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

CHEMBUR

Pre-Monsoon (April 2024 to June 2024)

MAHARASHTRA

LiFE Lifestyle for Environment

Maharashtra Pollution Control Board

महाराष्ट्र प्रदूषण नियंत्रण मंडळ

Index

ABBREVIATIONS

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
CEPI	Comprehensive Environmental Pollution Index
CETP	Common Effluent Treatment Plant
CPA	Critically Polluted Area
CPCB	Central Pollution Control Board
EPA	Environmental Protection Act, 1986
GDP	Gross Domestic Product
MIDC	Maharashtra Industrial Development Corporation
MPCB	Maharashtra Pollution Control Board
NAAQS	National Ambient Air Quality Standard
NWMP	National Water Quality Monitoring Program
OPA	Other polluted Area
SPA	Severely Polluted Area
VOCs	Volatile Organic Compounds
WHO	World Health Organisation
ZLD	Zero Liquid Discharge

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 the CPCB location with the additional locations of samplings for ambient air, surface and groundwater in consideration with the previous CEPI monitoring and covering the entire CEPI Impact Zone. The Pre - Monsoon monitoring was carried out during the period of April 2024 to June 2024 to verify the Ambient Air Quality, Surface water and Groundwater.

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 the domestic wastewater drain is also connected with the surface water and hence the quality of surface water could not compare with IS 10500:2012 drinking water standards. In groundwater, the concentrations of all parameters are well within the limit.

Based on the study conducted by CPCB in January 2018, the CEPI score of Chembur region (as per the revised CEPI guidelines 2016) was 54.67 (Ambient Air–52.25, Water-50.75, Land–10). The concentrations of PM10 and PM2.5 in the CEPI score of CPCB were the main contributors to the increase in the score, and this is primarily due to the AAQM stations installed near the roadside where the majority of vehicular movements occur, causing PM10 and PM2.5 concentrations to be further apart from industrial emission sources.

The Maharashtra Pollution Control Board has made several steps to reduce the CPCB CEPI Score of 54.67 of 2018 to 46.3 of June 2024. According to the present study result, the Environmental Pollution Index (EPI) score of Pre-Monsoon in Ambient Air is calculated as 16.0, Surface Water as 19.75, and Ground Water as 44.50. Hence, Chembur's Comprehensive Environmental Pollution Index (CEPI) score for the Pre-monsoon 2024 is 46.30.

2. Introduction

The industrial sector remains a pivotal force in driving a nation's economic growth, significantly contributing to increased production, fixed investment, exports, employment, and capacity utilization. Industries serve as engines of economic development, bolstering government revenue, international trade, social services, and job creation. The growth rate of the industrial sector directly impacts the overall economic growth of a country. Consequently, industries are essential for achieving economic goals and prosperity. According to the World GDP Ranking 2024, India stands as the fifth-largest economy globally. Several Sustainable Development Goals (SDGs) focus on growth, including Decent Work and Economic Growth (Goal 8) and Industry, Innovation, and Infrastructure (Goal 9).

Despite these economic benefits, industrial activities have a profound negative impact on the environment, affecting water, air, and soil quality. Industries discharging untreated wastewater have contaminated drinking water with hazardous substances, posing severe risks to human, animal, and aquatic life. Air pollution from industrial emissions is linked to a range of respiratory and cardiovascular diseases, particularly affecting children and leading to increased rates of infant mortality and chronic health issues in adulthood. According to the World Health Organization (WHO), environmental pollution is responsible for approximately 9 million premature deaths annually. Over 90% of the global population is exposed to air pollution levels exceeding WHO guidelines, posing serious health risks. Furthermore, around 2 billion people use drinking water contaminated with feces, leading to infectious diseases such as cholera and dysentery.

The impact on flora and fauna is equally alarming. Industrial pollution has led to habitat destruction, loss of biodiversity, and the disruption of ecosystems. Toxic pollutants can cause genetic mutations, reproductive failures, and behavioral changes in wildlife, endangering entire species. Plants exposed to polluted air and water can experience stunted growth, reduced photosynthesis, and increased susceptibility to diseases, which ultimately affects food security and ecosystem stability.

To mitigate these adverse effects, robust environmental policies are essential. These policies set forth rules for industries and individuals, enforced by government agencies. Key aspects include monitoring pollution levels, imposing fines or penalties on violators, and conducting environmental impact assessments for proposed projects. Conservation measures are crucial for protecting biodiversity, and policies must be regularly updated to address emerging challenges. A comprehensive approach, including robust regulatory frameworks, international collaboration, advanced monitoring technologies, and a commitment to sustainable practices from industries and governments, is vital for safeguarding our natural resources and promoting sustainability.

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,

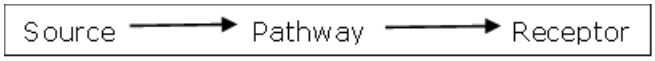
Sampling Criteria	Total Sites	Monitoring Parameters
		CIS-1,2-Dichloroethylene, Bromochloromethane, 1,1,1-Trichloroethane
Water Quality Monitoring	**Surface water - 06**	**(i) Simple Parameters** Sanitary Survey, General Appearance, Colour, Smell, Transparency and Ecological **(ii) Regular Monitoring 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
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 Groundwater 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, 2009) 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	26.06.2024	28.06.2024	30.06.2024
2.	Ambapada Gaon	19°0'43.92"N	72°53'25.70"E	26.06.2024	28.06.2024	30.06.2024
3.	Nearby RCF main plant	19°2'5.62"N	72°53'31.98"E	26.06.2024	28.06.2024	30.06.2024
4.	BPCL sports club	19°1'44.07"N	72°53'43.66"E	26.06.2024	28.06.2024	30.06.2024
5.	HPCL Refinery Main Gate	19°1'11.79"N	72°53'49.63"E	26.06.2024	28.06.2024	30.06.2024
6.	Tata Power Colony	19°2'20.46"N	72°53'59.23"E	26.06.2024	28.06.2024	30.06.2024
7.	Eversmile Building	19°0'55.47"N	72°53'12.80"E	26.06.2024	28.06.2024	30.06.2024
8.	Near main gate Pepsico	19°1'12.26"N	72°53'59.12"E	26.06.2024	28.06.2024	30.06.2024

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

	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	26.06.2024	28.06.2024	30.06.2024
2.	BPCL sports club	19°1'44.07" N	72°53'43.66"E	26.06.2024	28.06.2024	30.06.2024

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	Amba pada Gaon	Near by RCF main plant	BPCL sports club
Sulphur Dioxide (SO_2)	$\mu g/m^3$	33.90	23.20	19.50	14.90
Nitrogen Dioxide (NO_2)	$\mu g/m^3$	BLQ	20.50	11.99	14.85
Particulate Matter (size less than 10 µm) or PM_{10}	$\mu g/m^3$	37	44	45	41
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	$\mu g/m^3$	9	11	10	10
Ozone (O_3)	$\mu g/m^3$	43.45	51.00	39.50	39.40
Lead (Pb)	$\mu g/m^3$	0.06	0.06	0.04	0.05
Carbon Monoxide (CO) (1h)	mg/m^3	0.89	1.01	0.97	1.02
Carbon Monoxide (CO) (8h)	mg/m^3	1.34	1.35	1.40	1.50
Ammonia (NH_3)	$\mu g/m^3$	85.65	76.35	97.30	74.95
Benzene (C_6H_6)	$\mu g/m^3$	2.07	2.21	2.08	2.03
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m^3	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m^3	0.64	0.60	0.60	0.74
Nickel (Ni)	ng/m^3	4.07	4.38	8.00	10.15

Parameters	Unit	Results			
		HPCL Refinery Main Gate	Tata Power Colony	Eversmile Building	Near main gate Pepsico
Sulphur Dioxide (SO_2)	$\mu g/m^3$	33.70	27.70	39.45	25.70
Nitrogen Dioxide (NO_2)	$\mu g/m^3$	BLQ	11.30	7.23	18.00
Particulate Matter (size less than 10 µm) or PM_{10}	$\mu g/m^3$	41	47	37	41
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	$\mu g/m^3$	9	12	10	11

Parameters	Unit	Results			
		HPCL Refinery Main Gate	Tata Power Colony	Eversmile Building	Near main gate Pepsico
Ozone (O_3)	µg/m³	21.90	31.70	38.90	39.40
Lead (Pb)	µg/m³	0.08	0.12	0.12	0.09
Carbon Monoxide (CO) (1h)	mg/m³	0.97	1.00	1.05	0.94
Carbon Monoxide (CO) (8 h)	mg/m³	1.42	1.47	1.36	1.52
Ammonia (NH_3)	µg/m³	59.20	68.30	64.35	54.40
Benzene (C_6H_6)	µg/m³	2.36	1.93	2.01	1.75
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m³	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m³	1.20	0.89	0.82	0.90
Nickel (Ni)	ng/m³	8.07	6.34	6.33	5.17

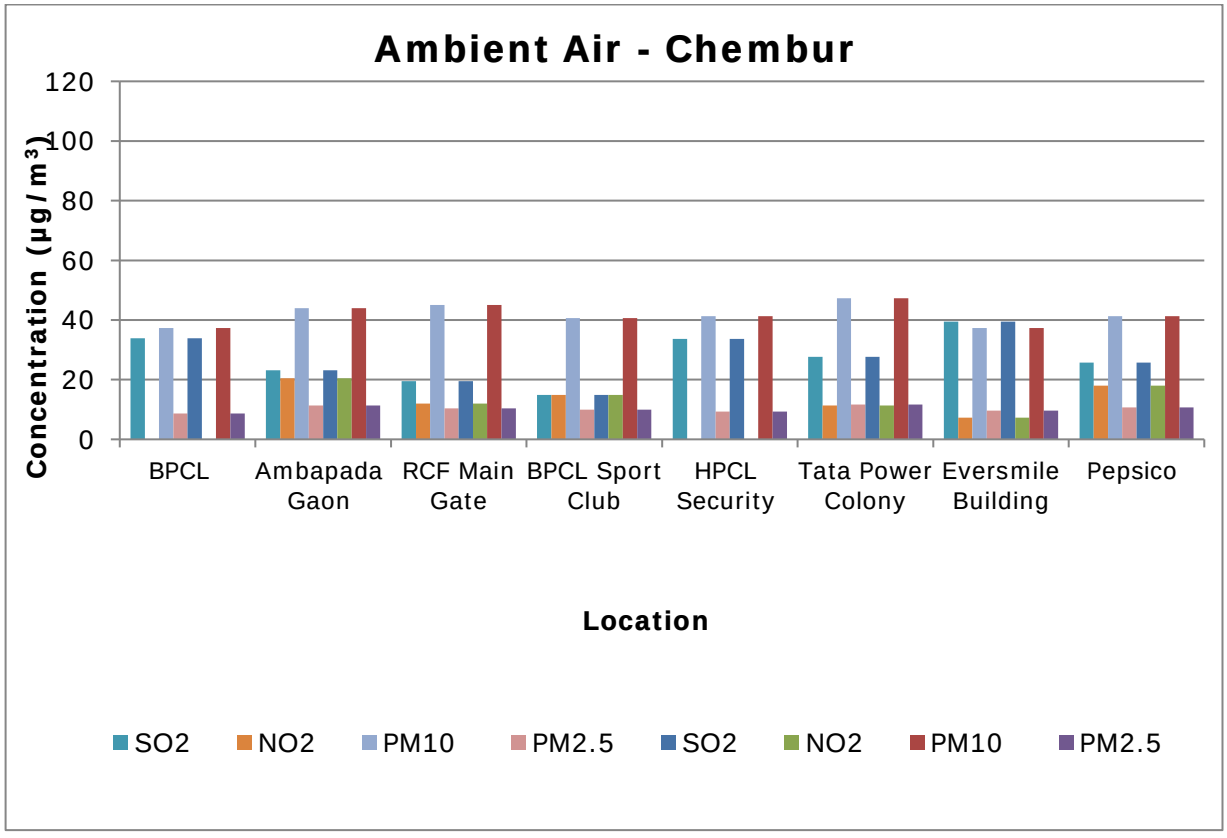
Table 5.4 Volatile Organic Compounds (VOCs) in Ambient Air Results

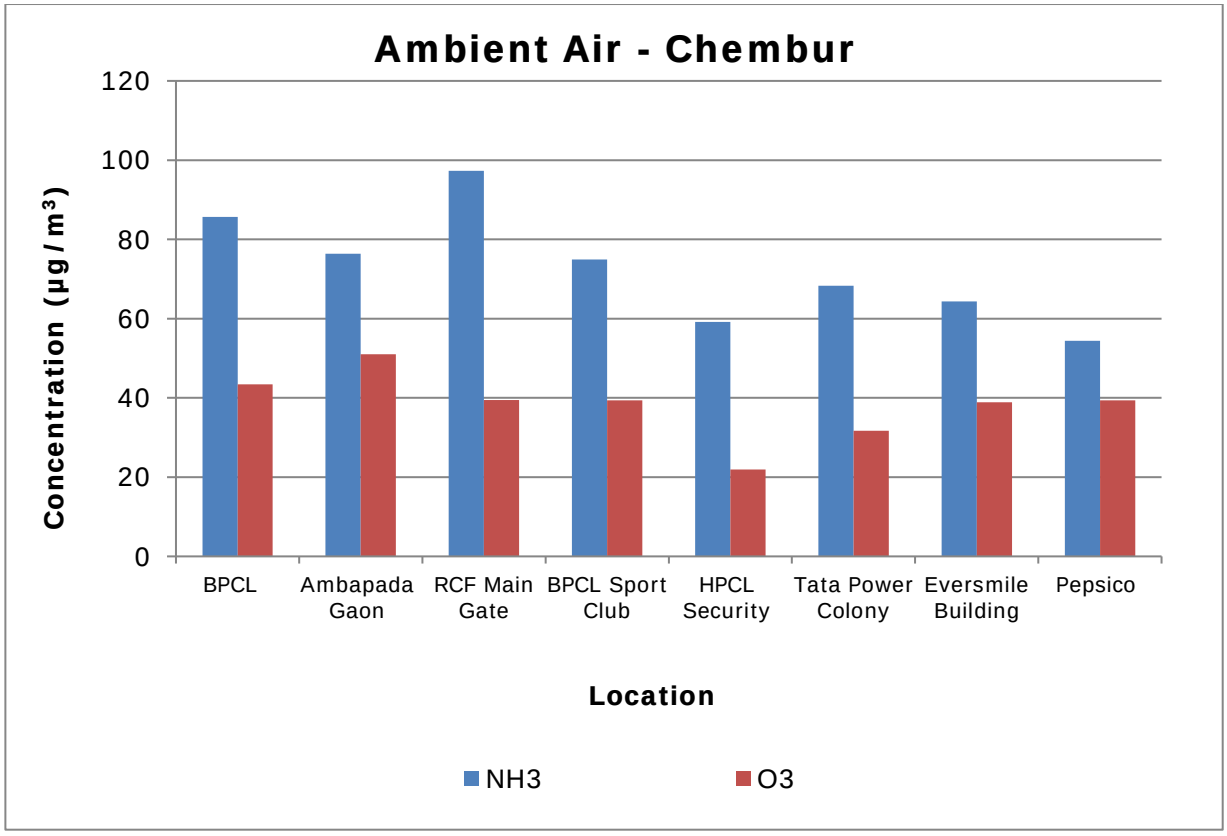
Parameters	Unit	Results	
		Nearby RCF main plant	BPCL sports club
Dichloromethane	µg/m³	1.32	1.48
Chloroform	µg/m³	BLQ	BLQ
Carbon Tetrachloride	µg/m³	BLQ	BLQ
Trichloroethylene	µg/m³	BLQ	BLQ
Bromodichloromethane	µg/m³	BLQ	BLQ
1,3-Dichloropropane	µg/m³	BLQ	BLQ
1,4-Dichlorobenzene	µg/m³	BLQ	BLQ
1,3-Dichlorobenzene	µg/m³	BLQ	BLQ
1,2-Dichlorobenzene	µg/m³	BLQ	BLQ
1,2-Dibromo-3-Chloropropane	µg/m³	BLQ	BLQ
Naphthalene	µg/m³	BLQ	BLQ
Bromobenzene	µg/m³	BLQ	BLQ
1,2,4-Trimethylbenzene	µg/m³	BLQ	BLQ

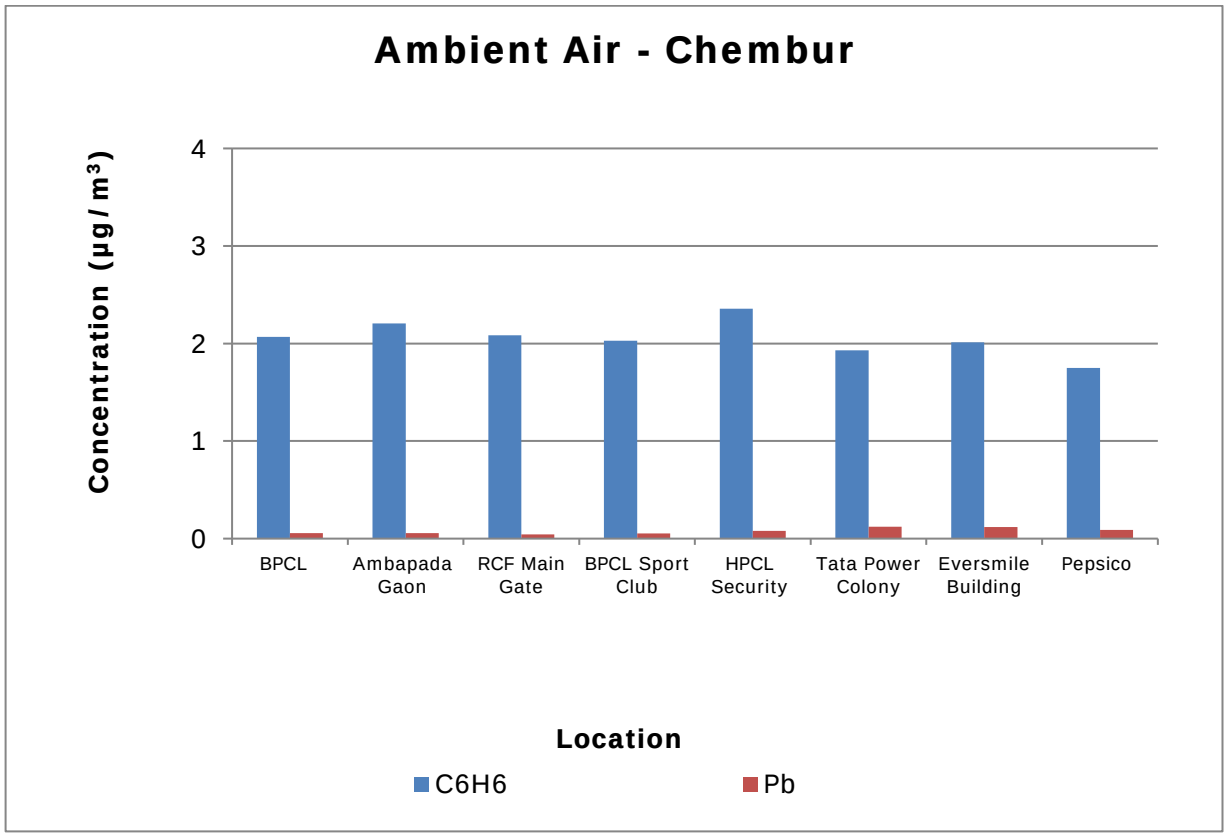
Parameters	Unit	Results	
		Nearby RCF main plant	BPCL sports club
2-Chlorotoluene	µg/m³	BLQ	BLQ
Tert-Butylbenzene	µg/m³	BLQ	BLQ
SEC-Butylbenzene	µg/m³	BLQ	BLQ
P-Isopropyltoluene	µg/m³	BLQ	BLQ
M-Xylene	µg/m³	BLQ	BLQ
P-Xylene	µg/m³	BLQ	BLQ
Styrene	µg/m³	BLQ	BLQ
Cumene	µg/m³	BLQ	BLQ
1,2,3-Trichloropropane	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	BLQ
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	BLQ	BLQ
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

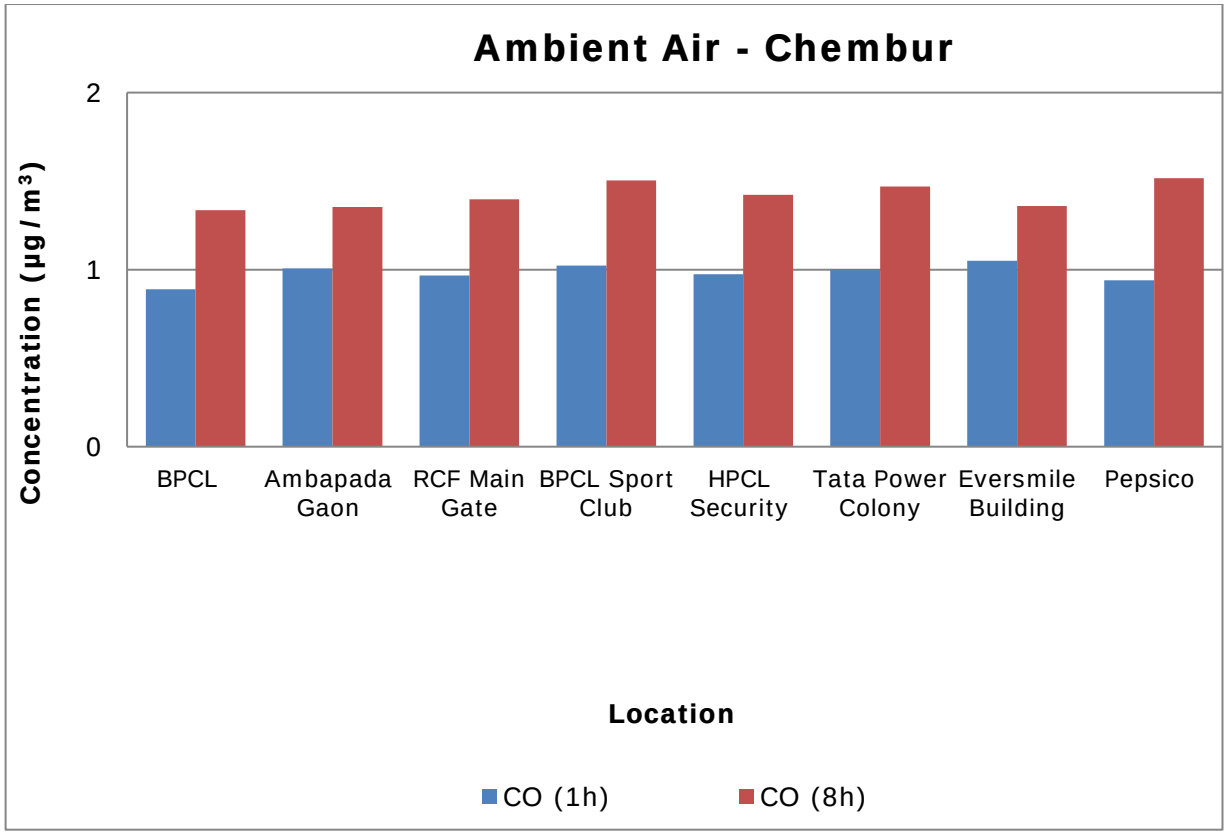
Parameters	Unit	Results	
		Nearby RCF main plant	BPCL sports club
Dibromomethane	µg/m³	BLQ	BLQ
Toluene	µg/m³	0.76	0.77
O-Xylene	µg/m³	BLQ	BLQ
Bromoform	µg/m³	BLQ	BLQ
1,1,2,2-Tetrachloroethane	µg/m³	BLQ	BLQ
4-Chlorotoluene	µg/m³	BLQ	BLQ
1,1-Dichloroethylene	µg/m³	BLQ	BLQ
Trans-1,2-Dichloroethylene	µg/m³	BLQ	BLQ
1,1-Dichloroethane	µg/m³	BLQ	BLQ
CIS-1,2-Dichloroethylene	µg/m³	BLQ	BLQ
Bromochloromethane	µg/m³	BLQ	BLQ
1,1,1-Trichloroethane	µg/m³	BLQ	BLQ

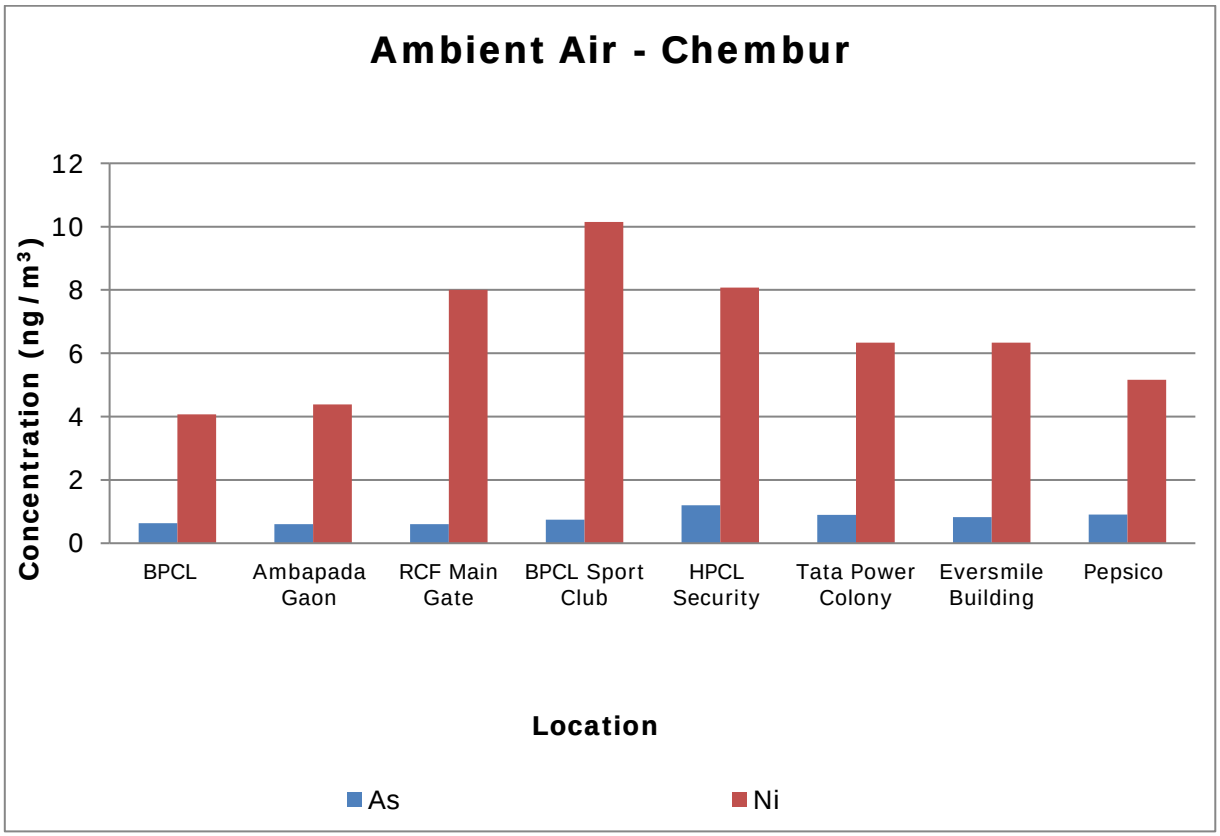
Graphs - Ambient Air Quality Monitoring of Chembur




Ambient Air - Chembur
Concentration (µg/m³)
120
100
80
60
40
20
0
BPCL
Ambapada Gaon
RCF Main Gate
BPCL Sport Club
HPCL Security
Tata Power Colony
Eversmile Building
Pepsico
Location
NH3
O3


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


Ambient Air - Chembur
Concentration (µg/m³)
2
1
0
BPCL
Ambapada Gaon
RCF Main Gate
BPCL Sport Club
HPCL Security
Tata Power Colony
Eversmile Building
Pepsico
Location
CO (1h)
CO (8h)


Ambient Air - Chembur
Concentration (ng/m³)
12
10
8
6
4
2
0
BPCL
Ambapada Gaon
RCF Main Gate
BPCL Sport Club
HPCL Security
Tata Power Colony
Eversmile Building
Pepsico
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.
- Total Dissolved Solids in surface water of Mahul Jetty (downstream) is found to exceed the permissible limit.
- pH and suspended solids are well within the limits of all six samples collected.
- BOD concentration of Ghatla pond water is found to exceed the acceptable limit.
- 60-87% survival in Fish Bioassay was observed in the samples collected.
- All metals like Arsenic, Nickel, Copper, Hexavalent Chromium (Cr^{6+}) etc. are observed either below the limit of quantification (BLQ) or below their standard limits.
- 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	26.06.2024	28.06.2024	30.06.2024
2.	Downstream near Mahul Jetty	19°0'50.64"N	72°53'5.91"E	26.06.2024	28.06.2024	30.06.2024
3.	Mahul jetty Middle stream	19°1'14.62"N	72°52'44.20"E	26.06.2024	28.06.2024	30.06.2024
4.	Pond water from Cherry Talab near Chembur police station	19°3'3.23"N	72°53'34.25"E	26.06.2024	28.06.2024	30.06.2024
5.	Ghatla pond water	19°3'21.11"N	72°54'22.40"E	26.06.2024	28.06.2024	30.06.2024

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
6.	Creek water near Ajmera Chembur	19°1'44.59"N	72°52'43.00"E	26.06.2024	28.06.2024	30.06.2024

Fig: Geographical Locations of Surface Water Sampling

Table 6.2 Results of Surface Water

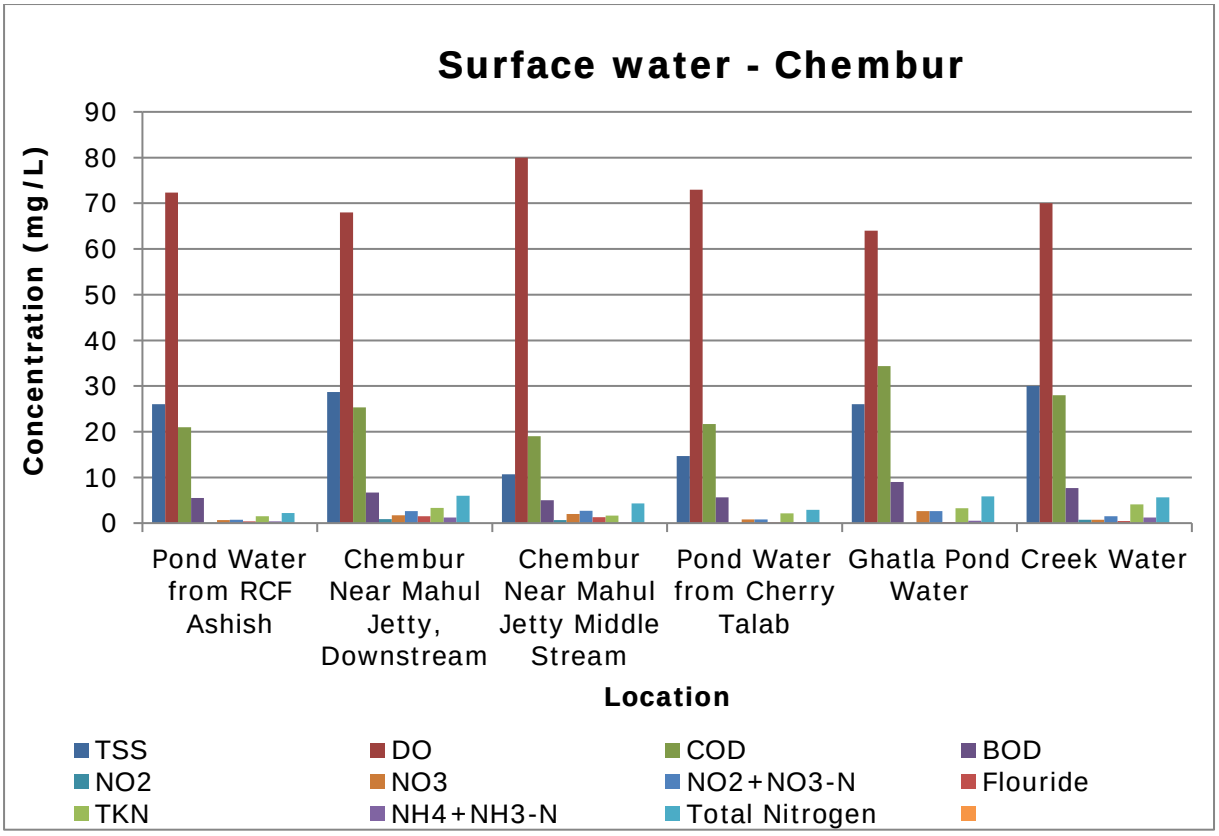
Parameters	Unit	Results					
		Pond water from RCF Ashish	Downstream near Mahul Jetty	Mahul jetty Middle stream	Pond water from Cherry Talab near Chembur police station	Ghatla pond water	Creek water near Ajmera Chembur
Sanitary Survey	-	Reasonably clean neighborhood	Reasonably clean neighborhood	Reasonably clean neighborhood	Reasonably clean neighborhood	Reasonably Clean neighborhood	Reasonably Clean neighborhood
General Appearance	-	No Floating matter	No Floating matter	No Floating matter	No floating matter	No Floating matter	No Floating matter

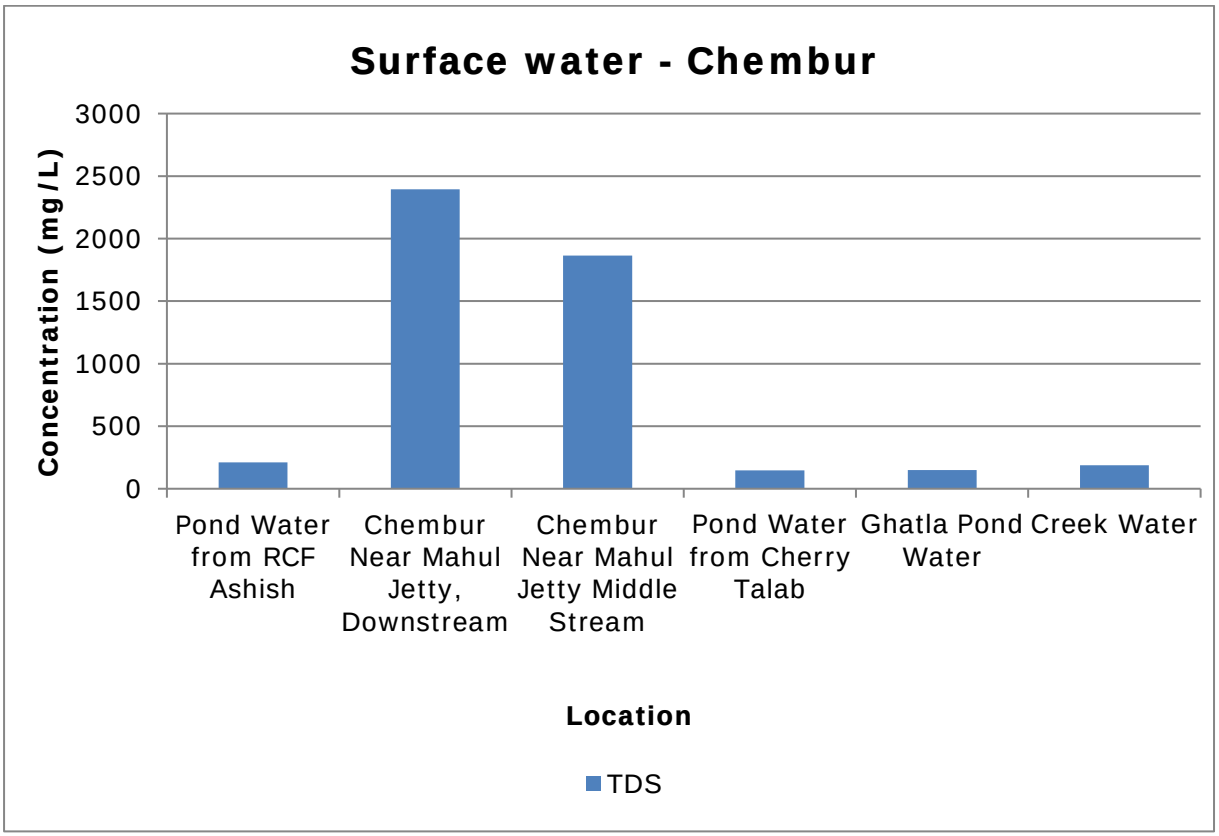
Parameters	Unit	Results					
		Pond water from RCF Ashish	Downstream near Mahul Jetty	Mahul jetty Middle stream	Pond water from Cherry Talab near Chembur police station	Ghatla pond water	Creek water near Ajmera Chembur
Transparency	m	0.2	0.3	0.4	0.47	0.5	0.2
Temperature	^{o}C	29	30	30	29	28	29
Colour	Hazen	2	4	1	1	2	2
Smell	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH	-	7.58	7.57	7.56	7.31	7.33	7.18
Oil & Grease	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Suspended Solids	mg/L	26.00	28.67	10.67	14.67	26.00	30.00
Total Dissolved Solids	mg/L	212	2395	1865	146	149	188
Dissolved Oxygen (% Saturation)	%	72	68	80	73	64	70
Chemical Oxygen Demand	mg/L	21	25	19	22	34	28
Biochemical Oxygen Demand (3 days,27^{o}C)	mg/L	6	7	5	6	9	8
Electrical Conductivity (at 25 ^{o}C)	µmho/cm	380	4278	3330	261	266	335
Nitrite Nitrogen (as NO_2)	mg/L	0.08	0.88	0.68	BLQ	BLQ	0.77
Nitrate Nitrogen (as NO_3)	mg/L	0.69	1.72	2.02	0.77	2.59	0.73
(NO_2 + NO_3)-Nitrogen	mg/L	0.72	2.60	2.70	0.77	2.59	1.50
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	0.40	1.50	1.30	0.20	0.27	0.43
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ

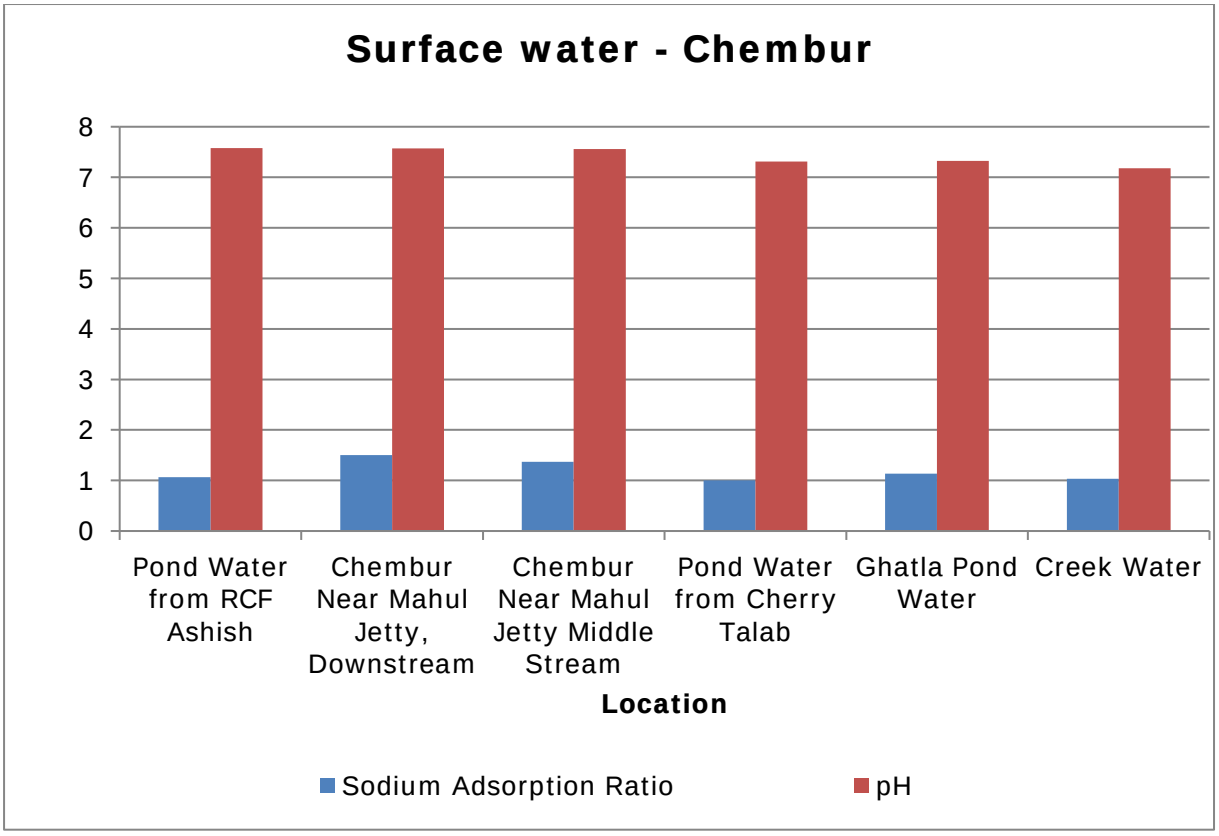
Parameters	Unit	Results					
		Pond water from RCF Ashish	Downstream near Mahul Jetty	Mahul jetty Middle stream	Pond water from Cherry Talab near Chembur police station	Ghatla pond water	Creek water near Ajmera Chembur
Dissolved Phosphate (as P)	mg/L	0.6	1.3	1.27	0.2	0.9	0.8
Sodium Adsorption Ratio	-	1.07	1.50	1.37	1.00	1.13	1.03
Total Coliforms	MPN Index/ 100 ml	153	1090	1373	757	656	1183
Faecal Coliforms	MPN Index/ 100 ml	9	28	234	63	102	171
Total Phosphate (as P)	mg/L	1	1.13	1.71	0.4	1.1	1.6
Total Kjeldahl Nitrogen (as N)	mg/L	1.49	3.36	1.64	2.13	3.25	4.11
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.38	1.25	0.15	0.22	0.52	1.26
Total Nitrogen	mg/L	2.21	5.96	4.34	2.9	5.84	5.61
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	0.06	BLQ	0.46	0.17	0.07	0.42
Nickel (as Ni)	mg/L	BLQ	0.06	0.01	0.05	0.02	0.02
Copper (as Cu)	mg/L	0.04	0.02	BLQ	BLQ	0.02	BLQ

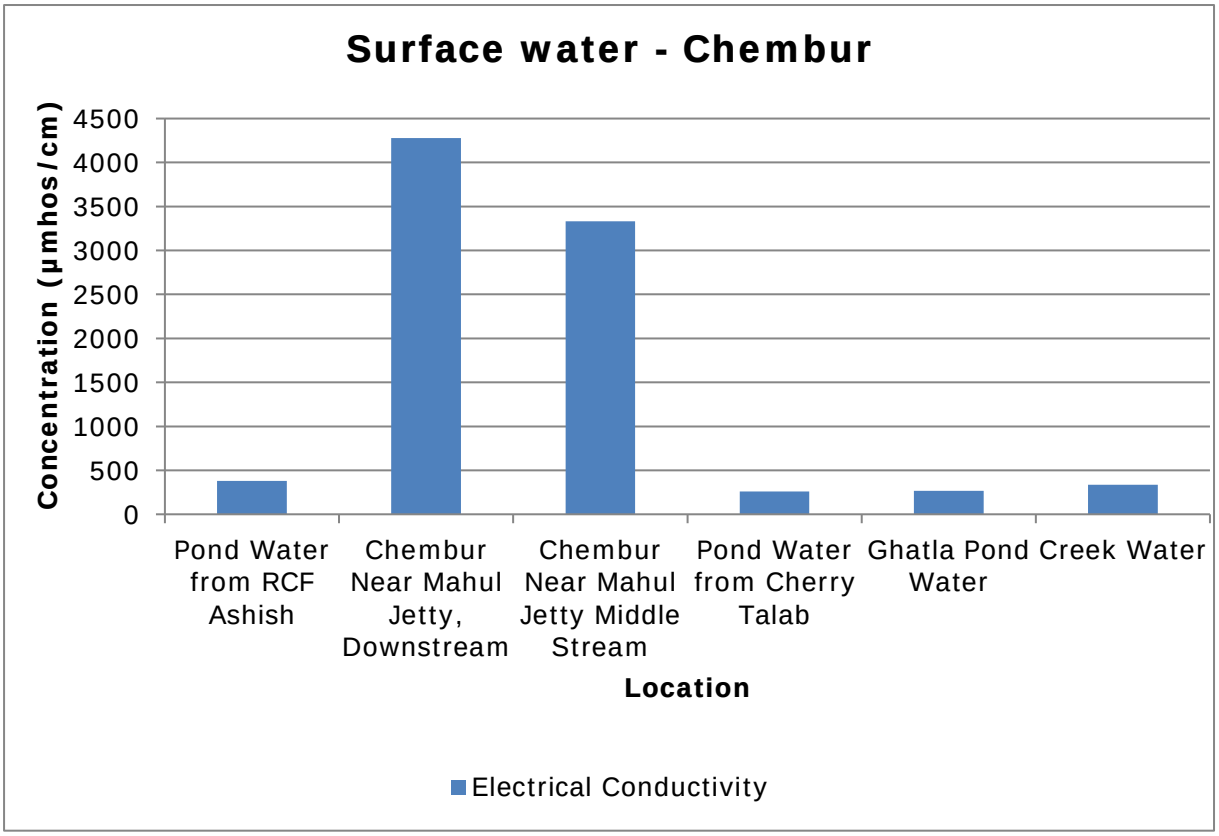
Parameters	Unit	Results					
		Pond water from RCF Ashish	Downstream near Mahul Jetty	Mahul jetty Middle stream	Pond water from Cherry Talab near Chembur police station	Ghatla pond water	Creek water near Ajmera Chembur
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	0.05	0.03	0.04	BLQ	BLQ
Total Arsenic (as As)	mg/L	BLQ	0.02	BLQ	BLQ	BLQ	0.01
Lead (as Pb)	mg/L	BLQ	0.01	0.04	0.02	0.01	0.009
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	0.08	0.10	0.14	0.06	0.10	0.10
Iron (as Fe)	mg/L	0.79	0.20	0.70	0.33	0.16	0.19
Vanadium (as V)	mg/L	0.02	BLQ	0.02	BLQ	0.02	0.03
Selenium (as Se)	mg/L	BLQ	BLQ	0.01	BLQ	0.01	BLQ
Boron (as B)	mg/L	0.32	0.25	0.25	BLQ	BLQ	0.46
Bioassay Test on fish	% survival	80	80	60	87	87	80

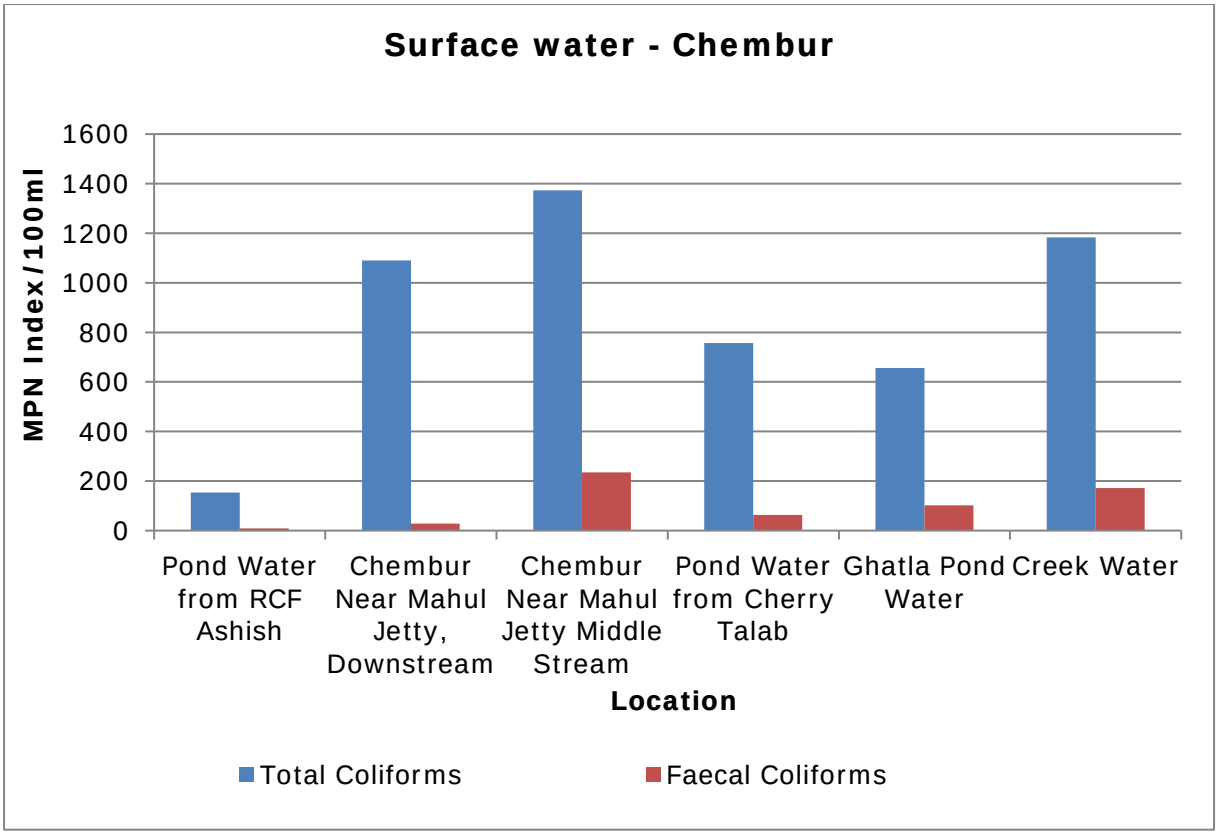
Graphs - Surface Water Quality of Chembur

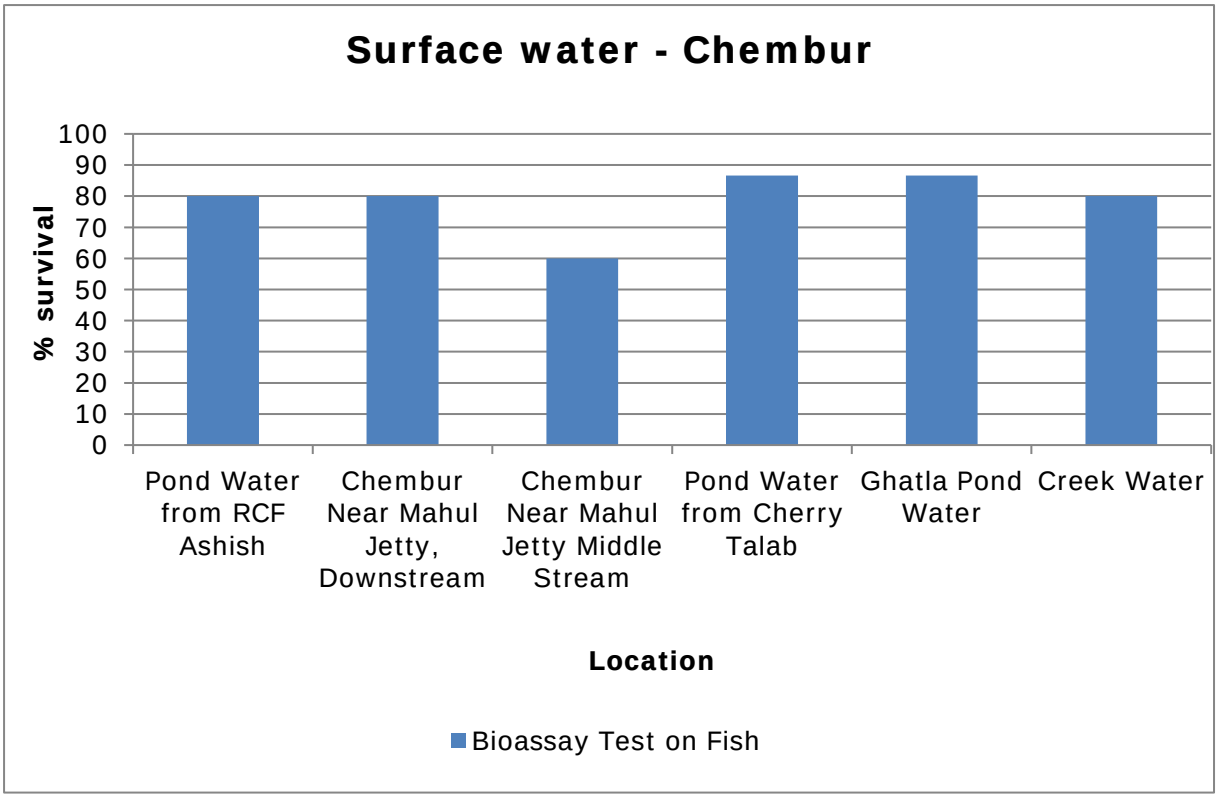

Surface water - Chembur
Concentration (mg/L)
90
80
70
60
50
40
30
20
10
0
Pond Water from RCF Ashish
Chembur Near Mahul Jetty, Downstream
Chembur Near Mahul Jetty Middle Stream
Pond Water from Cherry Talab
Ghatla Pond Water
Creek Water
Location
TSS
DO
COD
BOD
NO2
NO3
NO2+NO3-N
Flouride
TKN
NH4+NH3-N
Total Nitrogen


Surface water - Chembur
Concentration (mg/L)
3000
2500
2000
1500
1000
500
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
TDS


Surface water - Chembur
8
7
6
5
4
3
2
1
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


Surface water - Chembur
Concentration (µmhos/cm)
4500
4000
3500
3000
2500
2000
1500
1000
500
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


Surface water - Chembur
MPN Index/100ml
1600
1400
1200
1000
800
600
400
200
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
Total Coliforms
Faecal Coliforms


Surface water - Chembur
% survival
100
90
80
70
60
50
40
30
20
10
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
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 and smell.
- pH, suspended solids, BOD, and COD were also well within the limits in all three samples collected.
- Electrical conductivity was also observed within the acceptable limits in all six water samples.
- 100% survival was achieved in Fish Bioassay in all the six water samples.
- All metals like Arsenic, Nickel, Copper, Iron, Hexavalent Chromium (Cr^{6+}) etc. were observed either below the limit of quantification (BLQ) 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	26.06.2024	28.06.2024	30.06.2024
2.	Well water at Prayag Nagar	19°1'11.10"N	72°54'31.93"E	26.06.2024	28.06.2024	30.06.2024
3.	Well water at Prayag Nagar Tabela	19°1'29.20"N	72°54'24.65"E	26.06.2024	28.06.2024	30.06.2024
4.	Well water at Laxmi Nagar	19°1'46.72"N	72°53'44.31"E	26.06.2024	28.06.2024	30.06.2024
5.	Well water at Ambapada	19°1'7.96"N	72°53'20.72"E	26.06.2024	28.06.2024	30.06.2024
6.	Well water Mahul Village	19°0'52.00"N	72°53'10.95"E	26.06.2024	28.06.2024	30.06.2024

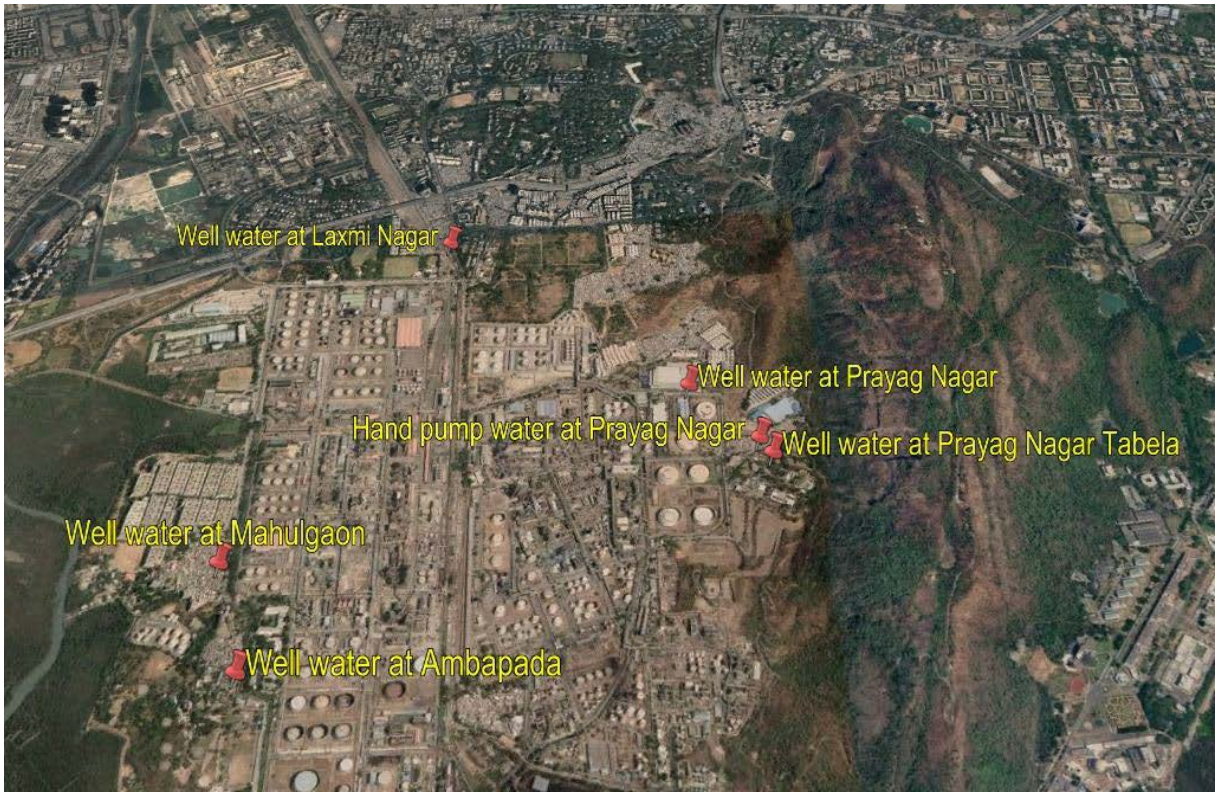


Fig: Geographical Locations of Ground Water Sampling

Table 7.2 Results of Ground Water

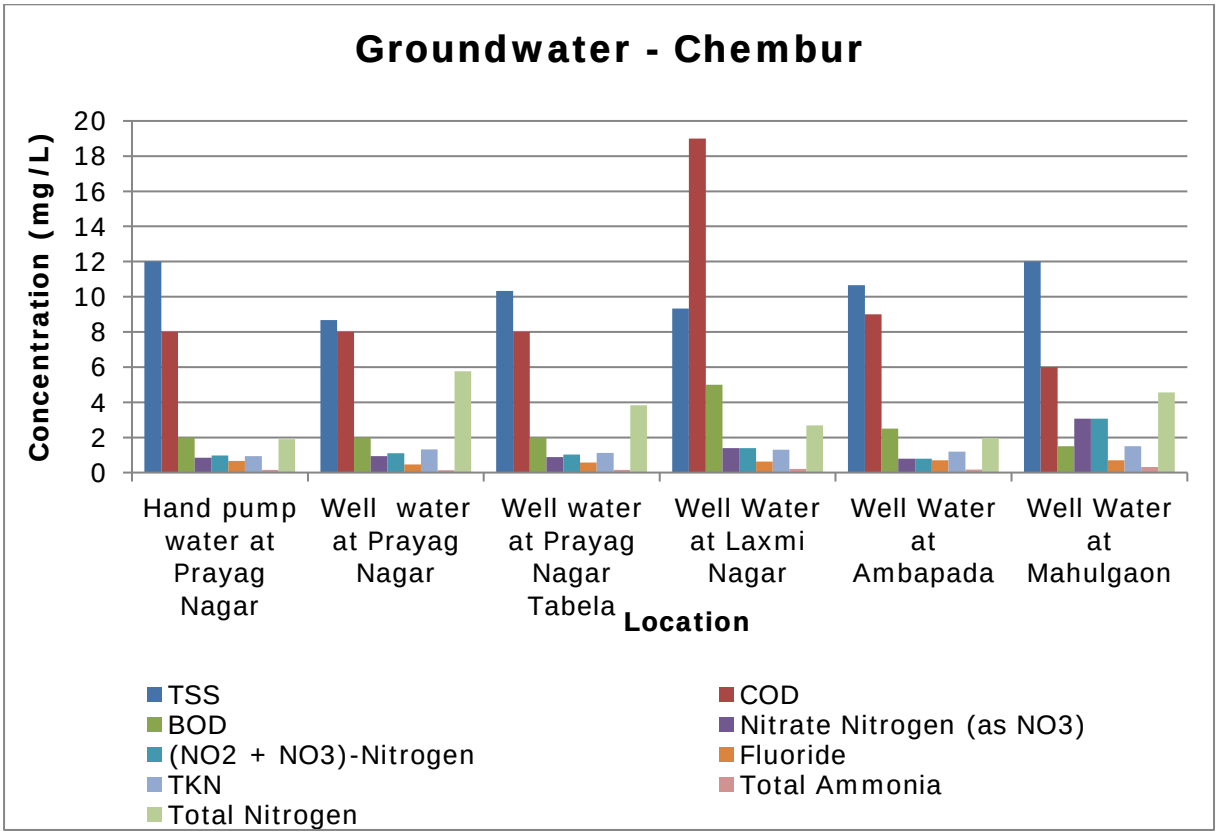
Parameters	Unit	Results					
		Hand pump water at Prayag Nagar	**Well water at Prayag Nagar**	**Well water at Prayag Nagar Tabela**	**Well water at Laxmi Nagar**	**Well water at Ambapada**	**Well water Mahul Village**
Sanitary Survey		Reasonably clean neighborhood	Reasonably clean neighborhood	Reasonably clean neighborhood	Reasonably clean neighborhood	Reasonably clean neighborhood	Reasonably clean neighborhood
General Appearance		No Floating matter	No Floating matter	No Floating matter	No Floating matter	No Floating matter	No Floating matter
Transparency	m	NA	0.7	0.7	0.4	0.5	0.3
Temperature	^{o}C	30	29	30	29	28	29
Colour	Hazen	1	1	1	1	1	1
Smell	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH	-	7.65	7.81	7.73	7.99	8.09	7.84
Oil & Grease	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Suspended Solids	mg/L	12.00	8.67	10.33	9.33	10.67	12.00
Total Dissolved Solids	mg/L	198	150	174	110	168	181

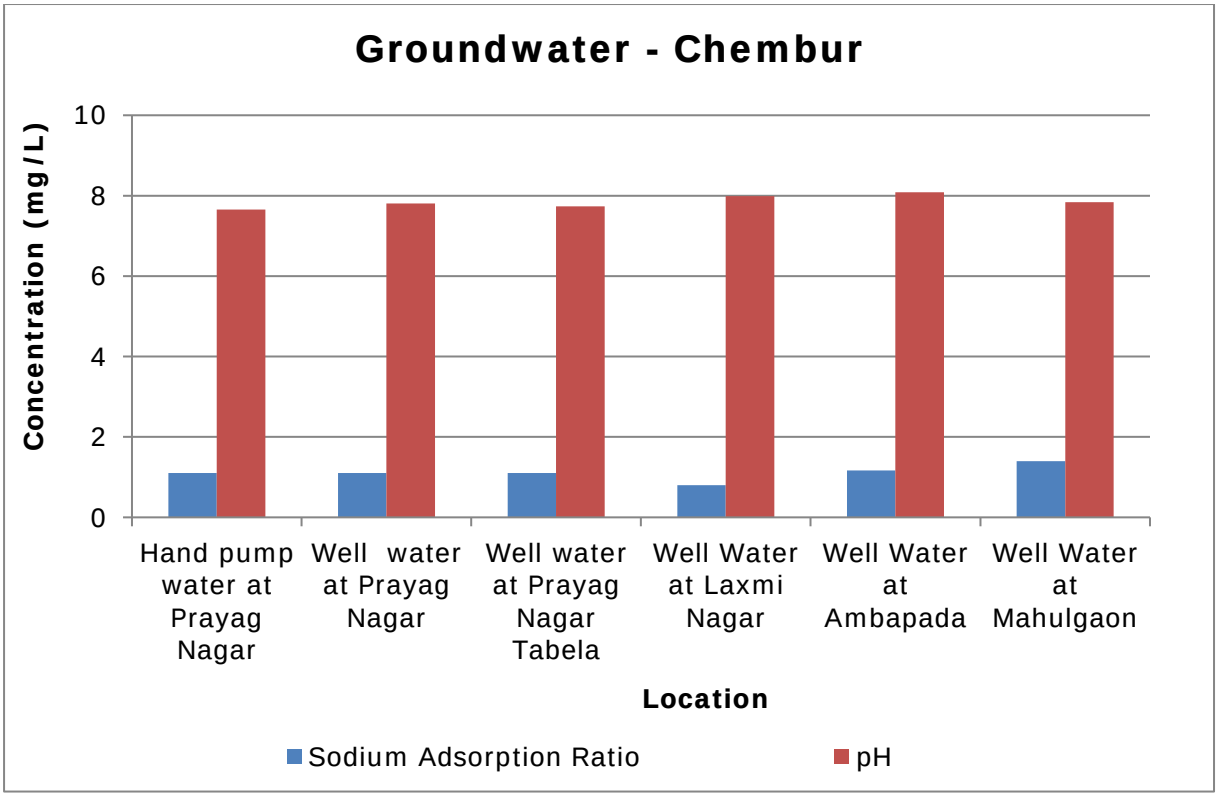
Parameters	Unit	Results					
		Hand pump water at Prayag Nagar	Well water at Prayag Nagar	Well water at Prayag Nagar Tabela	Well water at Laxmi Nagar	Well water at Ambapada	Well water Mahul Village
Chemical Oxygen Demand	mg/L	8	8	8	19	9	6
Biochemical Oxygen Demand (3 days,27°C)	mg/L	2	2	2	5	3	2
Electrical Conductivity (at 25 °C)	µmho/cm	354	268	311	197	301	323
Nitrite Nitrogen (as NO_2)	mg/L	0.4	0.49	0.45	BLQ	BLQ	0.03
Nitrate Nitrogen (as NO_3)	mg/L	0.84	0.93	0.89	1.38	0.78	3.06
(NO_2 + NO_3)-Nitrogen	mg/L	0.97	1.10	1.03	1.38	0.78	3.07
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	0.67	0.47	0.57	0.63	0.70	0.70
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.2	0.2	BLQ	BLQ	BLQ	1.5
Sodium Adsorption Ratio	-	1.10	1.10	1.10	0.80	1.17	1.40
Total Coliforms	MPN Index/ 100 ml	350	653	501	581	472	166
Faecal Coliforms	MPN Index/ 100 ml	27	18	23	14	240	20
Total Phosphate (as P)	mg/L	0.2	0.4	0.3	0.2	0.6	3.6
Total Kjeldahl Nitrogen (as N)	mg/L	0.93	1.31	1.12	1.31	1.20	1.49

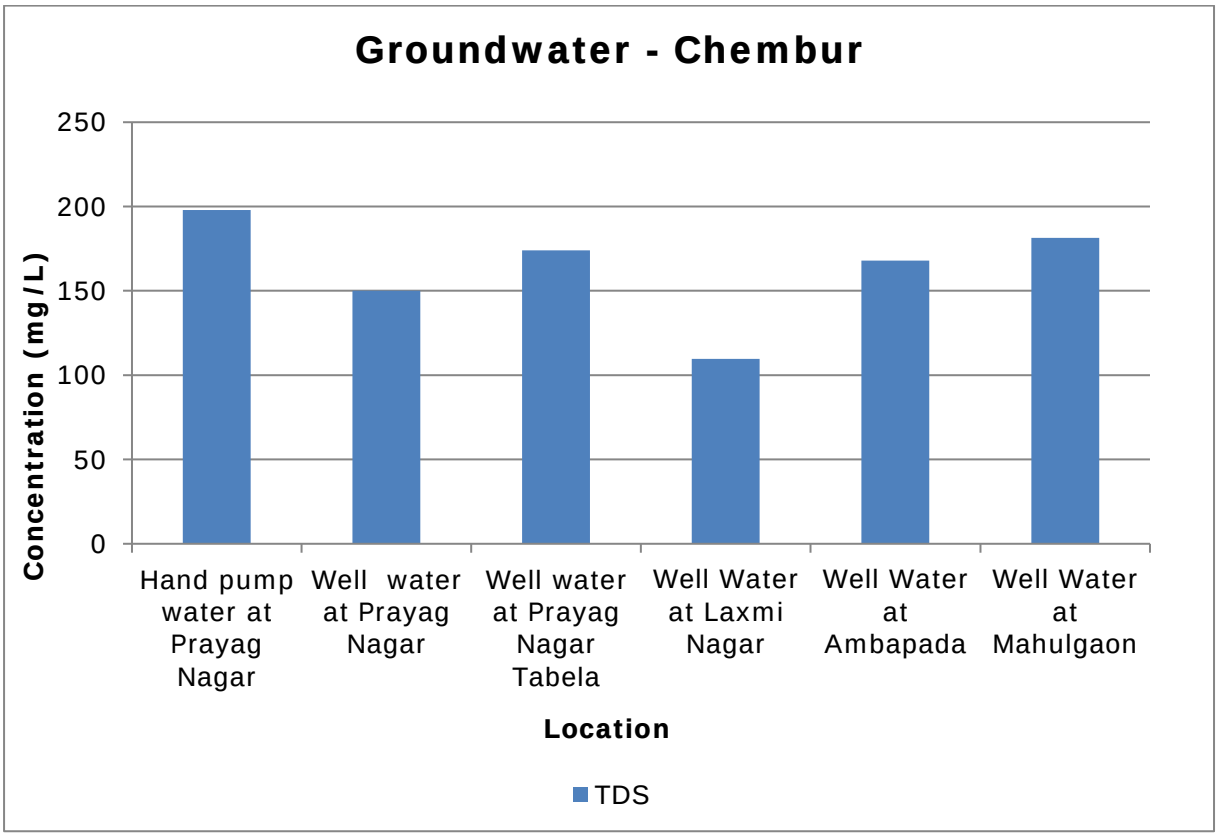
Parameters	Unit	Results					
		Hand pump water at Prayag Nagar	Well water at Prayag Nagar	Well water at Prayag Nagar Tabela	Well water at Laxmi Nagar	Well water at Ambapada	Well water Mahul Village
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.16	0.14	0.15	0.21	0.17	0.31
Total Nitrogen	mg/L	1.90	5.76	3.83	2.69	1.98	4.57
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	0.28	0.62	0.45	0.26	0.38	0.08
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	0.01	BLQ	BLQ	BLQ	BLQ	0.01
Lead (as Pb)	mg/L	0.023	0.02	0.02	0.01	0.04	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	0.06	0.06	0.05	0.51	0.06
Iron (as Fe)	mg/L	0.61	0.88	0.74	0.21	0.35	0.11
Vanadium (as V)	mg/L	0.01	0.02	0.02	0.02	0.01	0.02
Selenium (as Se)	mg/L	0.01	BLQ	BLQ	BLQ	BLQ	0.01

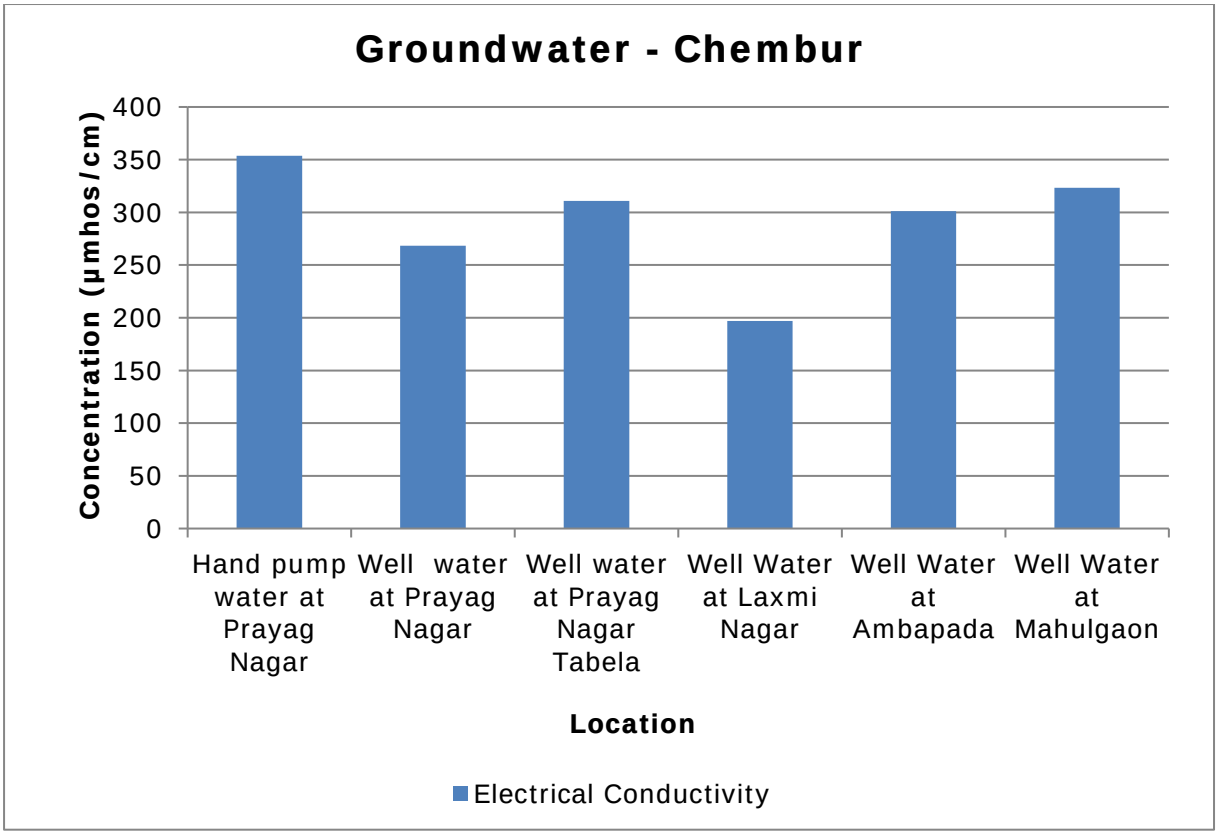
Parameters	Unit	Results					
		Hand pump water at Prayag Nagar	Well water at Prayag Nagar	Well water at Prayag Nagar Tabela	Well water at Laxmi Nagar	Well water at Ambapada	Well water Mahul Village
Boron (as B)	mg/L	0.16	2.77	1.47	0.11	0.46	0.32
Bioassay Test on fish	% survival	100	100	100	100	100	100

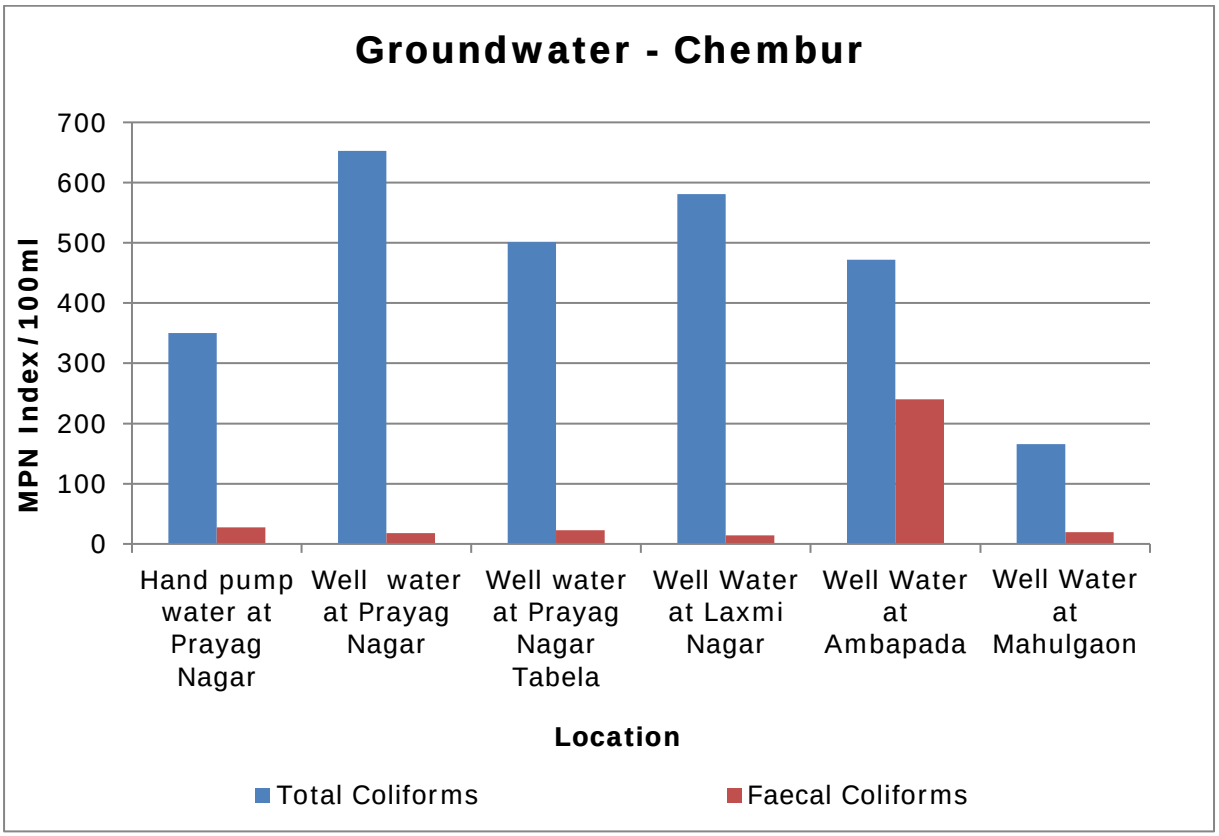
Graphs - Ground water quality of Chembur

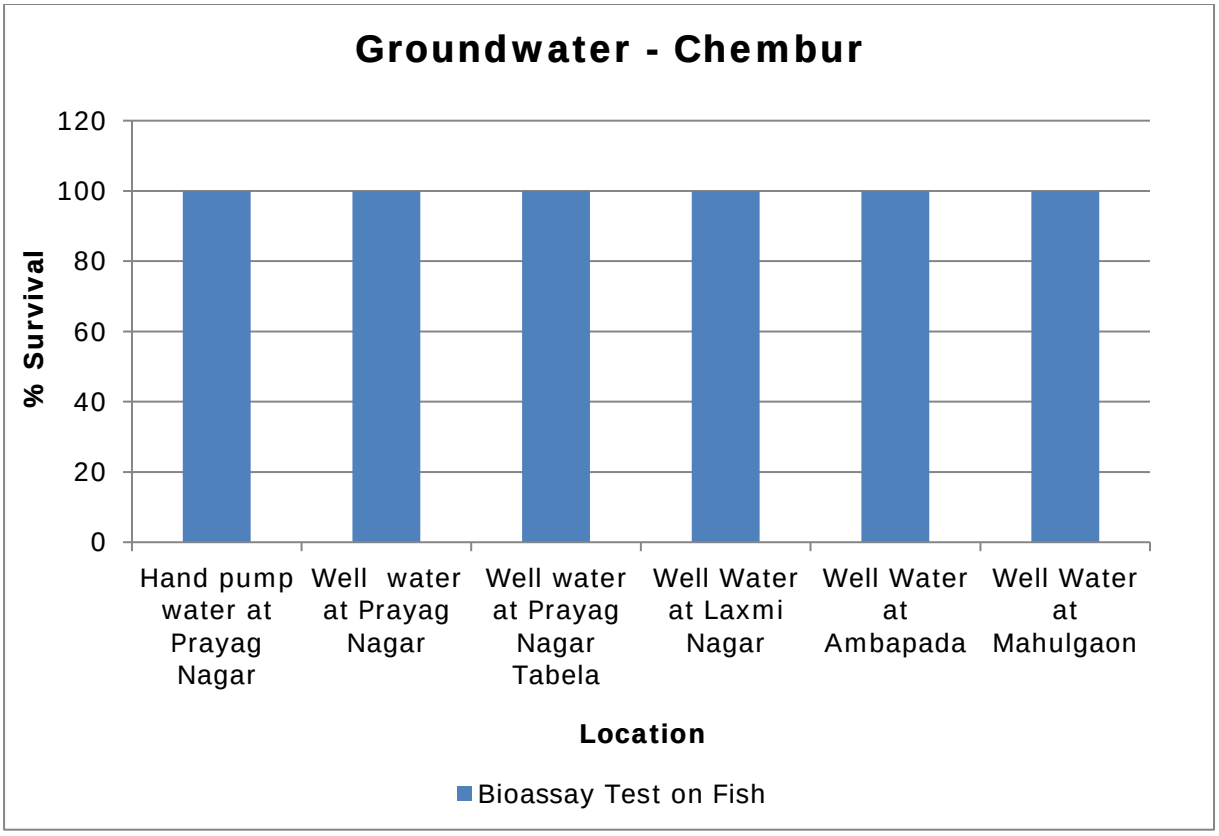



Groundwater - Chembur
Concentration (mg/L)
10
8
6
4
2
0
Hand pump water at Prayag Nagar
Well water at Prayag Nagar
Well water at Prayag Nagar Tabela
Well Water at Laxmi Nagar
Well Water at Ambapada
Well Water at Mahulgaon
Location
Sodium Adsorption Ratio
pH


Groundwater - Chembur
Concentration (mg/L)
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


Groundwater - Chembur
Concentration (µmhos/cm)
400
350
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
Electrical Conductivity


Groundwater - Chembur
MPN Index/100ml
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


Groundwater - Chembur
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

8. Health Related Data

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 Pre - Monsoon season 2024

	A1	A2	A	B	C	D	CEPI
Air Index	4	4	16	0	0	0	**16.00**
Water Index	2.5	4	10	9.75	0	0	**19.75**
Land Index	1.75	4	7	37.5	0	0	**44.50**
						Aggregated CEPI	**46.30**

The CEPI score observed in the present study is 46.30. Land Environment Pollution Index (EPI) is highest with 44.50 followed by water and air Environment Pollution Index (EPI) with 19.75 and 16.0 EPI respectively.

Table 8.2 Comparison of CEPI Scores

	Air Index	Water Index	Land Index	CEPI
CEPI Score June 2024	16.00	19.75	44.50	**46.30**
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**
CEPI score March 2019	35.50	24.75	42.50	**42.28**

	Air Index	Water Index	Land Index	CEPI
CEPI score June 2018	36	39.88	30.25	**44.1**
CEPI score March 2018	38.8	32.3	31.72	**45.07**
CPCB CEPI score March 2018	52.25	50.75	10	**54.67**

The result shows that CEPI score of present report is 46.30. This time CEPI score is observed lower than the CPCB CEPI score March 2018 which was 54.67.

CEPI Score Calculations:

Chembur, Maharashtra - CEPI - JUNE 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	0.80	6	0.13	0	8	0.00	L	0
$PM_{2.5}$	10.00	60	0.17	0	8	0.00	L	0
PM_{10}	41.79	100	0.42	0	8	0.00	L	0
B score = (B1+B2+B3)							**B**	**0**

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

Air CEPI	**(A+B+C+D)**	**16.0**

Water Quality Analysis report

Pollutant	Group	A1	A2	A (A1 X A2)
BOD	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)	
BOD	6.83	8	0.85	1	6	0.14	M	9.75
TN	4.48	15	0.30	0	6	0.00	L	0
Total Ammonia	0.63	1.5	0.42	0	6	0.00	L	0
B score = (B1+B2+B3)							**B**	**9.75**

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

Water CEPI	**(A+B+C+D)**	**19.8**

Ground Water Quality Analysis report

Pollutant	Group	A1	A2	A (A1 X A2)
Fe	A	1	Large	
Se	B	0.5		
F	A	0.25		
		1.75	**4**	**7**

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)	
Fe	0.48	0.3	1.60	4	6	1.07	C	30
Se	0.01	0.01	1.00	0	6	0.00	L	7.5
F	0.62	1.5	0.41	0	6	0.00	L	0
B score = (B1+B2+B3)							**B**	**37.5**

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

Land CEPI	**(A+B+C+D)**	**44.5**

Land CEPI Score (im) **44.50**

Water CEPI Score (i2)	**19.80**
Air CEPI Score (i3)	**16.00**
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	**46.3**

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, 2009.
- In the CEPI score calculated for Air Environment by CPCB in March 2018, PM_{10} and $PM_{2.5}$ have exceeded which may also be due to the vehicular emissions.

Surface Water Quality

- All the parameters of Surface water sampling are observed within the acceptable limit
- 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 wells in the region.
- Iron concentration is observed higher than the permissible limit in most of the ground water samples, which may be from natural geological processes and industrial pollution, particularly from mining and manufacturing activities. This can cause health issues such as gastrointestinal problems and organ damage, environmental damage like soil degradation and harm to aquatic life, and practical problems such as staining, unpleasant taste, and increased maintenance costs for water infrastructure.
- All other parameters were observed well within the limits.

CEPI Score

- The CEPI Score Pre - Monsoon season is 46.30.
- In comparison with the CEPI Score of March 2018, there is a decrease in the overall CEPI score.
- 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 Pre - Monsoon season, which results in dilution of environmental samples resulting in lower pollution load, hence also affects the total score.
- In conclusion, approximately 15% decrease in CEPI score is observed from 54.67 of the CPCB score of March 2018 to 46.30 in June 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 the 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 Ambapada Gaon

Ambient Air Sampling at Near main gate BPCL

Ambient Air Sampling at Near main gate Pepsico

Ambient Air Sampling at Eversmile Building

Surface water sampling at Downstream near Mahul Jetty

Surface water sampling at Mahul jetty Middle stream

Surface water sampling at Ghatla pond water

Surface water sampling at Creek water near Ajmera Chembur

Groundwater sampling at Prayag Nagar

Groundwater sampling at Laxmi Nagar

Groundwater sampling at Prayag Nagar

Groundwater sampling at Ambapada

HEALTH STATISTICS

Required for Comprehensive Environmental Pollution Index (CEPI)
Pre-monsoon Season (April 2024- June 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 CENTRE HEAD
Address	CHEMBUR

S No.	Diseases	No. of Patients Reported	
		Year 2022-2023	Year 2023-2024
AIRBORNE DISEASES			
1.	Asthma	70	65
2.	Acute Respiratory Infection	200	180
3.	Bronchitis	300	260
4.	Cancer	80	150
WATERBORNE DISEASES			
1.	Gastroenteritis	280	250
2.	Diarrhea	250	300
3.	Renal diseases	180	150
4.	Cancer	80	150

Date: 13/7/2024

Signature

SAI HOSPITAL Chembur

HEALTH STATISTICS

Required for Comprehensive Environmental Pollution Index (CEPI)
Pre-monsoon Season (April 2024- June 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 & Research center
Name and designation of the Contact person	DR SUMEET DUBEY Medical Admin
Address	CHEMBUR, SUSHRUT Hospital

S No.	Diseases	No. of Patients Reported	
		Year 2022-2023	Year 2023-2024
AIRBORNE DISEASES			
1.	Asthma	11	5
2.	Acute Respiratory Infection	9	6
3.	Bronchitis	8	6
4.	Cancer	16	12
WATERBORNE DISEASES			
1.	Gastroenteritis	37	29
2.	Diarrhea	20	13
3.	Renal diseases	70	36
4.	Cancer		0

Date: 13/7/2024

Signature

HEALTH STATISTICS

Required for Comprehensive Environmental Pollution Index (CEPI)
Pre-monsoon Season (April 2024- June 2024) Study by
Maharashtra Pollution Control Board (MPCB), MAHARASHTRA

Name of the Polluted Industrial Area (PIA)	CHEMBUR
Name of the major health center/ organization	V.R. Medicare Pvt Ltd – Zen Multispeciality Hospital
Name and designation of the Contact person	Ms. Aakanksha Jadhav Head Biomedical.
Address	10th Road, Plot No. 425, Near Sandu Garden Chembur (E)

S No.	Diseases	No. of Patients Reported	
		Year 2022-2023	Year 2023-2024
AIRBORNE DISEASES			
1.	Asthma	210	41
2.	Acute Respiratory Infection	157	65
3.	Bronchitis	210	41
4.	Cancer	NA	NA
WATERBORNE DISEASES			
1.	Gastroenteritis	5548	1309
2.	Diarrhea	5548	1309
3.	Renal diseases	215	56
4.	Cancer	NA	NA

Date: 12/07/2024

for V.R. MEDICARE PVT. LTD. MUMBAI

Signature