

**BEFORE NATIONAL GREEN TRIBUNAL
WESTERN ZONE BENCH, PUNE
ORIGINAL APPLICATION NO 77 OF 2016**

IN

APPLICATION NO 33 OF 2013

In the matter of :-

Janardan Chandar Patil

...Applicant

Vs

Union of India

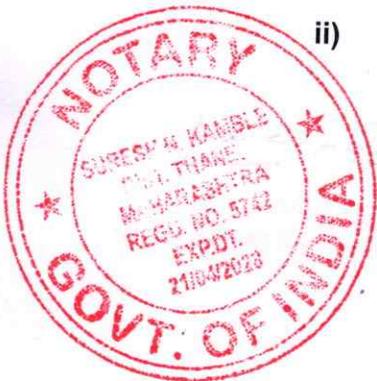
....Respondent

AFFIDAVIT ON BEHALF OF RESPONDENT NO.3 :-

I, Satish H Padwal, aged about 52 years, occupation-Service, the Regional Officer of Maharashtra Pollution Control Board at Navi Mumbai, having my office at Raigad Bhavan, 7th Floor CBD Belapur, Navi Mumbai, do hereby state on solemn affirmation in continuation with the earlier affidavit and compliance of the order dated 12.2.2024 on behalf of the Respondent No. 3 as under :-

I say and submit that in compliance of Order dated 12.2.2024 the Respondent Board has taken following action which are summarized as under :-

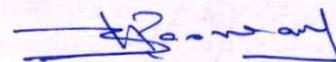
- i) The Respondent Board has prepared and submitted revised Action Plan of severally polluted area (SPA) of Navi Mumbai area to CPCB, New Delhi vide letter dated 03.08.2020. A copy of said revised Action Plan has been submitted to this Hon'ble Tribunal alongwith the Affidavit dated 21.7.2023.
- ii) It is submitted that the Respondent Board is in process of implementation of revised Action Plan with the other stake holders. In this regard, the specific steps have been taken and in progress to reduce CEPI in respect of Navi Mumbai area. In this regard, the Respondent Board has taken necessary steps and measures to execute and enforce such action plan with all stakeholders & also taken review meeting alongwith concern stakeholders on 21.12.2023. During the hearing, the Regional Officer, Navi Mumbai has given instruction to implement compliance measures for improvement of situation to reduce CEPI score. A copy of said list of specific steps taken and progress made to reduce CEPI in respect of Navi Mumbai as per Hon'ble NGT Order dated 12.2.2024 is enclosed and mark as an **Annexure I**.



- iii) It is submitted that the Respondent Board submitted report of pre-monsoon monitoring, sampling and analysis for Ambient Air Quality, Surface Water Quality and Ground Water Quality in Critically/Severally/Other Polluted Industrial Area of Navi Mumbai (April 2023 to June 2023) to CPCB which is hoisted on the website of the Respondent Board. A copy of said report is enclosed and marked as an **Annexure II**.
- iv) The Board has issued work order for project on Monitoring, Sampling and analysis for Ambient Air Quality, Surface Water, Wastes Water and Ground Water Quality in CEPI designated critically/severally/other polluted area in Maharashtra i.e Tarapur, Chandrapur, Dombivali, Aurangabad, Navi Mumbai, Nashik, Pimpri Chinchwad, Chembur and Mahad for 3rd season i.e post Monsoon Season period 2023 to Feb 2024 to M/s Ashwamedh Engineers and Consultants, C, SL, Survey No 102, Plot No 26, Wadala, Pathardi Road, Indira Nagar, Nashik-422009. The said monitoring and sampling as per the work order has been completed and preparation of report is under progress.
- v) In this regard, CPCB has developed portal for submission of progress report by State Pollution Control Board in respect of CEPI. The officials of the Respondent has been uploading progress report regularly on the said portal.

In view of continuous persuasion and follow up with the stakeholders, 135 no of industries from Trans Thane Creek Industrial Area, Navi Mumbai has switched over to cleaner fuel (PNG) and 32 nos of Industries are under process to switch over to cleaner fuel(PNG). It is submitted that the Respondent Board has taken various steps to reduce CEPI score in Navi Mumbai Area.

Solemnly affirmed as on ^{28th} March, 2024.



(Satish H Padwal)

Regional Officer-Navi Mumbai



BEFORE ME


28/3/2024

SURESH N. KAMBLE
ADVOCATE & NOTARY
(Govt. Of India)

Register Sr. No.	351	2024
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28 MAR 2024

ORIGINAL APPLICATION No. 77 of 2016 (WZ)

3

Janardan Chandar Patil & Anr

The specific steps taken and in progress to reduce CEPI in respect of Navi Mumbai in respect of Hon'ble NGT OA No. 77 of 2016 and order passed on 12.02.2024.



Short Term Measures

Sr. No.	Action Points (including source & mitigation measures)	Responsible Stake Holders	Present status.
A			
1	Uncovered area will be connected to CETP	MIDC/ CETP/ MPCB	TTC MIDC- TTC industrial area is divided into K, R, A, EL, C, D & W blocks and all blocks are connected with HDPE effluent carrying pipeline Work is completed.
2	Performance Evaluation of CETP	CETP/ MPCB	TTC MIDC- CETP has already submitted the performance evaluation report to MPCB done by Emergy Enviro Pvt. Ltd. by SINE IIT Bombay Company at 2020. CETP falls under the confirming category.
3	Performance Evaluation of ETPs	Industries	TTC MIDC- There are total 48 no. of Large and Medium Scale Industries generating trade effluent and have provided necessary ETPs. ETPs of LSI & MSI are being operated regularly. Most industries generally meeting the consented standards. 12 number of industries has provided ZLD. Total 47 number of industries has provided SCADA system at outlet of ETP.
4	Performance Evaluation of ECS.	Industries	Mahanagar Gas Ltd (MNGL) has reported that 135 No of industries from Trans Thane Creek Industrial area, Navi Mumbai has switch over to cleaner fuel (PNG) and 32 Nos of industries are under process.



5	Repairs of Internal Roads in MIDC area.	NMMC/ MIDC	<p>TTC MIDC-</p> <p>There are internal roads of 95 km in TTC MIDC area, Navi Mumbai Municipal Corporation authority informed that 90% construction work of internal roads in MIDC area is completed & the remaining work is under progress. NMMC shall submit the progress report and time required for completion of internal roads in MIDC area.</p>
6	Taking possession of drainage pipeline carrying effluent to CETP.	CETP/ MIDC/ MPCB as Nodal Agency	<p>TTC MIDC-</p> <p>TTC industrial area is divided into K, R, A, EL, C & D blocks. Previously, effluent pipelines of K, R, A & EL blocks was having with MIDC and at C & D block, it was with CETP (Thane-Belapur) Association. On dt. 27/11/2018, effluent pipeline network was taken over by MIDC from CETP. As on today effluent network for whole TTC Indl area is with MIDC.</p>
7	Online display of AAQM data.	MPCB as Nodal Agency	<p>In RO Navi Mumbai jurisdiction there are 7 stations are operational for strengthening of Air monitoring in Navi Mumbai area and display board are installed along road side. The data transfer to CPCB/MPCB server.</p> <ol style="list-style-type: none"> 1. Fire Station, CBD Belapur. 2. Sewage Treatment Plant, Nerul. 3. Tortoise Amusement Park, Kopari Gaon. 4. Sensory Garden, Sanpada. 5. Nirmal Bhavan, Mahape. 6. Opposite to Hindalco, MIDC Taloja 7. CIDCO garden, Kalamboli <p>Along with these, Regional Office MPCB (Navi Mumbai) is having 2 nos. of Mobile Ambient air quality monitoring vans in respective areas.</p>
8.	Inventory of Hazardous air	MPCB/ Individual	<p>Following industries are having LDAR-</p> <p>TTC MIDC-</p>

	Pollutant emitting units and installation of Leak detection & repair (LDAR) in Case pesticide & bulk drug manufacturing units	industry	<ol style="list-style-type: none"> 1. Amines & Plasticizers Ltd. Turbhe 2. Lubrizol Ltd. Turbhe 3. Zydus Takeda Healthcare Ltd. Pawane 4. NOCIL Ltd. Pawane 5. RPG Life Sciences Pawane. 6. Croda Chemicals Ltd. 7. Gramercy Trade Industries Pvt. Ltd.
9.	Monitoring of the Industries for compliance of CEPI norms	MPCB/Individual industry	<p>TTC MIDC-</p> <p>Board is regularly monitoring the industries compliance of consent conditions. Regional office Navi Mumbai has issued various directions in the year 2023-24. Direction issued from last 6 months regarding Air Pollution Control details are as below:</p> <p>Proposed/Interim Directions – 44</p> <p>Closure Directions – 1</p>
10.	Recovery of Solvent by solvent using units.	Industries	<p>Board is strictly adhering to CPCB Standard Operating Process (2021) for solvent recovery units for the issuance of consent as well as authorizations.</p> <p>Bulk Drugs units are using solvents in their process and generate waste solvents</p> <p>Major industries have installed their own solvent recovery system at their site.</p> <p>They are sending waste solvents to authorized party.</p> <p>Recently direction has issued to solvent recovery units for specific mitigation measures to be taken as per suggestion of CPCB in respect of SUMOTO NGT Case No. 197/2023.</p>
11	Health Impact Assessment Study.	DISH/ District Health Officer/ MPCB	<p>Health related data is enclosed in the Post Monsoon report (Dec 2022 to Feb 2023) prepared by MPCB on page No. 37. (Copy enclosed)</p>
12	Monitoring of ground water at MSW/TSDF site.	MPCB	<p>Analysis reports of ground water monitoring at MSW/TSDF is enclosed in the Post Monsoon report prepared by MPCB on page No. 29 to 33 (Copy enclosed). On going continuous activity.</p>

13	Improvements in CETP.	CETP/ MIDC	<p>TTC MIDC -</p> <ol style="list-style-type: none"> 1. Installation & Commissioning of Additional Clarifier cum Clariflocculator at P-60 completed in Dec.-2019 for an standby operation during any emergency maintenance work required by the existing Clarifier, Clarifoculator, Thickner or any of the tank and also for better treatment of effluent during shock load. 2. Installation and Commissioning 2 nos. each of new technology single screw & double screw Volute at P-60 done in the year 2023 for efficient sludge handling and is in operation giving maximum sludge rejection. 3. Constructed an additional inlet effluent collection tank of 500 m3 in the year 2023 to handle the inlet shock load mostly during monsoon season. 4. Reinforcement civil work done of Platform, Pathways, of Aeration Tank at 12 MLD and 15 MLD plant in the year 2023 to enhance the structural life of an aeration tank 5. Compound wall constructed in the year – 2022 & 23 from slum area side to avoid further encroachment at P-60 (15 MLD) side. 6. Installation and commissioning of the 67 kw Solar panel project on the roof of Admin Building done in the year 2023. 7. Installation of 10 KL capacity pilot plant completed in Dec. 2023 to study the process need to support the small scale Industries being operated by CETP. 8. Double stage Scrubber system at plot P-18 has been ordered and will be installed by the end of the month of March. – 2024. <p>Work on going.</p>
14	Installation of VOC analyzer.	Industries	<p>TTC MIDC-</p> <p>12 number of solvent recovery units are operational and they have installed VOC analyzer.</p>
15	Set up new AAQM Station, Navi Mumbai.	MPCB	<p>As per Board policy regarding new CAAQM Station based on population criteria has been fulfilled by Regional Office (Navi Mumbai), MPCB.</p> <p>Therefore no requirement of additional CAAQMS.</p>

Long Term Measures

Sr. No.	Action Points (including source & mitigation measures)	Responsible Stake Holders	Present Status
1.	Improvements in CETP.	CETP/MIDC	TTC MIDC- <ol style="list-style-type: none"> 1. Laying & Installation of effluent transfer pipeline of 400mm dia from Plot P-18 to Plot P-60 to replace the Old existing pipeline. 2. Upgradation of primary and secondary treatment process as per the need, after completing the necessary evaluation. 3. Installation of 5MLD capacity Additional plant as per the need.
2	Upgradation of Individual ETPs	Industries	As and when for non-complied industries MPCB issued direction for upgradation of ETPs. Ongoing continuous activity.
3	Change in fuel	Industries /MNGL	Mahanagar Gas Ltd (MNGL) has reported that 135 Nos of industries from Trans Thane Creek Industrial area, Navi Mumbai has switch over to cleaner fuel (PNG) and 32 Nos of industries are under process. Ongoing continuous activity.
4	Improvement in ECS	Industries	Mahanagar Gas Ltd (MNGL) has reported that 135 No of industries from Trans Thane Creek Industrial area, Navi Mumbai has switch over to cleaner fuel (PNG) and 32 Nos of industries are under process. Ongoing continuous activity.
5.	Replacement of Damaged pipeline. The replacement of old/damaged pipelines by the new one has not been completed.	MIDC	MIDC authority has already initiated steps towards providing new HDPE Pipeline in TTC MIDC Area. About 95% work of remodeling of pipelines is completed and remaining work of pipelines in balance area is in progress. MIDC authority shall submit progress report in this regard.
6	To provide proper sewerage system for slum pockets & connects the	MIDC/ NMMC	NMMC can take up work of sewage pumping stations on receipt of plots in TTC MIDC area. MIDC authority shall provide plot to NMMC for installation of STP. Ongoing follow up from MPCB office.

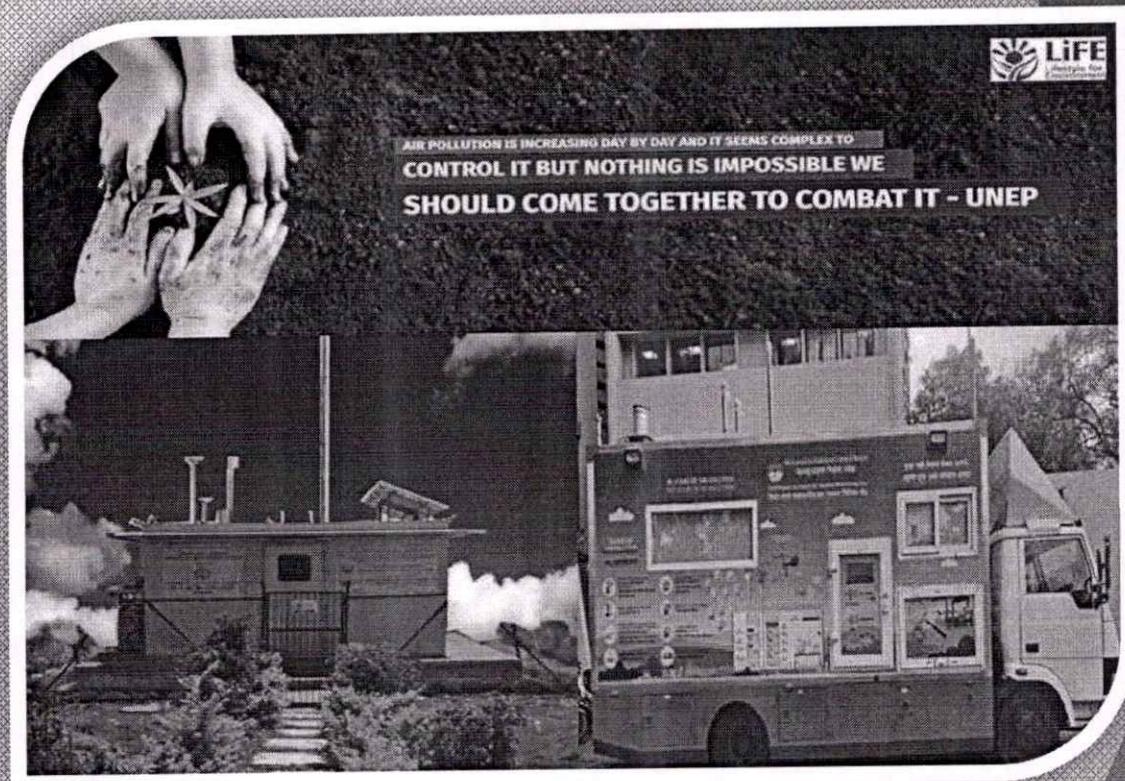
	sewage to STPs & use of treated sewage for gardening & industrial purpose		
7	Installation of CAAQM Stations with digital display on screen.	MPCB	<p>As per Board policy regarding new CAAQM Station based on population criteria has been fulfilled by Regional Office (Navi Mumbai), MPCB.</p> <p>Therefore no requirement of additional CAAQMS.</p> <p>Along with these, Regional Office MPCB (Navi Mumbai) is having 2 nos. of Mobile Ambient air quality monitoring vans in respective areas.</p>
8	Development of green belt & garden.	MIDC/TBIA	<p>TTC MIDC-</p> <p>In MIDC, while approving Building Completion Certificate (B.C.C.), there is condition for plantation as per area of plot and after fulfilling these conditions, BCC is get approved. Secondly, on every 5th June i.e. environment day, MIDC makes available around 500 saplings to Thane Belapur Association to distribute among industries for plantation.</p> <p>TBIA informed that, over 12,00,000 saplings have been planted in Navi Mumbai area with 90% survival rate.</p> <p>Board has taken special drive of mass tree plantation in Maharashtra. Accordingly, around 8000 Nos. of trees planted in TTC area.</p> <p>Plantation is regularly carried out by MIDC TBIA, Individual industries & Navi Mumbai Municipal Corporation.</p>
9	Scientific Disposal of MSW. (500 MT/D)	NMMC	750 TPD MSW is scientifically treated @ Turbhe 60000 liter per day capacity LTP treats Leachate.
10	Installation of Supervisory control and data acquisition (SCADA)	Industry/ CETP/ MPCB	<p>TTC MIDC-</p> <p>Total 47 number of industries has provided SCADA system at outlet of ETP.</p>
11	Air pollution control measures for stone crusher units.	MPCB/ Stone Crusher Units	<p>TTC MIDC-</p> <p>Stone crushing units in Navi Mumbai Municipal Corporation area are not operational since 2017 in respect of order passed by Hon'ble NGT order dated 14.11.2017.</p>
12	Installation of	Industry/	TTC MIDC-

	Online monitoring system to 13 nos. of highly polluting (17 th Category) industries.	MPCB	There are 4 number of industries and 1 CETP under 17 categories are operational and units have provided OCEMS.
13	Vehicle pollution and traffic management plan	NMMC/ RTO/ MIDC	Under 15 th Finance Commission NMMC has procured 25 EV buses in 2023. Additional 100 EV buses work order has been issued and will be procured in 2024. Currently, 02 Fog Cannon Machines have been procured from 15 th Finance Commission funds and 03 no of additional Fog Cannon machines will be procured in 2024.
14	Reuse of Treated Sewage.	NMMC/ MPCB	TTC MIDC/NMMC- NMMC has 7 Nos. of STP's having total capacity 454 MLD. Total sewage generation from NMMC area is 230 MLD and same is treated in 07 STPs located at different locations. About 65 MLD treated water is being used for various purposes like gardening etc. washing of roads, divider etc. Further NMMC has proposed recycling of water in TTC MIDC area of 40 MLD. Infrastructure work of 2 Nos. of 20 MLD capacity is completed, and it is under trials.
15	Air Quality Monitoring and Emission Source apportionment Study of Navi Mumbai City	NMMC / MPCB	TTC MIDC- MPCB issued Work Order to IIT (B), Mumbai and NERI. Work under progress.
16	Noise mapping of Navi Mumbai City	NMMC / MPCB	TTC MIDC/NMMC- Noise monitoring during Diwali and Ganesh festival is carried out by MPCB through MoEF approved agency.
17	Awareness program	MPCB/ TBIA	Awareness program under Mission LiFE, NCAP, CEPI are jointly conducted with NMMC, MIDC, CETP, DISH, MNGL and Industry association on the occasion of various environmental days. MPC Board has also conducted aware ness programs such as – World Environment day (5 June), World Ozone Day (22 Sep), Eco friendly Ganesh Festival, Vasundhara Awards, & Fire Cracker testing during Diwali. Ongoing continuous activity.

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

NAVI MUMBAI

Pre-Monsoon (April 2023 to June 2023)



LIFE
Lifestyle for
Environment

Maharashtra Pollution Control Board

Kalptaru Point, Sion East, Mumbai – 400 022

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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 2023 to June 2023 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, 2023). Based on the study, the present CEPI score is 52.2 (Air Index-36.00, Water Index-49.3 and Land Index-16.00). 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 21% decrease in CEPI score is observed from 66.32 in 2018 to 52.2 in June 2023.

2. Introduction

Industries play a pivotal role in a country's economic development, contributing to GDP growth, job creation, and technological advancement. However, in recent years, the environmental pollution caused by industries has emerged as a formidable challenge for authorities worldwide. The impact of these industrial activities on the environment is severe, affecting the quality of the water we drink, the air we breathe, and the soil that nurtures our plants. Industries releasing untreated wastewater have contaminated drinking water with hazardous substances, posing risks to human, animal, and aquatic life. Exposure to air pollutants has been linked to various respiratory and cardiovascular diseases, particularly in early human life, leading to infant mortality or chronic health issues in adulthood. According to the World Health Organization (WHO), environmental pollution is responsible for an estimated 9 million premature deaths worldwide each year. It also estimates that over 90% of the global population is exposed to air pollution levels that exceed WHO guidelines, causing serious health risks. Around 2 billion people worldwide use drinking water contaminated with faeces leading to infectious diseases such as cholera and dysentery.

Hence, addressing these pollution sources is crucial to achieving significant environmental and health benefits. Additionally, the widespread nature of industrial pollution requires extensive monitoring systems and resources to collect reliable data and assess the full extent of the environmental impacts. The complexities associated with monitoring and identifying pollution sources make it a daunting task for authorities to develop targeted strategies and enforce regulations effectively. Striking a balance between economic growth and environmental protection requires delicate negotiations and innovative policy approaches. Overcoming these challenges demands robust regulatory frameworks, international collaboration, advanced monitoring technologies, and a commitment to sustainable practices from industries and governments alike.

In view of this, Central Pollution Control Board (CPCB) has evolved the concept of the Comprehensive Environmental Pollution Index (CEPI) during 2009-10 as a tool for comprehensive environmental assessment of prominent industrial clusters and formulation of remedial Action Plans for the identified critically polluted areas. Later in 2016, the revised concept of CEPI was formulated by eliminating the subjective factors but retaining the factors which are monitorable CEPI bridges the perceptible gap between experts, public, and government departments by simplifying the complexity of environmental issues. It aims at categorizing critically polluted industrial areas based on scientific criteria, so as to ascertain various dimensions of pollution. This is a combined framework used to evaluate the impacts caused by industrial clusters on the nearby environment, as a numerical value.

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 based on the revised CEPI version 2016. The results of the application of the Comprehensive Environmental Pollution Index (CEPI) to selected industrial cluster 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.

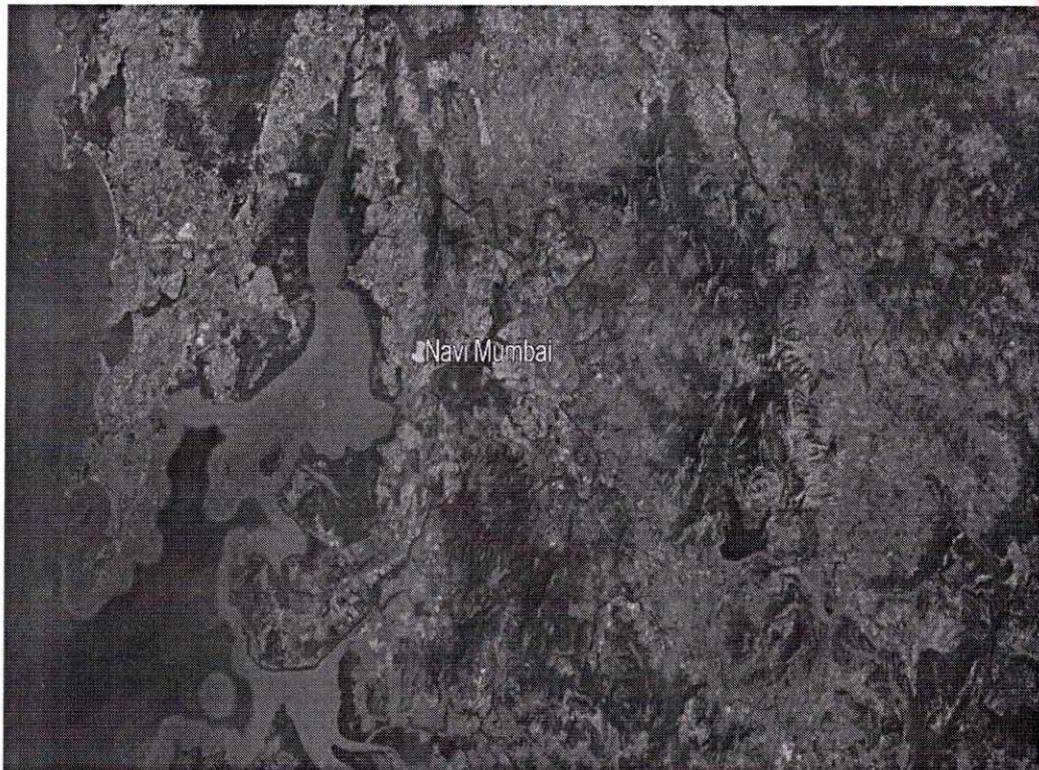


Fig. Navi Mumbai Region - CEPI Monitoring Zone

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 ₆ H 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	<p>(i) Simple Parameters</p> <p>Sanitary Survey, General Appearance, Colour, Smell, Transparency and Ecological</p> <p>(ii) Regular Monitoring Parameters</p> <p>pH, O & G, Suspended Solids, DO, COD, BOD, TDS, Electrical Conductivity, Total Dissolved Solids, Nitrite-Nitrogen, Nitrate-Nitrogen, (NO₂+NO₃) total nitrogen, Free Ammonia, Total Residual Chlorine, Cyanide, Fluoride, Chloride, Sulphate, Sulphides, Total Hardness, Dissolved Phosphates, SAR, Total Coliforms, Faecal Coliform</p> <p>(iii) Special Parameters</p> <p>Total Phosphorous, TKN, Total Ammonia (NH₄+NH₃)-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</p> <p>(iv) Bio-assay (zebra Fish) Test - For specified samples only.</p>
	Ground water - 06	

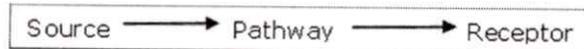
Table 3.2 Frequency of Sampling

	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

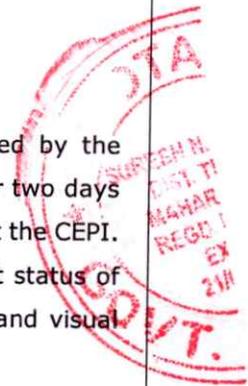
	Parameter	Round of Sampling	Frequency in Each Round
6.	Ozone (O ₃)	03	24 Shifts of 1 hr each
7.	Benzene (C ₆ H ₆)	03	1 Shifts of 24 hrs
8.	Carbon Monoxide (CO)	03	24 Shifts of 1 hr each
9.	Benzo (a) Pyrene (BaP) - particulate phase only	03	3 Shifts of 8 hrs each
10.	Lead (Pb)	03	3 Shifts of 8 hrs each
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 29th May 2023 to 2nd June 2023. 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°02'27.88"	E73°01'27.22"	29.05.2023	31.05.2023	02.06.2023
2.	TTCWMA, Mahape	N19°06'28.72"	E73°01'51.68"	29.05.2023	31.05.2023	02.06.2023
3.	Nearby Reliable IT Park	N19°06'30.77"	E73°01'49.57"	29.05.2023	31.05.2023	02.06.2023
4.	Nearby Zoetis Pharmaceuticals Research Pvt. Ltd.	N19°03'59.58"	E73°01'32.13"	29.05.2023	31.05.2023	02.06.2023
5.	CETP Koparkharine, near ETP Table No. I	N19°04'30.99"	E73°04'03.74"	29.05.2023	31.05.2023	02.06.2023
6.	Nearby Ashi India Glass	N19°05'10.73"	E73°06'19.14"	29.05.2023	31.05.2023	02.06.2023
7.	Nearby Technova Imaging System	N19°03'27.50"	E73°06'48.19"	29.05.2023	31.05.2023	02.06.2023
8.	Nearby Deepak Fertilizer and Petrochemicals	N19°04'08.26"	E73°07'59.22"	29.05.2023	31.05.2023	02.06.2023

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 Zoetis Pharmaceuticals Research Pvt. Ltd.	N19°03'59.58"	E73°01'32.13"	29.05.2023	31.05.2023	02.06.2023
2.	Nearby Deepak Fertilizer and Petrochemicals	N19°04'08.26"	E73°07'59.22"	29.05.2023	31.05.2023	02.06.2023

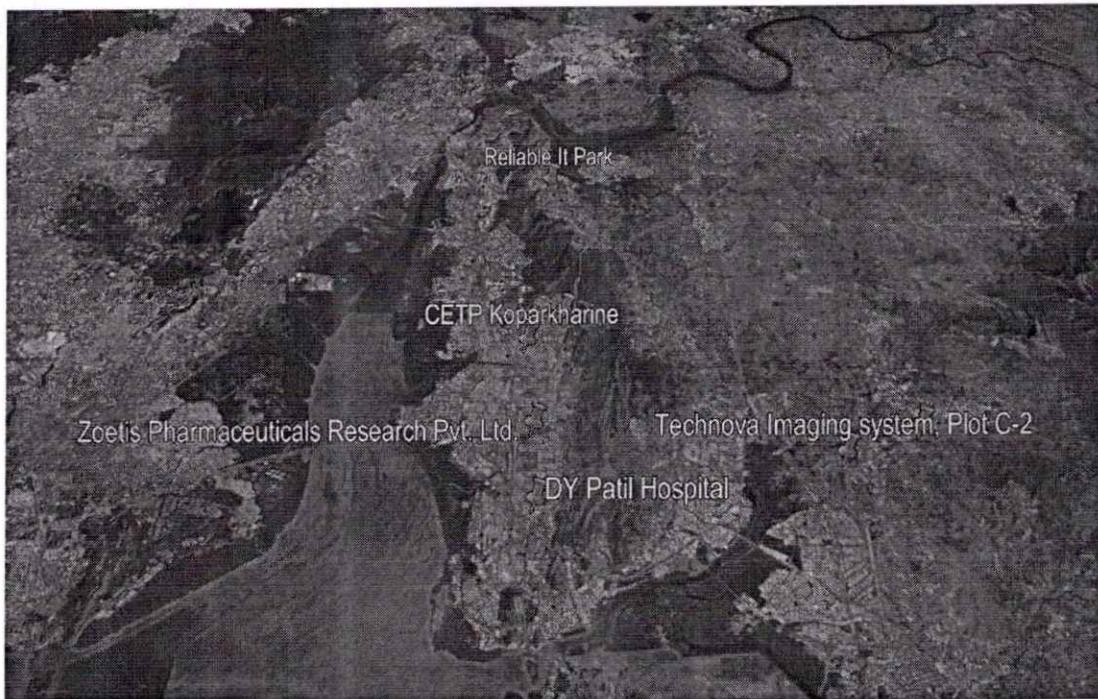


Fig: Geographical Locations of Ambient Air Quality Monitoring



Fig. Geographical Locations of VOCs Monitoring

Table 5.3 Ambient Air Quality Monitoring Results

Parameters	Unit	Results			
		DY Patil Hospital	TTC WMA, Mahape	Nearby Reliable IT Park	Nearby Zoetis Pharmaceuticals Research Pvt. Ltd.
Sulphur Dioxide (SO ₂)	µg/m ³	BLQ	99.70	BLQ	BLQ
Nitrogen Dioxide (NO ₂)	µg/m ³	57	61	61	78
Particulate Matter (size less than 10 µm) or PM ₁₀	µg/m ³	16	16	17	22
Particulate Matter (size less than 2.5 µm) or PM _{2.5}	µg/m ³	16	16	17	22
Ozone (O ₃)	µg/m ³	27.70	BLQ	43.20	28.80
Lead (Pb)	µg/m ³	BLQ	BLQ	BLQ	0.02
Carbon Monoxide (CO) (1h)	mg/m ³	1.39	1.60	1.54	1.51
Carbon Monoxide (CO) (8h)	mg/m ³	1.74	1.78	1.71	1.81
Ammonia (NH ₃)	µg/m ³	87.53	170.50	110.23	203.00

Parameters	Unit	Results			
		DY Patil Hospital	TTC WMA, Mahape	Nearby Reliable IT Park	Nearby Zoetis Pharmaceuticals Research Pvt. Ltd.
Benzene (C ₆ H ₆)	µg/m ³	2.37	2.67	2.72	2.68
Benzo (a) Pyrene (BaP) - particulate phase only	ng/m ³	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m ³	BLQ	BLQ	0.87	0.45
Nickel (Ni)	ng/m ³	BLQ	BLQ	BLQ	BLQ

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)	µg/m ³	BLQ	BLQ	BLQ	BLQ
Nitrogen Dioxide (NO ₂)	µg/m ³	14.50	15.40	12.30	18.90
Particulate Matter (size less than 10 µm) or PM ₁₀	µg/m ³	60	68	66	75
Particulate Matter (size less than 2.5 µm) or PM _{2.5}	µg/m ³	17	18	19	21
Ozone (O ₃)	µg/m ³	26.40	27.85	30.40	98.50
Lead (Pb)	µg/m ³	BLQ	0.02	0.02	BLQ
Carbon Monoxide (CO) (1h)	mg/m ³	1.52	1.77	1.53	1.36
Carbon Monoxide (CO) (8h)	mg/m ³	1.76	1.94	1.84	1.88
Ammonia (NH ₃)	µg/m ³	151.07	91.13	76.67	77.40
Benzene (C ₆ H ₆)	µg/m ³	2.44	2.34	3.10	2.75
Benzo (a) Pyrene (BaP) - particulate phase only	ng/m ³	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m ³	BLQ	BLQ	0.73	0.35
Nickel (Ni)	ng/m ³	4.11	BLQ	BLQ	BLQ

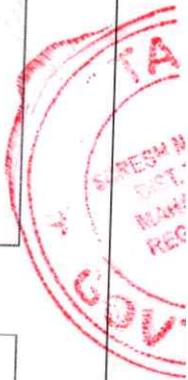
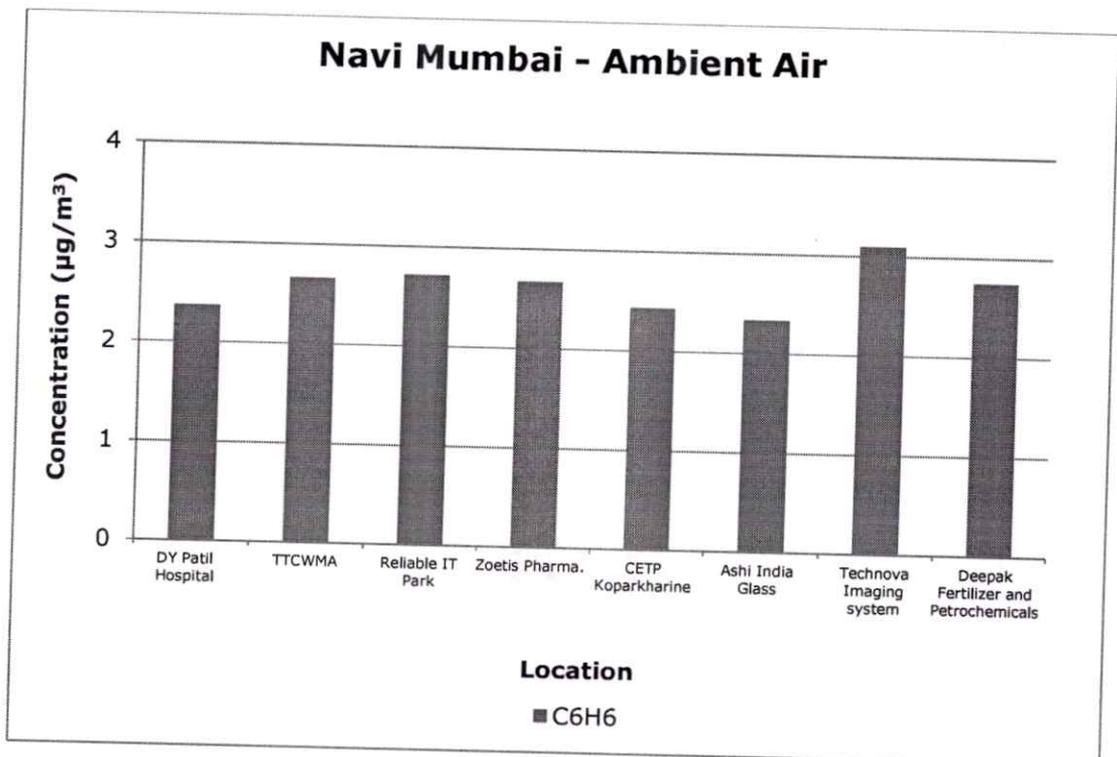
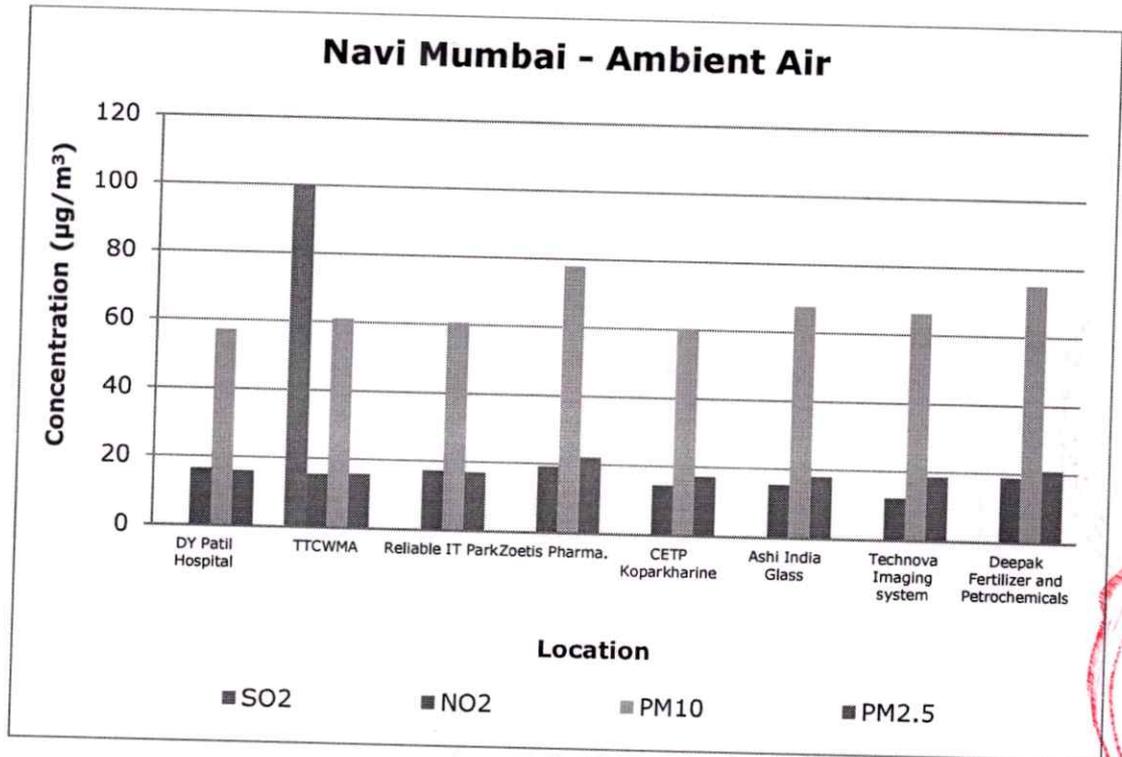
Table 5.4 Volatile Organic Compounds (VOCs) in Ambient Air Results

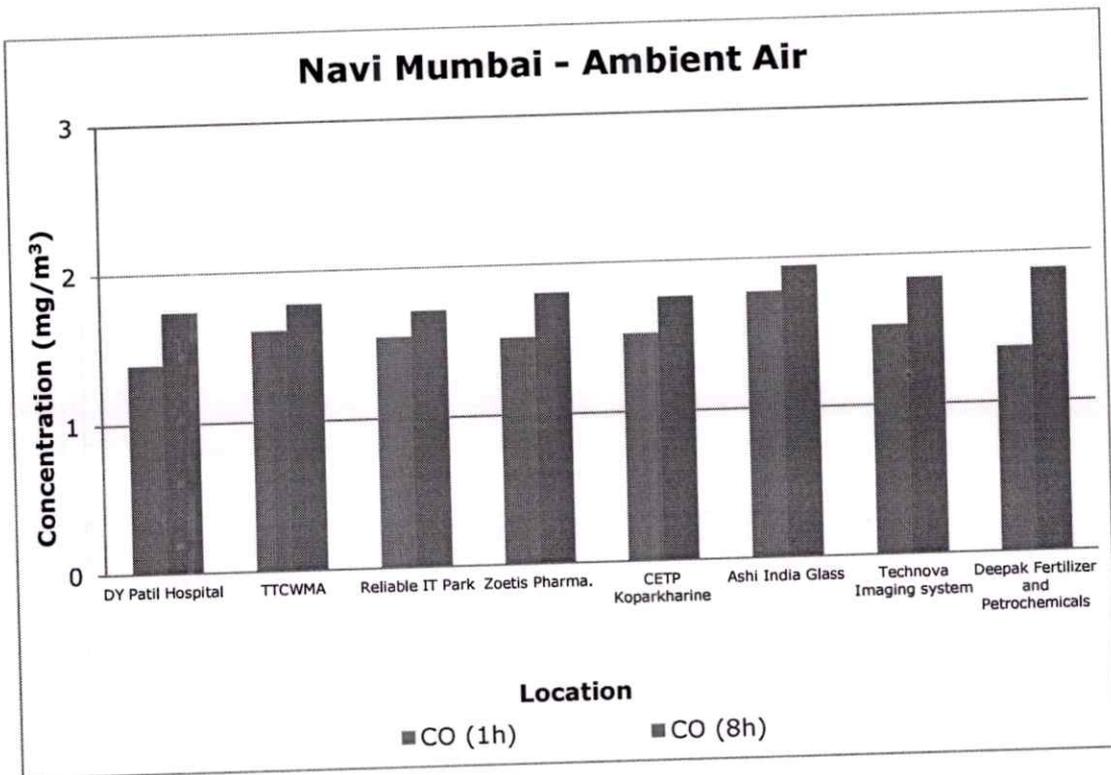
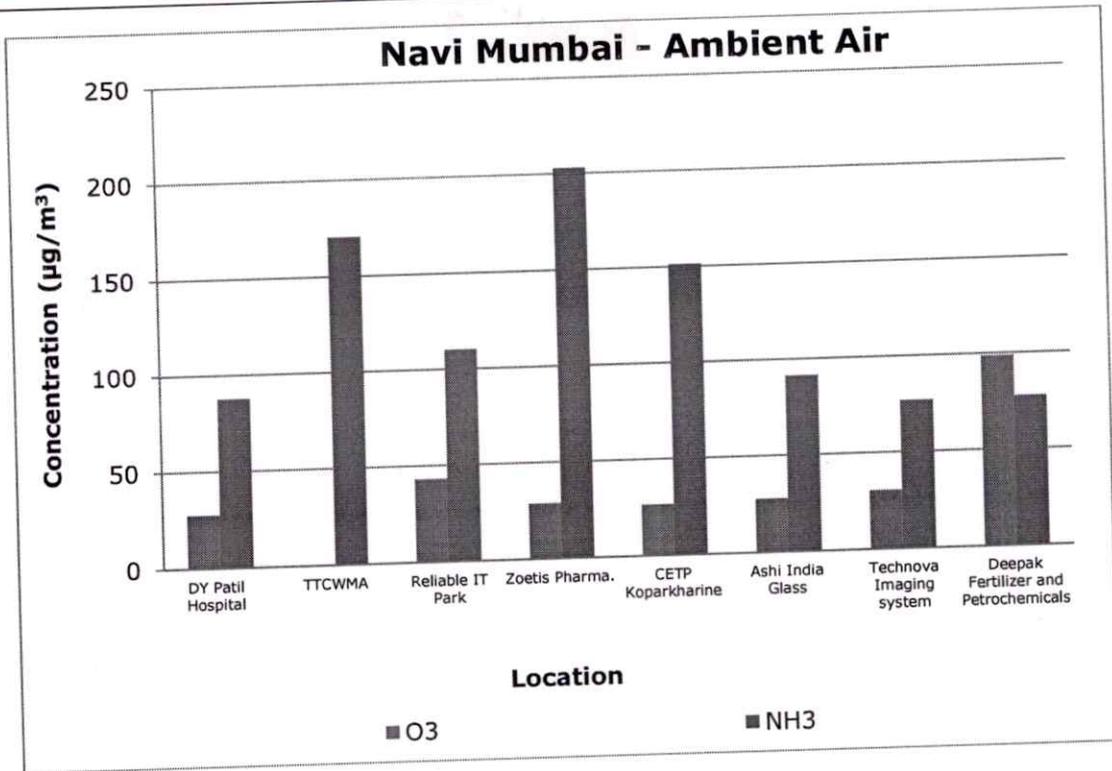
Parameters	Unit	Results	
		Zoetis Pharmaceuticals Research Pvt. Ltd.	Deepak Fertilizer and Petrochemicals
Dichloromethane	$\mu\text{g}/\text{m}^3$	1.02	1.44
Chloroform	$\mu\text{g}/\text{m}^3$	0.94	0.55
Carbon Tetrachloride	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
Trichloroethylene	$\mu\text{g}/\text{m}^3$	BLQ	0.58
Bromodichloromethane	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
1,3-Dichloropropane	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
1,4-Dichlorobenzene	$\mu\text{g}/\text{m}^3$	6.76	BLQ
1,3-Dichlorobenzene	$\mu\text{g}/\text{m}^3$	BLQ	1.50
1,2-Dichlorobenzene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
1,2-Dibromo-3-Chloropropane	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
Napthalene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
Bromobenzene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
1,2,4-Trimethylbenzene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
2-Chlorotoluene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
Tert-Butylbenzene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
SEC-Butylbenzene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
P-Isopropyltoluene	$\mu\text{g}/\text{m}^3$	1.21	1.79
M-Xylene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
P-Xylene	$\mu\text{g}/\text{m}^3$	1.74	3.30
Styrene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
Cumene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
1,2,3-Trichloropropane	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
N-Propylbenzene	$\mu\text{g}/\text{m}^3$	BLQ	7.95
Dibromochloromethane	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
1,2-Dibromoethane	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
Chlorobenzene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
1,1,1,2-Tetrachloroethane	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
Ethylbenzene	$\mu\text{g}/\text{m}^3$	BLQ	1.72
1,1-Dichloropropylene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
1,2-Dichloroethane	$\mu\text{g}/\text{m}^3$	6.15	3.47

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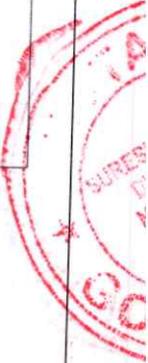
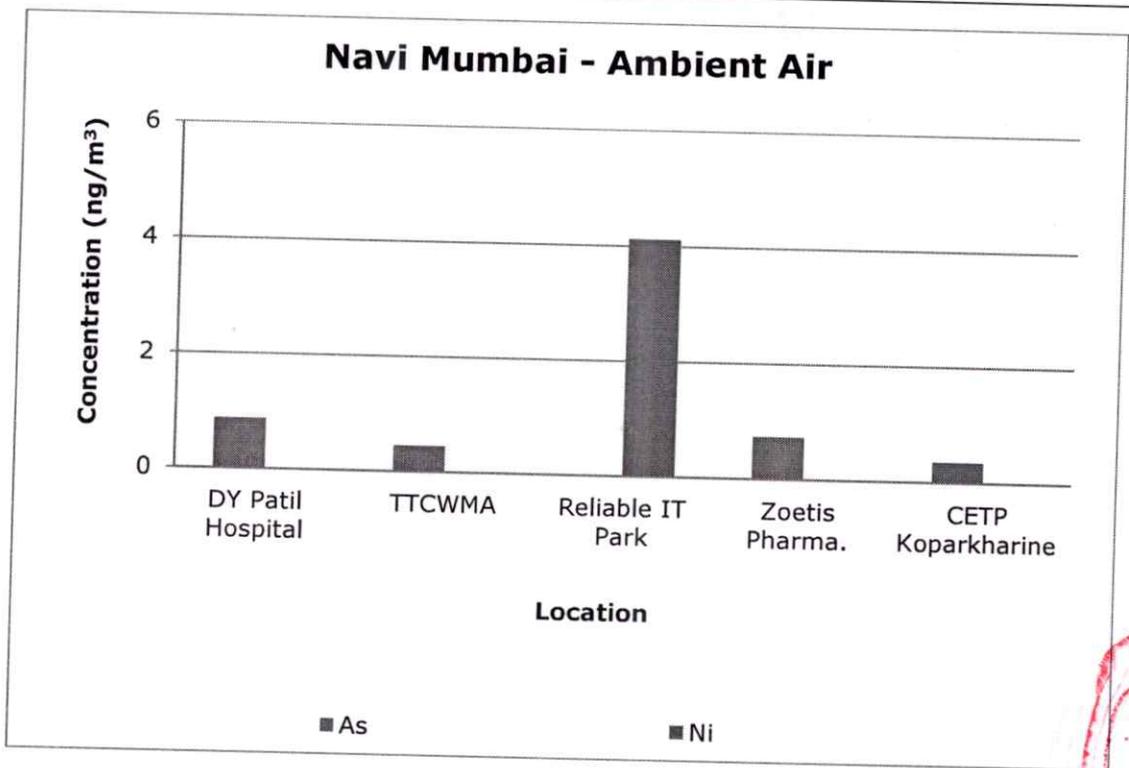
Parameters	Unit	Results	
		Zoetis Pharmaceuticals Research Pvt. Ltd.	Deepak Fertilizer and Petrochemicals
1,2-Dichloropropane	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
Trans-1,3-Dichloropropene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
CIS 1,3-Dichloropropene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
1,1,2-Trichloroethane	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
Tetrachloroethylene	$\mu\text{g}/\text{m}^3$	0.50	BLQ
1,3,5-Trimethylbenzene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
N-Butylbenzene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
1,2,3-Trichlorobenzene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
Hexachlorobutadiene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
1,2,4-Trichlorobenzene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
2,2-Dichloropropane	$\mu\text{g}/\text{m}^3$	BLQ	2.64
Dibromomethane	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
Toluene	$\mu\text{g}/\text{m}^3$	1.16	0.69
O-Xylene	$\mu\text{g}/\text{m}^3$	1.24	BLQ
Bromoform	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
1,1,2,2-Tetrachloroethane	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
4-Chlorotoluene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
1,1-Dichloroethylene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
Trans-1,2-Dichloroethylene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
1,1-Dichloroethane	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
CIS-1,2-Dichloroethylene	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
Bromochloromethane	$\mu\text{g}/\text{m}^3$	BLQ	BLQ
1,1,1-Trichloroethane	$\mu\text{g}/\text{m}^3$	BLQ	BLQ

Graphs - Ambient Air Quality Monitoring in Navi Mumbai





OF INDIA



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 Talaja (ii) Vashi Creek (ii) CETP Outlet (iii) Siemens Nallah (iv) CBD Nallah (v) CETP Talaja 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 6.71 to 7.16
- Total Dissolved Solids, Total Kjeldahl Nitrogen (TKN) and BOD concentration values were found to exceed the standard limit in all the samples.
- Concentration of Total Phosphorous (TP) is also found above the standard limit in all the water samples.
- In fish bioassay, 100% survival of fishes was achieved in the water sample of Vashi Creek.
- All metals like Arsenic, Nickel, Copper, Iron, Hexavalent Chromium (Cr⁶⁺) etc. were also observed either below the limit of quantification (BLQ) or below their standard limits.
- Parameters like Total Residual Chlorine, Cyanide, Fluoride, Sulphide, Dissolved Phosphate, Total Ammonical Nitrogen and Phenolic compounds, also 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°08'09.00"	E72°59'59.03"	30.05.2023	01.06.2023	03.06.2023
2.	Vashi Creek at Vashi Bridge	N19°03'83.20"	E72°58'68.20"	30.05.2023	01.06.2023	03.06.2023
3.	Siemens Nallah	N19°09'3.11"	E73° 0'18.78"	30.05.2023	01.06.2023	03.06.2023
4.	CBD Nallah	N19° 0'28.72"	E73° 1'29.24"	30.05.2023	01.06.2023	03.06.2023

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
5.	Kasardi River Near CETP Taloja Bridge	N19°05321593°	E73°11432839°	30.05.2023	01.06.2023	03.06.2023
6.	Lek Village Ghot	N19°0872947°	E73°1030953°	30.05.2023	01.06.2023	03.06.2023

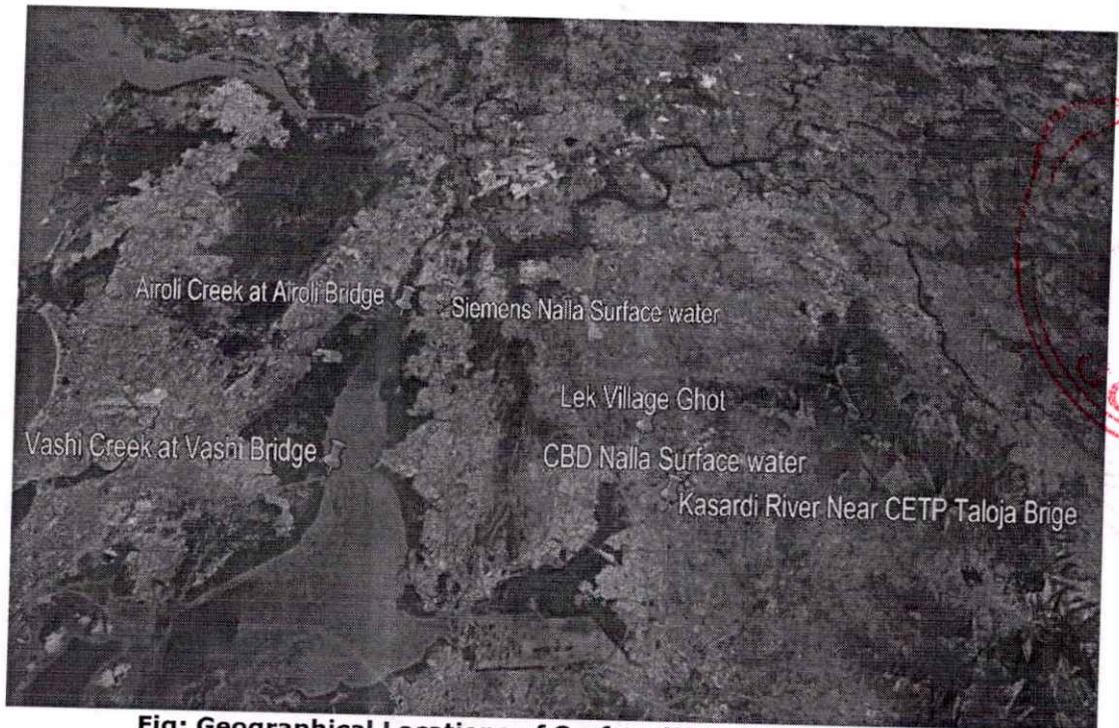


Fig: Geographical Locations of Surface Water Sampling

Table 6.2 Results of Surface Water

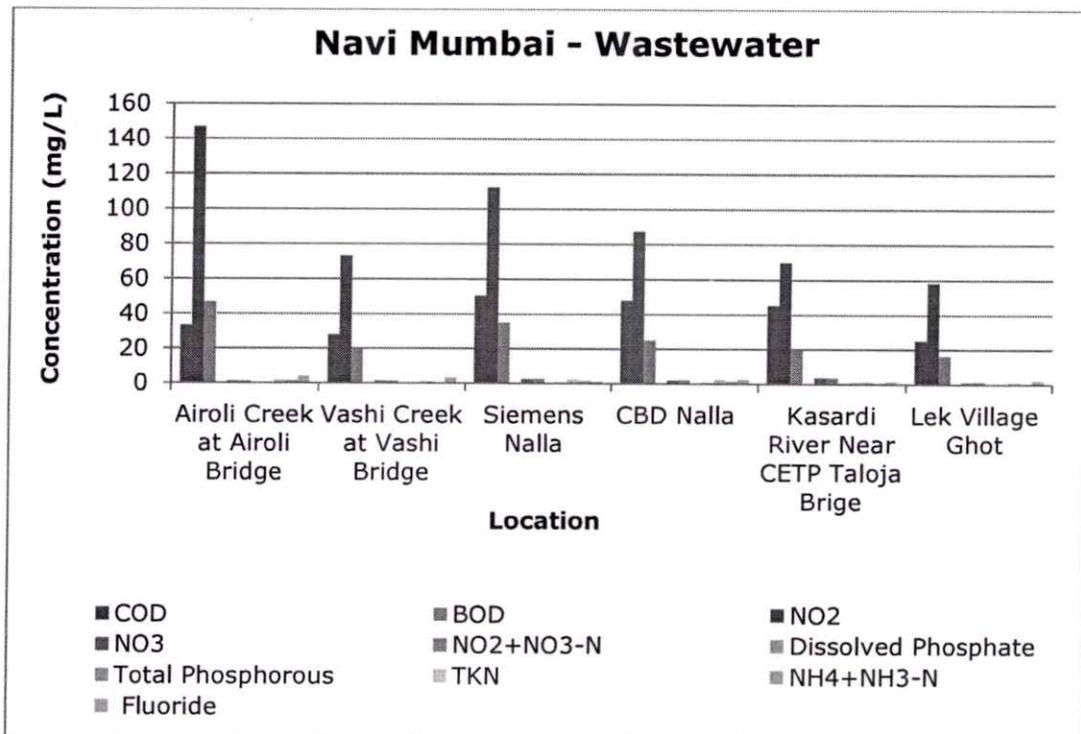
Parameters	Unit	Results					
		Airoli Creek at Airoli Bridge	Vashi Creek at Vashi Bridge	Siemens Nallah	CBD Nallah	Kasardi River Near CETP Taloja Bridge	Lek Village Ghot
Sanitary Survey	-	Reasonably clean neighbourhood	Reasonably clean neighbourhood				
General Appearance	-	Floating matter	No Floating matter	Floating matter	No Floating matter	Floating matter	No Floating matter
Transparency	m	0.60	0.60	0.40	0.40	0.50	0.40

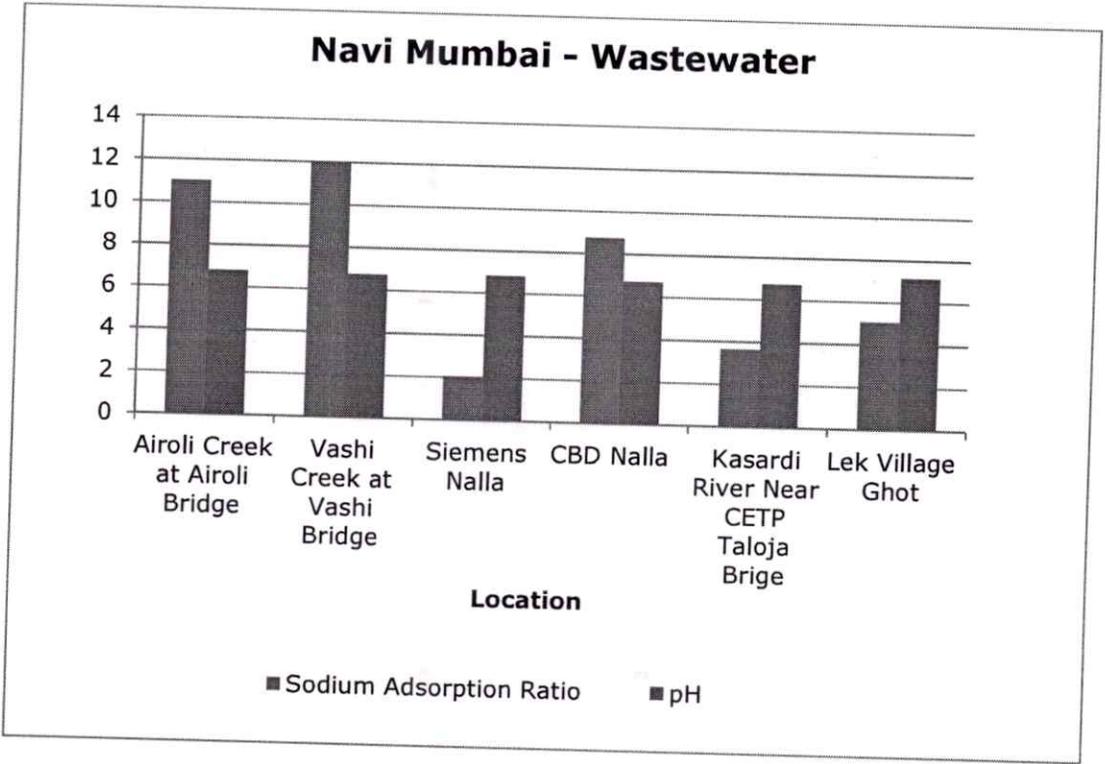
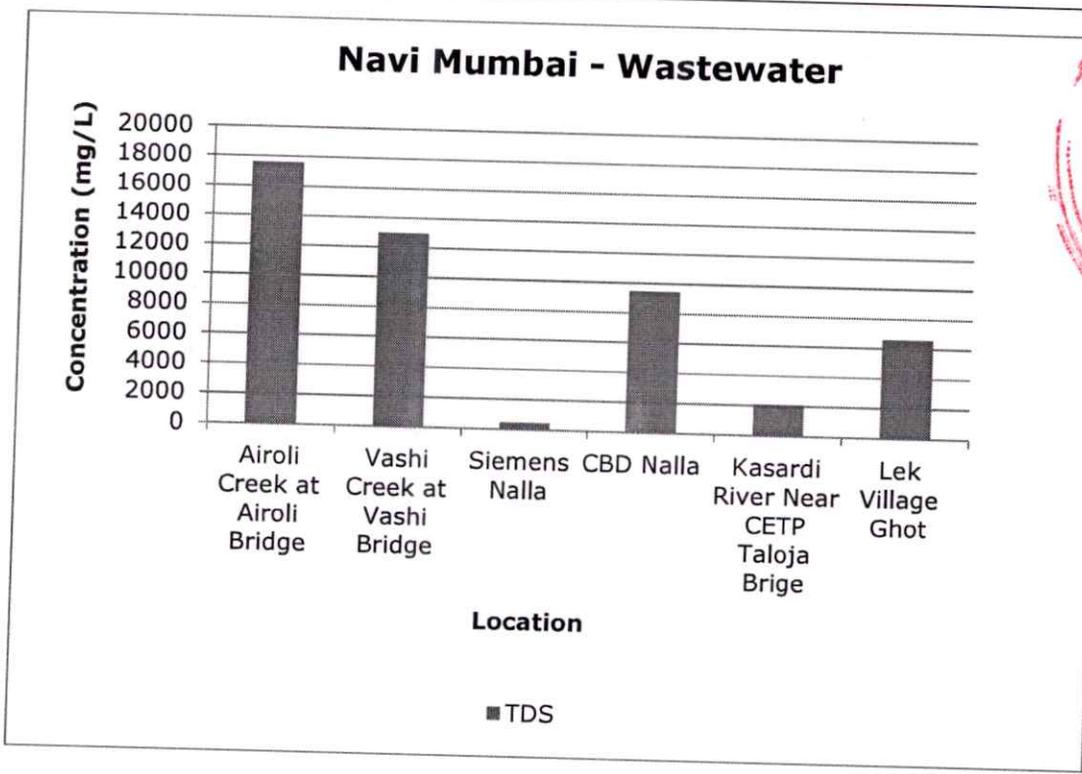
Parameters	Unit	Results					
		Airoli Creek at Airoli Bridge	Vashi Creek at Vashi Bridge	Siemens Nallah	CBD Nallah	Kasardi River Near CETP Taloja Bridge	Lek Village Ghot
Temperature	°C	29	28	28	29	27	27
Colour	Hazen	2	1	3	1	2	1
Smell	-	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
pH	-	6.77	6.73	6.82	6.71	6.75	7.16
Oil & Grease	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Suspended Solids	mg/L	33	28	51	48	45	25
Total Dissolved Solids	mg/L	17613	12982	489	9463	2085	6601
Dissolved Oxygen (% Saturation)	%	41.33	48.00	46.00	50.67	45.00	47.00
Chemical Oxygen Demand	mg/L	147	73	112	87	70	58
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	47	20	35	25	20	16
Electrical Conductivity (at 25 °C)	µmho/cm	30733	22458	871	16516	3726	11402
Nitrite Nitrogen (as NO ₂)	mg/L	0.06	0.09	0.04	0.04	0.05	0.06
Nitrate Nitrogen (as NO ₃)	mg/L	1.23	1.40	2.67	2.10	3.59	1.24
(NO ₂ + NO ₃)-Nitrogen	mg/L	1.27	1.43	2.69	2.14	3.61	1.30
Free Ammonia (as NH ₃ -N)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	BLQ	BLQ	BLQ	BLQ	0.23	0.23
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	4.17	3.33	0.83	2.63	1.37	2.23
Sulphide (as H ₂ S)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.32	0.33	0.56	0.61	0.75	0.27

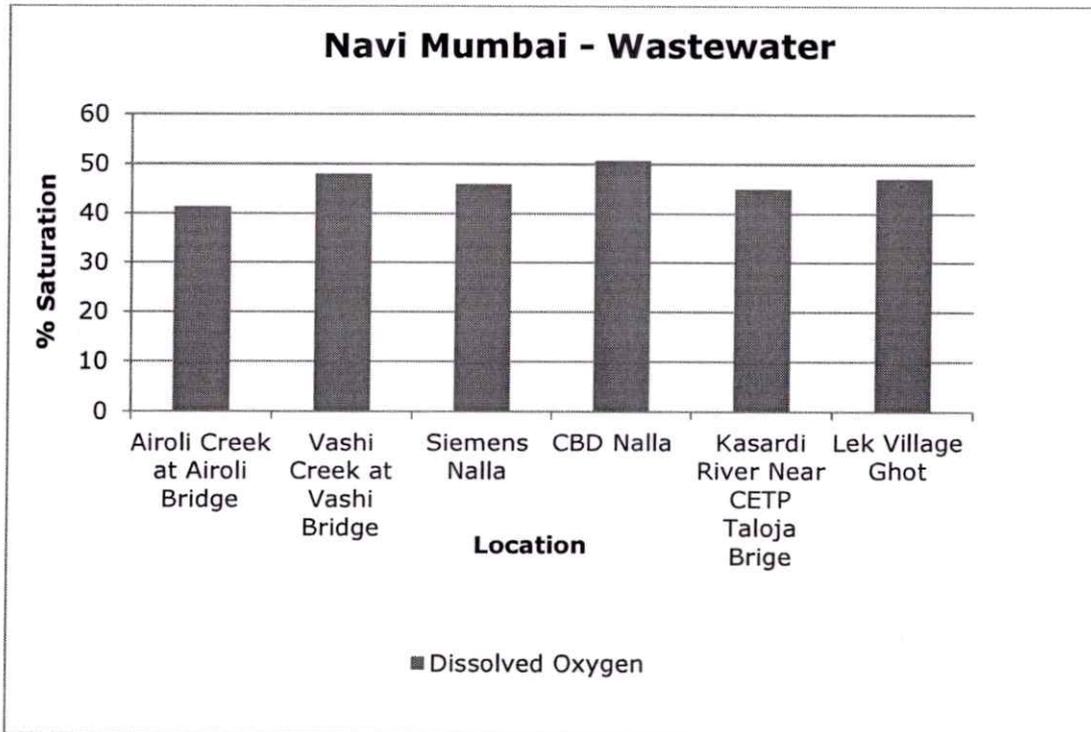
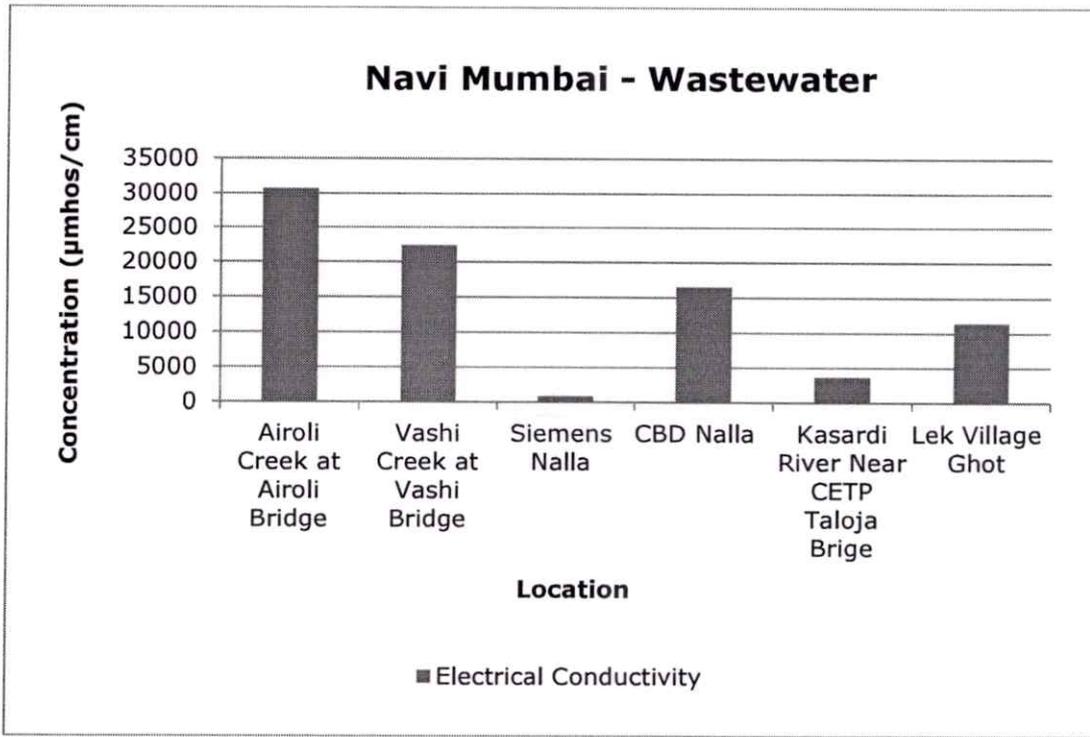
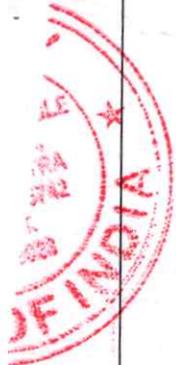
Parameters	Unit	Results					
		Airoli Creek at Airoli Bridge	Vashi Creek at Vashi Bridge	Siemens Nallah	CBD Nallah	Kasardi River Near CETP Taloja Bridge	Lek Village Ghot
Sodium Adsorption Ratio	-	11.01	12.04	2.06	8.75	3.66	5.07
Total Coliforms	MPN Index/100 ml	810	804	933	1247	1074	1020
Faecal Coliforms	MPN Index/100 ml	467	274	433	723	848	477
Total Phosphate (as P)	mg/L	0.38	0.39	0.65	0.68	0.82	0.30
Total Kjeldahl Nitrogen (as N)	mg/L	2.05	0.93	2.24	2.61	1.49	1.12
Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/L	1.49	0.22	1.39	1.51	0.67	0.38
Total Nitrogen	mg	3.33	2.36	4.30	4.75	5.10	2.01
Phenols (as C ₆ H ₅ OH)	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	0.10	BLQ	BLQ	BLQ
Nickel (as Ni)	mg/L	BLQ	0.03	0.01	0.02	0.02	0.01
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	0.05	0.06	0.03	0.03	0.03	BLQ

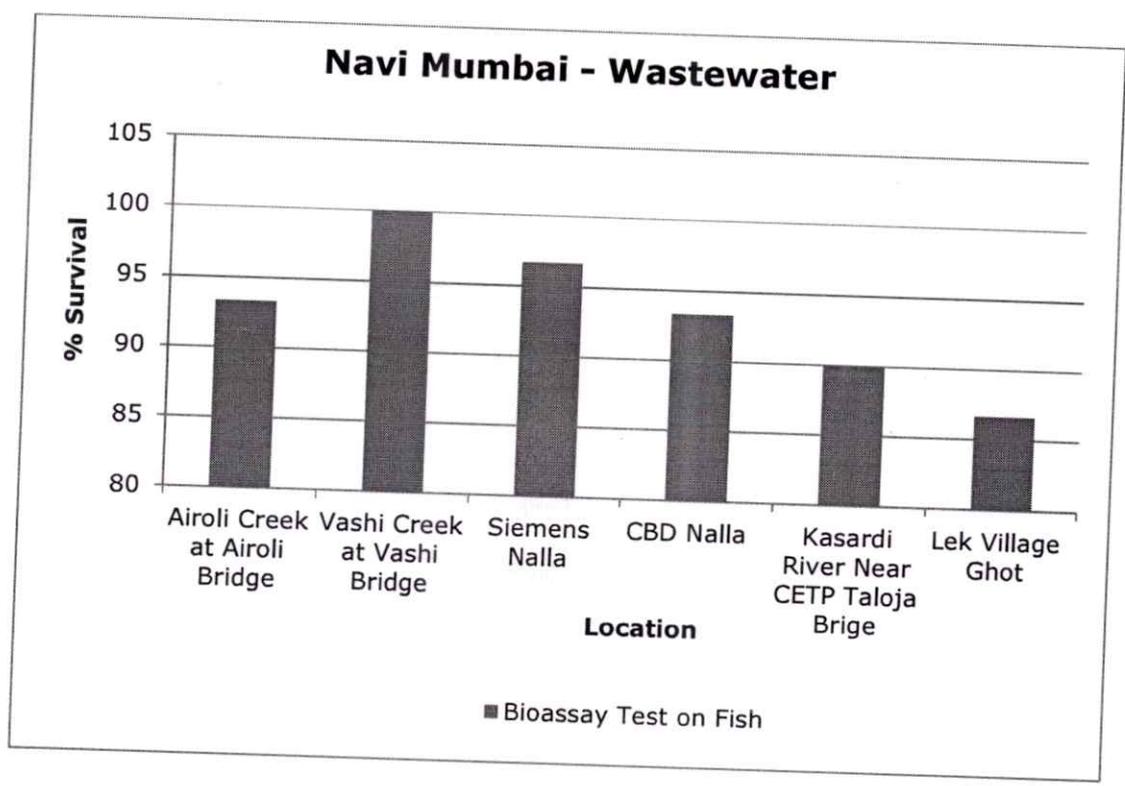
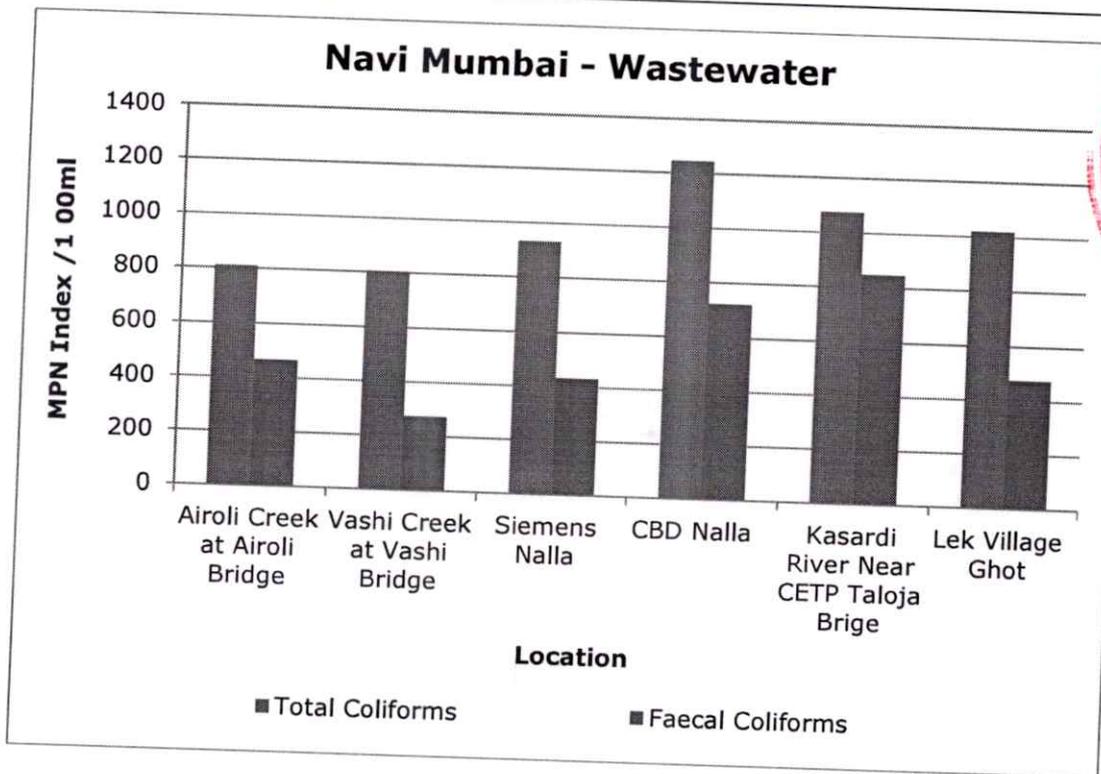
Parameters	Unit	Results					
		Airoli Creek at Airoli Bridge	Vashi Creek at Vashi Bridge	Siemens Nallah	CBD Nallah	Kasardi River Near CETP Taloja Bridge	Lek Village Ghot
Total Arsenic (as As)	mg/L	BLQ	0.02	0.02	BLQ	BLQ	BLQ
Lead (as Pb)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ	BLQ	0.00	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	0.35	0.12	0.09	0.42	0.52	0.33
Iron (as Fe)	mg/L	0.18	0.37	0.33	0.71	0.81	0.12
Vanadium (as V)	mg/L	0.02	0.01	0.03	0.03	0.02	0.03
Selenium (as Se)	mg/L	0.01	0.01	0.01	0.01	0.01	BLQ
Boron (as B)	mg/L	BLQ	BLQ	BLQ	BLQ	0.24	BLQ
Bioassay Test on fish	% survival	93	100	97	93	90	87

Graphs - Surface Water Quality of Navi Mumbai









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 6.69 to 7.45.
- In Fish Bioassay, out of 6 water samples 2 samples achieved 100% fish survival.
- All metals like Arsenic, Nickel, Copper, Iron, Hexavalent Chromium (Cr⁶⁺), 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°04'16.30"	E 73°0'34.09"	30.05.2023	01.06.2023	03.06.2023
2.	Navi Mumbai MSW Dumping Ground Borewell Water Turbhe	N19°04'42.97"	E73°01'36.71"	30.05.2023	01.06.2023	03.06.2023
3.	MSW, TTC Area Borewell	N19°04'40.94"	E73°08'15.11"	30.05.2023	01.06.2023	03.06.2023
4.	TTC WMA Site Borewell	N19°06'31.05"	E73°01'49.67"	30.05.2023	01.06.2023	03.06.2023
5.	TTC Plot no. 142 Borewell	N19°05'46.58"	E73°01'27.10"	30.05.2023	01.06.2023	03.06.2023
6.	Mumbai Waste Management limited Borewell MIDC Taloja	N19°05'48.65"	E73°06'56.03"	30.05.2023	01.06.2023	03.06.2023

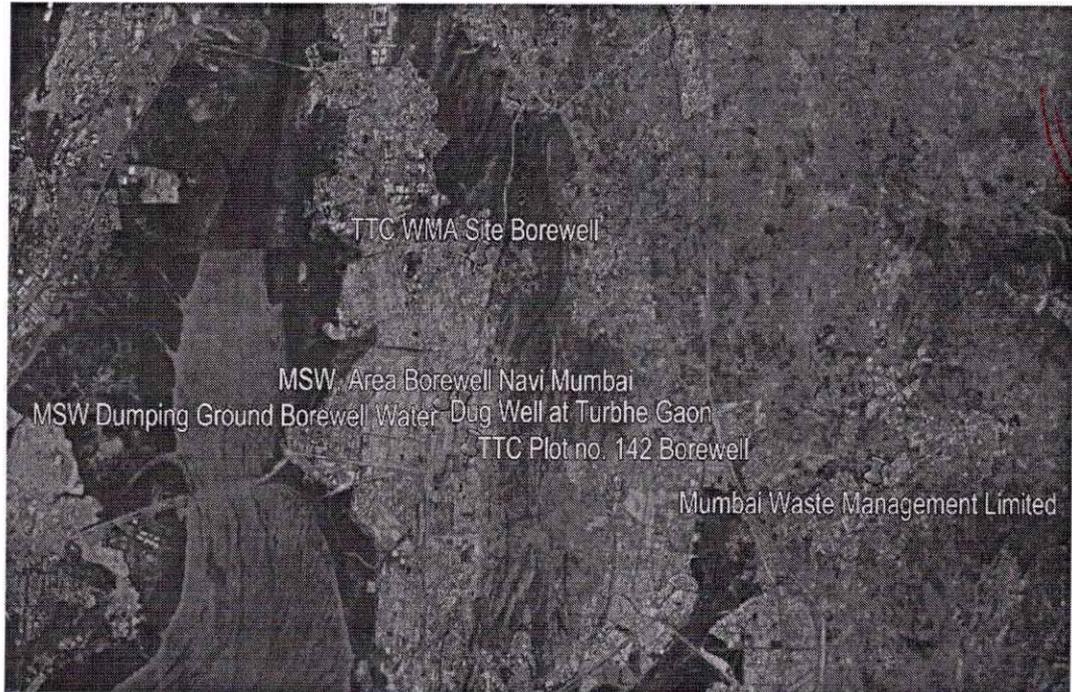


Fig: Geographical Locations of Groundwater Sampling in Navi Mumbai

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
General Appearance	-	No Floating matter	No Floating matter	No Floating matter	No Floating matter	No Floating matter	No Floating matter
Transparency	m	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Temperature	°C	28	28	28	28	29	28
Colour	Hazen	1	1	1	1	1	1
Smell	-	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
pH	-	6.80	6.76	7.23	7.45	6.69	6.70

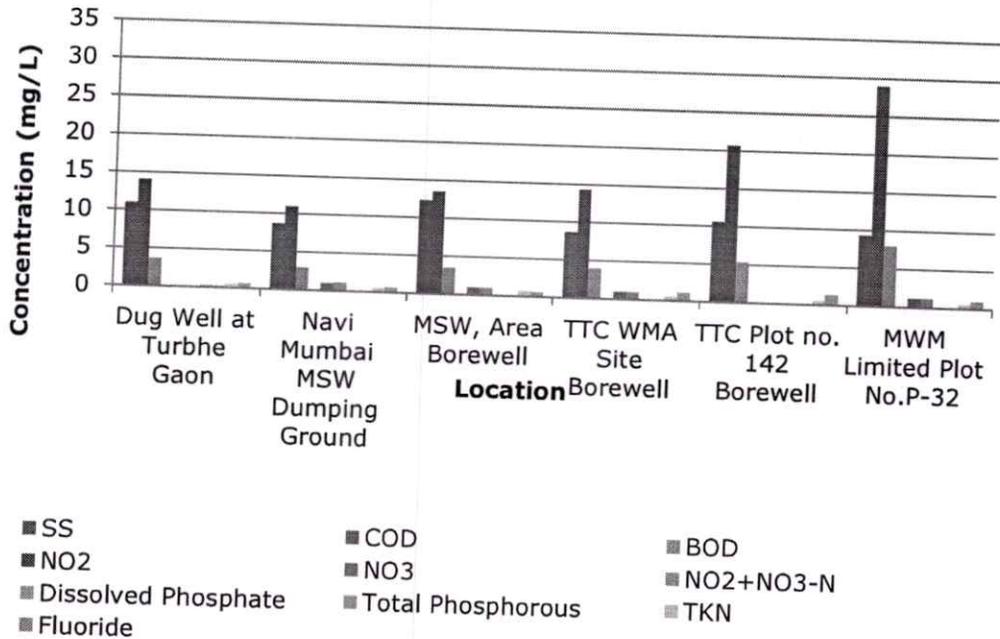
Parameters	Unit	Results					
		Dug Well at Turbhe Gaon, Navi Mumbai	Navi Mumbai MSW Dumping Ground Borewell Water Turbhe Navi Mumbai	MSW, Area Borewell Navi Mumbai	TTC WMA Site Borewell	TTC Plot no. 142 Borewell	Mumbai Waste Management Limited Plot No. P-32 and P-32 Part MIDC, Taloja
Oil & Grease	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Suspended Solids	mg/L	11	9	12	9	11	9
Total Dissolved Solids	mg/L	641	455	616	736	895	711
Chemical Oxygen Demand	mg/L	14	11	14	14	21	29
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	4	3	4	4	5	8
Electrical Conductivity (at 25 °C)	µmho/cm	1141	814	1102	1319	1599	1269
Nitrite Nitrogen (as NO ₂)	mg/L	0.04	0.07	0.02	BLQ	BLQ	BLQ
Nitrate Nitrogen (as NO ₃)	mg/L	BLQ	1.00	1.00	1.00	BLQ	1.24
(NO ₂ + NO ₃)-Nitrogen	mg/L	BLQ	1.07	1.02	1.00	BLQ	1.24
Free Ammonia (as NH ₃ -N)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	0.26	0.23	0.24	BLQ	BLQ	BLQ
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	0.63	0.70	0.67	1.10	1.43	1.00
Sulphide (as H ₂ S)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.26	0.11	0.11	0.11	0.11	BLQ
Sodium Adsorption Ratio	-	2.35	1.78	2.32	2.51	2.56	1.92
Total Coliforms	MPN Index/100 ml	643	847	593	1071	1600	887

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
Faecal Coliforms	MPN Index/ 100 ml	350	654	322	1260	730	234
Total Phosphate (as P)	mg/L	0.21	0.16	0.13	0.14	0.16	0.12
Total Kjeldahl Nitrogen (as N)	mg/L	0.56	0.56	0.75	0.56	0.56	0.56
Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/L	0.13	0.13	0.13	BLQ	BLQ	BLQ
Total Nitrogen	mg/L	1.02	1.01	1.53	1.06	1.06	0.93
Phenols (as C ₆ H ₅ OH)	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	0.08	BLQ	BLQ
Nickel (as Ni)	mg/L	0.02	0.01	0.01	0.01	0.01	0.03
Copper (as Cu)	mg/L	BLQ	0.06	BLQ	BLQ	BLQ	0.04
Hexavalent Chromium (as Cr ⁶⁺)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	0.04	BLQ	0.03	0.03	0.03	0.05
Total Arsenic (as As)	mg/L	BLQ	BLQ	BLQ	BLQ	0.01	BLQ

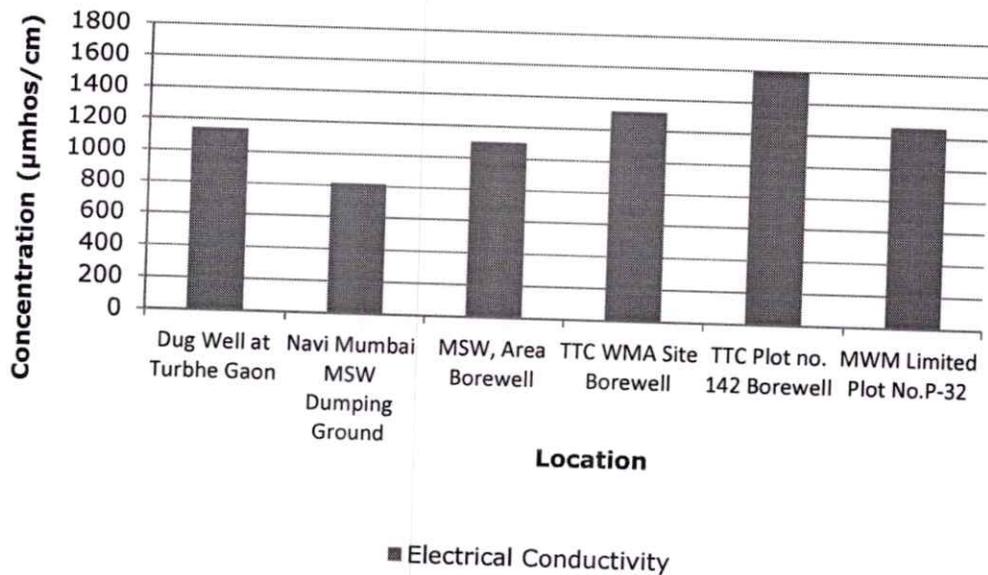
Parameters	Unit	Results					
		Dug Well at Turbhe Gaon, Navi Mumbai	Navi Mumbai MSW Dumping Ground Borewell Water Turbhe Navi Mumbai	MSW, Area Borewell Navi Mumbai	TTC WMA Site Borewell	TTC Plot no. 142 Borewell	Mumbai Waste Management Limited Plot No. P-32 and P-32 Part MIDC, Taloja
Lead (as Pb)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	0.10	0.08	0.06	0.06	0.07	0.14
Iron (as Fe)	mg/L	0.40	0.32	0.38	0.35	0.27	0.35
Vanadium (as V)	mg/L	BLQ	0.03	0.01	0.01	0.02	0.02
Selenium (as Se)	mg/L	BLQ	BLQ	0.01	0.02	BLQ	BLQ
Boron (as B)	mg/L	BLQ	0.15	BLQ	BLQ	0.15	BLQ
Bioassay Test on fish	% survival	100	90	100	97	97	93

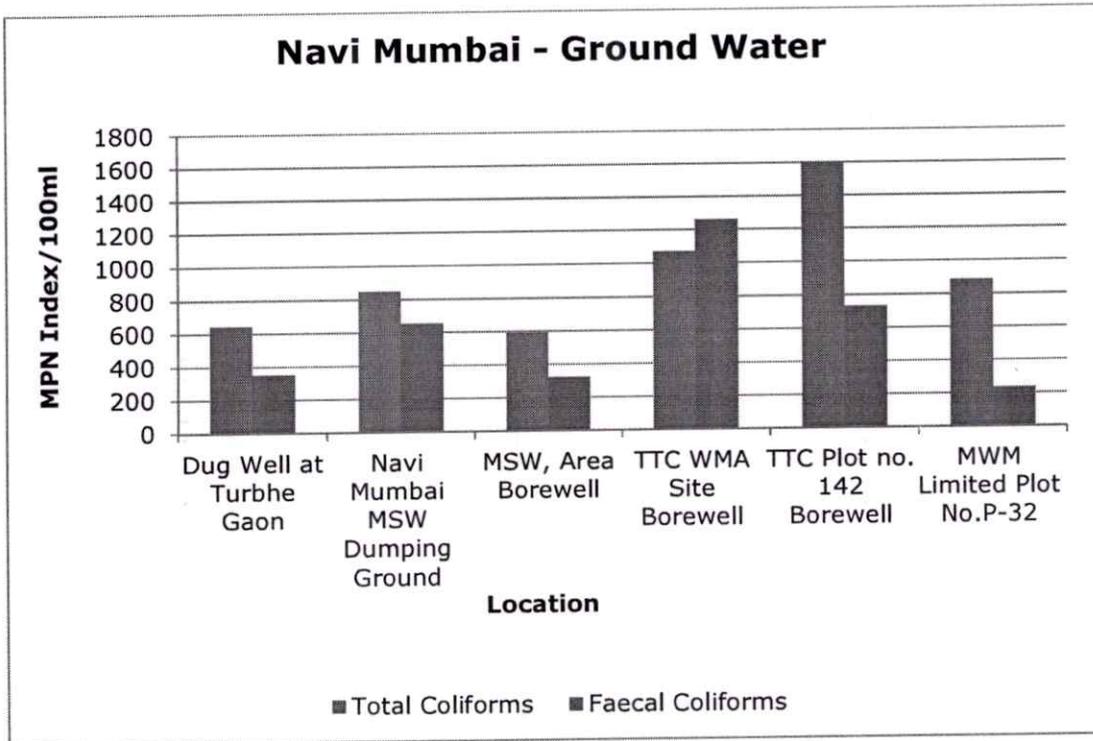
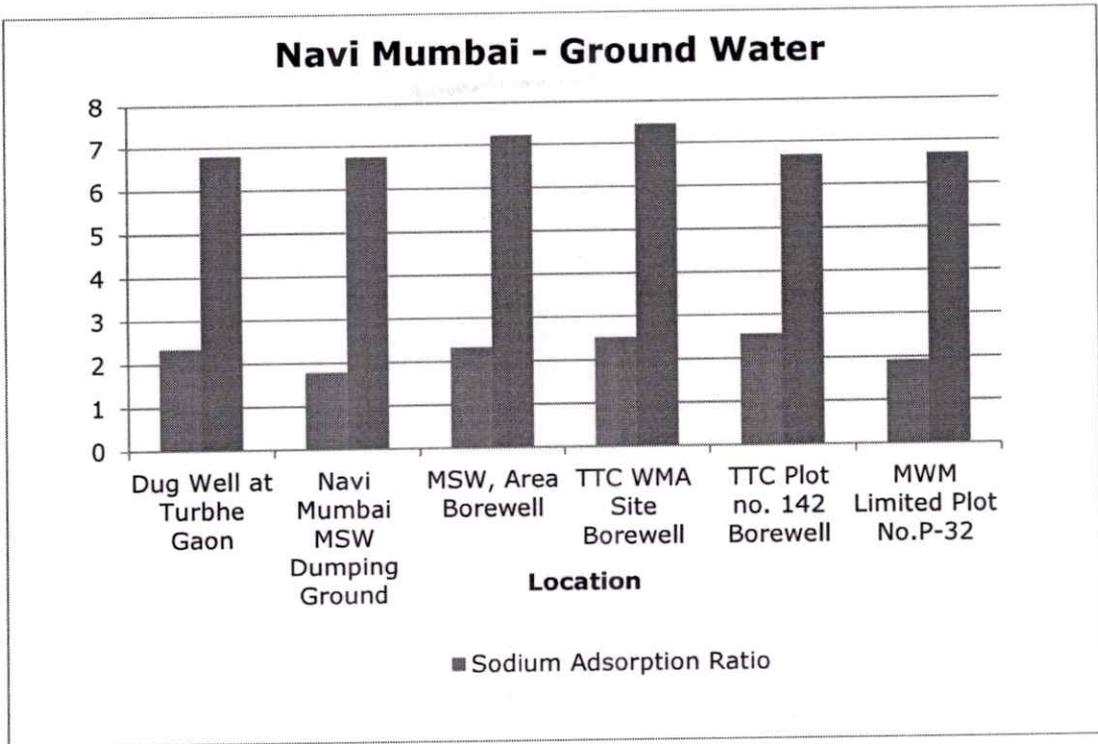
Graphs - Ground Water Quality of Navi Mumbai

Navi Mumbai - Ground Water

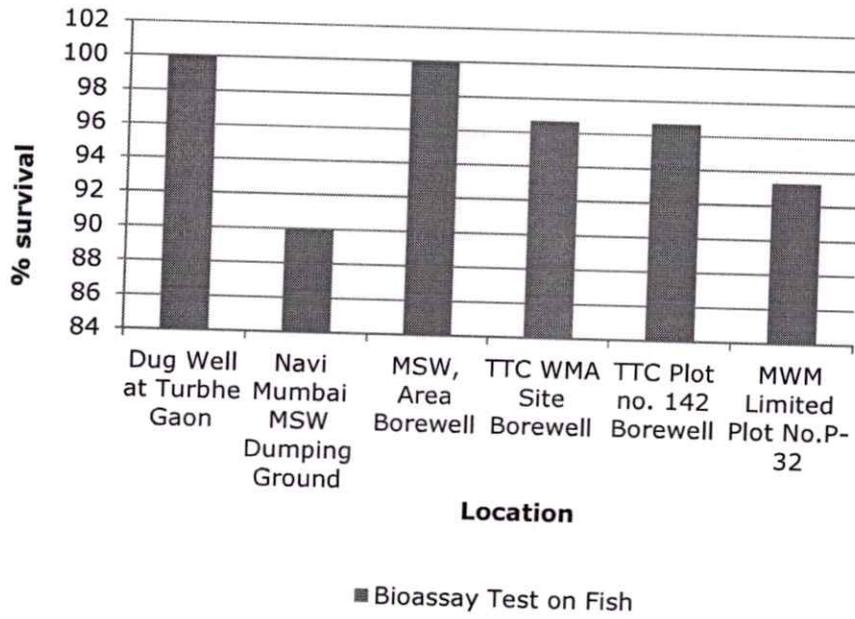


Navi Mumbai - Ground Water





Navi Mumbai - Ground Water



8. Health Related Data

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 2023

	A1	A2	A	B	C	D	CEPI
Air Index	4	4	16	0	10	10	36.00
Water Index	1.5	4	6	33.25	10	0	49.30
Land Index	1.5	4	6	0	10	0	16.00
Aggregated CEPI							52.20

Table 8.2 Comparison of CEPI Scores

Year	Air Index	Water Index	Land Index	CEPI
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
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
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CEPI Score Calculations:

Ambient Air Analysis Report

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

Pollutant	Avg (1)	Std (2)	EF (3) [(3)=(1)/(2)]	No. of samples Exceeding (4)	Total no. of samples (5)	SNLF Value (6) [(6)=(4)/(5)x(3)]	SNLF score (B)	
As	0.3	6	0.05	0	8	0.00	L	0
PM ₁₀	65.8	100	0.66	0	8	0.00	L	0
PM _{2.5}	18.2	60	0.30	0	8	0.00	L	0
B score = (B1+B2+B3)							B	0

C	10	>10 %
D	10	A-A-IA

Air CEPI	(A+B+C+D)	36.0
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Water Quality Analysis Report

Pollutant	Group	A1	A2	A (A1 X A2)
TDS	A	1	Large	
(NH ₄ ⁺ NH ₃)-N	A	0.25		
Zn	A	0.25		
		1.5	4	6

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)	
TDS	8205.6	2000	4.10	5	6	3.42	C	30
(NH ₄ ⁺ NH ₃)-N	0.94	1.5	0.63	1	6	0.10	M	3.25
Zn	0.02	0.3	0.07	0	6	0.00	L	0
B score = (B1+B2+B3)							B	33.25

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

Water CEPI	(A+B+C+D)	49.3
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Ground Water Quality Analysis Report

Pollutant	Group	A1	A2	A (A1 X A2)
(NH ₄ +NH ₃)-N	A	1	Large	
F	A	0.25		
TDS	A	0.25		
		1.5	4	6

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)	
(NH ₄ +NH ₃)-N	0.13	0.5	0.26	0	6	0.00	L	0
F	0.92	1.5	0.61	0	6	0.00	L	0
TDS	675.56	2000	0.34	0	6	0.00	L	0
B score = (B1+B2+B3)							B	0

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

Land CEPI	(A+B+C+D)	16.0
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Water CEPI Score (i_m) 49.3

Air CEPI Score (i₂) 36.00

Land Score (i₃) 16.00

Aggregated CEPI Score = $i_m + \{(100-i_m) \cdot i_2 / 100\} \cdot i_3 / 100\}$

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

CEPI Score **52.2**

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 57.33 µg/m³ to 78.00 µg/m³ and PM_{2.5} in the range of 15.67 to 22.00 µg/m³ at the studied locations.
- In the CEPI score calculated for Air Environment by CPCB in March 2018, the concentration of PM₁₀ 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 PM_{2.5} are found below permissible levels resulted in less exceedance factor, hence lower air index (36.00).

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 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.

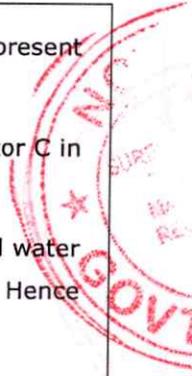
Ground Water Quality

- Six ground water samples were collected from different Dug well, well and Bore well in the region.
- Ground water of the studied regions was found to be safe for drinking with a very low concentration of 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

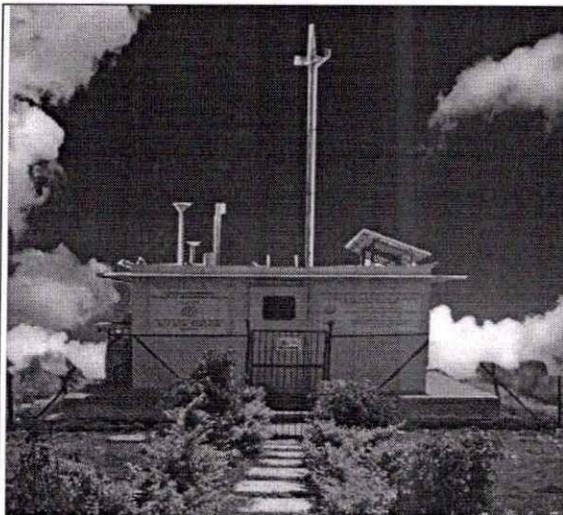
- The CEPI Score pre-monsoon season is 52.2.
- During calculation of CEPI score, water Index is calculated highest with 49.3, followed by the Air Index 36.00 and Land index as 16. The parameters of surface water and ground water in Navi Mumbai region is well within the limits. Hence, aggregated CEPI score is calculated as 52.2, 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 2023) 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 air and 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 all three 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 21% decrease in CEPI score is observed from 66.32 in 2018 to 52.2 in June 2023.



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 proccured 2 Nos. of fogging machines. NMMC is already having 6 Nos. of mechanical sweeping machines.
- Around 1 lakh trees are planted in last one year (2021-2022).
- Directions issued to the industries to switch over on clean fuel.



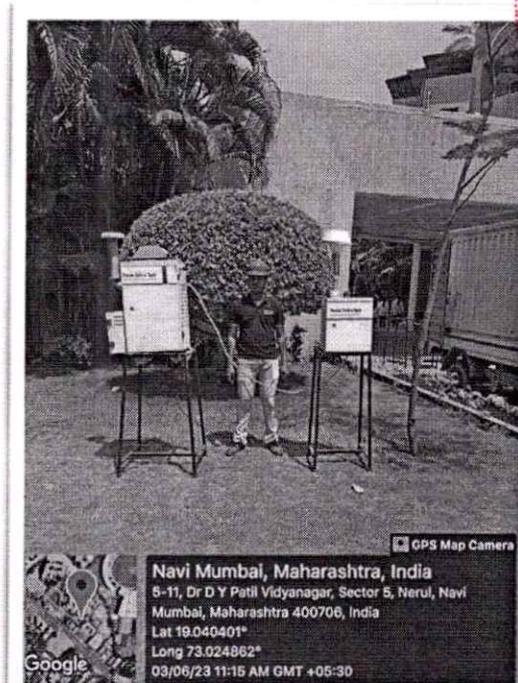
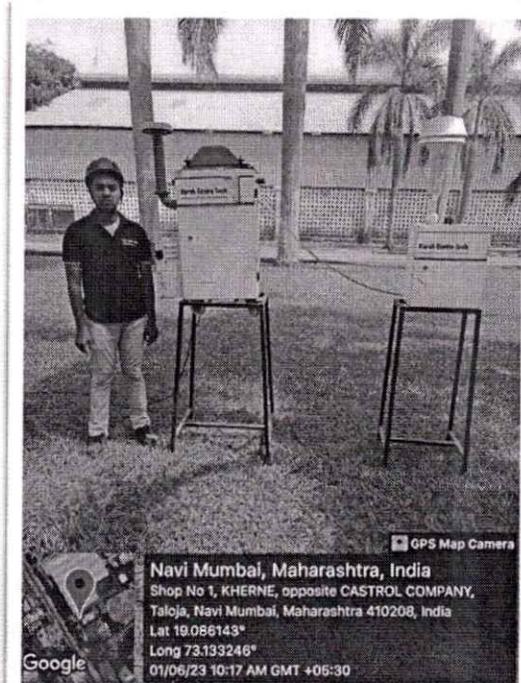
Continuous Ambient Air Quality Monitoring Station (CAAQMS)



Ambient Air Quality Monitoring (AAQM) Van

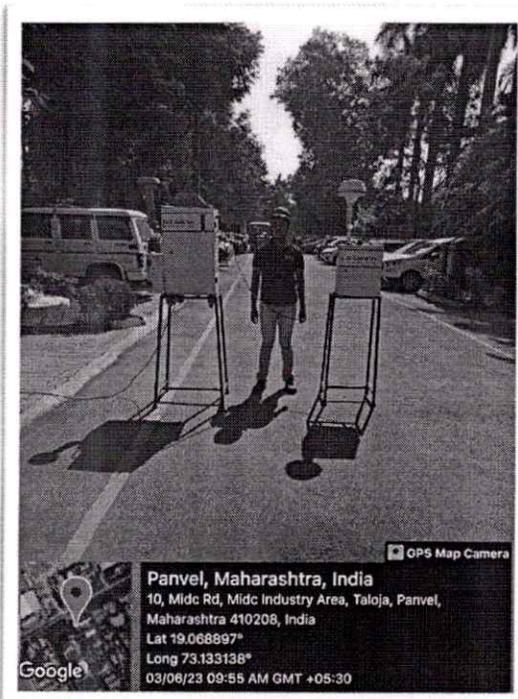
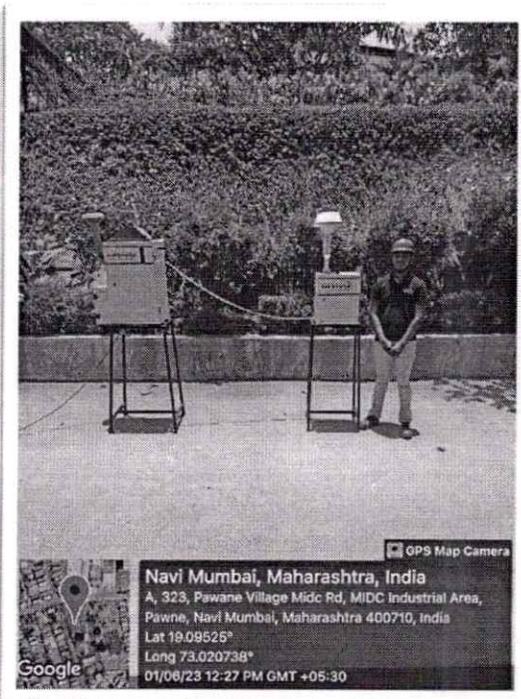
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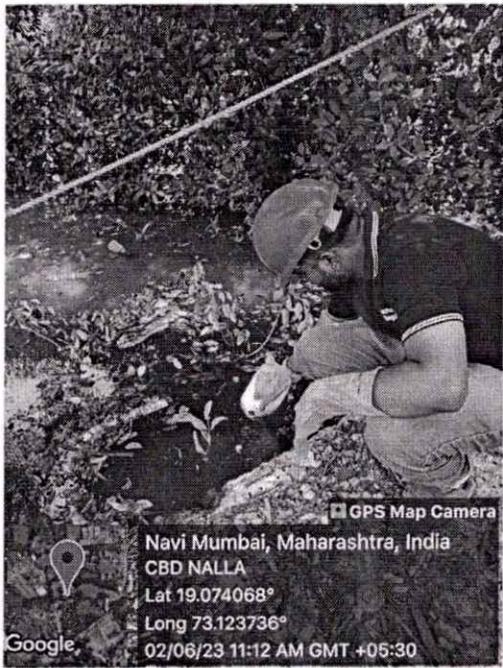
Ambient Air Sampling at Ashi India Glass

Ambient Air Sampling at D Y Patil Hospital



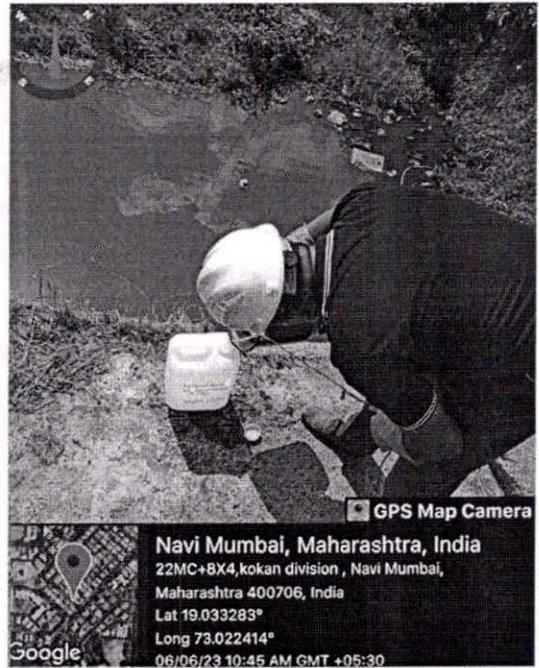
Ambient Air Quality Monitoring CETP
 Koparkharine

Ambient Air Quality Monitoring at Deepak
 Fertilizers and Petrochemicals



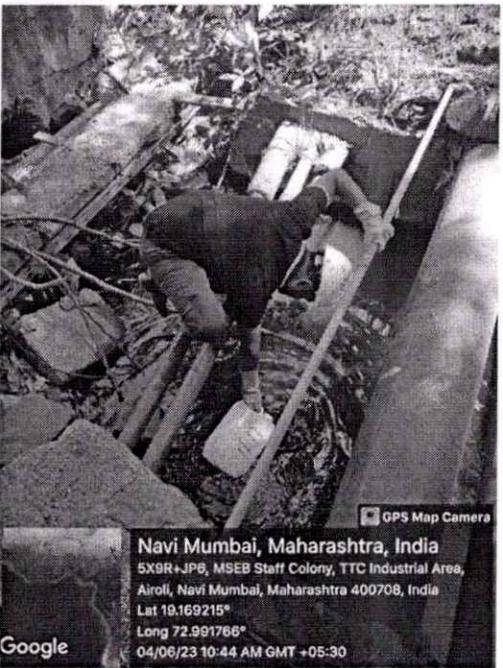
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Surface Water Sampling – CBD Nallah



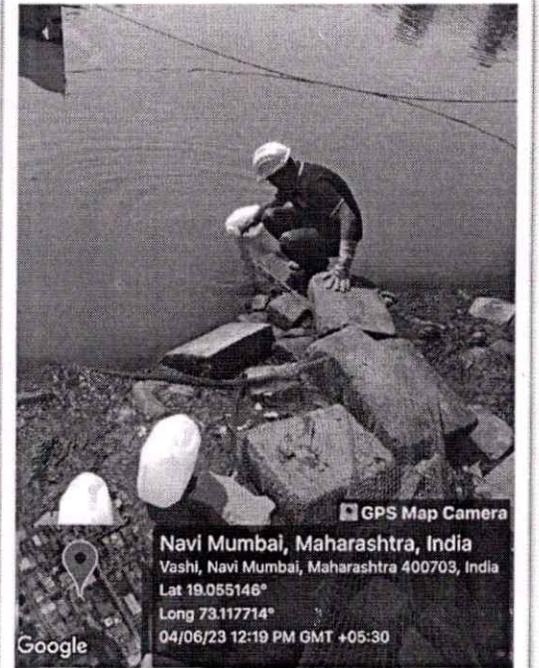
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Surface Water Sampling – Kasardi River near CETP Taloja



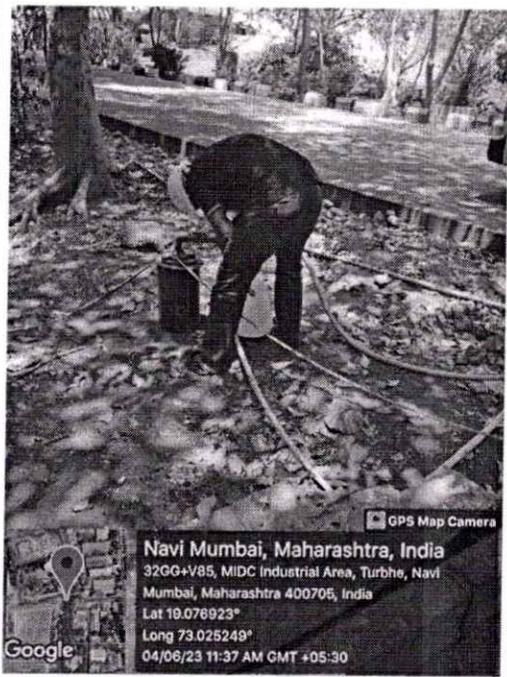
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Surface Water Sampling – Siemens Nallah

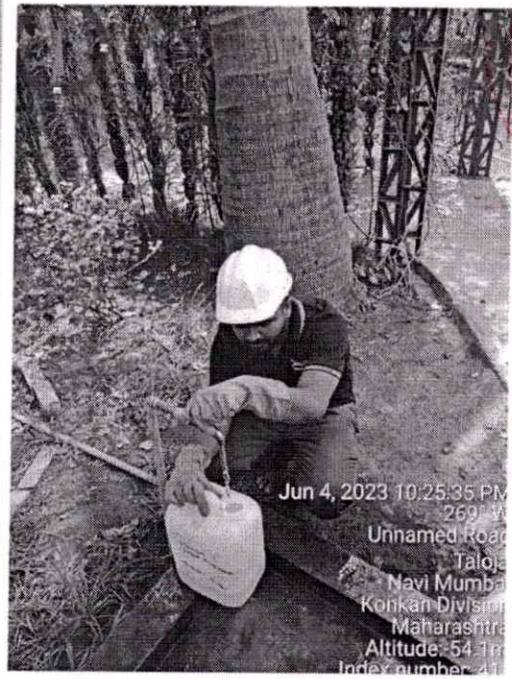


GPS Map Camera
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 Long 73.117714°
 04/06/23 12:19 PM GMT +05:30

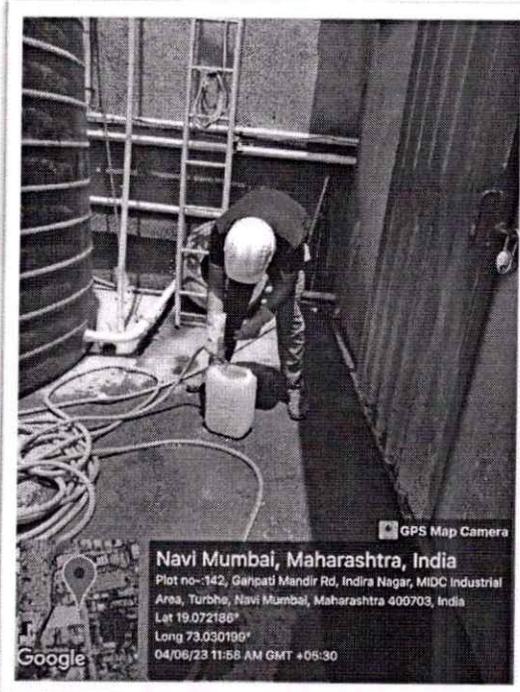
Surface Water Sampling – Vashi Creek at Vashi Bridge



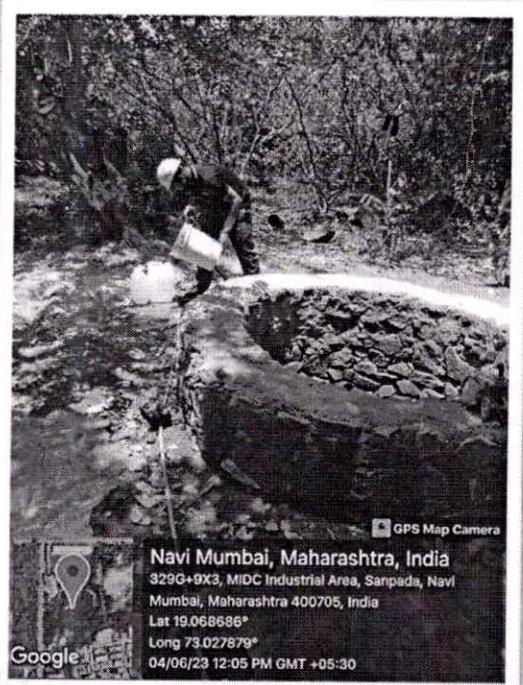
Groundwater Sampling – MSW Borewell



Groundwater Sampling – Mumbai Waste Management Limited



Groundwater Sampling – TTC plot no. 142



Groundwater Sampling – Dug well Turbhe

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)	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	
		2022 (Jan-Dec)	2021 (Jan-Dec)
AIRBORNE DISEASES			
1.	Asthma	516	218
2.	Acute Respiratory Infection	484	204
3.	Bronchitis	218	84
4.	Cancer	109	88
WATERBORNE DISEASES			
1.	Gastroenteritis	184	17
2.	Diarrhea	148	68
3.	Renal diseases	425	312
4.	Cancer	179	116

Date:

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