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

NAVI-MUMBAI

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
SPA	Severely Polluted Area
VOCs	Volatile Organic Compounds
WHO	World Health Organisation
ZLD	Zero Liquid Discharge

1. Executive Summary

Navi Mumbai was monitored for Ambient Air Quality, Ground and Surface Water quality. Based on the data collected by monitoring, a Comprehensive Environmental Pollution Index (CEPI) Score [as per latest directions 120 of Letter No. B-29012/ESS (CPA)/2015-16 dated 26th April 2016 of Central Pollution Control Board (CPCB)] was calculated. Maharashtra Pollution Control Board (MPCB) has carried out monitoring at CPCB location with the additional locations of sampling for ambient air, surface and ground water 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 assess the ambient air quality, surface water quality and ground water quality.

The Ambient Air Quality stations were identified considering the upwind and cross wind direction in the CEPI impact area. Ambient Air Quality was monitored at eight locations. The concentration of all the ambient air parameters was found well within the limits prescribed by NAAQS. Six locations each for surface water and groundwater were monitored for the study. Land index is represented by groundwater in the CEPI. Ground water parameters were also found to be within the permissible limits when compared with IS 10500:2012 drinking water standards.

Based on the study conducted by CPCB during the period March 2018, the CEPI score of Navi Mumbai region as per the revised guidelines of CEPI (2016) was 66.32 (Air Index–56, Water Index-63 and Land Index–16). However, the present study reports aggregated CEPI score of Navi Mumbai region of pre-monsoon season (June, 2024). Based on the study, the present CEPI score is 55.8 (Air Index–12.00, Water Index-54.25 and Land Index–27.5). The CEPI score is the combination of A, B, C and D factors. Here, C factor represents the health data and D factor represents the initiatives taken by MPCB in the past few years to mitigate pollution. The regional offices of MPCB have taken various initiatives like the installation of CAAQMS, CETPs, online VOC analysers etc. in the past few years to control and mitigate air and water pollutants. This has contributed to the factor D, hence reducing the CEPI score of the region over the years.

The analysis of the aggregated CEPI score shows that the pollution in Navi Mumbai industrial clusters has reduced in the last three years. Approximately 16% decrease in CEPI score is observed from 66.32 in 2018 to 55.8 in June 2024.

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 faeces, 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. The present CEPI study includes Navi Mumbai region, which is the largest planned city in the world. Its development was started in 1972 to de-congest Mumbai. Navi Mumbai is environmentally very important, ecologically sensitive and are natural habitats for migratory birds. It also includes mangroves, lakes and wetlands. Its industrial area is commonly known as TTC MIDC Estate. This TTC MIDC accounts for about 3254 industrial units of various category engaged in the manufacturing of chemicals, dyes, dye-intermediates, Bulk drugs, pharmaceuticals, Textile auxiliaries, Pesticides, Petrochemicals, Textile processors, Engineering units etc. Besides the industries, there are other sources which are major contributors of pollution like emissions by transport and construction activities etc.

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 action plan reports offer hope for addressing environmental concerns and fostering sustainable development in Navi Mumbai.

Fig. Navi Mumbai Region - CEPI Monitoring Zone

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 Navi Mumbai, 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 Navi Mumbai

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-Dichloroethylene, Bromochloromethane, 1,1,1-Trichloroethane

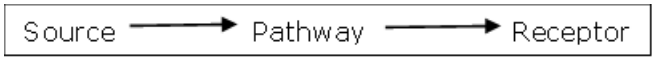
Sampling Criteria	Total Sites	Monitoring Parameters
Water Quality Monitoring	**Surface water - 06**	**(i) Simple Parameters** Sanitary Survey, General Appearance, Colour, Smell, Transparency and Ecological **(ii) Regular Monitoring Parameters** pH, O & G, Suspended Solids, DO, COD, BOD, TDS, Electrical 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 hrs
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 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 Navi Mumbai area, monitoring stations were identified considering the upwind and cross wind 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 Navi Mumbai eight locations have been monitored for checking the Ambient Air Quality (AAQ) in triplicate from 26th June 2024 to 30th June 2024. Volatile Organic Compounds (VOCs) were monitored at 2 locations namely Zoetis Pharmaceuticals Research Pvt. Ltd. and Deepak Fertilizer and Petrochemicals Ltd.

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.	DY Patil Hospital	N19^{0}02'27.88"	E73^{0}01'27.22"	26.06.2024	28.06.2024	30.06.2024
2.	TTCWMA, Mahape	N19^{0}06'28.72"	E73°01'51.68"	26.06.2024	28.06.2024	30.06.2024
3.	Nearby Reliable IT Park	N19^{0}06'30.77"	E73^{0}01'49.57"	26.06.2024	28.06.2024	30.06.2024
4.	Nearby Zoetis Pharmaceuticals Research Pvt. Ltd.	N19°03'59.58"	E73°01'32.13"	26.06.2024	28.06.2024	30.06.2024
5.	CETP Koparkharine, near ETP Table No. I	N19^{0}04'30.99"	E73^{0}04'03.74"	26.06.2024	28.06.2024	30.06.2024
6.	Nearby Ashi India Glass	N19^{0}05'10.73"	E73^{0}06'19.14"	26.06.2024	28.06.2024	30.06.2024
7.	Nearby Technova Imaging System	N19^{0}03'27.50"	E73^{0}06'48.19"	26.06.2024	28.06.2024	30.06.2024
8.	Nearby Deepak Fertilizer and Petrochemicals	N19^{0}04'08.26"	E73^{0}07'59.22"	26.06.2024	28.06.2024	30.06.2024

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 Zoetis Pharmaceuticals Research Pvt. Ltd.	N19°03'59.58"	E73°01'32.13"	1.07.2024	3.07.2024	05.07.2024
2.	Nearby Deepak Fertilizer and Petrochemicals	N19^{0}04'08.26"	E73^{0}07'59.22"	1.07.2024	3.07.2024	05.07.2024

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			
		DY Patil Hospital	TTC WMA, Mahape	Nearby Reliable IT Park	Nearby Zoetis Pharmaceuticals Research Pvt. Ltd.
Sulphur Dioxide (SO_2)	$\mu g/m^3$	24.70	10.90	21.84	13.90
Nitrogen Dioxide (NO_2)	$\mu g/m^3$	9.36	14.10	7.85	22.80
Particulate Matter (size less than 10 µm) or PM_{10}	$\mu g/m^3$	56	62	57	44
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	$\mu g/m^3$	15	16	14	12
Ozone (O_3)	$\mu g/m^3$	38.17	42.13	57.30	44.97
Lead (Pb)	$\mu g/m^3$	0.10	0.13	0.12	0.12
Carbon Monoxide (CO) (1h)	mg/m^3	0.95	1.07	1.00	1.05
Carbon Monoxide (CO) (8h)	mg/m^3	1.35	1.49	1.48	1.35
Ammonia (NH_3)	$\mu g/m^3$	58.15	33.05	70.63	79.30

Parameters	Unit	Results			
		DY Patil Hospital	TTC WMA, Mahape	Nearby Reliable IT Park	Nearby Zoetis Pharmaceuticals Research Pvt. Ltd.
Benzene (C_6H_6)	$\mu g/m^3$	2.51	1.81	2.05	2.06
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m^3	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m^3	0.91	0.71	0.75	0.68
Nickel (Ni)	ng/m^3	6.04	9.04	9.38	7.25

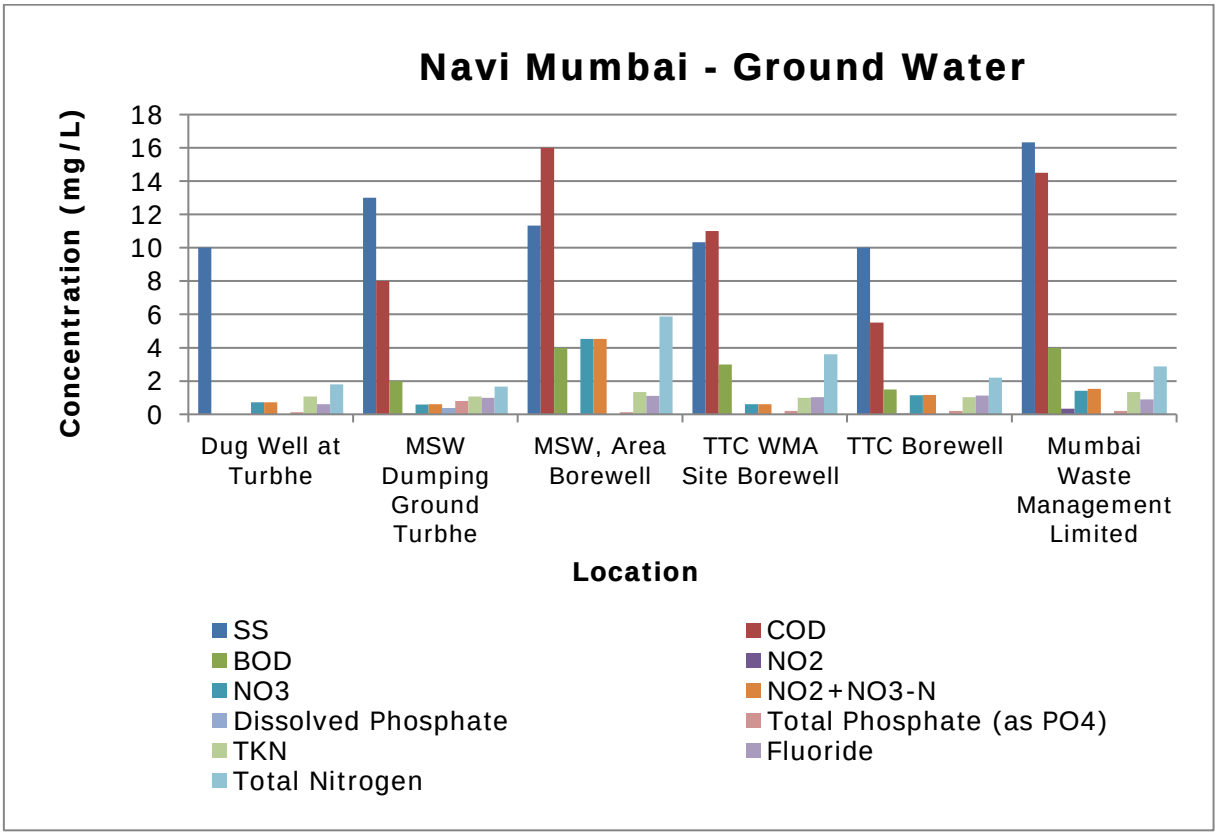
Parameters	Unit	Results			
		CETP Koparkharine Near ETP Table No. I	Nearby Ashi India Glass	Nearby Technova Imaging System	Nearby Deepak Fertilizer and Petrochemicals
Sulphur Dioxide (SO_2)	$\mu g/m^3$	45.30	13.50	28.30	11.90
Nitrogen Dioxide (NO_2)	$\mu g/m^3$	11.14	20.20	12.46	11.05
Particulate Matter (size less than 10 µm) or PM_{10}	$\mu g/m^3$	39	38	40	50
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	$\mu g/m^3$	12	11	12	14
Ozone (O_3)	$\mu g/m^3$	36.15	60.60	46.30	37.80
Lead (Pb)	$\mu g/m^3$	0.06	0.05	0.06	0.07
Carbon Monoxide (CO) (1h)	mg/m^3	1.00	1.00	1.10	1.12
Carbon Monoxide (CO) (8h)	mg/m^3	1.40	1.48	1.58	1.45
Ammonia (NH_3)	$\mu g/m^3$	65.17	73.33	36.60	71.07
Benzene (C_6H_6)	$\mu g/m^3$	2.58	2.04	2.14	2.67
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m^3	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m^3	0.95	0.60	0.51	0.82
Nickel (Ni)	ng/m^3	4.98	4.99	4.60	4.46

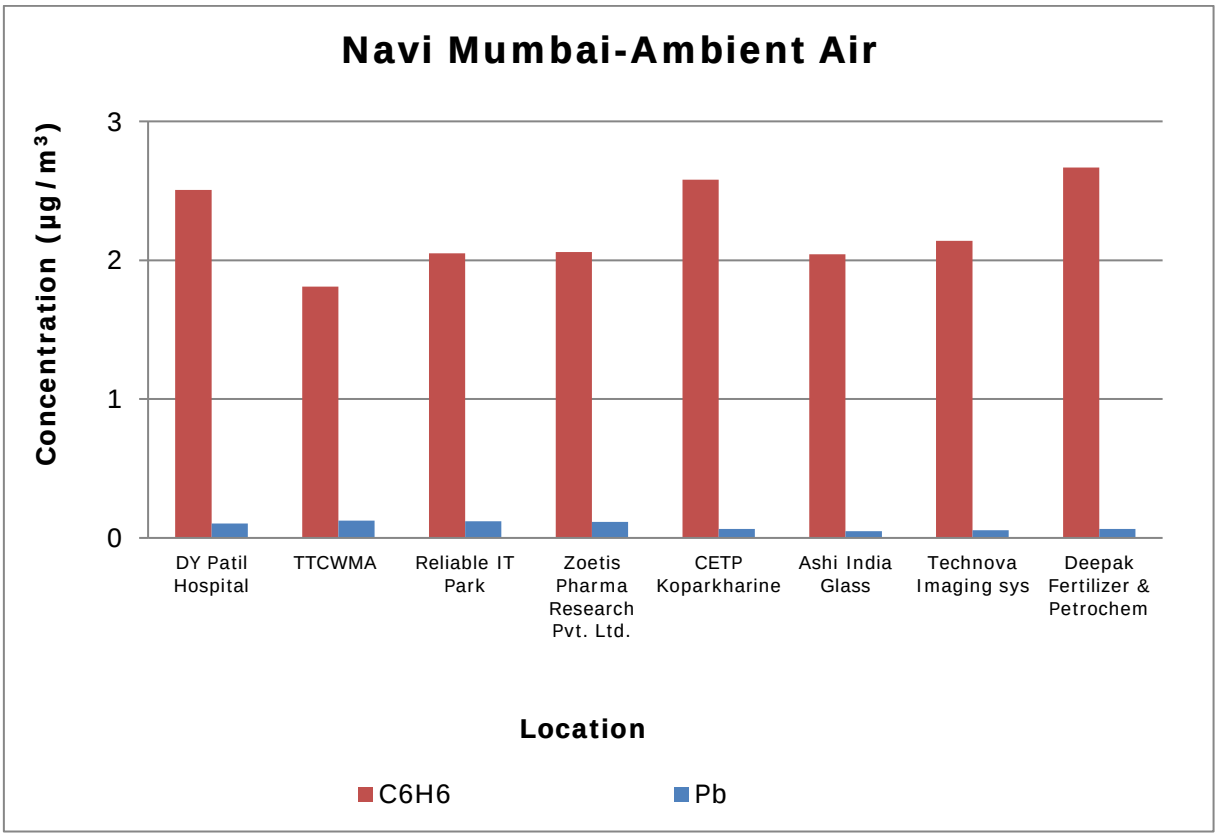
Table 5.4 Volatile Organic Compounds (VOCs) in Ambient Air Results

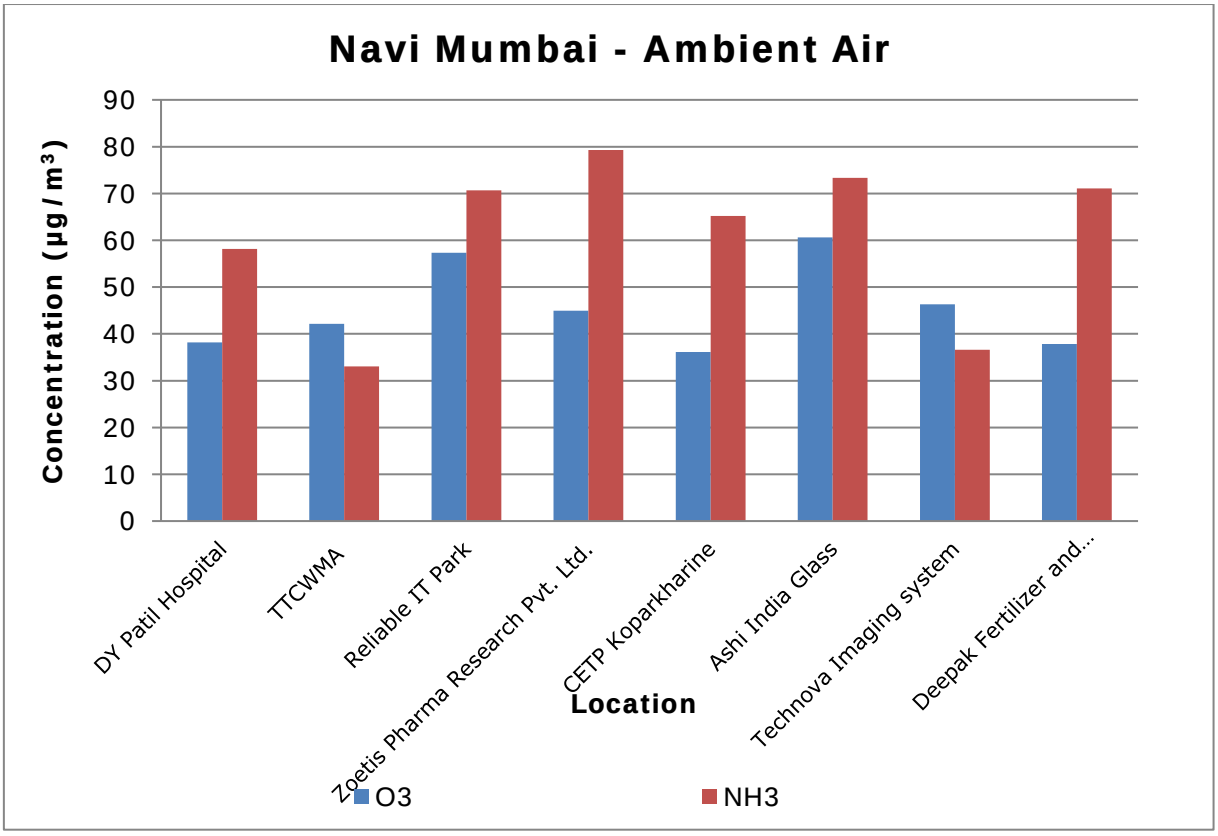
Parameters	Unit	Results	
		Zoetis Pharmaceuticals Research Pvt. Ltd.	Deepak Fertilizer and Petrochemicals
Dichloromethane	µg/m³	1.02	2.07
Chloroform	µg/m³	0.94	0.53
Carbon Tetrachloride	µg/m³	BLQ	BLQ
Trichloroethylene	µg/m³	BLQ	BLQ
Bromodichloromethane	µg/m³	BLQ	BLQ
1,3-Dichloropropane	µg/m³	BLQ	BLQ
1,4-Dichlorobenzene	µg/m³	6.76	BLQ
1,3-Dichlorobenzene	µg/m³	BLQ	BLQ
1,2-Dichlorobenzene	µg/m³	BLQ	BLQ
1,2-Dibromo-3-Chloropropane	µg/m³	BLQ	BLQ
Napthalene	µg/m³	BLQ	BLQ
Bromobenzene	µg/m³	BLQ	BLQ
1,2,4-Trimethylbenzene	µg/m³	BLQ	BLQ
2-Chlorotoluene	µg/m³	BLQ	BLQ
Tert-Butylbenzene	µg/m³	BLQ	BLQ
SEC-Butylbenzene	µg/m³	BLQ	BLQ
P-Isopropyltoluene	µg/m³	1.21	BLQ
M-Xylene	µg/m³	BLQ	BLQ
P-Xylene	µg/m³	1.74	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	0.60

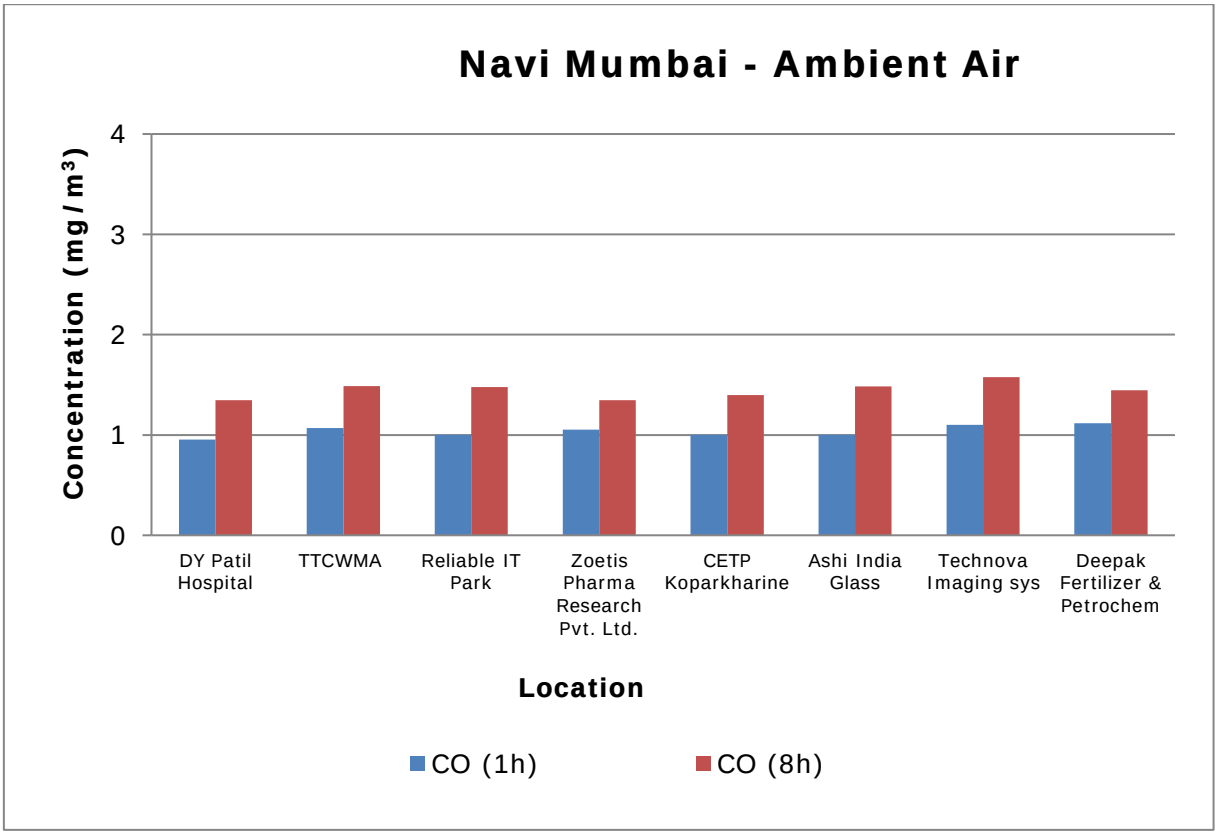
Parameters	Unit	Results	
		Zoetis Pharmaceuticals Research Pvt. Ltd.	Deepak Fertilizer and Petrochemicals
1,2-Dichloropropane	µg/m³	BLQ	BLQ
Trans-1,3-Dichloropropene	µg/m³	BLQ	BLQ
CIS 1,3-Dichloropropene	µg/m³	BLQ	BLQ
1,1,2-Trichloroethane	µg/m³	BLQ	BLQ
Tetrachloroethylene	µg/m³	BLQ	BLQ
1,3,5-Trimethylbenzene	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	0.72	0.59
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

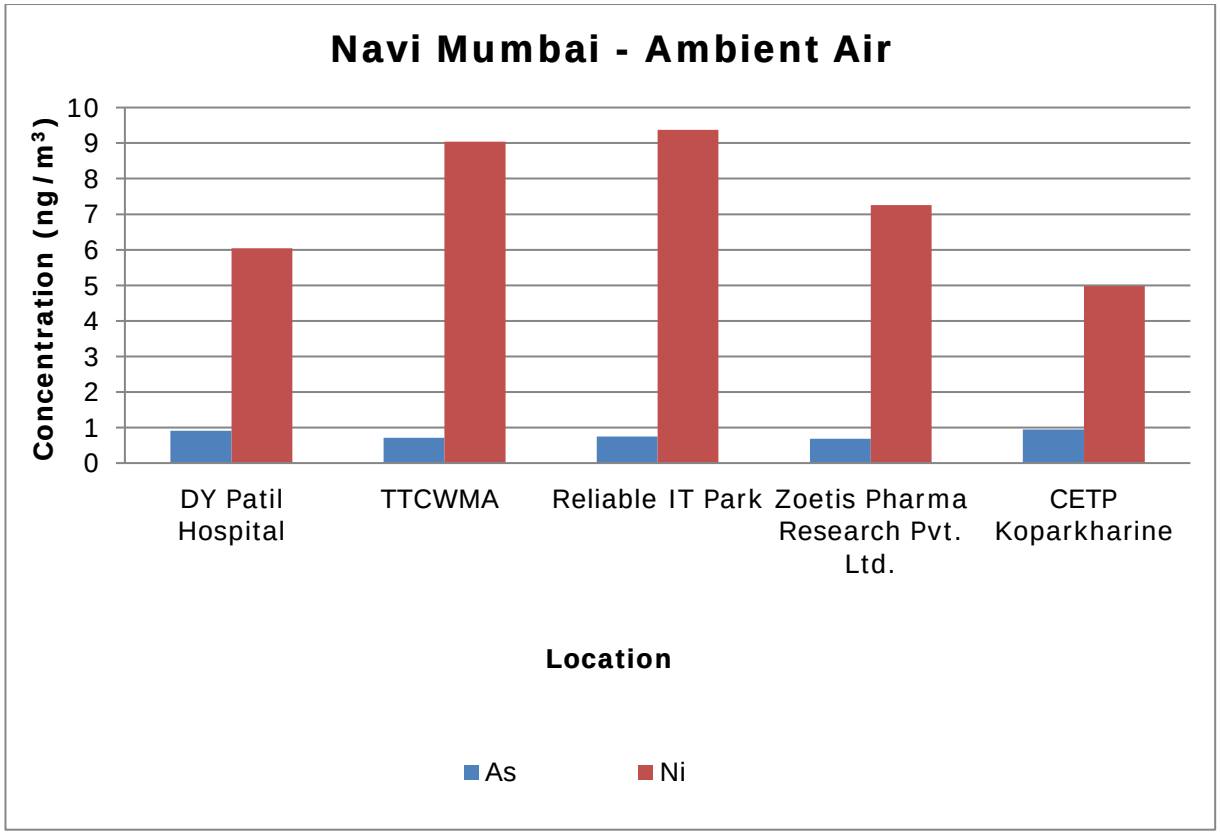
Graphs - Ambient Air Quality Monitoring in Navi Mumbai






Navi Mumbai - Ambient Air
Concentration (µg/m³)
90
80
70
60
50
40
30
20
10
0
DY Patil Hospital
TTCWMA
Reliable IT Park
Zoetis Pharma Research Pvt. Ltd.
CETP Koparkharine
Ashi India Glass
Technova Imaging system
Deepak Fertilizer and...
Location
O3
NH3


Navi Mumbai - Ambient Air
Concentration (mg/m³)
4
3
2
1
0
DY Patil Hospital
TTCWMA
Reliable IT Park
Zoetis Pharma Research Pvt. Ltd.
CETP Koparkharine
Ashi India Glass
Technova Imaging sys
Deepak Fertilizer & Petrochem
Location
CO (1h)
CO (8h)


Navi Mumbai - Ambient Air
Concentration (ng/m³)
10
9
8
7
6
5
4
3
2
1
0
DY Patil Hospital
TTCWMA
Reliable IT Park
Zoetis Pharma Research Pvt. Ltd.
CETP Koparkharine
Location
As
Ni

6. Water Environment

For studying the water environment of Navi Mumbai area, surface water was collected from Nallah, Lake and River. To understand the quality of treated effluent, samples were collected from following six industries - (i) Airoli Creek Taloja (ii) Vashi Creek (ii) CETP Outlet (iii) Siemens Nallah (iv) CBD Nallah (v) CETP Taloja Bridge (vi) Lek Village Ghot. The following points are observed through the analysis of water samples:

- All six water samples collected are found acceptable in general appearance, colour, smell and transparency.
- General parameters like suspended solids, oil and Grease are observed well within the limits in all the samples.
- pH is observed in the range of 5.60 to 8.01
- BOD concentration was found to exceed the standard limit in two of the samples.
- Fluoride concentration is also observed higher than the acceptable limit of 1mg/L in four of the ground water samples.
- In fish bioassay, 100% survival of fishes was achieved in 5 out of 6 water samples collected.
- All metals like Arsenic, Nickel, Copper, Iron, Hexavalent Chromium (Cr^{6+}) etc. were also 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 meet the criteria as prescribed by CPCB.
- Organo Chlorine Pesticides, Polynuclear aromatic hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB) are also observed below the limit of quantification in all the studied samples.

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.	Airoli Creek at Airoli Bridge	N19^{0}08'09.00"	E72^{0}59'59.03"	26.07.2024	28.07.2024	30.07.2024
2.	Vashi Creek at Vashi Bridge	N19^{0}03'83.20"	E72^{0}58'68.20"	26.07.2024	28.07.2024	30.07.2024
3.	Siemens Nallah	N19°09'3.11"	E73° 0'18.78"	26.07.2024	28.07.2024	30.07.2024
4.	CBD Nallah	N19° 0'28.72"	E73° 1'29.24"	26.07.2024	28.07.2024	30.07.2024
5.	Kasardi River Near CETP Taloja Bridge	N19^{o}05321593°	E73^{o}11432839°	26.07.2024	28.07.2024	30.07.2024

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
6.	Lek Village Ghot	N19º0872947°	E73º1030953°	26.07.2024	28.07.2024	30.07.2024

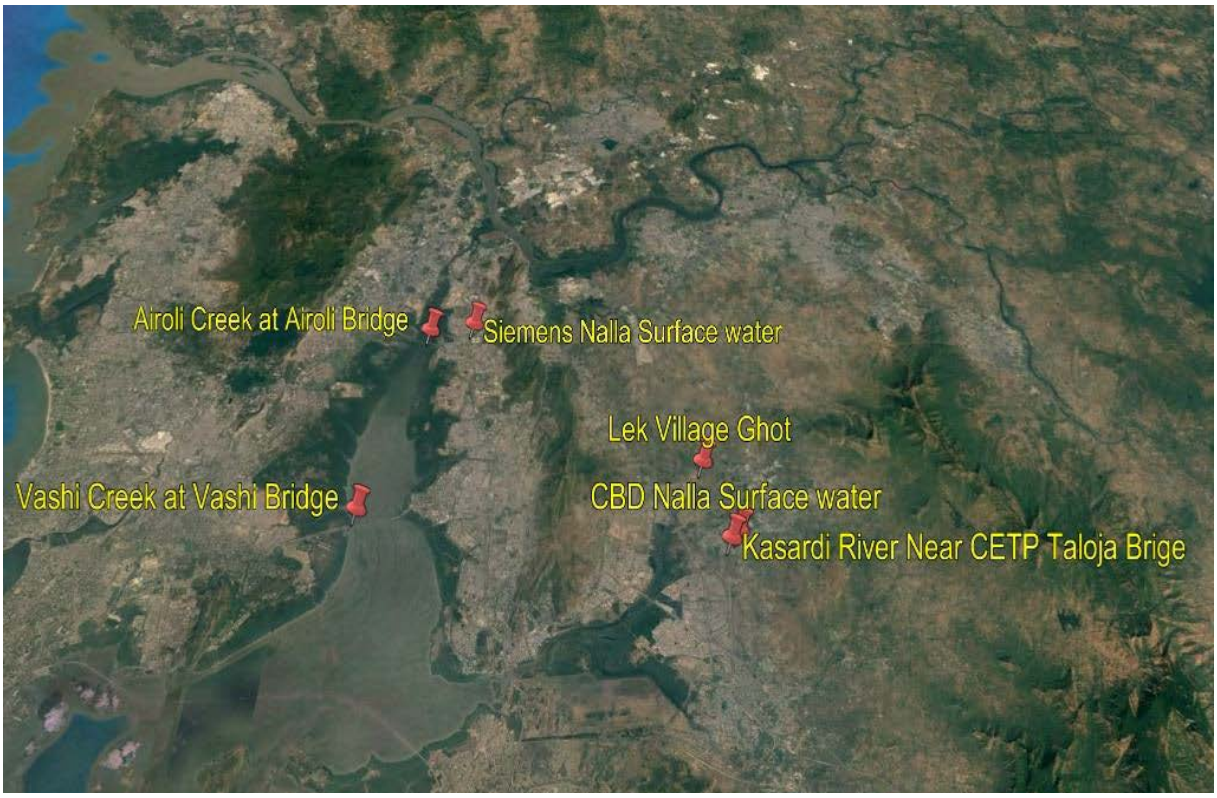


Fig: Geographical Locations of Surface Water Sampling

Table 6.2 Results of Surface Water

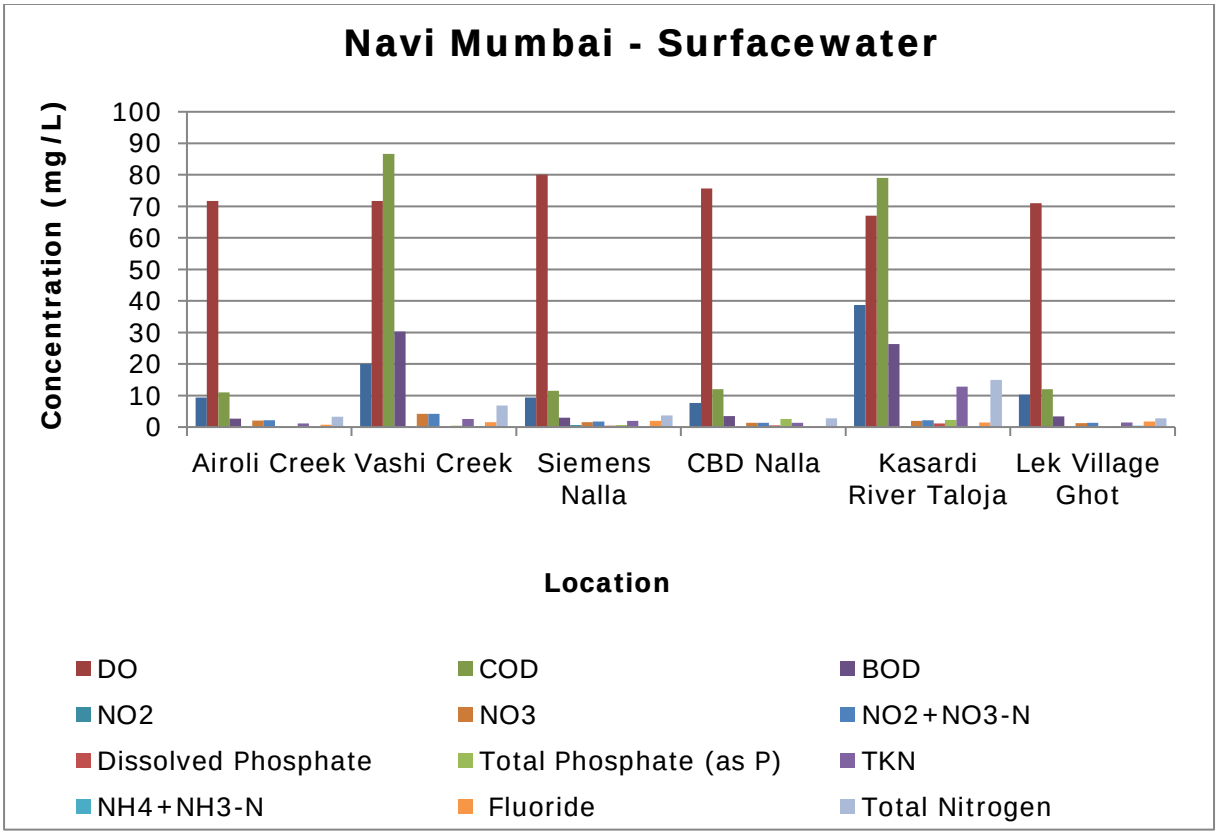
Parameters	Unit	Results					
		Airoli Creek at Airoli Bridge	Vashi Creek at Vashi Bridge	Siemens Nallah	CBD Nallah	Kasardi River Near CETP Taloja Bridge	Lek Village Ghot
Sanitary Survey	-	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	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	0.40	0.50	0.50	0.4	0.5	0.43
Temperature	ºC	29	29	29	30	29	28
Colour	Hazen	1	2	1	1	2	1

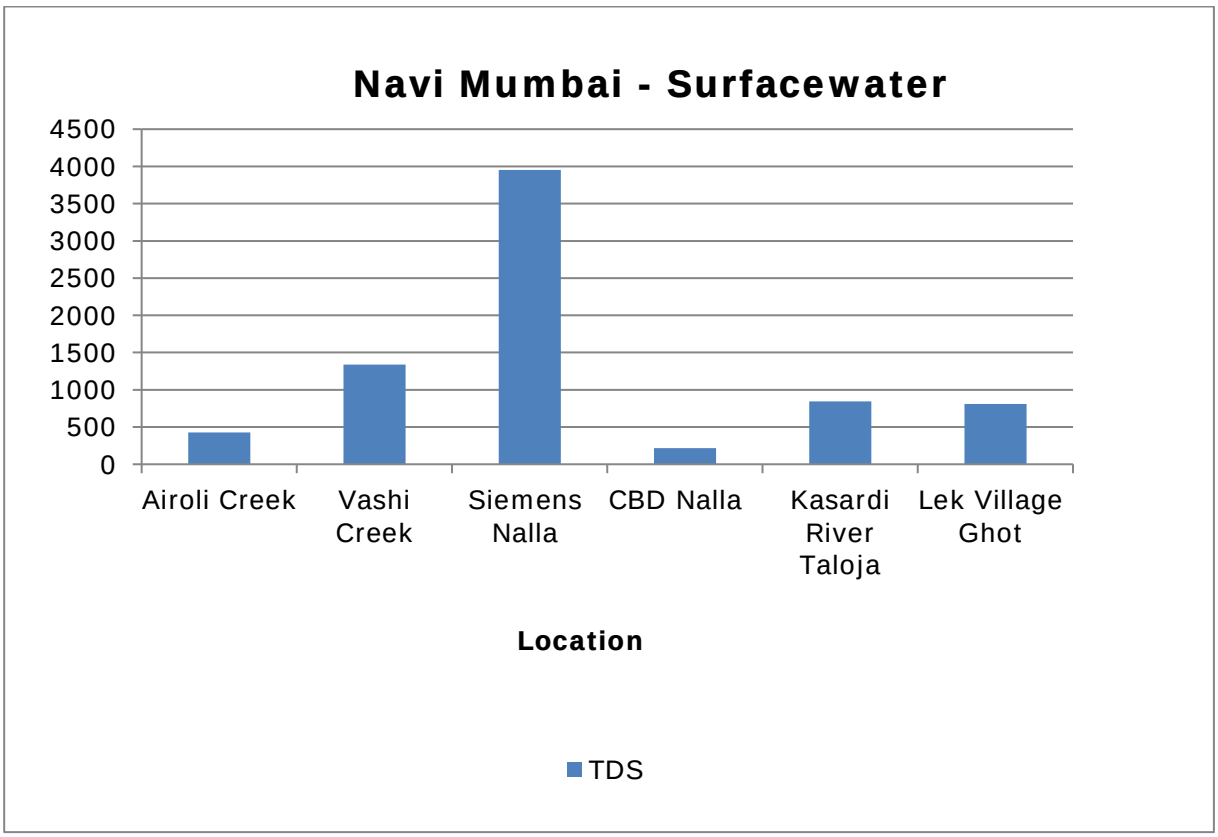
Parameters	Unit	Results					
		Airoli Creek at Airoli Bridge	Vashi Creek at Vashi Bridge	Siemens Nallah	CBD Nallah	Kasardi River Near CETP Taloja Bridge	Lek Village Ghot
Smell	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH	-	7.37	7.32	7.49	7.08	5.60	8.01
Oil & Grease	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Suspended Solids	mg/L	9.33	20.00	9.33	7.67	38.67	10.33
Total Dissolved Solids	mg/L	428	1339	3954	215	844	809
Dissolved Oxygen (% Saturation)	%	71.67	71.67	80.00	75.67	67.00	71.00
Chemical Oxygen Demand	mg/L	11	87	12	12	79	12
Biochemical Oxygen Demand (3 days,27^{o}C)	mg/L	3	30	3	4	26	3
Electrical Conductivity (at 25 ^{o}C)	µmho/cm	764	2277	6842	384	1508	1445
Nitrite Nitrogen (as NO_2)	mg/L	0.10	0.06	0.60	0.09	0.21	0.07
Nitrate Nitrogen (as NO_3)	mg/L	2.07	4.19	1.55	1.32	2.01	1.28
(NO_2 + NO_3)-Nitrogen	mg/L	2.17	4.21	1.75	1.38	2.15	1.35
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	0.70	1.53	1.97	0.37	1.47	1.77
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.16	0.20	0.39	0.50	1.10	BLQ
Sodium Adsorption Ratio	-	1.73	1.34	1.35	1.30	1.47	1.63

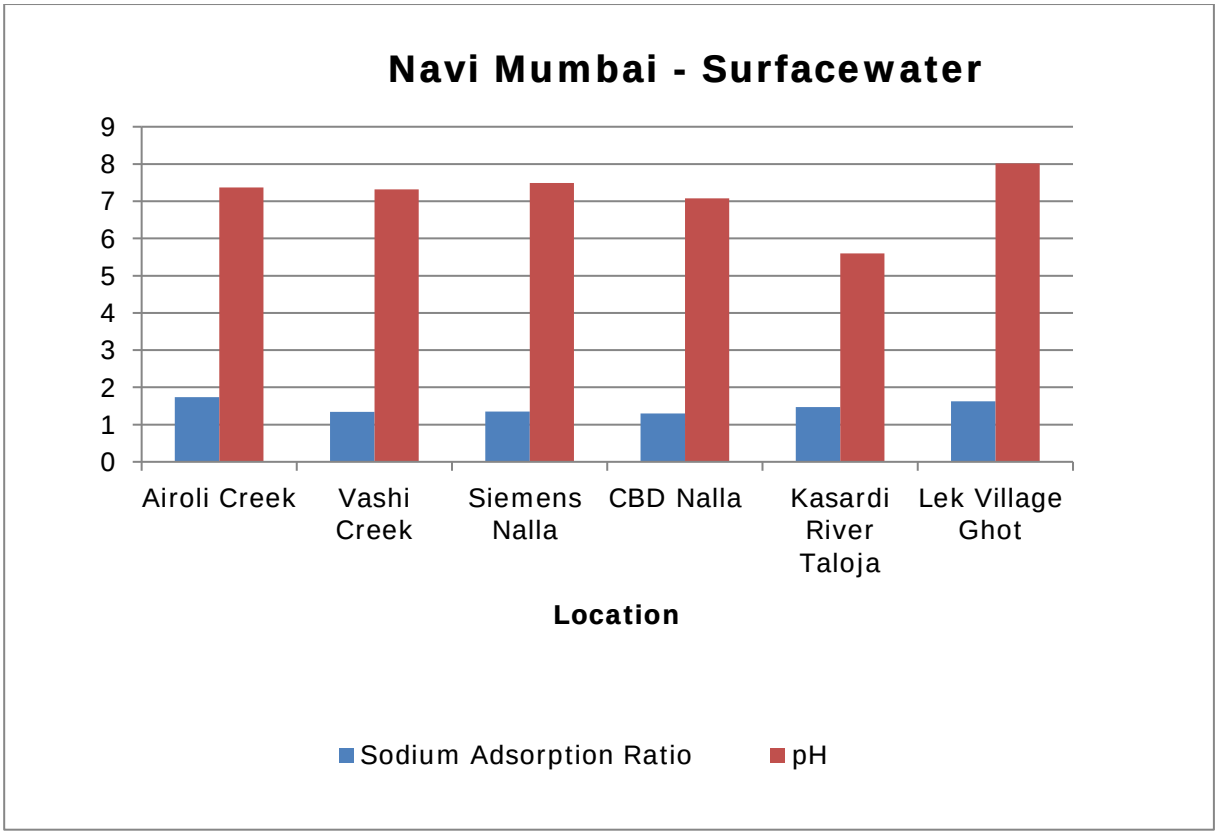
Parameters	Unit	Results					
		Airoli Creek at Airoli Bridge	Vashi Creek at Vashi Bridge	Siemens Nallah	CBD Nallah	Kasardi River Near CETP Taloja Bridge	Lek Village Ghot
Total Coliforms	MPN Index/ 100 ml	7	1073	573	1069	920	31
Faecal Coliforms	MPN Index/ 100 ml	3	33	67	1260	13	13
Total Phosphate (as P)	mg/L	0.20	0.40	0.60	2.60	2.27	0.20
Total Kjeldahl Nitrogen (as N)	mg/L	1.12	2.61	1.94	1.34	12.85	1.42
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.14	0.34	0.15	0.20	0.26	0.46
Total Nitrogen	mg	3.29	6.82	3.69	2.72	14.99	2.77
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	0.13	0.09	0.07	0.06	0.30	0.06
Nickel (as Ni)	mg/L	0.01	BLQ	BLQ	BLQ	0.05	0.08
Copper (as Cu)	mg/L	0.03	BLQ	BLQ	BLQ	6.43	0.02
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	BLQ	BLQ	BLQ	0.02	0.04
Total Arsenic (as As)	mg/L	0.02	BLQ	0.04	BLQ	0.01	0.01

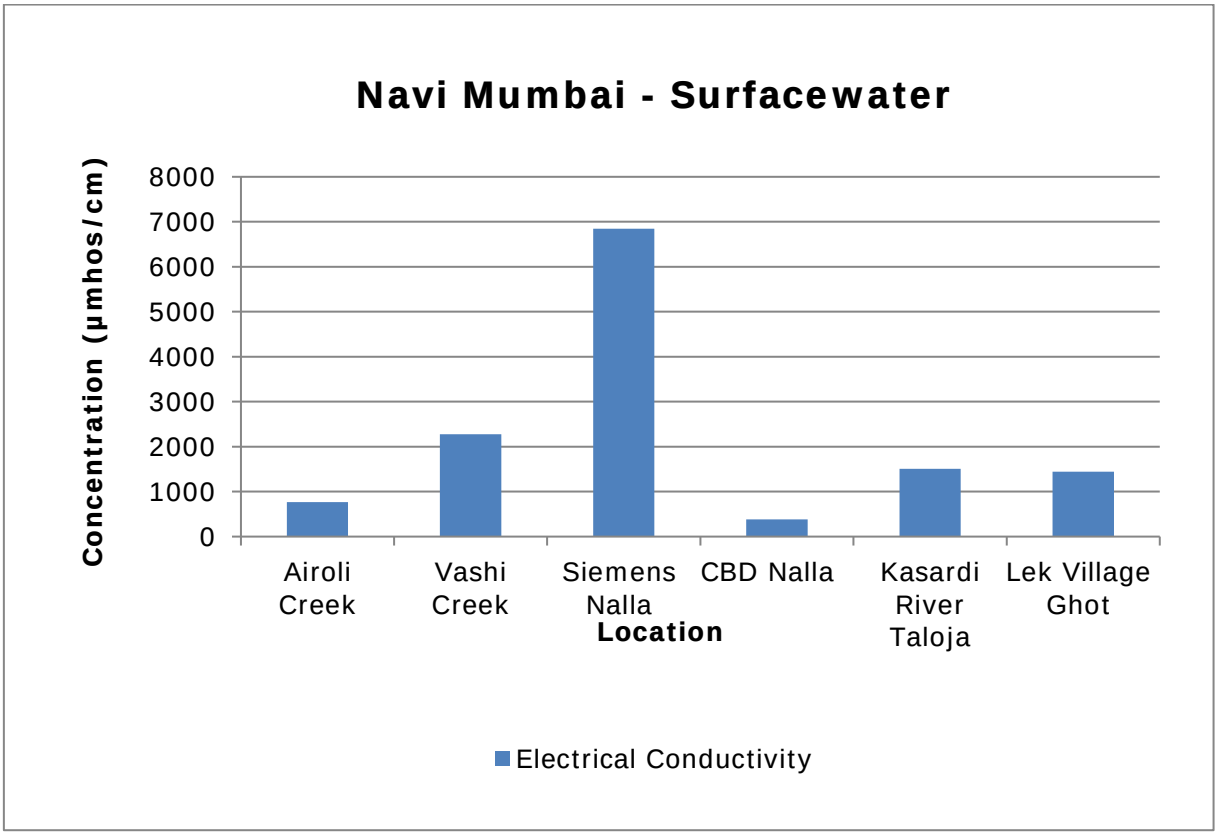
Parameters	Unit	Results					
		Airoli Creek at Airoli Bridge	Vashi Creek at Vashi Bridge	Siemens Nallah	CBD Nallah	Kasardi River Near CETP Taloja Bridge	Lek Village Ghot
Lead (as Pb)	mg/L	0.01	BLQ	0.01	BLQ	0.02	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ	BLQ	0.01	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	0.34	0.12	0.11	0.10	0.38	0.21
Iron (as Fe)	mg/L	1.09	0.32	0.19	0.31	1.86	0.20
Vanadium (as V)	mg/L	BLQ	BLQ	BLQ	BLQ	0.02	0.01
Selenium (as Se)	mg/L	0.13	BLQ	0.02	BLQ	BLQ	0.01
Boron (as B)	mg/L	0.44	0.25	0.19	0.24	0.22	0.20
Bioassay Test on fish	% survival	100	80	93	100	35	100

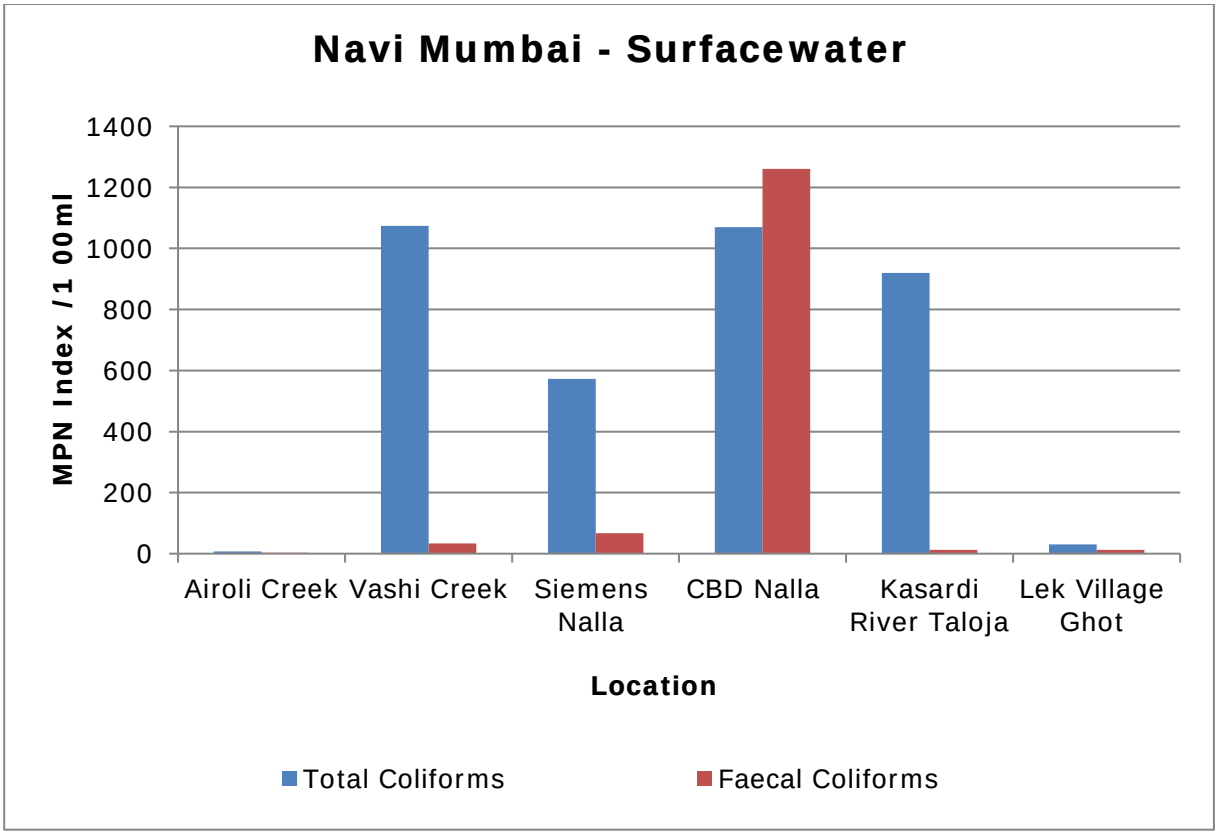
Graphs - Surface Water Quality of Navi Mumbai

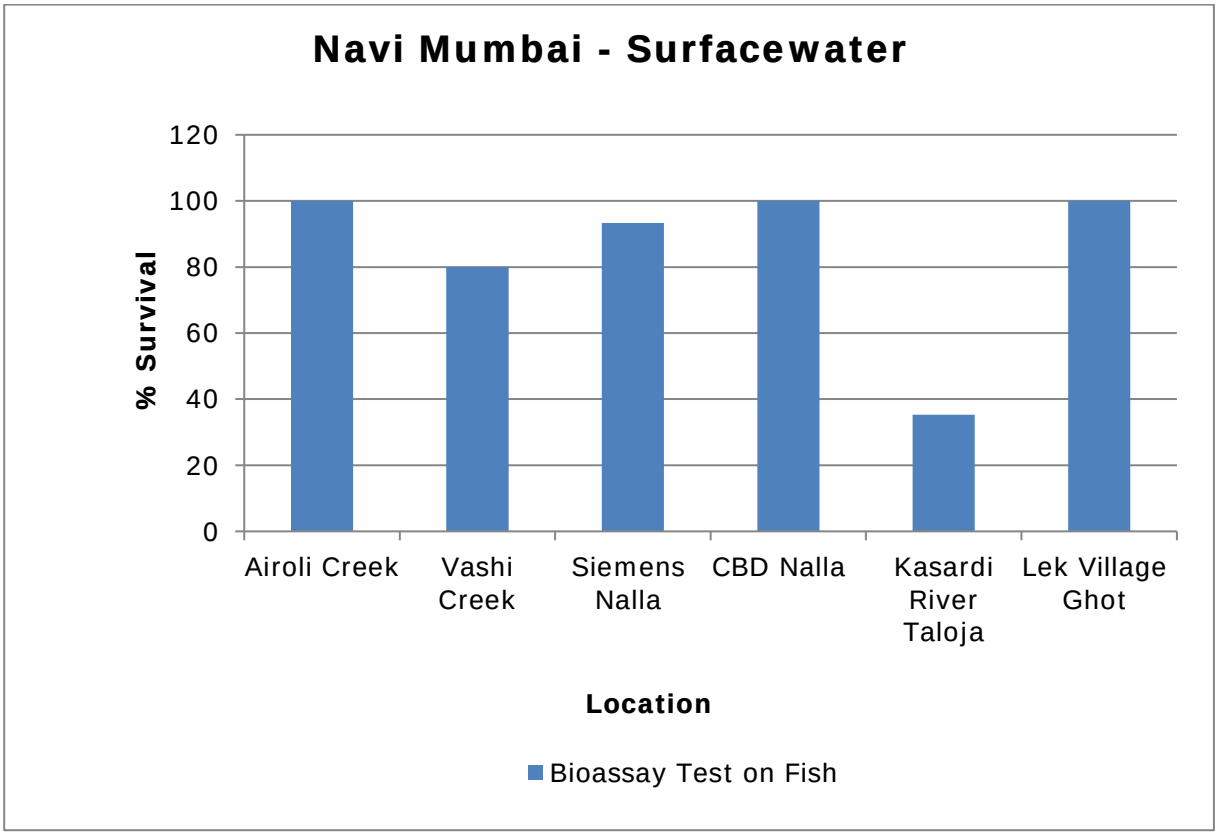





Navi Mumbai - Surfacewater
9
8
7
6
5
4
3
2
1
0
Airoli Creek
Vashi Creek
Siemens Nalla
CBD Nalla
Kasardi River Taloja
Lek Village Ghot
Location
Sodium Adsorption Ratio
pH


Navi Mumbai - Surfacewater
Concentration (µmhos/cm)
8000
7000
6000
5000
4000
3000
2000
1000
0
Airoli Creek
Vashi Creek
Siemens Nalla
CBD Nalla
Kasardi River Taloja
Lek Village Ghot
Location
Electrical Conductivity


Navi Mumbai - Surfacewater
MPN Index /1 00ml
1400
1200
1000
800
600
400
200
0
Airoli Creek
Vashi Creek
Siemens Nalla
CBD Nalla
Kasardi River Taloja
Lek Village Ghot
Location
Total Coliforms
Faecal Coliforms


Navi Mumbai - Surfacewater
% Survival
120
100
80
60
40
20
0
Airoli Creek
Vashi Creek
Siemens Nalla
CBD Nalla
Kasardi River Taloja
Lek Village Ghot
Location
Bioassay Test on Fish

7. Land Environment

For studying the land Environment of Navi Mumbai area, ground water was collected from Bore well. Dug well, and Hand Pump. A total of 6 samples were collected from i) Dugwell at Turbhe Gaon (ii) MSW Dumping Ground (iii) MSW TTC Area (iv) TTC WMA (v) TTC Plot no. 142 MIDC (vi) Mumbai Waste Management Ltd. (MWML) site.

Six ground water samples were collected from MIDC Navi Mumbai region.

- All the water samples collected are found acceptable in general appearance, colour, smell and transparency.
- General parameters like suspended solids, TDS, electrical conductivity, BOD, and COD are also observed well within the limits in all the collected samples.
- pH is found in the range of 7.32 to 8.32.
- In Fish Bioassay, out of 6 water samples 5 samples achieved 100% fish survival.
- All metals like Arsenic, Nickel, Copper, Iron, Hexavalent Chromium (Cr^{6+}), etc. were also observed either below the limit quantification 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.
- Organo Chlorine Pesticides, Polynuclear aromatic hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB) were below the limit quantification in all studied samples.

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.	Dug Well at Turbhe Gaon	N19°04'16.3"	E 73°0'34.09"	26.07.2024	28.07.2024	30.07.2024
2.	Navi Mumbai MSW Dumping Ground Borewell Water Turbhe	N19^{0}04'42.97"	E73^{0}01'36.71"	26.07.2024	28.07.2024	30.07.2024
3.	MSW, TTC Area Borewell	N19^{0}04'40.94"	E73^{0}08'15.11"	26.07.2024	28.07.2024	30.07.2024
4.	TTC WMA Site Borewell	N19^{0}06'31.05"	E73^{0}01'49.67"	26.07.2024	28.07.2024	30.07.2024
5.	TTC Plot no. 142 Borewell	N19^{0}05'46.58"	E73^{0}01'27.10"	26.07.2024	28.07.2024	30.07.2024

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
	Mumbai Waste Management limited Borewell MIDC Taloja	N19^{0}05'48.65"	E73^{0}06'56.0"	26.07.2024	28.07.2024	30.07.2024

Fig: Geographical Locations of Groundwater Sampling in Navi Mumbai

Table 7.2 Results of Ground Water

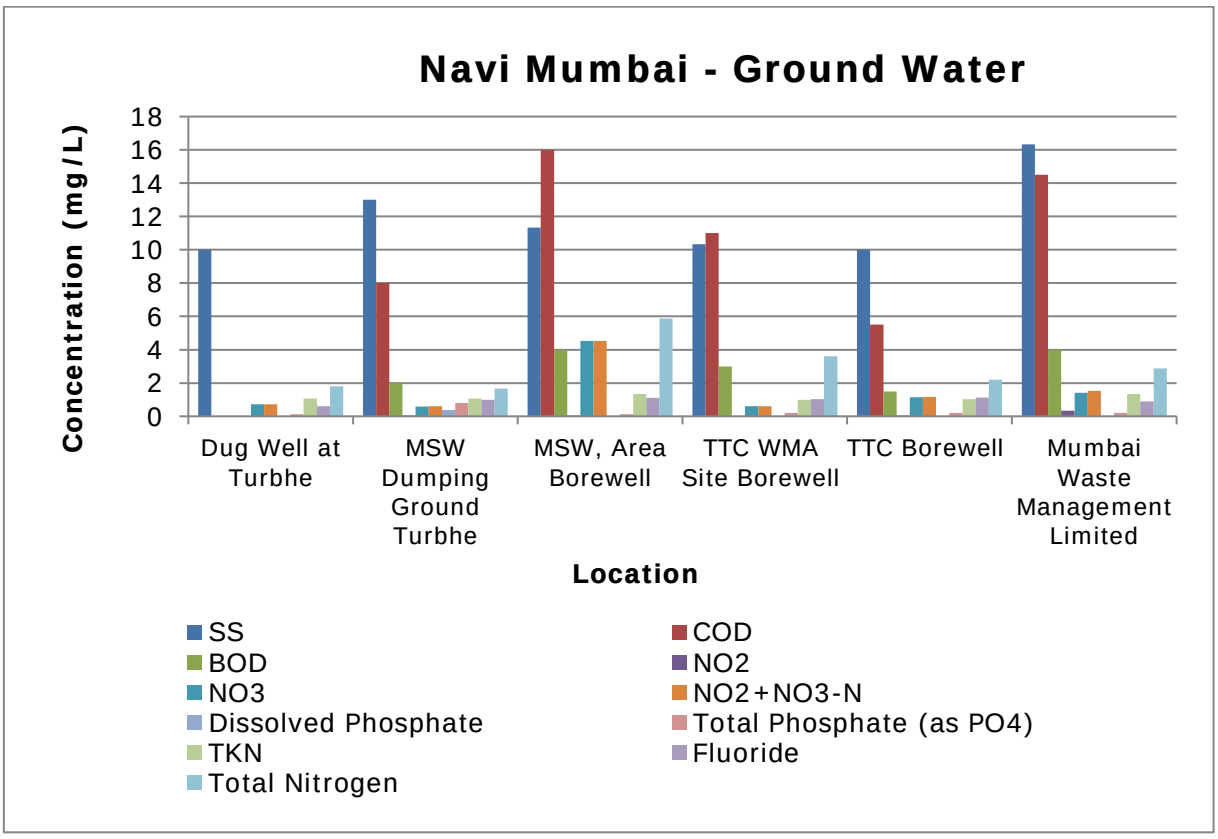
Parameters	Unit	Results					
		Dug Well at Turbhe Gaon, Navi Mumbai	Navi Mumbai MSW Dumping Ground Borewell Water Turbhe Navi Mumbai	MSW, Area Borewell Navi Mumbai	TTC WMA Site Borewell	TTC Plot no. 142 Borewell	Mumbai Waste Management Limited Plot No. P-32 and P-32 Part MIDC, Taloja
Sanitary Survey	-	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood

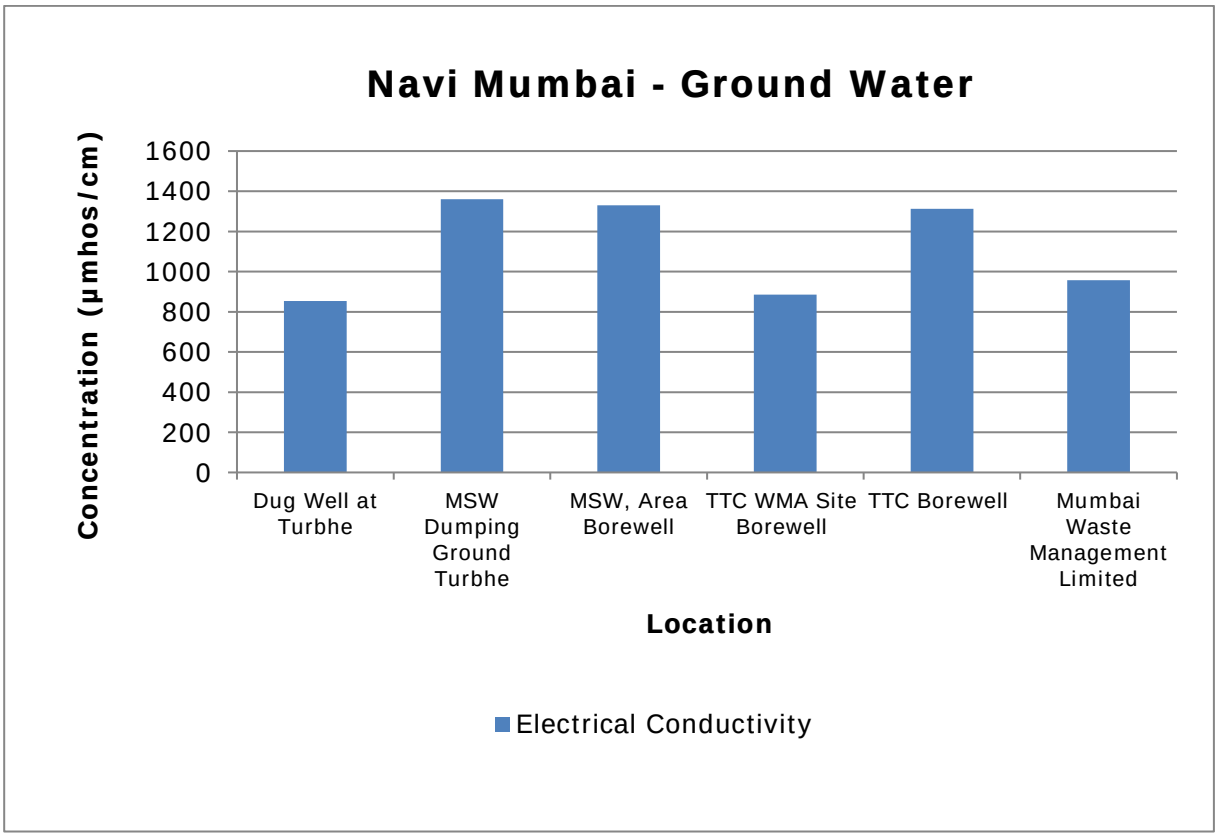
Parameters	Unit	Results					
		Dug Well at Turbhe Gaon, Navi Mumbai	Navi Mumbai MSW Dumping Ground Borewell Water Turbhe Navi Mumbai	MSW, Area Borewell Navi Mumbai	TTC WMA Site Borewell	TTC Plot no. 142 Borewell	Mumbai Waste Management Limited Plot No. P-32 and P-32 Part MIDC, Taloja
General Appearance	-	No Floating matter	No Floating matter	No Floating matter	No Floating matter	No Floating matter	No Floating matter
Transparency	m	0.30	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Temperature	^{o}C	27	29	28	29	28	29
Colour	Hazen	1	1	1	1	1	2
Smell	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH	-	8.32	7.32	7.68	8.23	7.91	7.91
Oil & Grease	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Suspended Solids	mg/L	10.00	13.00	11.33	10.33	10.00	16.33
Total Dissolved Solids	mg/L	479	762	745	497	735	537
Chemical Oxygen Demand	mg/L	BLQ	8	16	11	6	15
Biochemical Oxygen Demand (3 days,27^{o}C)	mg/L	BLQ	2	4	3	2	4
Electrical Conductivity (at 25 ^{o}C)	µmho/cm	854	1360	1331	886	1312	958
Nitrite Nitrogen (as NO_2)	mg/L	BLQ	0.04	0.04	BLQ	0.05	0.33
Nitrate Nitrogen (as NO_3)	mg/L	0.71	0.59	4.53	0.6	1.15	1.42
(NO_2 + NO_3)-Nitrogen	mg/L	0.71	0.60	4.53	0.6	1.16	1.53
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	0.60	1.00	1.10	1.03	1.13	0.90

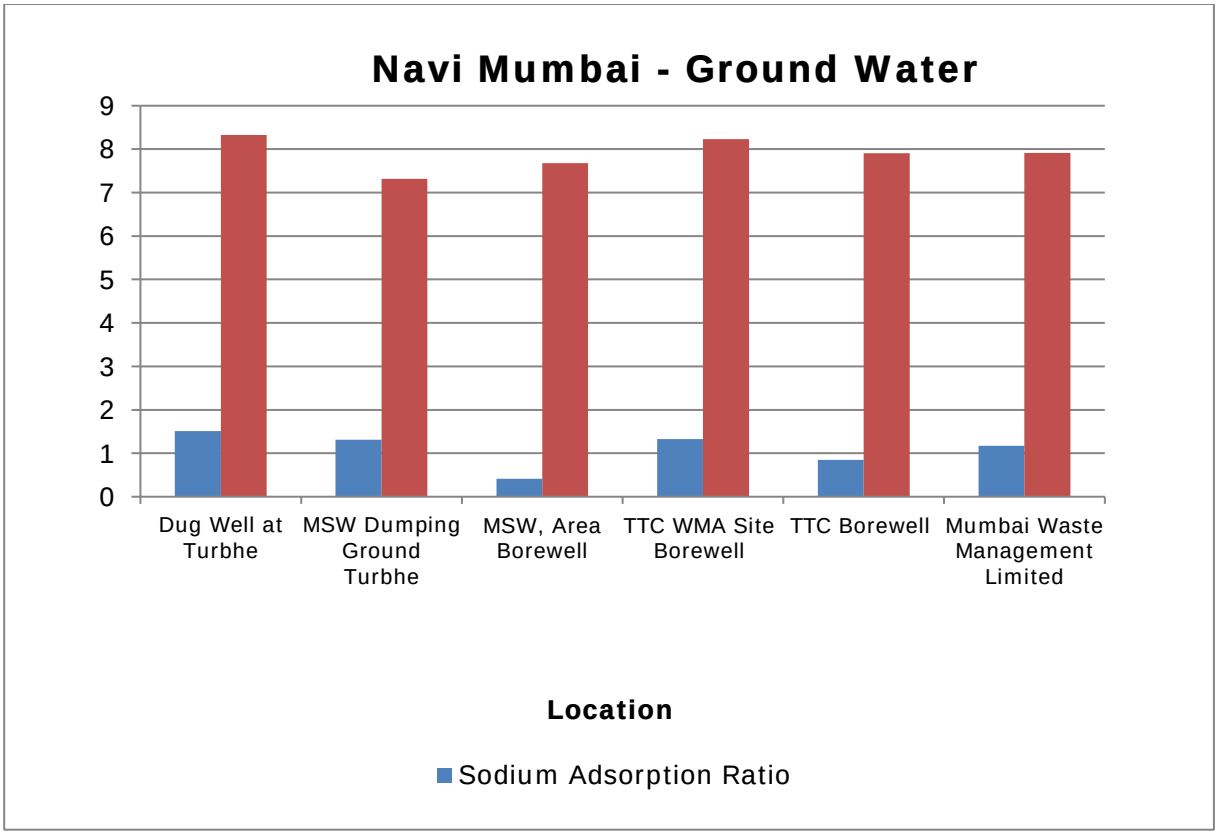
Parameters	Unit	Results					
		Dug Well at Turbhe Gaon, Navi Mumbai	Navi Mumbai MSW Dumping Ground Borewell Water Turbhe Navi Mumbai	MSW, Area Borewell Navi Mumbai	TTC WMA Site Borewell	TTC Plot no. 142 Borewell	Mumbai Waste Management Limited Plot No. P-32 and P-32 Part MIDC, Taloja
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	BLQ	0.4	BLQ	BLQ	BLQ	BLQ
Sodium Adsorption Ratio	-	1.51	1.31	0.41	1.33	0.85	1.17
Total Coliforms	MPN Index/ 100 ml	5	46	8	8	33	13
Faecal Coliforms	MPN Index/ 100 ml	<1.8	23	8	5	8	2
Total Phosphate (as P)	mg/L	0.12	0.80	0.12	0.20	0.20	0.20
Total Kjeldahl Nitrogen (as N)	mg/L	1.07	1.07	1.34	1.00	1.03	1.34
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.15	0.28	0.29	0.14	0.22	0.28
Total Nitrogen	mg/L	1.80	1.67	5.88	3.60	2.19	2.87
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						
Polynuclear aromatic hydrocarbons (as PAH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ

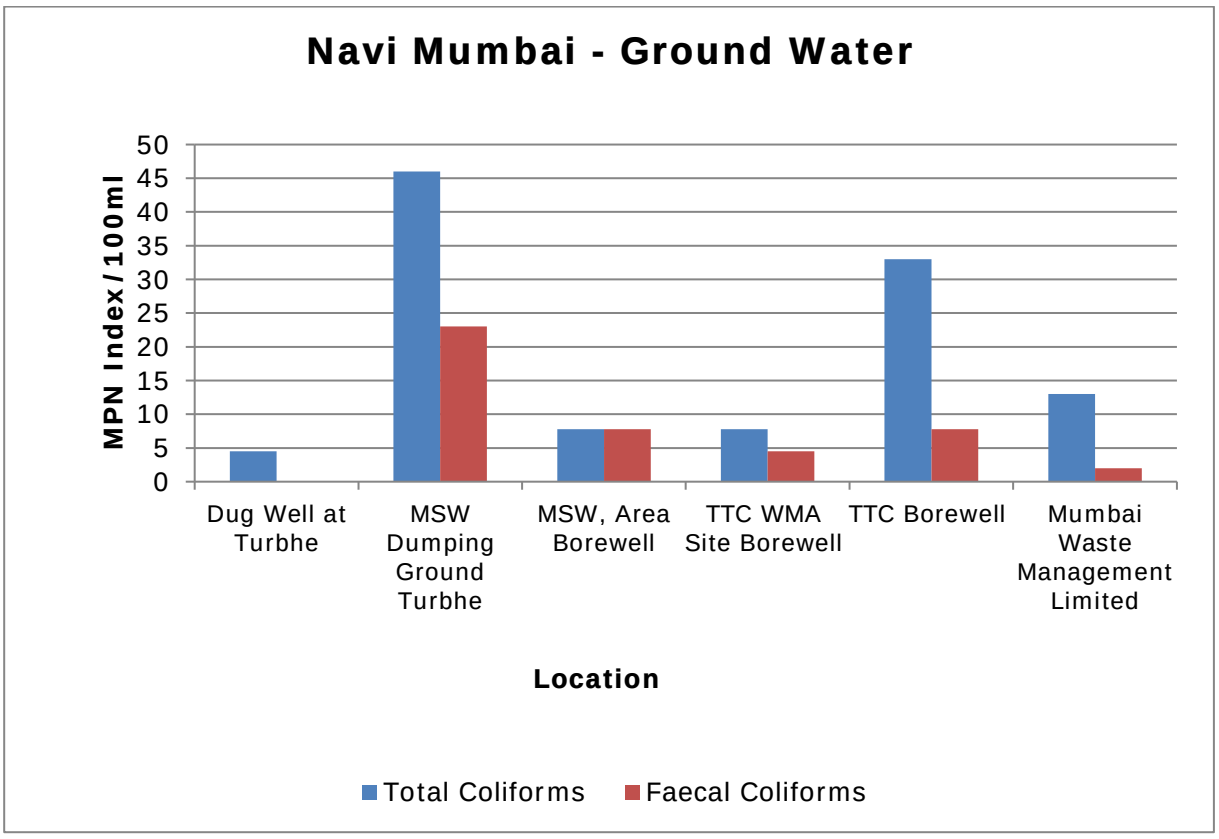
Parameters	Unit	Results					
		Dug Well at Turbhe Gaon, Navi Mumbai	Navi Mumbai MSW Dumping Ground Borewell Water Turbhe Navi Mumbai	MSW, Area Borewell Navi Mumbai	TTC WMA Site Borewell	TTC Plot no. 142 Borewell	Mumbai Waste Management Limited Plot No. P-32 and P-32 Part MIDC, Taloja
Zinc (as Zn)	mg/L	1.16	0.09	BLQ	0.69	BLQ	1.22
Nickel (as Ni)	mg/L	0.02	BLQ	0.07	0.01	BLQ	BLQ
Copper (as Cu)	mg/L	0.05	BLQ	0.03	0.03	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
Total Arsenic (as As)	mg/L	0.01	BLQ	BLQ	BLQ	0.01	0.01
Lead (as Pb)	mg/L	0.01	0.01	BLQ	BLQ	BLQ	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	0.10	0.28	0.55	0.13	0.34	0.16
Iron (as Fe)	mg/L	0.99	0.08	0.10	0.67	0.17	1.02
Vanadium (as V)	mg/L	BLQ	BLQ	0.01	BLQ	BLQ	BLQ
Selenium (as Se)	mg/L	BLQ	BLQ	BLQ	0.01	0.01	0.01
Boron (as B)	mg/L	0.21	0.22	0.22	0.20	0.17	1.10
Bioassay Test on fish	% survival	100	93	100	100	100	100

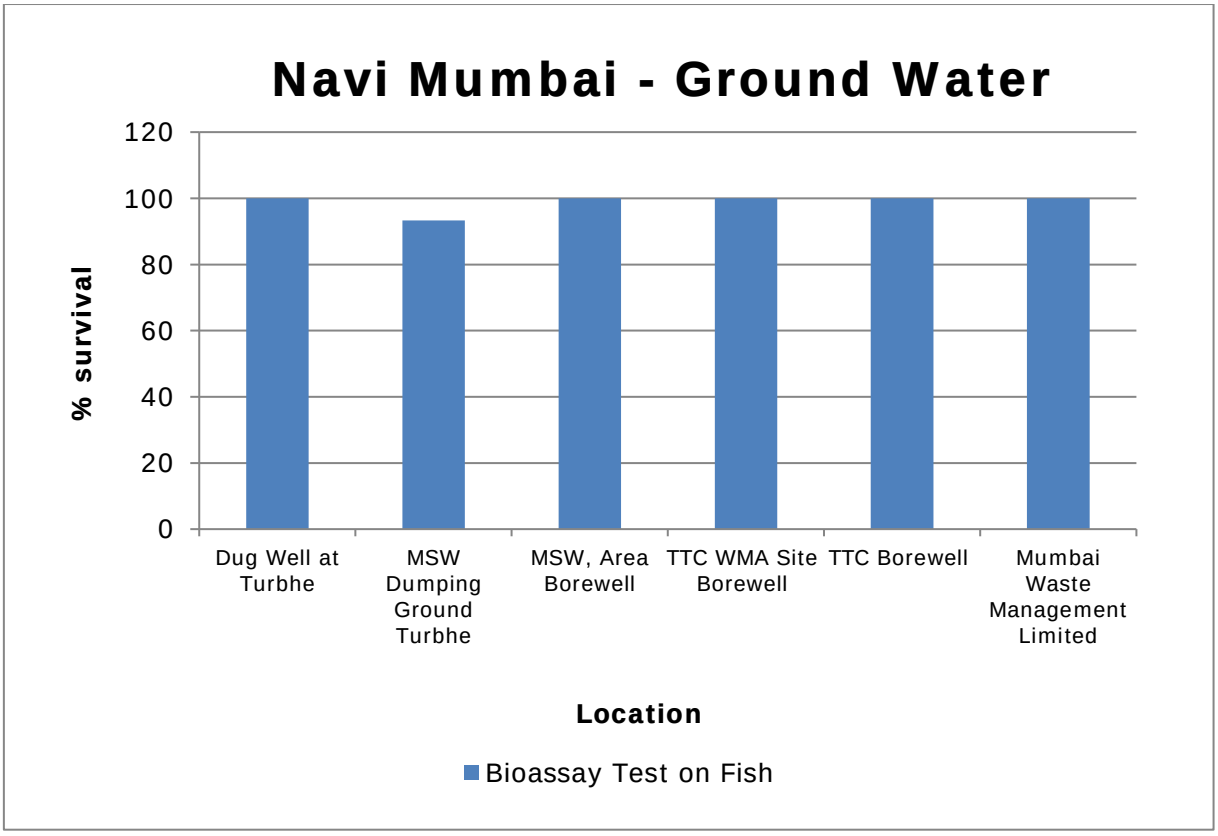
Graphs - Ground Water Quality of Navi Mumbai






Navi Mumbai - Ground Water
9
8
7
6
5
4
3
2
1
0
Dug Well at Turbhe
MSW Dumping Ground Turbhe
MSW, Area Borewell
TTC WMA Site Borewell
TTC Borewell
Mumbai Waste Management Limited
Location
Sodium Adsorption Ratio


Navi Mumbai - Ground Water
MPN Index/100ml
50
45
40
35
30
25
20
15
10
5
0
Dug Well at Turbhe
MSW Dumping Ground Turbhe
MSW, Area Borewell
TTC WMA Site Borewell
TTC Borewell
Mumbai Waste Management Limited
Location
Total Coliforms
Faecal Coliforms


Navi Mumbai - Ground Water
120
100
80
60
40
20
0
% survival
Dug Well at Turbhe
MSW Dumping Ground Turbhe
MSW, Area Borewell
TTC WMA Site Borewell
TTC Borewell
Mumbai Waste Management Limited
Location
Bioassay Test on Fish

C: Receptor

Component C (Impact on Human Health) 10	
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	3	4	12	0	0	0	**12.00**
Water Index	2.5	4	10	34.25	10	0	**54.25**
Land Index	2.5	4	10	7.5	10	0	**27.50**
						Aggregated CEPI	**55.80**

Table 8.2 Comparison of CEPI Scores

Year	Air Index	Water Index	Land Index	CEPI
CEPI score June 2024	12.00	54.25	27.5	**55.80**
CEPI score March 2023	28.00	50.00	29.00	**54.10**
CEPI score June 2023	36.00	49.30	16.00	**52.20**
CEPI score March 2023	36.00	50.75	16.00	**53.59**
CEPI Score June 2021	35.00	48.25	39.25	**55.36**
CEPI Score March 2021	42.75	43.75	36.00	**52.40**
CEPI score March 2020	50.80	17.80	25.30	**53.00**
CEPI score June 2019	46.25	30.00	25.50	**50.36**
CEPI score March 2019	40.0	32.5	22.5	**44.39**
CEPI score June 2018	40.0	22.0	13.5	**41.78**

Year	Air Index	Water Index	Land Index	CEPI
CEPI score March 2018	48.0	53.75	56.25	**67.54**
CPCB CEPI score March 2018	56.00	63.00	16.00	**66.32**

CEPI Score Calculations:

Navi Mumbai, Maharashtra - CEPI - JUNE 2024

Ambient Air Analysis Report

Pollutant	Group	A1	A2	A (A1 X A2)
CO	B	2	Large	
PM_{10}	B	0.5		
$PM_{2.5}$	B	0.5		
		3	**4**	**12**

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)	
CO	1.5	2	0.73	0	8	0.00	L	0
PM_{10}	48.3	100	0.48	0	8	0.00	L	0
$PM_{2.5}$	13.3	60	0.22	0	8	0.00	L	0
B score = (B1+B2+B3)							**B**	**0**

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

Air CEPI	**(A+B+C+D)**	**12.0**

Water Quality Analysis Report

Pollutant	Group	A1	A2	A (A1 X A2)
TP	B	2	Large	
TKN	A	0.25		
TN	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)	
TP	1.05	0.3	3.50	4	6	2.33	C	30
TKN	5.71	3	1.90	1	6	0.32	M	4.25
TN	5.71	15	0.38	0	6	0.00	L	0
B score = (B1+B2+B3)							**B**	**34.25**

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

Water CEPI	**(A+B+C+D)**	**54.3**

Ground Water Quality Analysis Report

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

Pollutant	Avg (1)	Std (2)	EF (3) [(3)=(1)/(2)]	No. of samples Exceeding (4)	Total no. of samples (5)	SNLF Value (6) [(6)=(4)/(5)x(3)]	SNLF score (B)	
Se	0.01	0.01	1.00	0	6	0.00	L	7.5
F	0.96	1.5	0.64	0	6	0.00	L	0
TDS	625.89	2000	0.31	0	6	0.00	L	0
B score = (B1+B2+B3)							**B**	**7.5**

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

Land CEPI	**(A+B+C+D)**	**27.5**

Water CEPI Score (im)	**54.3**
Land CEPI Score (i2)	**27.5**
Air Score (i3)	**12.00**
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 **55.8**

10. Conclusion

Ambient Air Quality

- In the present study, 08 AAQ stations were identified in the CEPI impact area to cover both upwind and cross wind directions and AAQ survey was conducted.
- All air quality parameters are observed well within the limits as per NAAQS, 2009.
- Concentration of PM10 is observed in the range of 38.00µg/m^3 to 62.0 µg/m^3 and PM2.5 in the range of 11.00 to 16.00 µg/m^3 at the studied locations.
- In the CEPI score calculated for Air Environment by CPCB in March 2018, the concentration of PM_{10} has exceeded at all the studied locations and which contributed to higher air index (56.00). However, in the present report, concentration of both PM10 and PM2.5 are found below permissible levels resulted in less exceedance factor, hence lower air index (12.00).

Surface Water Quality

- To understand the quality of treated effluent, samples were collected from six industries
- Higher concentration of BOD and Total phosphates was observed in two of the surface water samples collected which may be due to domestic wastewater, sewage, other localized activities.
- All the industries in Navi Mumbai region are either reusing the treated trade effluent as sewage in their process or gardening.
- In the CEPI score calculated for Water Environment by CPCB in March 2018, concentration values of total phosphorous were higher and exceeded at all the studied locations as observed in the present study also.

Ground Water Quality

- Six ground water samples were collected from different Dug well, well and Borewell in the region.
- Ground water of the studied regions was found to be safe for drinking with a very low concentration of fluoride, TDS, iron, chromium and other general as well as carcinogenic parameters.
- In the CEPI score calculated for Land Environment by CPCB in March 2018 also there is no critical pollutant exceeding in any water sample collected.

CEPI Score

- The CEPI Score pre-monsoon season is 55.8.
- During calculation of CEPI score, water Index is calculated highest with 54.25, followed by the Land Index 27.5 and Air index as 12. The parameters of surface water and ground water in Navi

Mumbai region is well within the limits. Hence, aggregated CEPI score is calculated as 55.8, which is lower than the CPCB CEPI score 2018 i.e. 66.32.

- In CEPI score of CPCB 2018, the air index and water Index was higher as compared to the present (pre-monsoon 2024) indices.
- As per the CPCB CEPI calculation revised in 2016, Health statistics represented by Receptor C in CEPI Calculation, also plays an important role.
- For analysing the health data collected from hospitals, more than 10% increase in water borne disease cases is observed in the consecutive years of 2020-2021 and 2021-2022. Hence score for receptor C is considered as 10 for ground as well as surface water environments.
- Collective efforts of regional office of MPCB, NMMC, administration and environmental organizations are resulting in significant reduction in pollution level.
- Efforts taken to reduce the pollution level is represents factor D in CEPI Calculation, which also affects the overall CEPI score.
- 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 16% decrease in CEPI score is observed from 66.32 in 2018 to 55.8 in June 2024.

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

- Drive against open burning of biomass, crop residue, garbage, leaves, etc.
- Organic Waste Compost Machines Malls, Infrastructure projects, Large scale hospitals & Hotels has installed OWC.
- Waste collection and segregation centres: Provided by NMMC at all wards.
- Construction of Common Effluent Treatment Plant (CETP): 1 CETP of 27 MLD capacity is already operational and complied.
- Installation of CEMS installed for Air and Water in Large and Medium scale RED category industries: 63 Nos. of unit has installed CEMS & connected to CETP server.
- Arrangement of scientific collection and treatment of sewage generated: 04 Nos of STP having total capacity as 256.5 MLD with adequate capacity of collection sumps are provided by NMMC.
- Installation of CAAQMS station: Total 4 Nos. (1 old + 3 new) of CAAQMS stations are operational.
- Number of Monitoring stations under National Water Quality Monitoring Programme (NWMP): 1 (Vashi Creek at Vashi Bridge).
- Steps are taken for industrial area/other units to recycle 100% treated effluent to achieve Zero Liquid Discharge (ZLD): 11 Nos of Industries has adapted ZLD.
- Steps are taken to reduce dust emission: Concretization of Roads and twice daily sweeping of Roads by NMMC authority. Presently NMMC has proccured2 Nos. of fogging machines. NMMC is already having 6 Nos. of mechanical sweeping machines.
- Around 1 lakh trees are planted in last one year.
- To reduce air pollution, Navi Mumbai Municipal Corporation has purchased 210 Electrical buses and 120 CNG Buses
- The average monthly Air Quality Index (AQI) of last six months from January 2024 to June 2024 is reported in the range of 55-156 in the industrial area of Taloja, which indicates satisfactory to moderate level of air pollution in that area.
- The average monthly Air Quality Index (AQI) of last six months from January 2024 to June 2024 is reported in the range of 64-126 in the Belapur region, 68-186 in Koprigaon Vashi, 58-142 in Sanpada, 65-144 in Mahape and 56-165 in Nerul, Navi Mumbai, which indicates satisfactory to moderate level of air pollution in that area.
- Moreover, it is proposed to install air purifiers at 20 locations in Navi Mumbai area.
- It is also proposed to install 08 Dust Suppression systems in Navi Mumbai area.
- Navi Mumbai Municipal Corporation has introduced last mile connectivity concept through introducing e-Bicycles via M/s YULU Bikes Pvt. through Navi Mumbai. A total of 616 cycles/e-

bikes have been provided for the citizens at 96 stands. A total of 3.77 km of Cycle tracks have been created in various places in the Navi Mumbai Municipal Corporation area.

- Navi Mumbai Municipal Corporation has developed 120 km Concrete roads and 500 km Asphalt roads in the city. Also concreting of 19 junctions has been completed. Daily cleaning of roads in the city area is done by 06 mechanical sweepers and 2646 manual sweepers.
- Domestic fuel burning has been controlled and PNG connection is being provided to maximum domestic and industrial customers through Mahanagar Gas Limited.
- With reference D.O.No.:CAP-2023/CR-170/TC-2, Dated 27/10/2023 by Hon. Principal Secretary, Environment & Climate Change Department (Government of Maharashtra), Guidelines for Air Pollution Mitigation have been circulated to Navi Mumbai Municipal Corporation. In this regard, Navi Mumbai to various Municipal Corporation has issued notices Construction Builders, RMC plants, Stone Quarries and other sensitive departments are potentially high air polluting sources. NMMC has issued 496 Intimation Notices, 18 Show Cause Notices and 17 Stop Work Notices till date.
- Water sprinkling system at internal and outer road.
- Construction material on open space covered with green net / Tarpulin.
- Road cleaning and sweeping.
- Vehicles carrying muck/Debris covered with tarpaulin.
- Barricades around the construction sites and its extension with
- Sensor based air monitoring for AQI.
- CCTV installation at sites for different activities.
- AQI by 3rd party vendor.
- Preparing Daily checklist for Dust mitigation control.

Dust Suppression Vehicles with Multi-Purpose Sprayer

NAVI-MUMBAI: 1,25,000+ saplings of 60+ different native species planted

NAVI-MUMBAI: PNG Crematorium

C&D Plant – 150 TPD

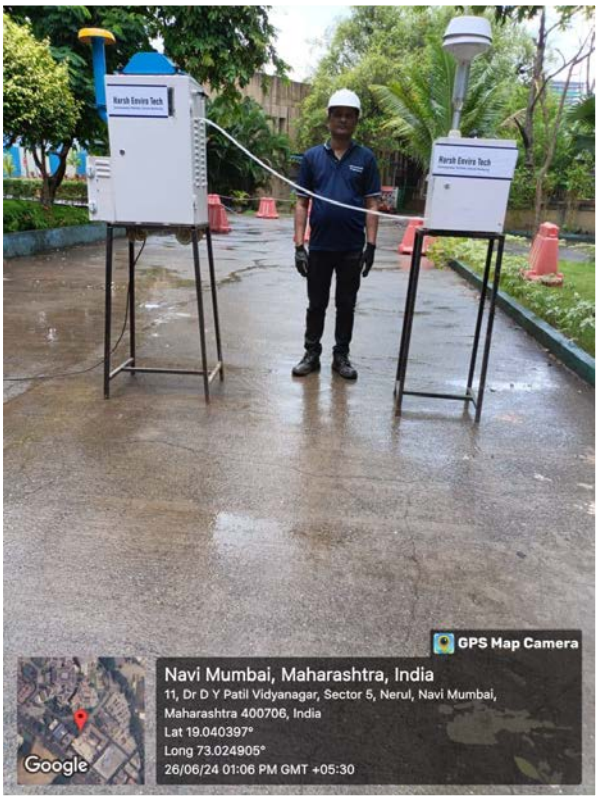
25 Street Shows, 25 stall setups, 104 society workshops & 160 Door to Door Awareness campaigns
 
Procurement of Electric Buses & EV Charging Stations

Ambient Air Quality Monitoring (AAQM) Van

Continuous Ambient Air Quality Monitoring Station (CAAQMS)

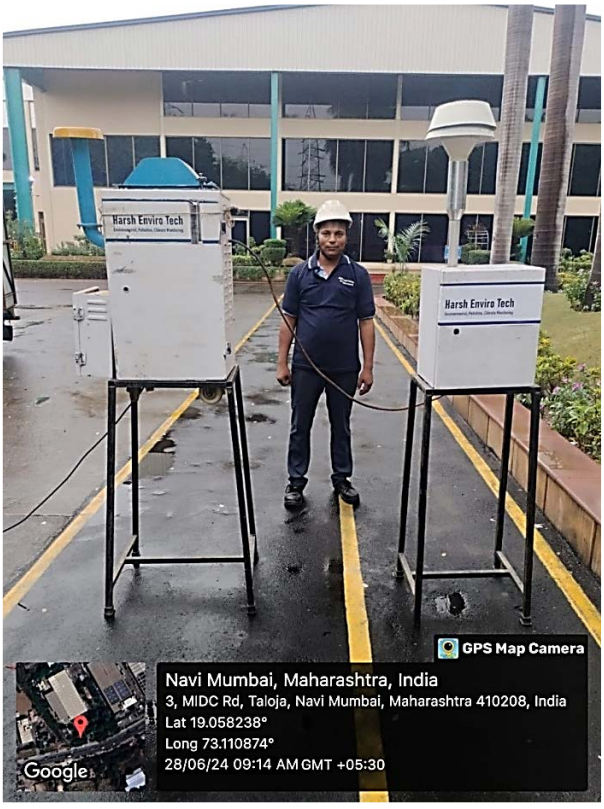
12. Photographs

Ambient Air Sampling at Ashi India Glass



Ambient Air Sampling at D Y Patil hospital

Ambient Air Quality Monitoring CETP Koparkharine



Ambient Air Sampling at Technova Imaging system

Groundwater Sampling – TTC WMA Site Borewell

Groundwater Sampling – Navi Mumbai MSW Dumping Ground Borewell Water Turbhe

Groundwater Sampling – TTC Plot no. 142 Borewell

Groundwater Sampling – Mumbai Waste Management Limited Plot

Surface Water Sampling – CBD Nalla

Surface Water Sampling – Vashi Creek

Surface Water Sampling – Airoli Creek

Surface Water Sampling – Kasardi River near CETP Taloja

HEALTH STATISTICS

Required for Comprehensive Environmental Pollution Index (CEPI) Pre-monsoon Season (April-2023-June2023) Study by Maharashtra Pollution Control Board (MPCB), MAHARASHTRA

Name of the Polluted Industrial Area (PIA)	NAVI MUMBAI
Name of the major health center/ organization	R N Hospital
Name and designation of the Contact person	Kajal mulla (Incharge sister)
Address	Plot no 1 & 1A, Sun palm view Bldg, sector-15, sanpada, Navi mumbai 400705

S No.	Diseases	No. of Patients Reported	
		Year 2022-2023	Year 2023-2024
AIRBORNE DISEASES			
1.	Asthma	4	2023 - 2
2.	Acute Respiratory Infection	5	2024 - 1
3.	Bronchitis	4	3
4.	Cancer	3	4
WATERBORNE DISEASES			
1.	Gastroenteritis	30	44
2.	Diarrhea	10	5
3.	Renal diseases	5	6
4.	Cancer	4	4

Date: 31/07/24

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)	NAVI MUMBAI
Name of the major health center/ organization	**Mahatma Gandhi Mission Hospital**
Name and designation of the Contact person	MR. SHYAM YEMPALLE ADMINISTRATOR
Address	PLOT No. 35, SECTOR-3, VASHI, NAVI MUMBAI-400703

S No.	Diseases	No. of Patients Reported	
		Year 2022-2023	Year 2023-2024
AIRBORNE DISEASES			
1.	Asthma	160	137
2.	Acute Respiratory Infection	301	509
3.	Bronchitis	23	12
4.	Cancer	569	680
WATERBORNE DISEASES			
1.	Gastroenteritis	672	758
2.	Diarrhea	8	18
3.	Renal diseases	750	675
4.	Cancer	569	680.

Date: 29.07.24.

Signature

SHYAM YEMPALLE
ADMINISTRATOR
MGM NEW BOMBAY HOSPITAL, VASHI

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)	NAVI MUMBAI
Name of the major health center/ organization	E.S.I.S. Hospital
Name and designation of the Contact person	
Address	

S No.	Diseases	No. of Patients Reported	
		Year 2022-2023	Year 2023-2024
AIRBORNE DISEASES			
1.	Asthma	524	375
2.	Acute Respiratory Infection	584	312
3.	Bronchitis	283	223+17=240
4.	Cancer	13	25
WATERBORNE DISEASES			
1.	Gastroenteritis	279	339
2.	Diarrhea		
3.	Renal diseases	254	366
4.	Cancer	16	79

Date: 24 JUL 2024

[This count taken from CA related to digestive system ~~pancreas~~ not specific disease from water contamination

Signature
Medical Superintendent
MH - ESIS HOSPITAL,
Vashi, Navi Mumbai - 400 703