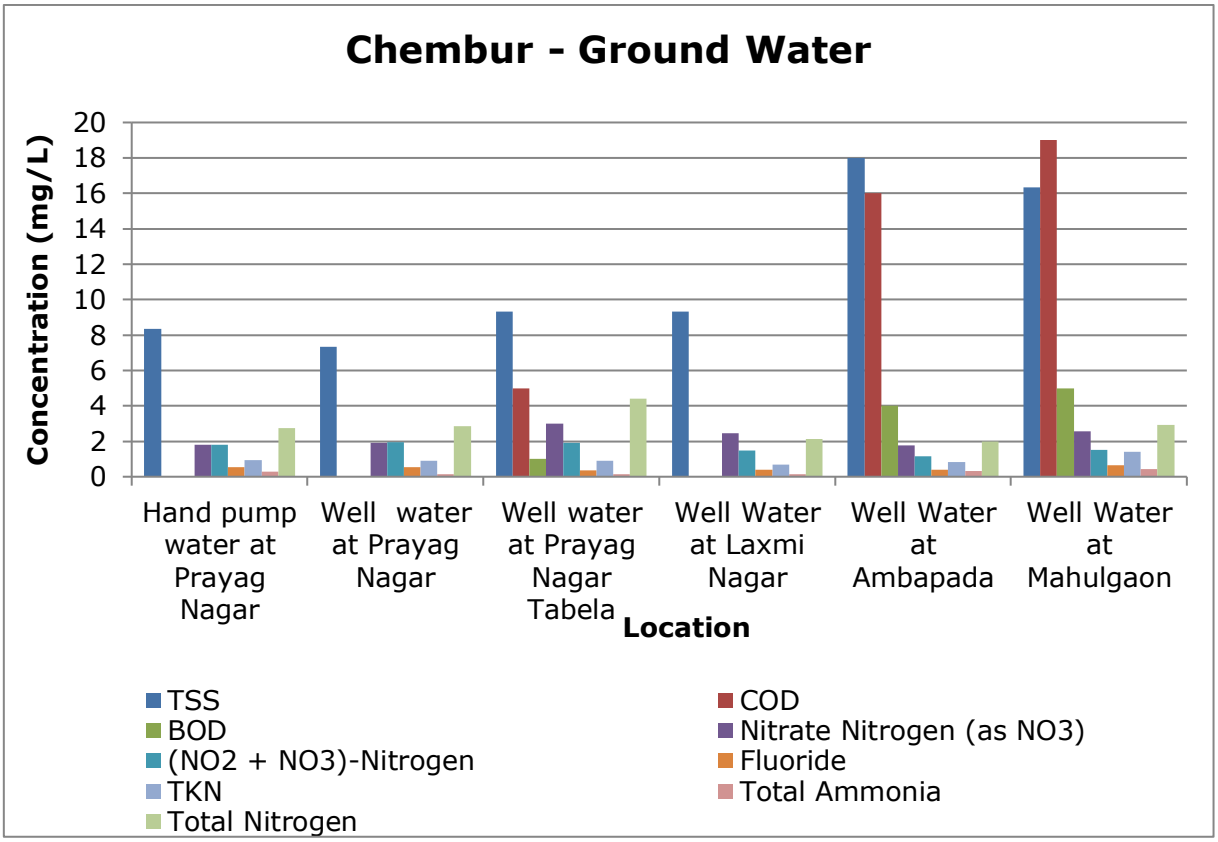
Parameters	Unit	Results					
		Hand pump water at Prayag Nagar	**Well water at Prayag Nagar**	**Well water at Prayag Nagar Tabela**	**Well water at Laxmi Nagar**	**Well water at Ambapada**	**Well water Mahul Village**
Sanitary Survey		Generally clean neighbou rhood	Generally clean neighbou rhood	Generally clean neighbou rhood	Generally clean neighbou rhood	Generally clean neighbou rhood	Generally clean neighbou rhood
General Appearance		No Floating matter	No Floating matter	No Floating matter	No Floating matter	No Floating matter	No Floating matter
Transparency	m	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Temperature	°C	27.89	29.20	28.43	29.30	28.53	28.97
Colour	Hazen	1	1	1	1	1	1
Smell	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH	-	7.44	7.33	7.52	7.39	7.58	7.49
Oil & Grease	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Suspended Solids	mg/L	8	7	9	9	18	16
Total Dissolved Solids	mg/L	250	260	157	173	239	273

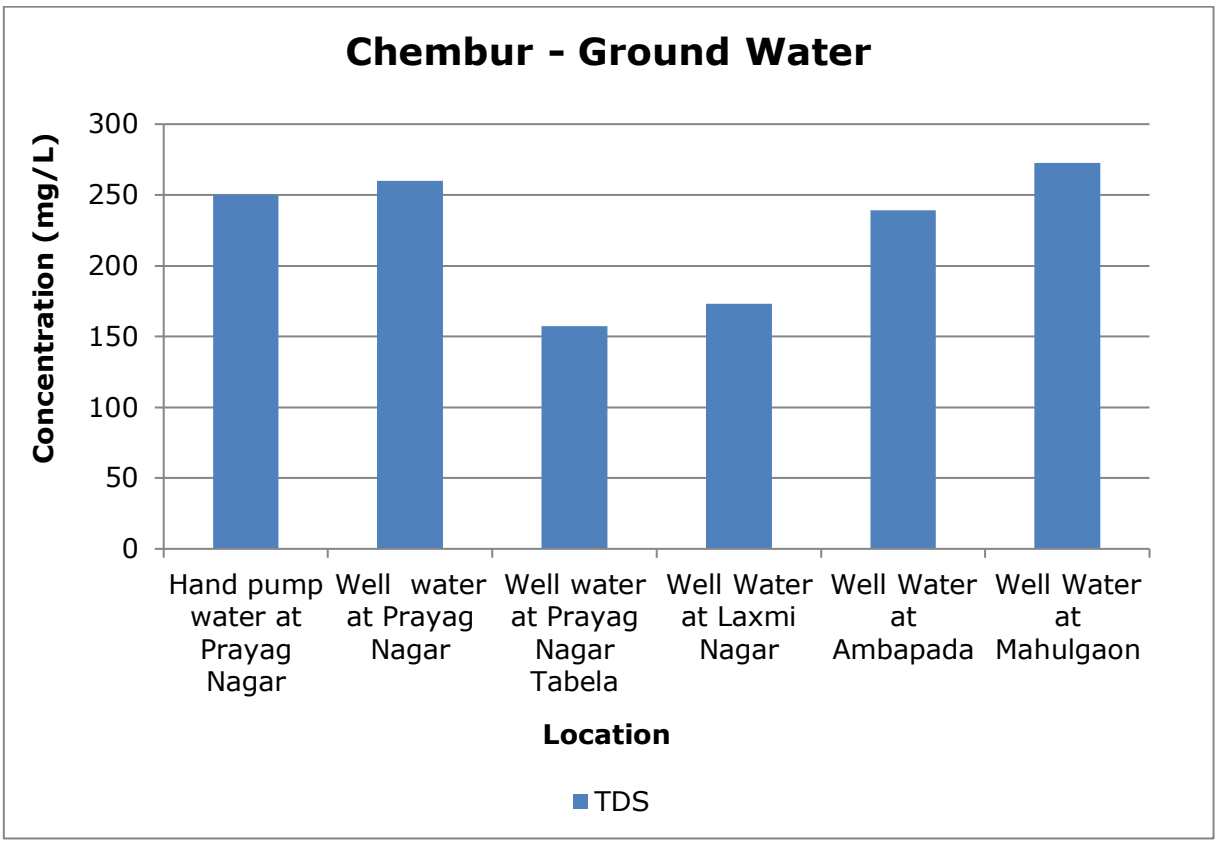
Parameters	Unit	Results					
		Hand pump water at Prayag Nagar	Well water at Prayag Nagar	Well water at Prayag Nagar Tabela	Well water at Laxmi Nagar	Well water at Ambapada	Well water Mahul Village
Chemical Oxygen Demand	mg/L	BLQ	BLQ	5	BLQ	16	19
Biochemical Oxygen Demand (3 days,27°C)	mg/L	BLQ	BLQ	1	BLQ	4	5
Electrical Conductivity (at 25 °C)	µmho/cm	444	460	278	306	426	484
Nitrite Nitrogen (as NO_2)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Nitrate Nitrogen (as NO_3)	mg/L	1.81	1.93	3.01	2.44	1.76	2.57
(NO_2 + NO_3)-Nitrogen	mg/L	1.81	1.94	1.90	1.47	1.16	1.53
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	0.55	0.55	0.35	0.40	0.40	0.65
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Sodium Adsorption Ratio	-	1.53	0.77	0.81	0.72	0.99	1.03
Total Coliforms	MPN Index/ 100 ml	350	170	186	856	260	578
Faecal Coliforms	MPN Index/ 100 ml	220	110	151	240	19	352
Total Phosphate (as P)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Kjeldahl Nitrogen (as N)	mg/L	0.95	0.90	0.90	0.67	0.84	1.40

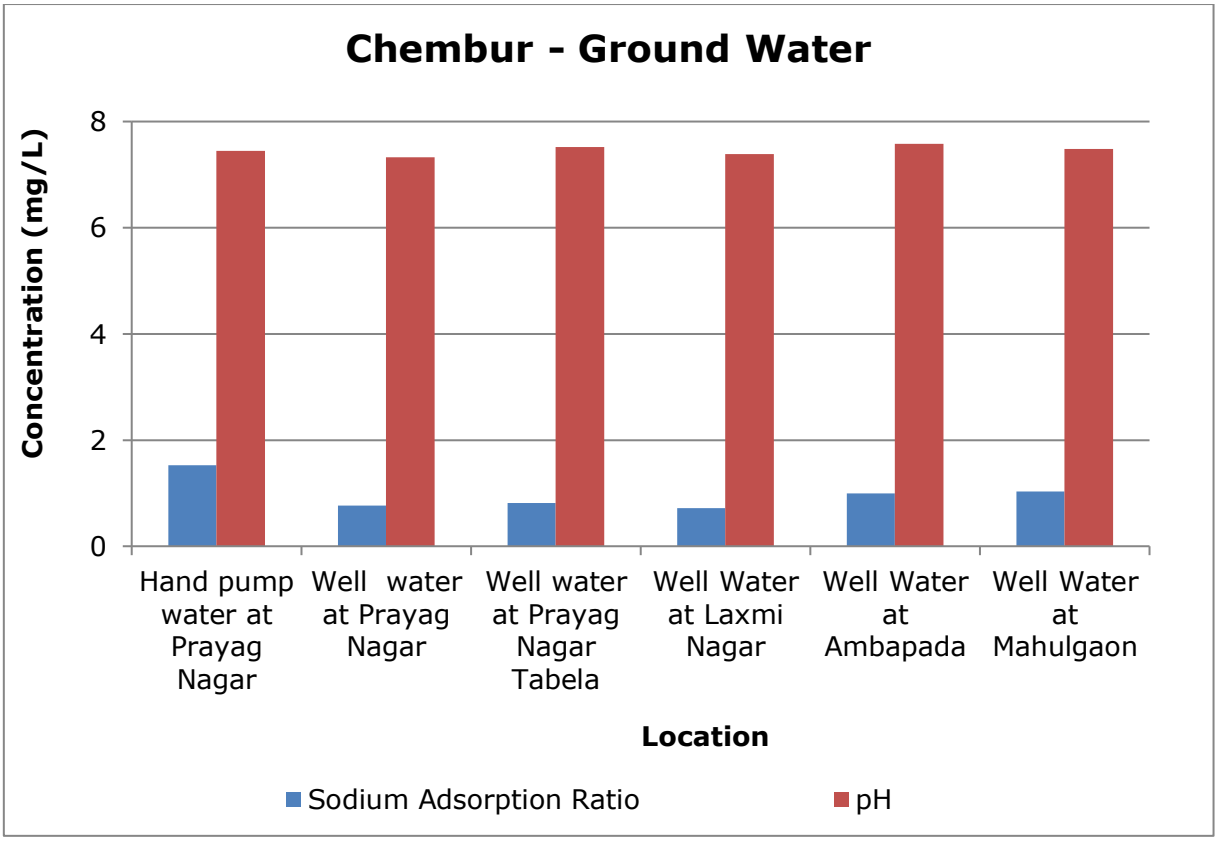
Parameters	Unit	Results					
		Hand pump water at Prayag Nagar	Well water at Prayag Nagar	Well water at Prayag Nagar Tabela	Well water at Laxmi Nagar	Well water at Ambapada	Well water Mahul Village
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.27	0.15	0.13	0.13	0.32	0.42
Phenols (as C_6H_5OH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Anionic Detergents (as MBAS Calculated as LAS, mol.wt.288.38)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Organo Chlorine Pesticides	µg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Polynuclear aromatic hydrocarbons (as PAH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	0.10	0.15	0.13	0.30	0.24	0.22
Nickel (as Ni)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Copper (as Cu)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Arsenic (as As)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Lead (as Pb)	mg/L	0.02	0.02	0.02	BLQ	0.01	0.01
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	0.07	0.02	0.74	0.64	0.13	0.17
Iron (as Fe)	mg/L	0.18	0.10	0.30	0.19	0.28	0.22
Vanadium (as V)	mg/L	0.02	0.02	BLQ	BLQ	BLQ	BLQ
Selenium (as Se)	mg/L	BLQ	0.01	0.01	0.01	0.01	0.01
Boron (as B)	mg/L	0.47	BLQ	BLQ	2.62	4.44	4.84

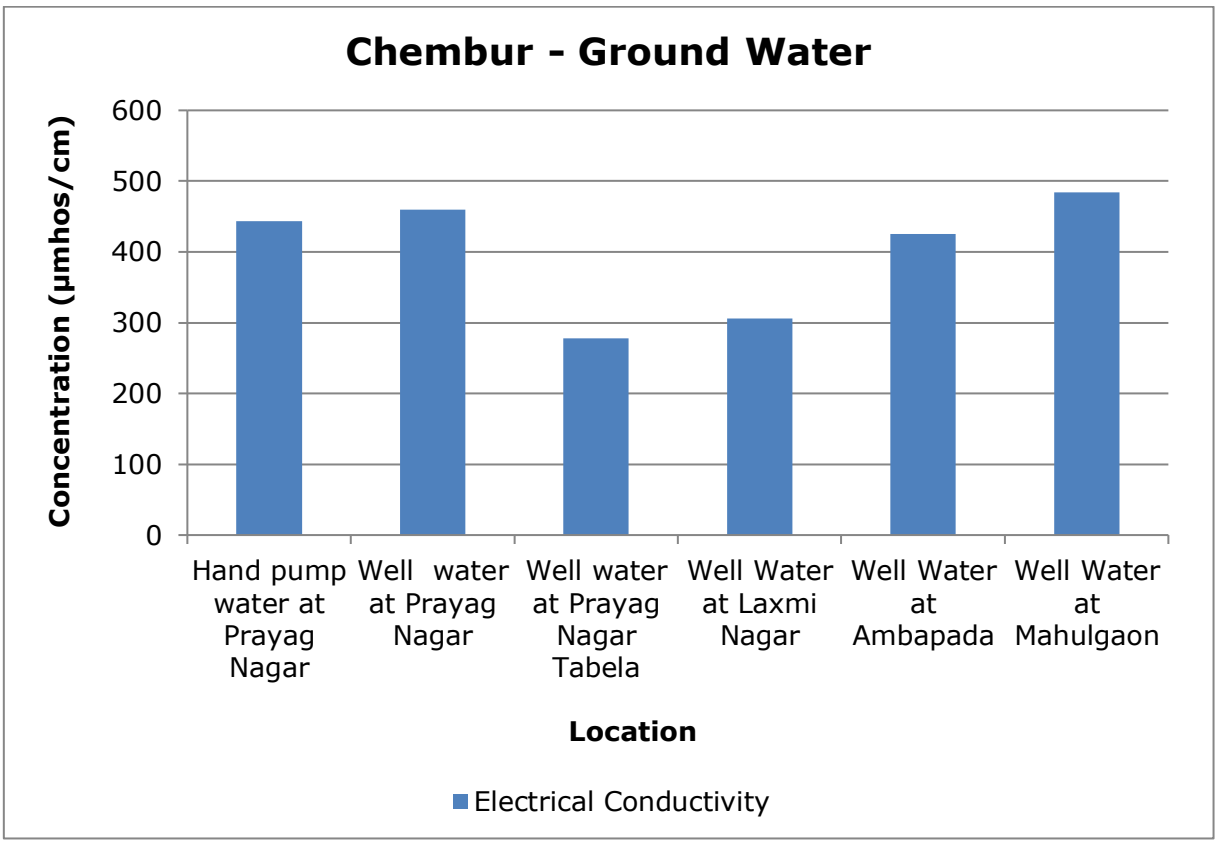
Parameters	Unit	Results					
		Hand pump water at Prayag Nagar	Well water at Prayag Nagar	Well water at Prayag Nagar Tabela	Well water at Laxmi Nagar	Well water at Ambapada	Well water Mahul Village
Total Nitrogen	mg/L	2.76	2.84	4.41	2.14	2.00	2.94
Bioassay Test on fish	% survival	100	100	100	100	97	100

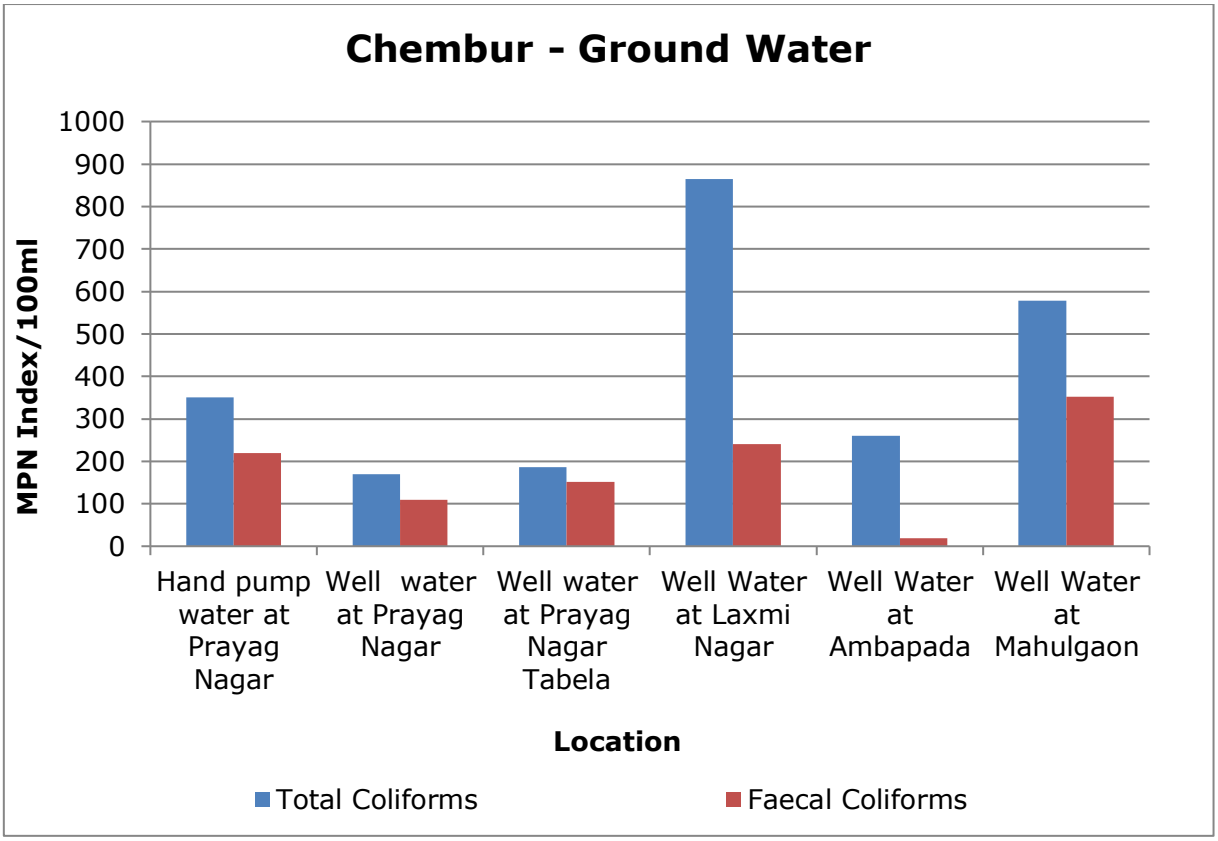
Graphs - Ground water quality of Chembur

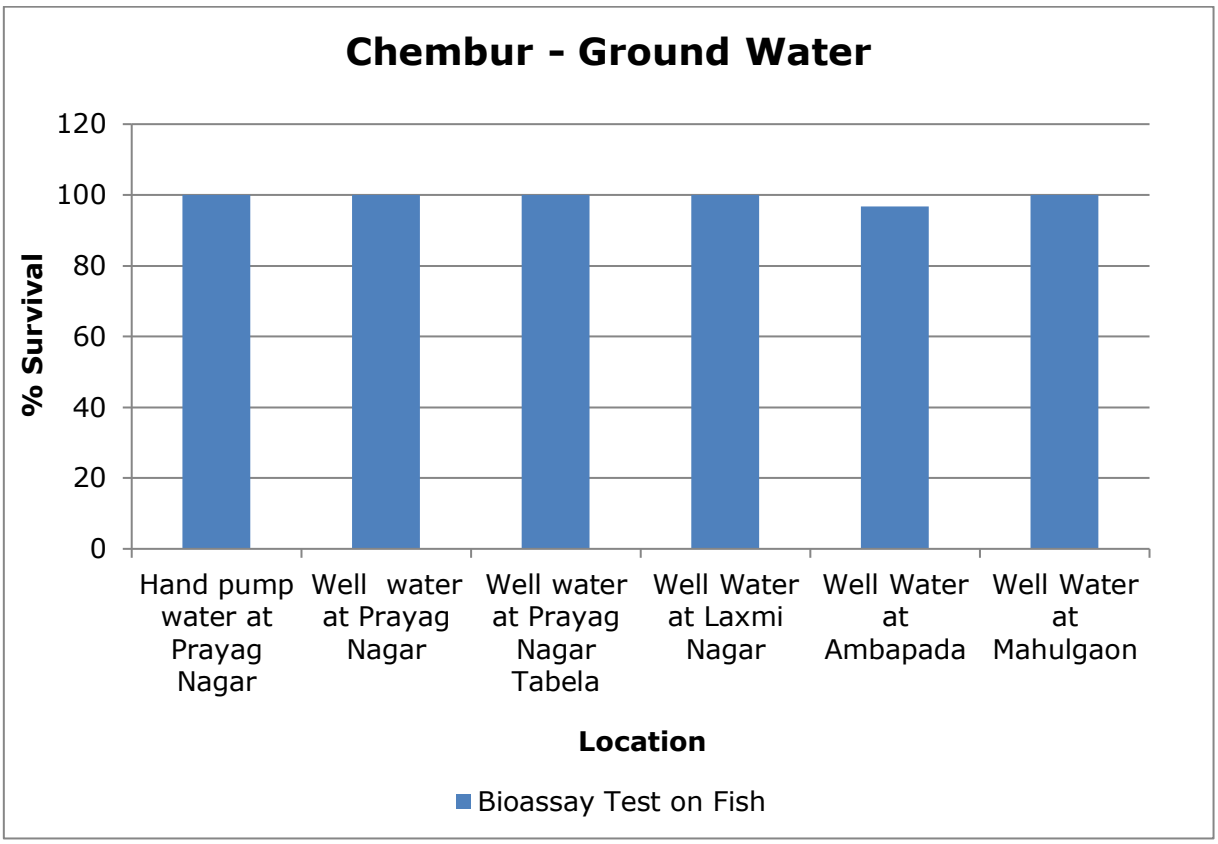



Chembur - Ground Water
Concentration (mg/L)
300
250
200
150
100
50
0
Hand pump water at Prayag Nagar
Well water at Prayag Nagar
Well water at Prayag Nagar Tabela
Well Water at Laxmi Nagar
Well Water at Ambapada
Well Water at Mahulgaon
Location
TDS


Chembur - Ground Water
Concentration (mg/L)
8
6
4
2
0
Hand pump water at Prayag Nagar
Well water at Prayag Nagar
Well water at Prayag Nagar Tabela
Well Water at Laxmi Nagar
Well Water at Ambapada
Well Water at Mahulgaon
Location
Sodium Adsorption Ratio
pH


Chembur - Ground Water
Concentration (µmhos/cm)
600
500
400
300
200
100
0
Hand pump water at Prayag Nagar
Well water at Prayag Nagar
Well water at Prayag Nagar Tabela
Well Water at Laxmi Nagar
Well Water at Ambapada
Well Water at Mahulgaon
Location
Electrical Conductivity


Chembur - Ground Water
MPN Index/100ml
1000
900
800
700
600
500
400
300
200
100
0
Hand pump water at Prayag Nagar
Well water at Prayag Nagar
Well water at Prayag Nagar Tabela
Well Water at Laxmi Nagar
Well Water at Ambapada
Well Water at Mahulgaon
Location
Total Coliforms
Faecal Coliforms


Chembur - Ground Water
120
100
80
60
40
20
0
% Survival
Hand pump water at Prayag Nagar
Well water at Prayag Nagar
Well water at Prayag Nagar Tabela
Well Water at Laxmi Nagar
Well Water at Ambapada
Well Water at Mahulgaon
Location
Bioassay Test on Fish

C: Receptor

Component C (Impact on Human Health)	
Main - 10	
% increase in cases	**Marks**
<5%	**0**
5-10%	**5**
>10%	**10**

- % increase is evaluated based on the total no. of cases recorded during two consecutive years.
- For Air Environment, total no. of cases related to Asthma, Bronchitis, Cancer, Acute respiratory infections etc. are to be considered.
- For surface water/ ground water Environment, cases related to Gastroenteritis, Diarrhoea, renal (kidney) malfunction, cancer etc are to be considered.
- For the above evaluation, the previous 5 years records of 3-5 major hospitals of the area shall be considered.

Annexure – I Health Related Data enclosed

9. CEPI Score

Comprehensive Environmental Pollution Index (CEPI) is intended to act as early warning tool which helps in categorization of industrial clusters/ areas in terms of priority of needing attention. The CEPI score have been calculated based on CPCB Letter No. B-29012/ESS (CPA)/2015-16 dated 26th April 2016. The scoring system involves an algorithm that considers the basic selection criteria. It is proposed to develop the CEPI based on Sources of pollution, real time observed values of the pollutants in the ambient air, surface water and ground water in & around the industrial cluster and health related statistics.

Table 8.1 CEPI score of the Post monsoon season 2024

	A1	A2	A	B	C	D	CEPI
Air Index	4	4	16	0.5	10	0	**26.50**
Water Index	2.5	4	10	30	0	0	**40.00**
Land Index	2.5	4	10	0	0	0	**10.00**
						Aggregated CEPI	**41.60**

Water Environment Pollution Index (EPI) is highest with 40.00. The reason for the increase in Water EPI is due to the exceedance of Selenium in most of the surface water samples collected. the sources of Selenium in the waste water include agricultural drainage, sewage sludge, coal-fired fly ash, phosphate and metal mining wastewater, selenium-containing sewage and other wastes discharged from industrial production processes

Table 8.2 Comparison of CEPI Scores

	Air Index	Water Index	Land Index	CEPI
CEPI Score March 2024	26.50	40.00	10.00	**41.60**
CEPI Score June 2023	21.50	40.00	26.00	**43.40**
CEPI Score March 2023	21.00	38.50	28.00	**42.12**
CEPI score June 2021	24.30	29.80	26.00	**39.40**
CEPI Score March 2021	20.00	47.00	15.00	**48.60**
CEPI score March 2020	44.80	18.80	21.00	**47.00**
CEPI score June 2019	30.60	40.30	39.38	**41.60**

	Air Index	Water Index	Land Index	CEPI
CEPI score March 2019	35.50	24.75	42.50	**42.28**
CEPI score June 2018	36.00	39.88	30.25	**44.1**
CEPI score March 2018	38.80	32.30	31.72	**45.07**
CPCB CEPI score March 2018	52.25	50.75	10.00	**54.67**

The result shows that CEPI score of present report is 41.60. The present study is the compilation of post monsoon season, which also affects the score value. This time CEPI score is observed lower than the CPCB CEPI score March 2018 which was 54.67 as well as little lower than the post monsoon score of last year which was 42.12.

CEPI Score Calculation:

Chembur, Maharashtra - CEPI - March 2024

Ambient Air Analysis report

Pollutant	Group	A1	A2	A (A1 X A2)
As	C	3	Large	
$PM_{2.5}$	B	0.5		
PM_{10}	B	0.5		
		4	**4**	**16**

Pollutant	Avg (1)	Std (2)	EF (3) [(3)=(1)/(2)]	No. of samples Exceeding (4)	Total no. of samples (5)	SNLF Value (6) [(6)=(4)/(5)x(3)]	SNLF score (B)	
As	1.15	6	0.19	0	8	0.00	L	0
$PM_{2.5}$	21.83	60	0.36	0	8	0.00	L	0
PM_{10}	78.92	100	0.79	0	8	0.00	L	0.5
B score = (B1+B2+B3)							**B**	**0.5**

C	**10**	**>10%**
D	**0**	**A-A-A**

Air CEPI	(A+B+C+D)	26.5

Water Quality Analysis report

Pollutant	Group	A1	A2	A (A1 X A2)
Se	B	2	Large	
TN	A	0.25		
Total Ammonia	A	0.25		
		2.5	**4**	**10**

Pollutant	Avg (1)	Std (2)	EF (3) [(3)=(1)/(2)]	No. of samples Exceeding (4)	Total no. of samples (5)	SNLF Value (6) [(6)=(4)/(5)x(3)]	SNLF score (B)	
Se	0.02	0.01	1.70	4	6	1.13	C	30
TN	4.13	15	0.28	0	6	0.00	L	0
Total Ammonia	0.34	1.5	0.23	0	6	0.00	L	0
B score = (B1+B2+B3)							**B**	**30**

C	**0**	**<5%**
D	**0**	**A-A-A**

Water CEPI	(A+B+C+D)	40.0

Ground Water Quality Analysis report

Pollutant	Group	A1	A2	A (A1 X A2)
Se	B	2	Large	
Fe	A	0.25		
F	A	0.25		
		2.5	**4**	**10**

Pollutant	Avg (1)	Std (2)	EF (3) [(3)=(1)/(2)]	No. of samples Exceeding (4)	Total no. of samples (5)	SNLF Value (6) [(6)=(4)/(5)x(3)]	SNLF score (B)	
Se	0.01	0.01	0.71	0	6	0.00	L	0
Fe	0.21	0.3	0.71	0	6	0.00	L	0
F	0.48	1.5	0.32	0	6	0.00	L	0
B score = (B1+B2+B3)							**B**	**0**

C	**0**	**<5%**
D	**0**	**A-A-A**

Land CEPI	(A+B+C+D)	10.0

Water CEPI Score (im) **40.00**

Air CEPI Score (i2) **26.50**

Land CEPI Score (i3) **10.00**

Aggregated CEPI Score = **im + {(100-im)*i2/100)*i3/100)}**

where, im = maximum sub index; and i2 and i3 are sub indices for other media

CEPI Score **41.6**

10. Conclusion

Ambient Air Quality

- The AAQ stations were identified in the CEPI impact area to cover both upwind and cross wind directions and AAQ survey was conducted.
- All parameters are well within the limits as per NAAQS as compared to the CEPI score calculated for Air Environment by CPCB in March 2018, where PM_{10} and $PM_{2.5}$ have exceeded the standard limits.

Surface Water Quality

- Higher concentration of Total nitrogen was observed in the surface water samples collected which may be due to increase in microbial activity, poor agricultural practices, leaking septic systems or discharges from sewage treatment plants.
- All the industries in Chembur region are either reusing the treated trade effluent as sewage in their process or gardening or are disposed into Sea.

Ground Water Quality

- Ground water samples were collected from different Bore well in the region.
- All parameters are observed well within the limits.

CEPI Score

- The CEPI Score post monsoon season is 41.6.
- In comparison with the CEPI Score of March 2023, there is a decrease in the Land Index, however the Air and the Water Index increased substantially.
- Collective efforts of MPCB, administration and environmental organizations have finally paid off and pollution levels in Chembur are on the decline.
- The present study is the compilation of post monsoon season, which results in dilution of environmental samples resulting in lower pollution load, hence also affects the total score.
- In conclusion, approximately 24% decrease in CEPI score is observed from 54.67 of the CPCB score of March 2018 to 41.6 in 2024.

11. Efforts Taken by MPCB to Control and Reduce Environmental Pollution Index

- Various directions were issued to concerned industries and stakeholders as well as continuous follow-up is taken for the implementation and compliance with directions and action plans.
- Specified & Implemented G.S.R. Std. 186 (E) dated 18th March 2008
- Special measures taken like covering all ETPs, reduction in LDAR (1500), upgradation in filling Gantries (extended arm with vapour control system), stock gauges, nitrogen blanketing, transporting products through pipelines (90%- BPCL and 93% HPCL), Bottom filling arrangements (PESO approved), restricted parking areas and tree plantation
- All 13 petrol pumps in the Chembur area have installed the vapour collection unit.
- Recently in the month of February 2020 and March 2020 MPC Board carried out VOC Monitoring to M/s. Glens Innovation Lab Pvt. Ltd. Chennai to know the status of VOCs in the Mahul Ambapada area in comparison with previous monitoring. The analysis reports showed that the concentration of main VOC parameters is less as compared to the concentration of VOCs monitored in 2019, which indicates an improvement in air quality.
- **Nitrogen blanketing**
    - It is related to BPCL only and they have completed all 5 tanks (Benzene storage-3 and Toluene Storage- 2), with internal floating roof and double sel completed.
- **Usage of bottom loading Tankers in all 04 industries**

  Bottom Lorry loading facility has been completed in all industries and started loading into some tankers, which will be done on priority.

  a) M/S BPCL: The Bottom Lorry loading facility has been completed and started the loading of Benzene tankers with the Bottom loading facility.
  b) M/S HPCL: The facility of bottom loading will be provided in the expansion phase. The tanker loading facility will be coming along with the expansion project.
  c) M/s. Aegis already using the bottom loading facility for LPG filling tankers. Recently completed bottom loading facility at Gantry No. 01 for 10 points and gantry No 02 for 05 points and started operation from 14.12.2020
  d) M/s. Sealord Container, at present handling Ethanol and Methanol. They are having bottom loading facility for loading Gantry at 5 points for 12 points and started bottom loading activity from 20.12.2020.
- **Parking and regulations of traffic movement in Mahul-Ambapada area**

- No parking zones were declared by the police Authority and started its implementation by imposing penalties. Also, MPC Board directed all four industries to submit the proposal for tanker / trucks movement to avoid traffic congestion and resolve the roadside parking problem and also explore the possibility of regulating time slot truck/ tanker movement by using a mobile app.

- **Tree Plantation in open space to be done by the industries**
    - Around 17,000 trees are planted in last one year.

- **Shifting the storage and handling of LAB (Linear Alkyl / Benzene being the organic product)**
    - M/s Sea Lord Container has shifted the storage and handling of LAB to their sister concern unit i.e. M/s. Aegis Logistics Ltd from 12.11.2020.

	
Continuous Ambient Air Quality Monitoring Station (CAAQMS)	**Ambient Air Quality Monitoring (AAQM)Van**

12. Photographs

Ambient Air Sampling at BPCL Sport Club

Ambient Air Sampling at Pepsico

Ambient Air Sampling at Eversmile Building

Ambient Air Sampling at HPCL

Surface water sampling at Downstream near Mahul Jetty

Surface water sampling at Cherry Talab

Surface water sampling at RCF Ashish

Surface water sampling at Ajmera Chembur

Groundwater sampling at Prayag Nagar

Groundwater sampling at Laxmi Nagar

Groundwater sampling at Mahul Village

Groundwater sampling at Prayag nagar Tabela

HEALTH STATISTICS

Required for Comprehensive Environmental Pollution Index (CEPI)
Post-monsoon Season (December 2023- February 2024) Study by
Maharashtra Pollution Control Board (MPCB), MAHARASHTRA

Name of the Polluted Industrial Area (PIA)	CHEMBUR
Name of the major health center/ organization	SUSHRUT HOSPITAL
Name and designation of the Contact person	Dr. Dipti Sulakhe Medical Admin
Address	365, SWASTIK PARK CHEMBUR EAST, MUMBAI 400071

S No.	Diseases	No. of Patients Reported	
		Year 2021-2022	Year 2022-2023
AIRBORNE DISEASES			
1.	Asthma	12	10
2.	Acute Respiratory Infection	396	350
3.	Bronchitis	24	21
4.	Cancer	1687	1921
WATERBORNE DISEASES			
1.	Gastroenteritis	408	395
2.	Diarrhea	12	15
3.	Renal diseases	36	42
4.	Cancer	1320	1106

Date: 18/1/2024

SUSHRUT HOSPITAL

18/01/2024
Signature

HEALTH STATISTICS

Required for Comprehensive Environmental Pollution Index (CEPI) Post-monsoon Season (December 2023- February 2024) Study by Maharashtra Pollution Control Board (MPCB), MAHARASHTRA

Name of the Polluted Industrial Area (PIA)	CHEMBUR
Name of the major health center/ organization	**Sai Hospital**
Name and designation of the Contact person	DR. NAZNEEN SAYED
Address	CHEMBUR

S No.	Diseases	No. of Patients Reported	
		Year 2021-2022	Year 2022-2023
AIRBORNE DISEASES			
1.	Asthma	180	70
2.	Acute Respiratory Infection	300	200
3.	Bronchitis	300	150
4.	Cancer	80	100
WATERBORNE DISEASES			
1.	Gastroenteritis	280	300
2.	Diarrhea	250	280
3.	Renal diseases	180	200
4.	Cancer	80	100

Date: 25/01/2024

Signature

SAI HOSPITAL Chembur

HEALTH STATISTICS

Required for Comprehensive Environmental Pollution Index (CEPI) Post-monsoon Season (December 2023- February 2024) Study by Maharashtra Pollution Control Board (MPCB), MAHARASHTRA

Name of the Polluted Industrial Area (PIA)	Chembur
Name of the major health center/ organization	Zen Hos Multispeciality Hospital
Name and designation of the Contact person	Ms. Aakanksha Jadhav - 9029490931
Address	chembur (E.)

S No.	Diseases	No. of Patients Reported	
		Year 2021-2022	Year 2022-2023
AIRBORNE DISEASES			
1.	Asthma	612	690
2.	Acute Respiratory Infection	407	950
3.	Bronchitis	214	195
4.	Cancer	NA	NA
WATERBORNE DISEASES			
1.	Gastroenteritis	652	704
2.	Diarrhea	652	704
3.	Renal diseases	240	265
4.	Cancer	NA	NA

Date: 11/03/2024

for, Signature

Zen Multi Speciality Hospital, Reg. No. — Dedication Compassion Excellence