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

CHEMBUR

Post Monsoon (December 2022 to February 2023)

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 2022 to February 2023 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.

Maharashtra Pollution Control Board has taken various initiatives in reducing the CPCB CEPI Score of 54.67 of 2018 to 42.12 of 2023. Based on the study results of December 2022 to February 2023 the CEPI score as per the revised CEPI, 2016, the CEPI index of Post-Monsoon - Ambient Air is 21.00, Surface Water is 38.50, and Ground Water is 28.00. The overall CEPI score for Chembur area for the Post-monsoon 2023 is 42.12.

2. Introduction

Over the past few decades, environmental deterioration has become a "common concern" for humanity. The distinctive nature of the current environmental issues is that human activity contributes to them more than natural events. Economic expansion and mindless consumption are beginning to have negative impacts on Mother Nature. It's been studied and reported that the majority of industries (77% approximately) contribute to water pollution, 15% to air pollution, and the remaining 8% to both air and water pollution. Additionally, the most polluting businesses are those that depend on natural resources and are expanding quickly.

These human activities have an adverse effect on the environment by polluting the water we drink, the air we breathe, and the soil in which plants grow. Untreated wastewater from industries has affected the potability and hygiene of drinking water due to the presence of hazardous impurities in it, causing detrimental health effects to human, animal and aquatic life. Exposure to air pollutants is closely related to Pulmonary Diseases, wheezing, asthma, respiratory disease, cardiovascular diseases etc. Moreover, air pollution seems to have various malign health effects in early human life, such as respiratory, cardiovascular, mental, and perinatal disorders, leading to infant mortality or chronic disease in adult age. Therefore, it is crucial to identify and investigate the major sources of pollution to implement mitigation strategies for substantial environmental and health co-benefits. Even though health is a major concern, industrial growth is a necessity for a developing economy. Research into the development of such systems that can cut down on the usage of freshwater by industrial sectors as well as the development of efficient and effective water treatment methods is encouraged for overall socioeconomic progress and well-being. To mitigate any hazardous impacts, new advancements and ongoing monitoring of the execution methods of various programmes and interventions related to industrial wastewater treatment are critically important.

The present CEPI study includes areas under Chembur. 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 results of the application of the Comprehensive Environmental Pollution Index (CEPI) to selected industrial clusters

or areas are presented in this report. The main objective of the study is to identify polluted industrial clusters or areas in order to take concerted action and to centrally monitor them at the national level to improve the current status of their environmental components such as air and water quality data, ecological damage, and visual environmental conditions. 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.

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	

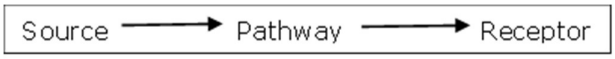
Table 3.2 Frequency of Sampling

	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	24.01.2023	26.01.2023	28.01.2023
2.	Ambapada Gaon	19°0'43.92"N	72°53'25.70"E	24.01.2023	26.01.2023	28.01.2023
3.	Nearby RCF main plant	19°2'5.62"N	72°53'31.98"E	24.01.2023	26.01.2023	28.01.2023
4.	BPCL sports club	19°1'44.07"N	72°53'43.66"E	24.01.2023	26.01.2023	28.01.2023
5.	HPCL Refinery Main Gate	19°1'11.79"N	72°53'49.63"E	24.01.2023	26.01.2023	28.01.2023
6.	Tata Power Colony	19°2'20.46"N	72°53'59.23"E	24.01.2023	26.01.2023	28.01.2023
7.	Eversmile Building	19°0'55.47"N	72°53'12.80"E	24.01.2023	26.01.2023	28.01.2023
8.	Near main gate Pepsico	19°1'12.26"N	72°53'59.12"E	24.01.2023	26.01.2023	28.01.2023

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	24.01.2023	26.01.2023	28.01.2023
2.	BPCL sports club	19°1'44.07"N	72°53'43.66"E	24.01.2023	26.01.2023	28.01.2023

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)	µg/m^3	8.06	8.49	8.24	16.44
Nitrogen Dioxide (NO_2)	µg/m^3	18.33	11.90	18.60	13.90
Particulate Matter (size less than 10 µm) or PM_{10}	µg/m^3	70	51	54	78
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	µg/m^3	18	14	15	21
Ozone (O_3)	µg/m^3	BLQ	21.00	20.40	BLQ
Lead (Pb)	µg/m^3	BLQ	0.03	0.03	0.03
Carbon Monoxide (CO) (1h)	mg/m^3	1.59	1.35	1.71	1.47
Carbon Monoxide (CO) (8h)	mg/m^3	1.85	1.63	1.93	1.97
Ammonia (NH_3)	µg/m^3	20.20	32.30	27.55	31.40
Benzene (C_6H_6)	µg/m^3	2.79	3.07	2.78	3.44
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m^3	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m^3	0.67	BLQ	0.53	BLQ
Nickel (Ni)	ng/m^3	BLQ	BLQ	5.03	BLQ

Parameters	Unit	Results			
		HPCL Refinery Main Gate	Tata Power Colony	Eversmile Building	Near main gate Pepsico
Sulphur Dioxide (SO_2)	µg/m^3	17.30	17.20	11.02	17.93
Nitrogen Dioxide (NO_2)	µg/m^3	14.05	20.53	25.23	13.80
Particulate Matter (size less than 10 µm) or PM_{10}	µg/m^3	60	62	55	57
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	µg/m^3	16	17	15	15
Ozone (O_3)	µg/m^3	BLQ	20.35	20.50	20.50
Lead (Pb)	µg/m^3	0.03	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	1.49	1.53	1.53	1.26
Carbon Monoxide (CO) (8 h)	mg/m^3	1.85	1.84	1.80	1.65
Ammonia (NH_3)	$\mu g/m^3$	28.60	37.25	25.60	35.70
Benzene (C_6H_6)	$\mu g/m^3$	3.01	3.14	3.12	2.94
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m^3	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m^3	0.61	BLQ	0.33	0.42
Nickel (Ni)	ng/m^3	3.43	4.91	BLQ	BLQ

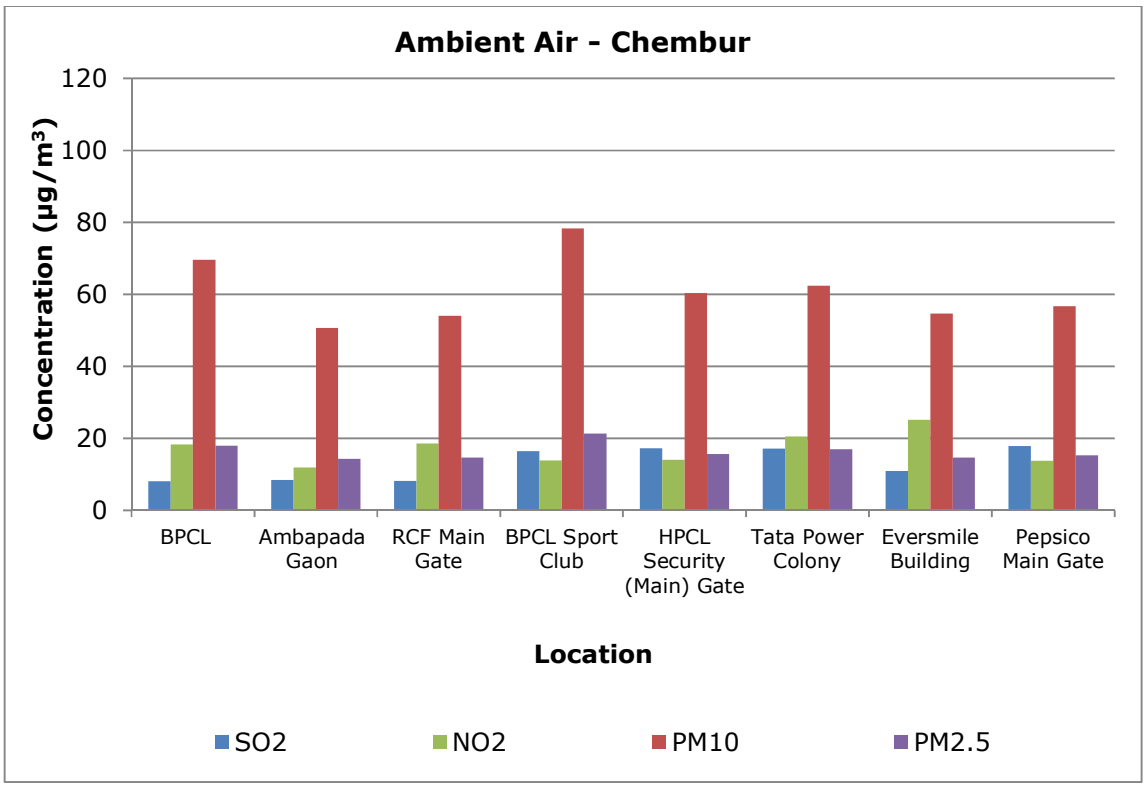
Table 5.4 Volatile Organic Compounds (VOCs) in Ambient Air Results

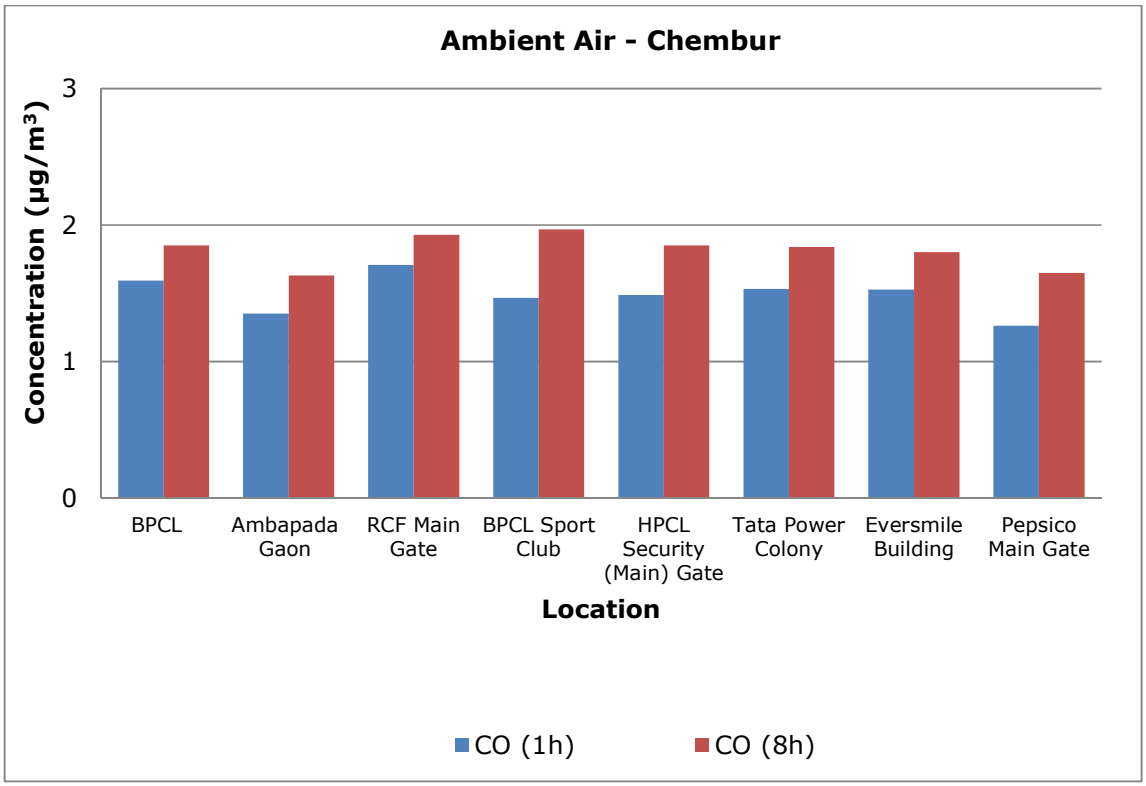
Parameters	Unit	Results	
		Nearby RCF main plant	BPCL sports club
Dichloromethane	$\mu g/m^3$	BLQ	BLQ
Chloroform	$\mu g/m^3$	BLQ	BLQ
Carbon Tetrachloride	$\mu g/m^3$	BLQ	BLQ
Trichloroethylene	$\mu g/m^3$	BLQ	BLQ
Bromodichloromethane	$\mu g/m^3$	BLQ	BLQ
1,3-Dichloropropane	$\mu g/m^3$	BLQ	BLQ
1,4-Dichlorobenzene	$\mu g/m^3$	0.90	0.72
1,3-Dichlorobenzene	$\mu g/m^3$	0.90	0.72
1,2-Dichlorobenzene	$\mu g/m^3$	4.38	5.93
1,2-Dibromo-3-Chloropropane	$\mu g/m^3$	BLQ	BLQ
Napthalene	$\mu g/m^3$	3.75	4.18
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

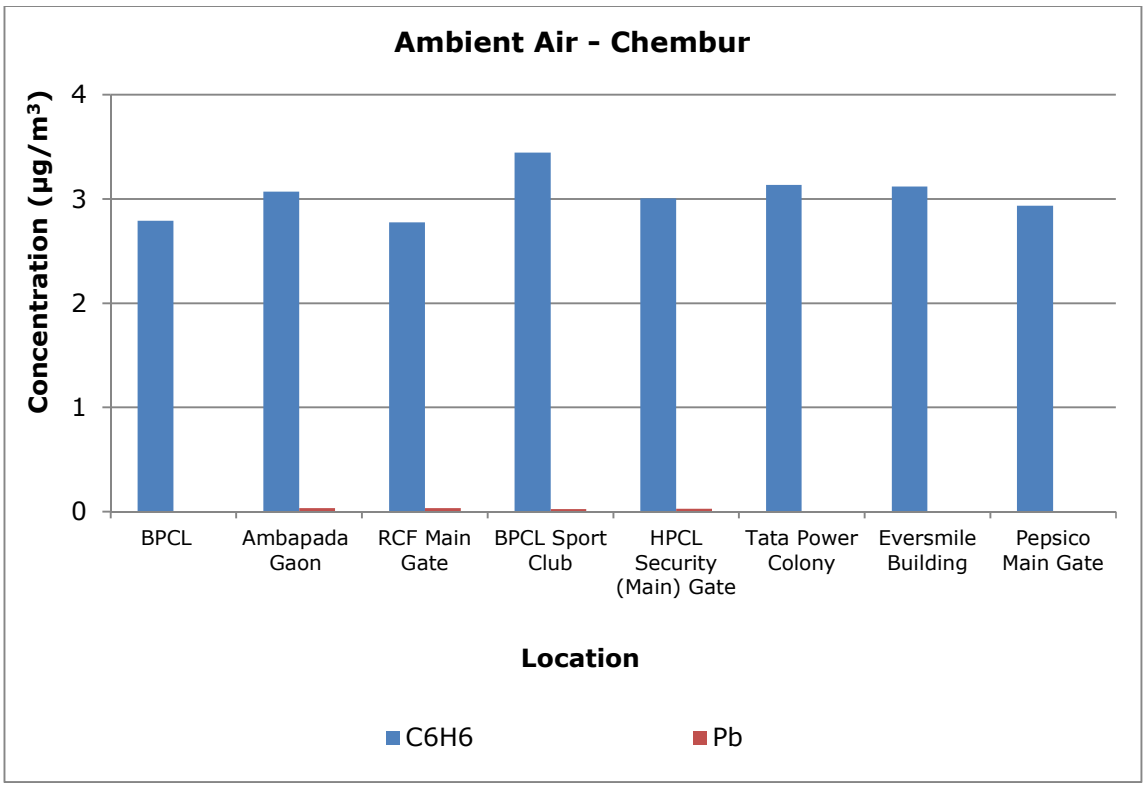
Parameters	Unit	Results	
		Nearby RCF main plant	BPCL sports club
SEC-Butylbenzene	µg/m³	BLQ	BLQ
P-Isopropyltoluene	µg/m³	BLQ	BLQ
M-Xylene	µg/m³	BLQ	BLQ
P-Xylene	µg/m³	BLQ	BLQ
Styrene	µg/m³	0.59	BLQ
Cumene	µg/m³	BLQ	BLQ
1,2,3-Trichloropropane	µg/m³	BLQ	BLQ
N-Propylbenzene	µg/m³	0.58	BLQ
Dibromochloromethane	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
Dibromomethane	µg/m³	BLQ	BLQ
Toluene	µg/m³	0.56	BLQ

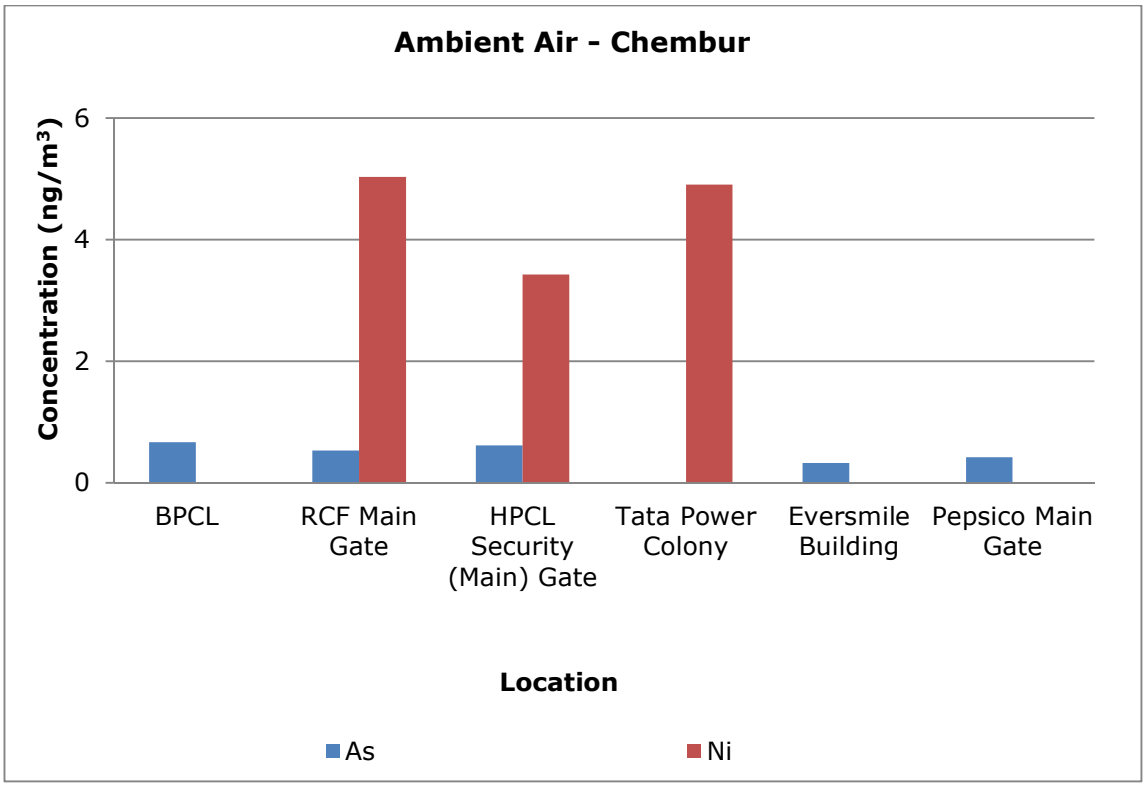
Parameters	Unit	Results	
		Nearby RCF main plant	BPCL sports club
O-Xylene	µg/m³	BLQ	BLQ
Bromoform	µg/m³	BLQ	BLQ
1,1,2,2-Tetrachloroethane	µg/m³	BLQ	BLQ
4-Chlorotoluene	µg/m³	BLQ	BLQ
1,1-Dichloroethylene	µg/m³	BLQ	BLQ
Trans-1,2-Dichloroethylene	µg/m³	BLQ	BLQ
1,1-Dichloroethane	µg/m³	BLQ	BLQ
CIS-1,2-Dichloroethylene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

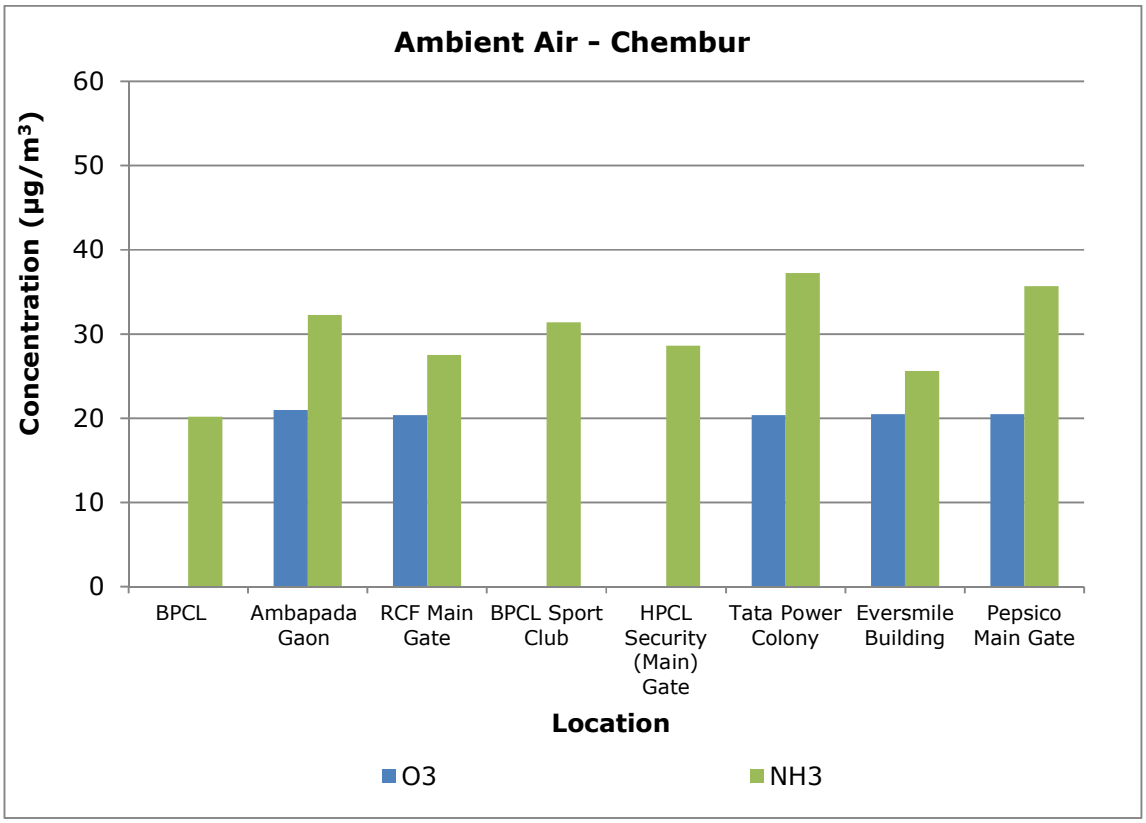
Graphs - Ambient Air Quality Monitoring of Chembur






Ambient Air - Chembur
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


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


Ambient Air - Chembur
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

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.
- Electrical Conductivity in Mahul Jetty, downstream as well as middle stream exceeded the limit.
- 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 3 out of 6 samples collected.
- All metals like Iron, Arsenic, Nickel, Copper, Hexavalent Chromium (Cr^{6+}) etc. are observed either below the limit of quantification (BQL) 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	24.01.2023	26.01.2023	28.01.2023
2.	Downstream near Mahul Jetty	19°0'50.64"N	72°53'5.91"E	24.01.2023	26.01.2023	28.01.2023
3.	Mahul jetty Middle stream	19°1'14.62"N	72°52'44.20"E	24.01.2023	26.01.2023	28.01.2023
4.	Pond water from Cherry Talab near Chembur police station	19°3'3.23"N	72°53'34.25"E	24.01.2023	26.01.2023	28.01.2023
5.	Ghatla pond water	19°3'21.11"N	72°54'22.40"E	24.01.2023	26.01.2023	28.01.2023
6.	Creek water near Ajmera Chembur	19°1'44.59"N	72°52'43.00"E	24.01.2023	26.01.2023	28.01.2023

Fig: Geographical Locations of Surface Water Sampling

Table 6.2 Results of Surface Water

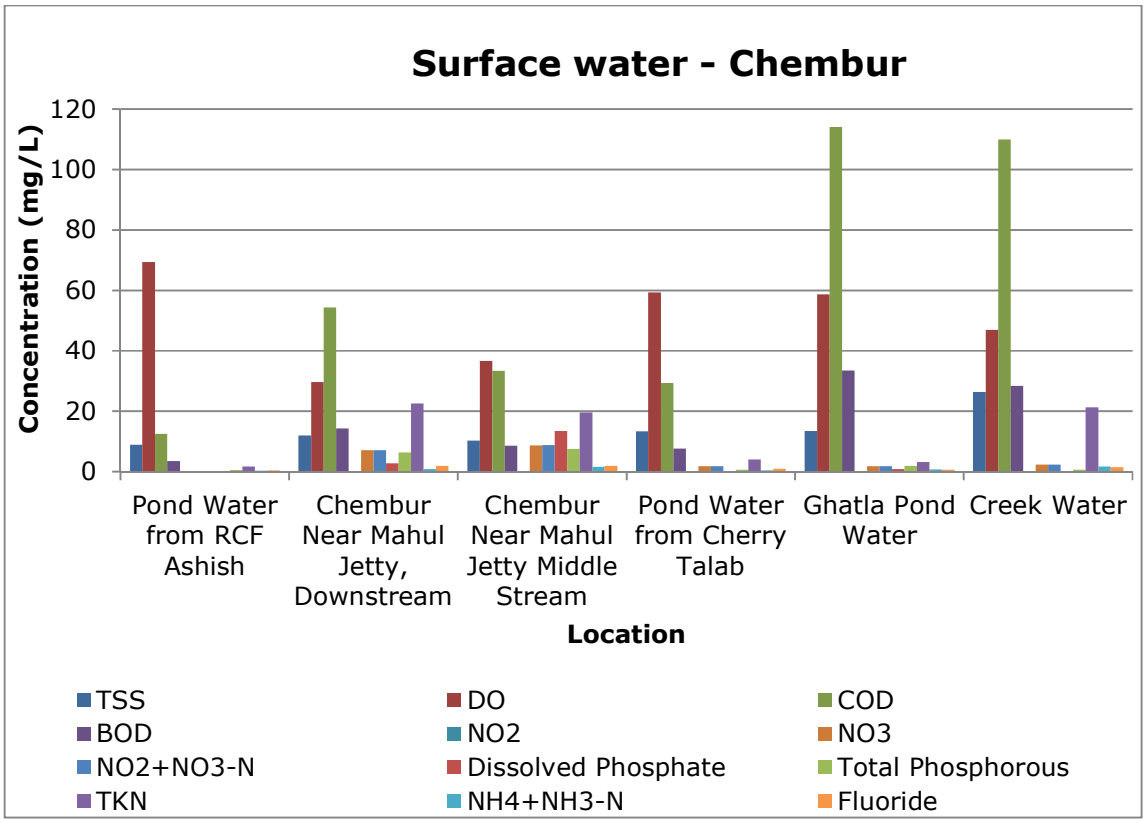
Parameters	Unit	Results					
		Pond water from RCF Ashish	**Downstream near Mahul Jetty**	**Mahul jetty Middle stream**	**Pond water from Cherry Talab near Chembur police station**	**Ghatla pond water**	**Creek water near Ajmera Chembur**
Sanitary Survey	-	Generally Clean neighbourhood	Generally Clean 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	0.53	0.43	0.30	0.47	0.37	0.37
Temperature	^{o}C	28	28	28	29	29	29
Colour	Hazen	1	1	1	1	1	2
Smell	-	Not Agreeable	Not Agreeable	Agreeable	Agreeable	Agreeable	Agreeable

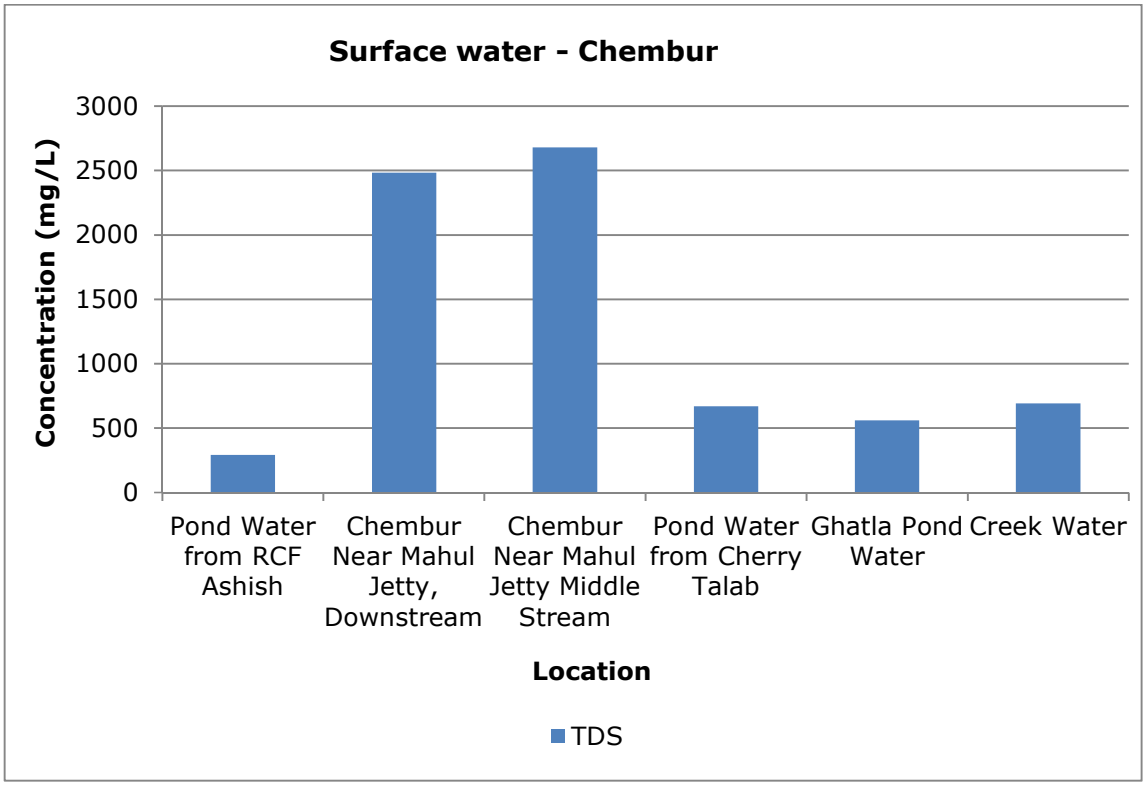
Parameters	Unit	Results					
		Pond water from RCF Ashish	Downstream near Mahul Jetty	Mahul jetty Middle stream	Pond water from Cherry Talab near Chembur police station	Ghatla pond water	Creek water near Ajmera Chembur
pH	-	7.31	7.17	7.26	7.44	7.20	7.10
Oil & Grease	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Suspended Solids	mg/L	9	12	10	13	14	26
Total Dissolved Solids	mg/L	292	2482	2679	671	560	691
Dissolved Oxygen (% Saturation)	%	69.33	29.67	36.67	59.33	58.67	47.00
Chemical Oxygen Demand	mg/L	13	54	33	29	114	110
Biochemical Oxygen Demand (3 days,27°C)	mg/L	4	14	9	8	34	29
Electrical Conductivity (at 25 °C)	µmho/cm	520	4430	4783	1199	999	1238
Nitrite Nitrogen (as NO_2)	mg/L	BLQ	BLQ	0.29	0.02	BLQ	BLQ
Nitrate Nitrogen (as NO_3)	mg/L	BLQ	7.14	8.71	1.80	1.76	2.36
(NO_2 + NO_3)-Nitrogen	mg/L	BLQ	7.14	8.81	1.80	1.76	2.36
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	BLQ	0.06	BLQ	BLQ	BLQ	BLQ
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	0.47	1.93	1.97	1.03	0.73	1.45
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.25	2.77	13.53	0.26	0.85	0.32
Sodium Adsorption Ratio	-	0.55	32.43	11.79	0.67	0.62	5.72

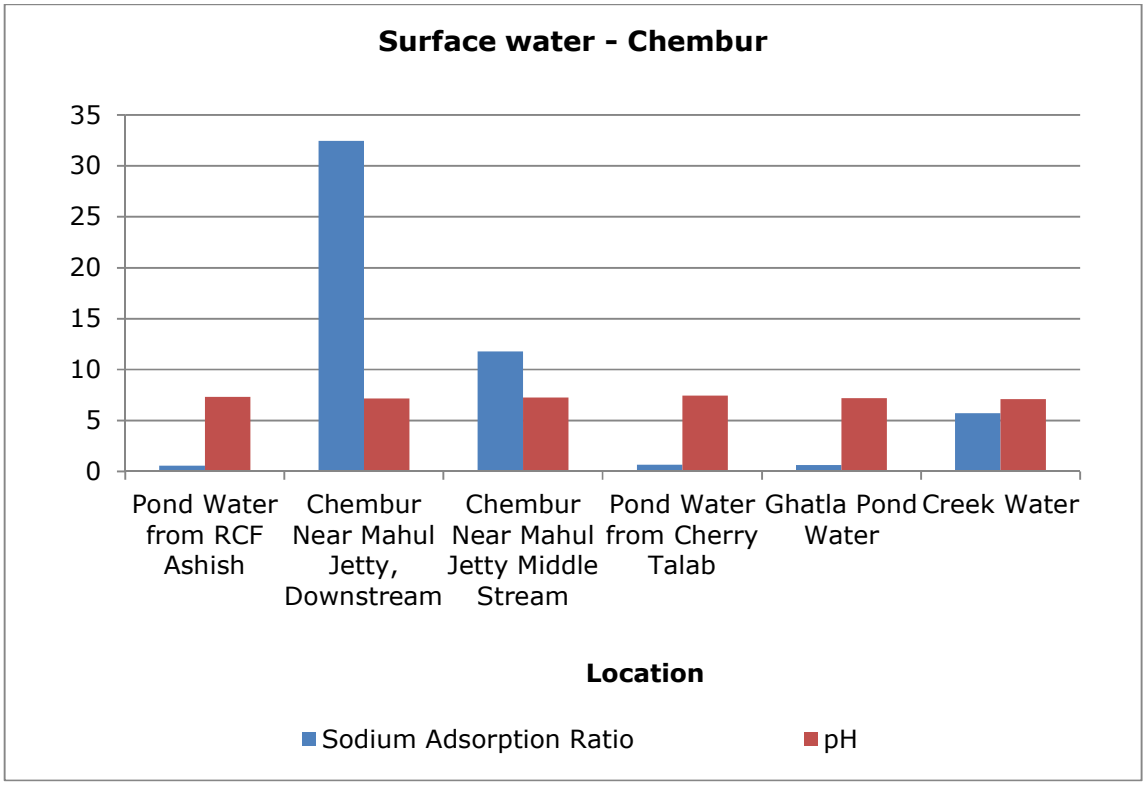
Parameters	Unit	Results					
		Pond water from RCF Ashish	Downstream near Mahul Jetty	Mahul jetty Middle stream	Pond water from Cherry Talab near Chembur police station	Ghatla pond water	Creek water near Ajmera Chembur
Total Coliforms	MPN Index/ 100 ml	370	263	233	554	653	169
Faecal Coliforms	MPN Index/ 100 ml	70	73	102	812	566	148
Total Phosphate (as P)	mg/L	0.62	6.35	7.57	0.65	1.93	0.72
Total Kjeldahl Nitrogen (as N)	mg/L	1.68	22.60	19.62	4.11	3.17	21.27
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.37	0.90	1.58	0.50	0.84	1.65
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	BLQ	BLQ	0.06	0.68	0.52
Nickel (as Ni)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	0.02
Copper (as Cu)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	0.03
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

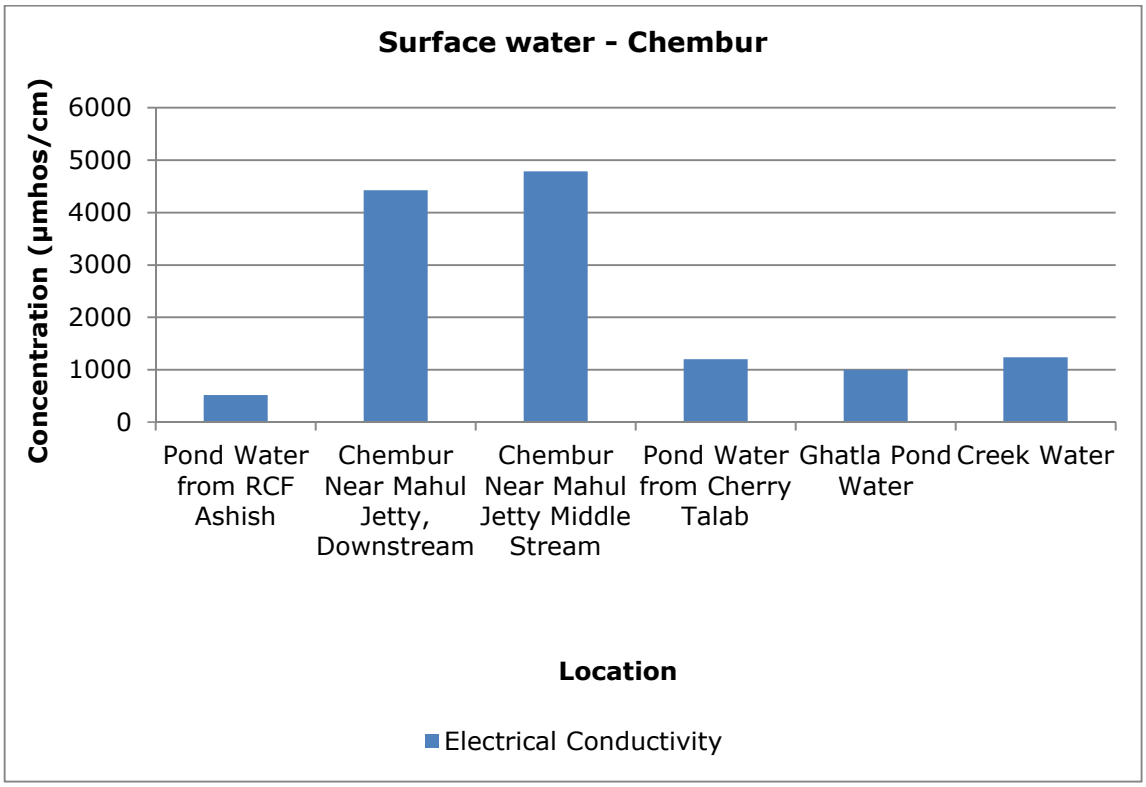
Parameters	Unit	Results					
		Pond water from RCF Ashish	Downstream near Mahul Jetty	Mahul jetty Middle stream	Pond water from Cherry Talab near Chembur police station	Ghatla pond water	Creek water near Ajmera Chembur
Total Arsenic (as As)	mg/L	BLQ	BLQ	BLQ	0.01	BLQ	0.01
Lead (as Pb)	mg/L	BLQ	BLQ	BLQ	BLQ	0.02	0.02
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	0.09	0.18	0.17	0.20	0.08	0.31
Iron (as Fe)	mg/L	0.08	0.71	0.45	0.07	0.33	3.59
Vanadium (as V)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	0.02
Selenium (as Se)	mg/L	BLQ	BLQ	0.01	0.01	0.01	0.01
Boron (as B)	mg/L	BLQ	0.38	0.37	BLQ	0.15	0.16
Total Nitrogen	mg/L	2.17	29.73	28.43	6.48	4.13	15.86
Bioassay Test on fish	% survival	100	100	87	80	100	87

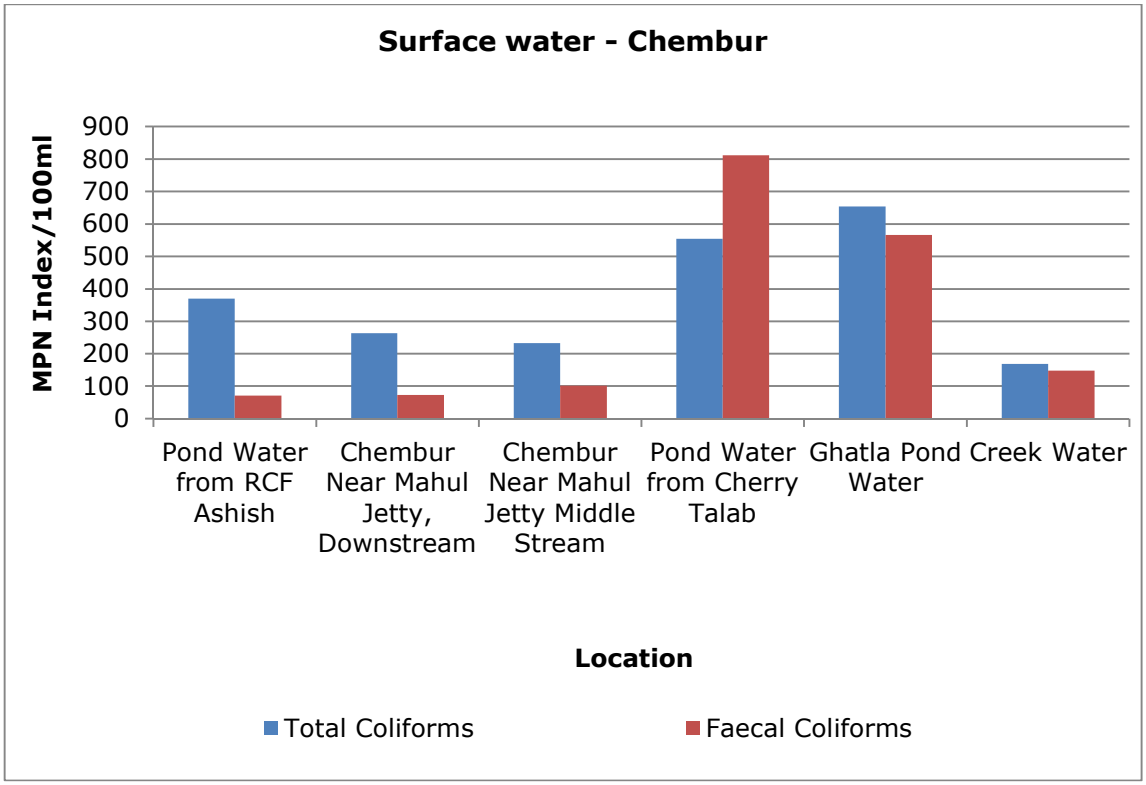
Graphs - Surface Water Quality of Chembur

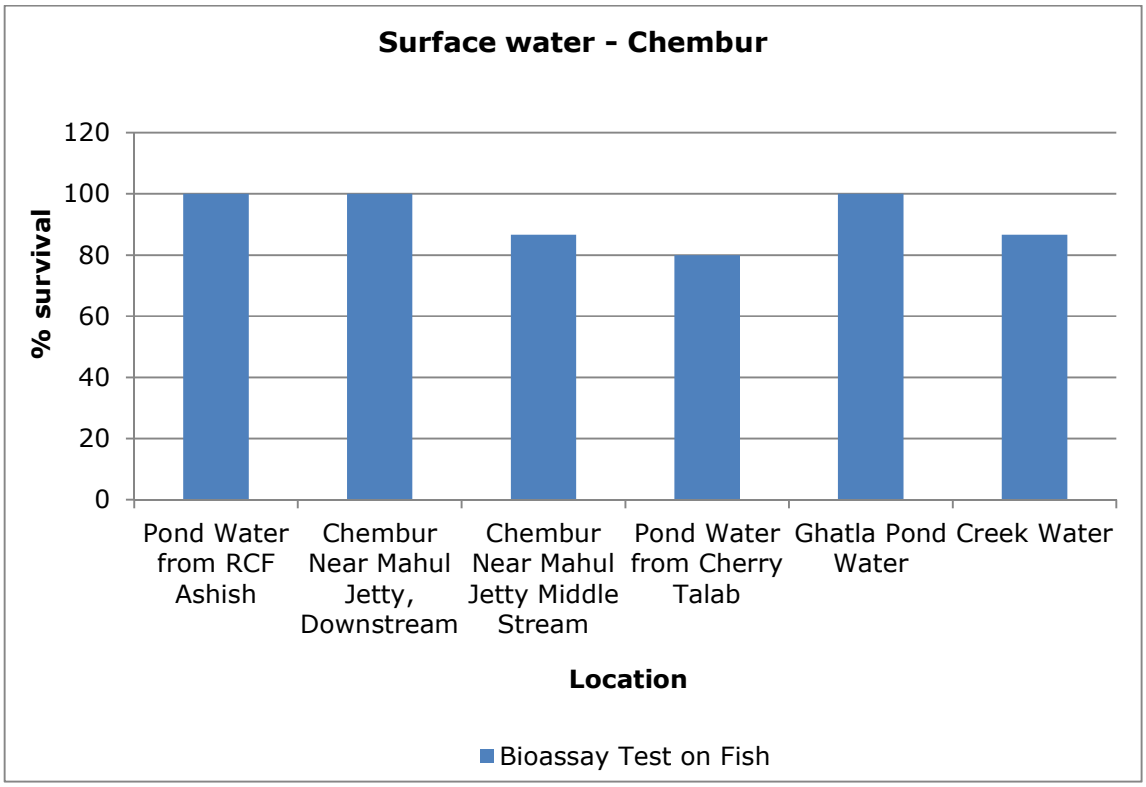





Surface water - Chembur
35
30
25
20
15
10
5
0
Pond Water from RCF Ashish
Chembur Near Mahul Jetty, Downstream
Chembur Near Mahul Jetty Middle Stream
Pond Water from Cherry Talab
Ghatla Pond Water
Creek Water
Location
Sodium Adsorption Ratio
pH


Surface water - Chembur
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


Surface water - Chembur
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


Surface water - Chembur
% 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 three samples collected.
- Electrical conductivity was also observed within the acceptable limits in all six water samples.
- 100% survival was achieved in Fish Bioassay of 2 water samples namely hand pump water at Prayag Nagar and well water at laxmi nagar.
- 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	24.01.2023	26.01.2023	28.01.2023
2.	Well water at Prayag Nagar	19°1'11.10"N	72°54'31.93"E	24.01.2023	26.01.2023	28.01.2023
3.	Well water at Prayag Nagar Tabela	19°1'29.20"N	72°54'24.65"E	24.01.2023	26.01.2023	28.01.2023
4.	Well water at Laxmi Nagar	19°1'46.72"N	72°53'44.31"E	24.01.2023	26.01.2023	28.01.2023
5.	Well water at Ambapada	19°1'7.96"N	72°53'20.72"E	24.01.2023	26.01.2023	28.01.2023
6.	Well water Mahul Village	19°0'52.00"N	72°53'10.95"E	24.01.2023	26.01.2023	28.01.2023

Fig: Geographical Locations of Ground Water Sampling

Table 7.2 Results of Ground Water

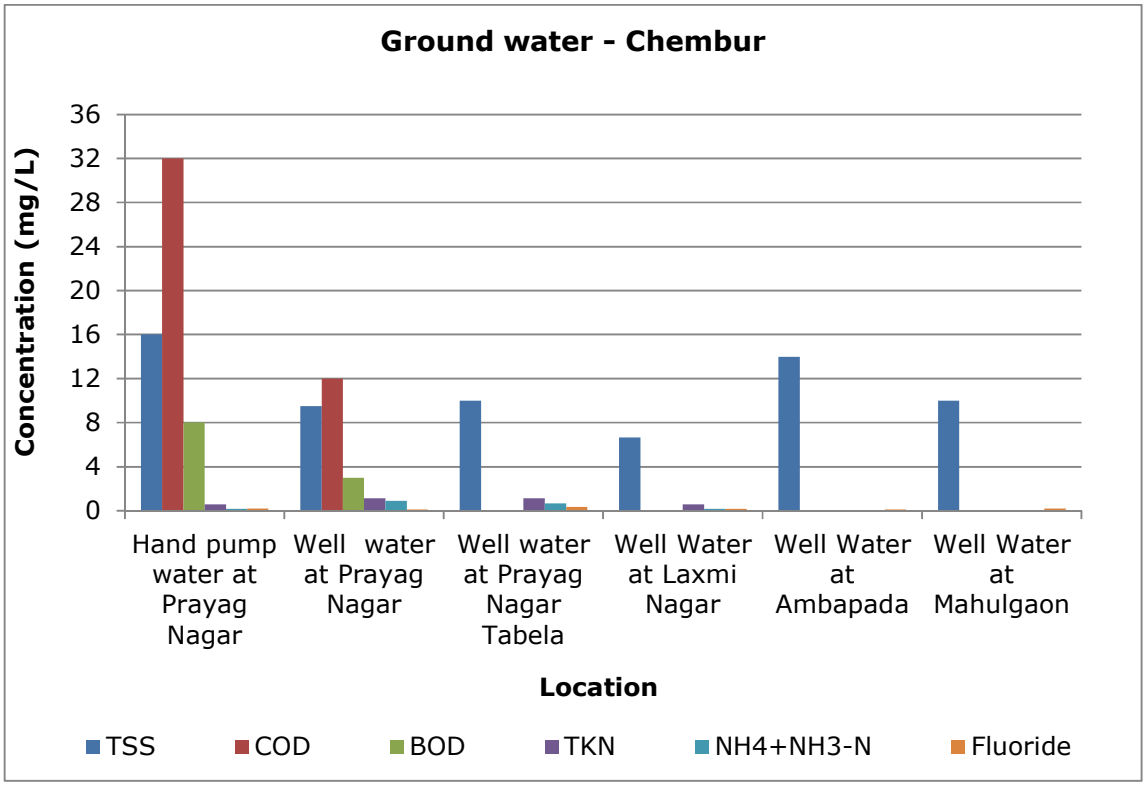
Parameters	Unit	Results					
		Hand pump water at Prayag Nagar	**Well water at Prayag Nagar**	**Well water at Prayag Nagar Tabela**	**Well water at Laxmi Nagar**	**Well water at Ambapada**	**Well water Mahul Village**
Sanitary Survey		Generally clean neighbourhood	Generally clean neighbourhood	Generally 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	Not Applicable	0.53	0.63	0.90	0.60	0.47
Temperature	^{o}C	29	29	30	28	28	27
Colour	Hazen	1	1	1	1	1	1
Smell	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH	-	7.82	7.63	7.40	7.29	7.31	7.40
Oil & Grease	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Suspended Solids	mg/L	16	10	10	7	14	10

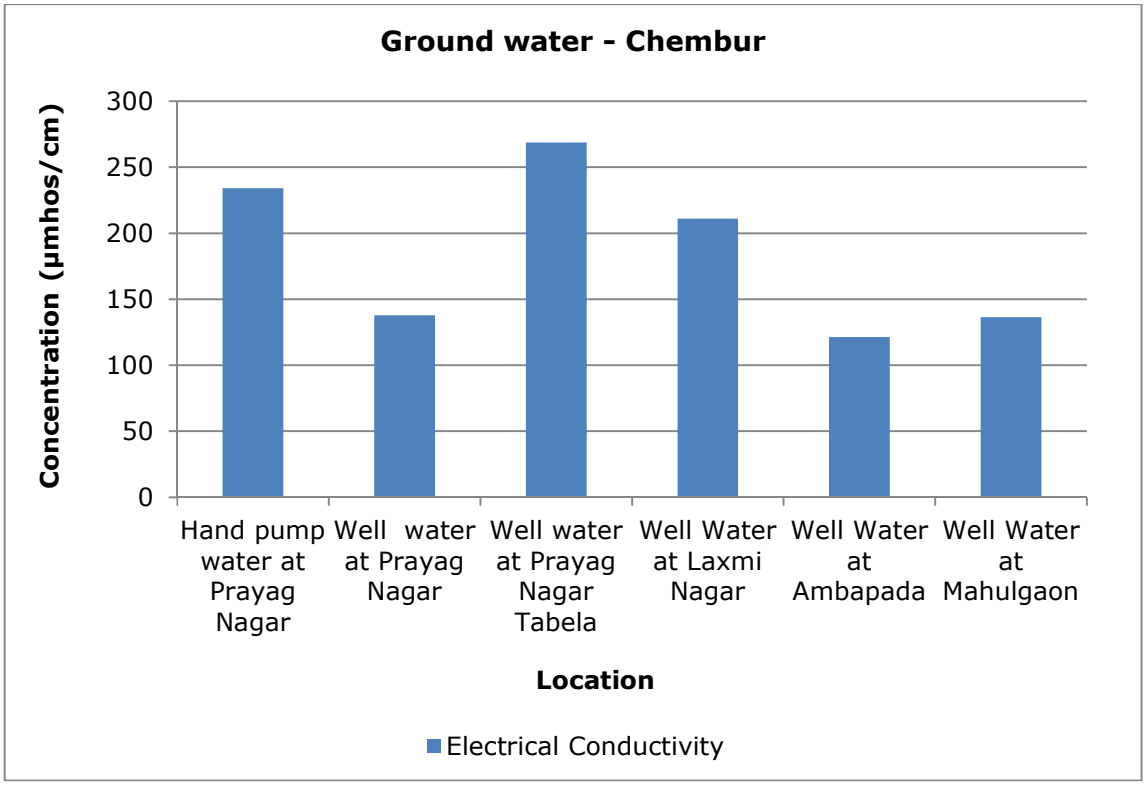
Parameters	Unit	Results					
		Hand pump water at Prayag Nagar	Well water at Prayag Nagar	Well water at Prayag Nagar Tabela	Well water at Laxmi Nagar	Well water at Ambapada	Well water Mahul Village
Total Dissolved Solids	mg/L	132	77	151	119	69	77
Chemical Oxygen Demand	mg/L	32	12	BLQ	BLQ	BLQ	BLQ
Biochemical Oxygen Demand (3 days,27°C)	mg/L	8	3	BLQ	BLQ	BLQ	BLQ
Electrical Conductivity (at 25 °C)	µmho/cm	234	138	269	211	121	136
Nitrite Nitrogen (as NO_2)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Nitrate Nitrogen (as NO_3)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
(NO_2 + NO_3)-Nitrogen	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
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	0.20	0.10	0.35	0.17	0.10	0.20
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	-	0.65	1.05	1.23	1.34	0.87	0.87
Total Coliforms	MPN Index/ 100 ml	46	23	36	36	94	91
Faecal Coliforms	MPN Index/ 100 ml	27	9	23	23	53	10
Total Phosphate (as P)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Kjeldahl Nitrogen (as N)	mg/L	0.56	1.12	1.12	0.56	BLQ	BLQ

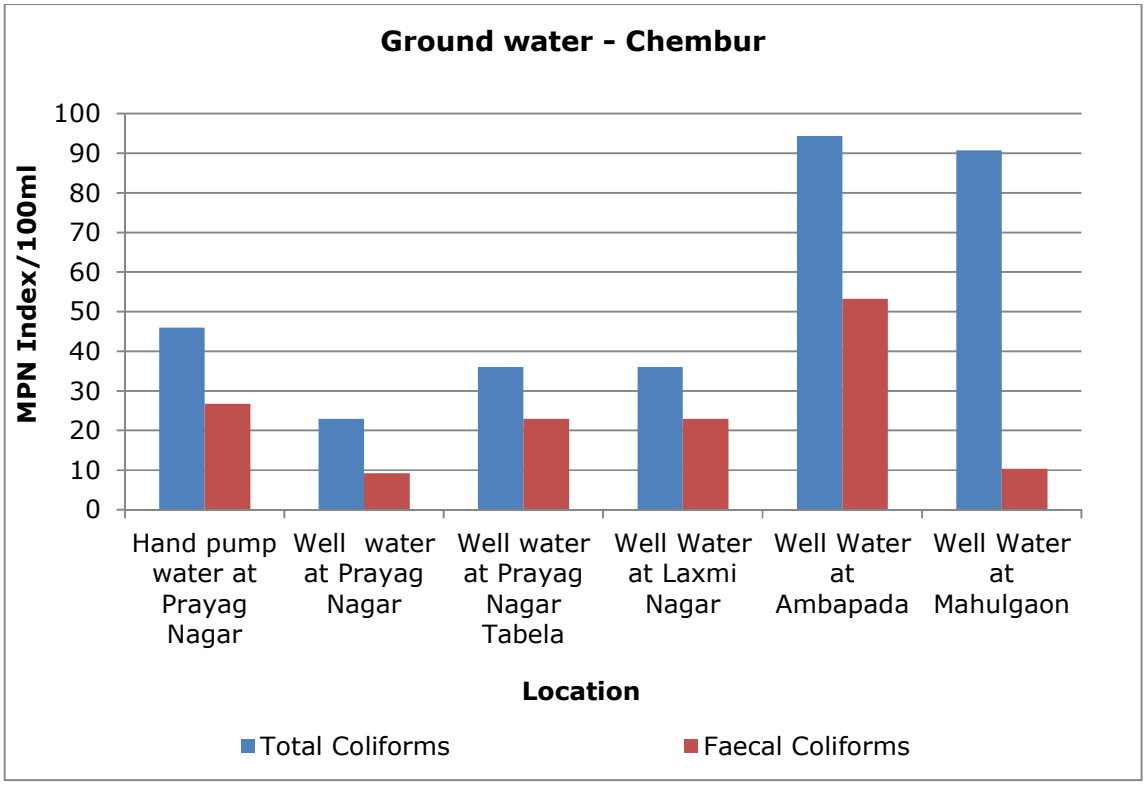
Parameters	Unit	Results					
		Hand pump water at Prayag Nagar	Well water at Prayag Nagar	Well water at Prayag Nagar Tabela	Well water at Laxmi Nagar	Well water at Ambapada	Well water Mahul Village
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.17	0.89	0.67	0.16	BLQ	BLQ
Phenols (as C_6H_5OH)	mg/L	BLQ	BLQ	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	0.57	0.38	0.25	0.20	0.21	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	0.33	0.09	BLQ	0.05	0.08	0.08
Iron (as Fe)	mg/L	5.11	0.27	0.21	0.08	0.83	0.13
Vanadium (as V)	mg/L	0.09	0.02	BLQ	BLQ	BLQ	BLQ
Selenium (as Se)	mg/L	0.01	BLQ	BLQ	BLQ	BLQ	0.01
Boron (as B)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ

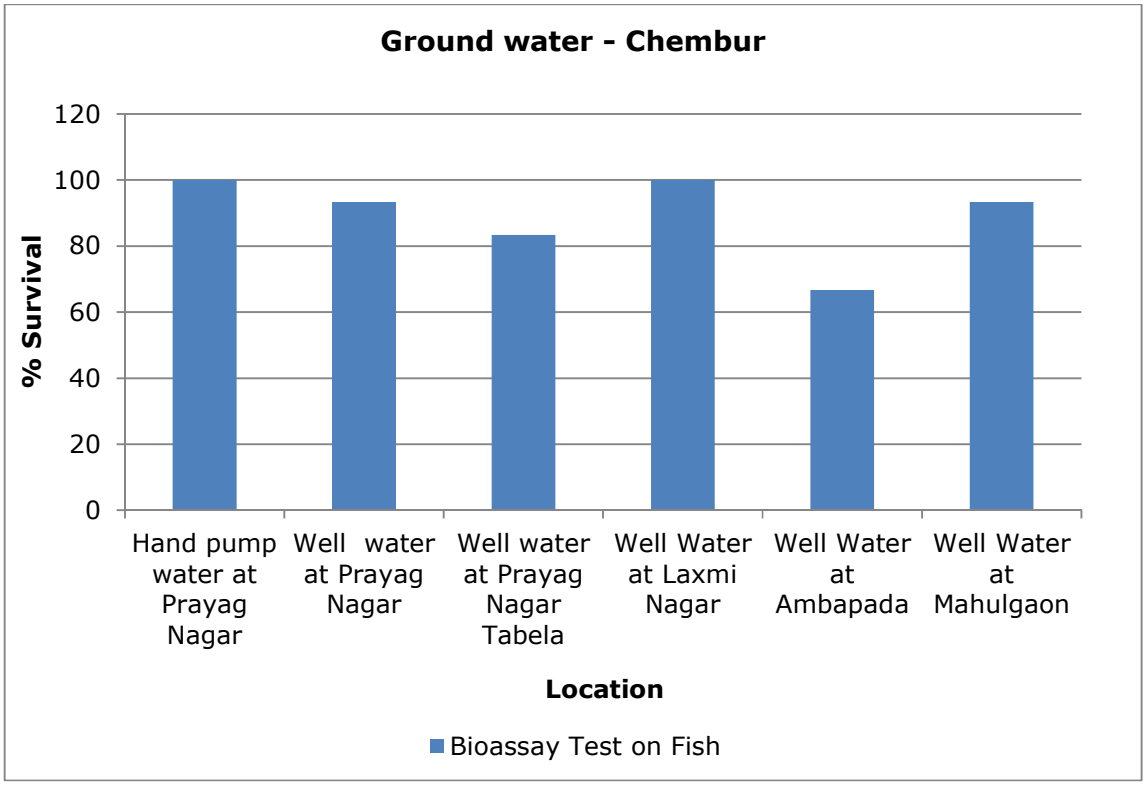
Parameters	Unit	Results					
		Hand pump water at Prayag Nagar	Well water at Prayag Nagar	Well water at Prayag Nagar Tabela	Well water at Laxmi Nagar	Well water at Ambapada	Well water Mahul Village
Total Nitrogen	mg/L	0.77	0.89	1.63	0.50	0.25	0.14
Bioassay Test on fish	% survival	100	93	83	100	67	93

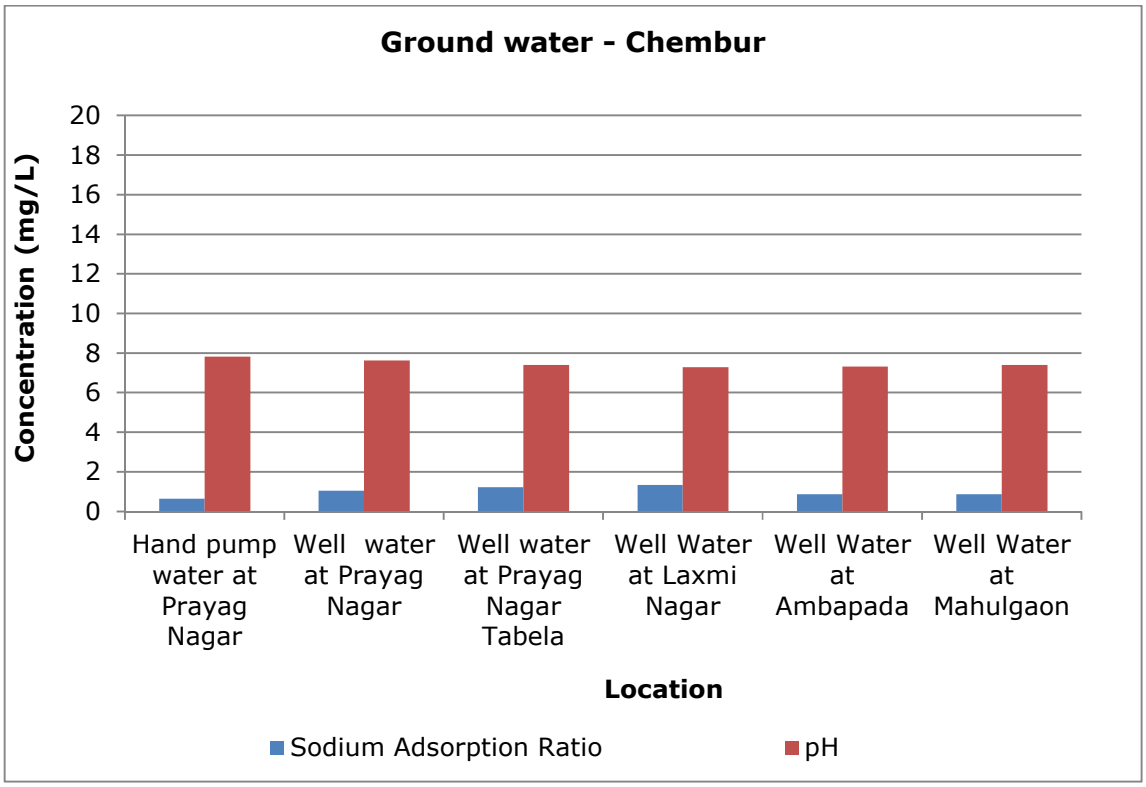
Graphs - Ground water quality of Chembur

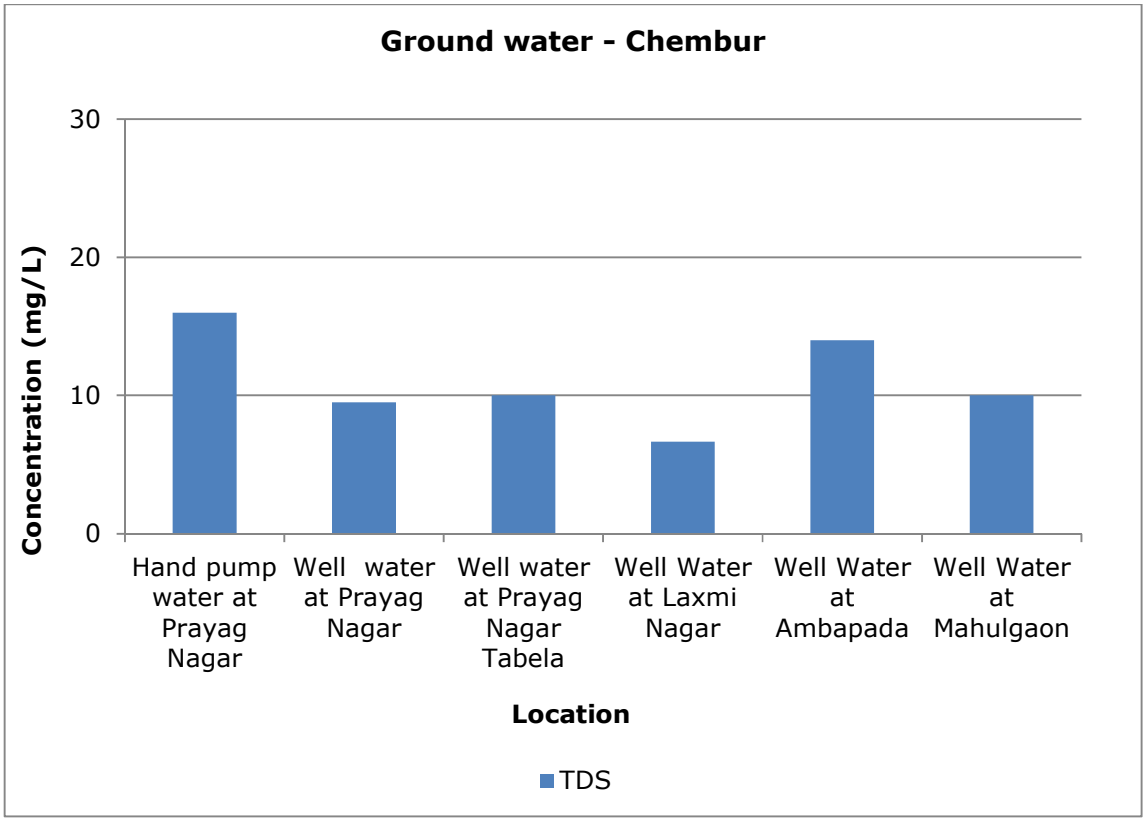



Ground water - Chembur
Concentration (µmhos/cm)
300
250
200
150
100
50
0
Hand pump water at Prayag Nagar
Well water at Prayag Nagar
Well water at Prayag Nagar Tabela
Well Water at Laxmi Nagar
Well Water at Ambapada
Well Water at Mahulgaon
Location
Electrical Conductivity


Ground water - Chembur
MPN Index/100ml
100
90
80
70
60
50
40
30
20
10
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


Ground water - 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


Ground water - Chembur
20
18
16
14
12
10
8
6
4
2
0
Concentration (mg/L)
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


Ground water - Chembur
30
20
10
0
Concentration (mg/L)
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

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 Post monsoon season 2023

	A1	A2	A	B	C	D	CEPI
Air Index	2.75	4	11	0	10	0	**21.00**
Water Index	1.75	4	7	21.5	10	0	**38.50**
Land Index	1.5	4	6	12	10	0	**28.00**
						Aggregated CEPI	**42.12**

Water Environment Pollution Index (EPI) is highest with 38.50. The reason for the increase in Water EPI is due to the exceedance of Total Nitrogen in all surface water samples collected. The increase in Total nitrogen may be due to poor agricultural practices, leaking septic systems or discharges from sewage treatment plants.

Table 8.2 Comparison of CEPI Scores

	Air Index	Water Index	Land Index	CEPI
CEPI Score March 2023	21.00	38.50	28.00	**42.12**
CEPI score June 2021	24.3	29.8	26	**39.40**
CEPI Score March 2021	20	47	15	**48.60**
CEPI score March 2020	44.8	18.8	21	**47**
CEPI score June 2019	30.6	40.3	39.38	**41.6**
CEPI score March 2019	35.5	24.75	42.5	**42.28**
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 42.12. 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.

CEPI Score Calculation:

Chembur
Ambient Air Analysis Report

Pollutant	**Group**	**A1**	**A2**	**A (A1 X A2)**
PM_{10}	B	2	Large	
$PM_{2.5}$	B	0.5		
NO_2	A	0.25		
		2.75	**4**	**11**

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)**	
PM_{10}	60.83	100	0.61	0	8	0.00	L	0
$PM_{2.5}$	16.38	60	0.27	0	8	0.00	L	0
NO_2	17.04	80	0.21	0	8	0.00	L	0
B score = (B1+B2+B3)							**B**	**0**

C	**10**	**5-10%**
D	**0**	**A-A-A**

Air CEPI Score	**(A+B+C+D)**	**21.00**

Water Quality Analysis Report

Pollutant	**Group**	**A1**	**A2**	**A (A1 X A2)**
TN	A	1	Large	
Se	B	0.5		
Zn	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)	
TN	14.47	15	0.96	3	6	0.48	M	15
Se	0.01	0.01	1.00	0	6	0.00	L	1.5
Zn	0.42	0.3	1.40	2	6	0.47	M	5
B score = (B1+B2+B3)							**B**	**21.5**

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

Water CEPI Score	**(A+B+C+D)**	**38.50**

Ground Water Quality Analysis Report

Pollutant	Group	A1	A2	A (A1 X A2)
TKN	A	1	Large	
TDS	A	0.25		
TN	A	0.25		
		1.5	**4**	**6.0**

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)	
TKN	0.84	1	0.84	2	6	0.28	M	12
TDS	104.22	2000	0.05	0	6	0.00	L	0
TN	0.70	45	0.02	0	6	0.00	L	0
B score = (B1+B2+B3)							**B**	**12**

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

Land CEPI Score	**(A+B+C+D)**	**28.00**

Water CEPI Score (im) **38.50**

Land CEPI Score (i2) **28.00**

Air CEPI Score (i3) **21.00**

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 **42.12**

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.
- 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

- 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 42.12.
- In comparison with the CEPI Score of March 2021, there is a decrease in the Water Index, however the Air and the Land 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 23% decrease in CEPI score is observed from 54.67 of the CPCB score of March 2018 to 42.12 in 2023.

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**

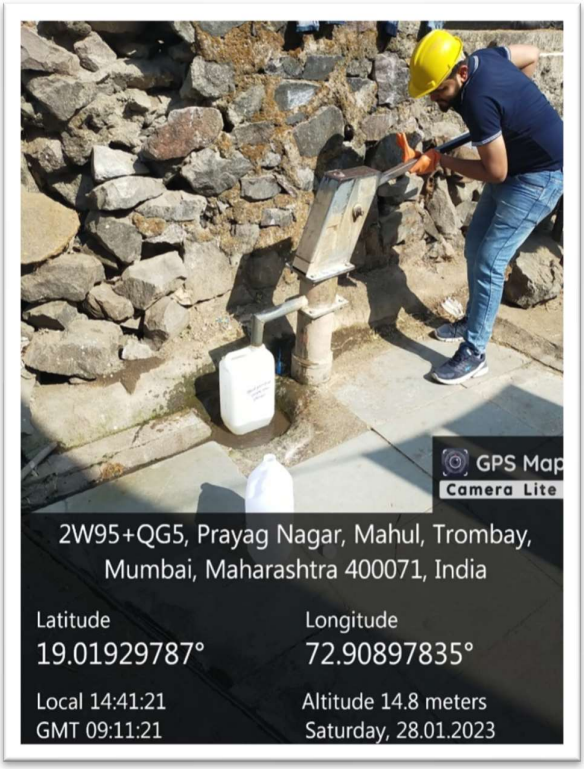
12. Photographs

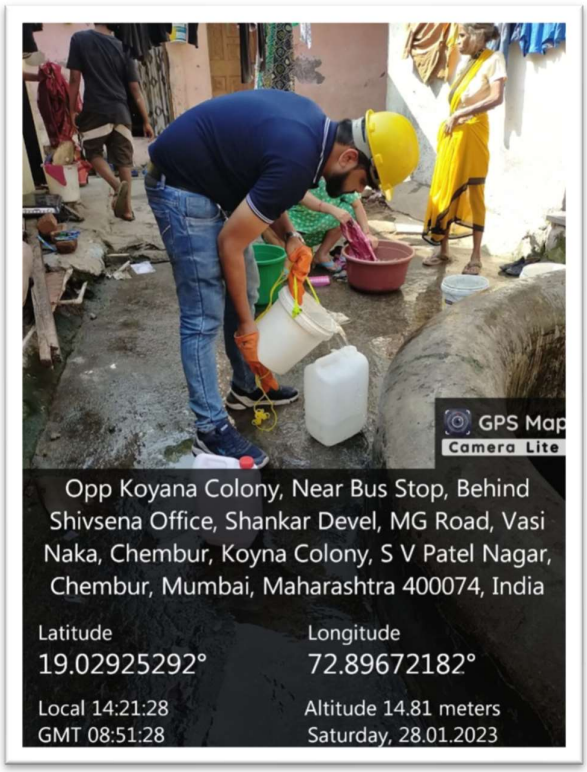
Ambient Air Sampling at BPCL Sports Club

Ambient Air Sampling at BPCL

Surface water sampling at creek water at Ajmera

Surface water sampling at Pond Water Cherry Talav

	
Surface water sampling at Pond water Ghatla	**Surface water sampling at Mahul Jetty**
	
Groundwater sampling at Prayag nagar	**Groundwater sampling at Ambapada**

	
Groundwater sampling at Mahul Village	**Groundwater sampling at Laxmi nagar**

Annexure – I Health Related Data

HEALTH STATISTICS

Required for Comprehensive Environmental Pollution Index (CEPI) Study by Maharashtra Pollution Control Board (MPCB)

Name of the Polluted Industrial Area (PIA)	MUMBAI
Name of the major health center/ organization	Surana Sethia Hospital
Name and designation of the Contact person	
Address	Chembur

S No.	Diseases	No. of Patients Reported	
		2022 (Jan-Dec)	2021 (Jan-Dec)
AIRBORNE DISEASES			
1.	Asthma	85	09
2.	Acute Respiratory Infection	39	16
3.	Bronchitis	16	09
4.	Cancer	NA	NA
WATERBORNE DISEASES			
1.	Gastroenteritis	69	NA
2.	Diarrhea	04	NA
3.	Renal diseases	04	08
4.	Cancer	NA	NA

Date:

Signature

SURANA SETHIA HOSPITAL & RESEARCH CENTER * Chembur Mumbai - 71

HEALTH STATISTICS

Required for Comprehensive Environmental Pollution Index (CEPI) Study by Maharashtra Pollution Control Board (MPCB)

Name of the Polluted Industrial Area (PIA)	MUMBAI
Name of the major health center/ organization	Sai Hospital
Name and designation of the Contact person	25264201
Address	SGGVikas Shree Chembur Ganesh co-op Hsg. SCHD Sion Trombay Road Chembur-400074.

S No.	Diseases	No. of Patients Reported	
		2022 (Jan-Dec)	2021 (Jan-Dec)
AIRBORNE DISEASES			
1.	Asthma	56	52
2.	Acute Respiratory Infection	50	250
3.	Bronchitis	15	12
4.	Cancer	135	12
WATERBORNE DISEASES			
5.	Gastroenteritis	48	25
6.	Diarrhea	28	18
7.	Renal diseases	55	28
8.	Cancer	12	8

Date:

Signature

SAI HOSPITAL Chembur