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

AURANGABAD

Post Monsoon (December 2022 to February 2023)

Maharashtra Pollution Control Board

Kalptaru Point, Sion East, Mumbai – 400 022

Index

ABBREVIATIONS **3**

1. Executive Summary **4**

2. Introduction **5**

3. Scope of Work **7**

Table 3.1 Sampling Details of Aurangabad 7

Table 3.2 Frequency of Sampling 8

4. Methodology **10**

5. Air Environment **12**

Table 5.1 MIDC Shendra - Details of Sampling Location of Ambient Air Quality Monitoring 12

Table 5.2 MIDC Shendra - Details of Sampling Location of VOCs Monitoring 12

Table 5.3 MIDC Shendra - Ambient Air Quality Monitoring Results 14

Table 5.4 MIDC Shendra - Volatile Organic Compounds (VOCs) in Ambient Air Results 14

Table 5.5 MIDC Chikhalthana - Details of Sampling Location of Ambient Air Quality Monitoring . 20

Table 5.6 MIDC Chikhalthana - Details of Sampling Location of VOCs Monitoring 20

Table 5.7 MIDC Chikhalthana - Ambient Air Quality Monitoring Results 22

Table 5.8 MIDC Chikhalthana - Volatile Organic Compounds (VOCs) in Ambient Air Results 22

Table 5.9 MIDC Waluj - Details of Sampling Location of Ambient Air Quality Monitoring 28

Table 5.10 MIDC Waluj - Details of Sampling Location of VOCs Monitoring 28

Table 5.11 MIDC Waluj - Ambient Air Quality Monitoring Results 30

Table 5.12 MIDC Waluj - Volatile Organic Compounds (VOCs) in Ambient Air Results 30

Table 5.13 MIDC Paithan - Details of Sampling Location of Ambient Air Quality Monitoring 36

Table 5.14 MIDC Paithan - Details of Sampling Location of VOCs Monitoring 36

Table 5.15 MIDC Paithan- Ambient Air Quality Monitoring Results 38

Table 5.16 MIDC Paithan- Volatile Organic Compounds (VOCs) in Ambient Air Results 38

6. Water Environment **45**

Table 6.1 MIDC Shendra - Details of Sampling Location of Surface Water 45

Table 6.2 MIDC Shendra - Results of Surface Water 46

Table 6.3 MIDC Chikhalthana - Details of Sampling Location of Surface Water 53

Table 6.4 MIDC Chikhalthana - Results of Surface Water 54

Table 6.5 MIDC Waluj - Details of Sampling Location of Surface Water 61

Table 6.6 MIDC Waluj - Results of Surface Water 62

Table 6.7 MIDC Paithan - Details of Sampling Location of Surface Water 69

Table 6.8 MIDC Paithan - Results of Surface Water 70

6. Land Environment 77

Table 7.1 MIDC Shendra - Details of Sampling Location of Ground Water 77

Table 7.2 MIDC Shendra - Results of Ground Water 78

Table 7.3 MIDC Chikhalthana - Details of Sampling Location of Ground Water 84

Table 7.4 MIDC Chikhalthana - Results of Ground Water 85

Table 7.5 MIDC Waluj - Details of Sampling Location of Ground Water 91

Table 7.6 MIDC Waluj - Results of Ground Water 92

Table 7.7 MIDC Paithan - Details of Sampling Location of Ground Water 97

Table 7.8 MIDC Paithan - Results of Ground Water 98

8. Health Related Data 104

9. CEPI Score 105

Table 8.1 CEPI score of the Post monsoon season 2023 is given below: 105

Table 8.2 Comparison of CEPI Scores 105

10. Conclusion 108

11. Efforts taken by MPCB to control and reduce Environmental Pollution Index 110

12. Photographs 112

ABBREVIATIONS

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

1. Executive Summary

Aurangabad CEPI area includes four Maharashtra Industrial development Corporations (MIDCs) namely, MIDC Shendra, MIDC Chikalthana, MIDC Waluj and MIDC Paithan were 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 locations 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 post monsoon monitoring was carried out during the period of December 2022 to February 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 sixteen locations. The concentration of all ambient air parameters was found well within the limits prescribed by NAAQS. Seventeen locations for surface water and twelve for ground water were monitored for the study. Concentration values of BOD, Total Phosphate (TP) and Total Kjeldahl Nitrogen (TKN) were found above the standard limits in the surface water monitoring. Land index is represented by ground water in the CEPI. Ground water parameters were found to be within the permissible limits when compared with IS10500:2012 drinking water standards.

Based on the study conducted by CPCB during the period January 2018, the CEPI score of Aurangabad region as per the revised guidelines of CEPI (2016) was 69.85 (Air Index–45, Water Index-65.38 and Land Index–28.75). However, the present study reports aggregated CEPI score of Aurangabad region of post-monsoon season (March, 2023). Based on the study, present CEPI score is 59.36 (Air Index–21.88, Water Index-55.88 and Land Index–36.0). 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 past few years to mitigate the pollution. As regional office of MPCB has taken various initiatives like installation of CAAQMS, CETPs, online VOC analysers etc. in the past few years to control and mitigate the air and water pollutants. This has contributed to the factor D, hence reduced the CEPI score of the region over the years.

The analysis of the aggregated CEPI score shows that the pollution in Aurangabad industrial clusters has reduced in last three years. Approximately 15% decrease in CEPI score is observed from 69.85 in 2018 to 59.36 in 2023.

2. Introduction

Environmental pollution is considered as a serious issue over the years, affecting the health of human beings all over the world. This issue and its corresponding harmful ecological impacts have also been increased by urbanization and industrialization across the country. This is further affecting the lives of billions of people, other living creatures, and monuments, damaging and destroying the natural resources.

In view of this, Central Pollution Control Board (CPCB) has evolved the concept of 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. CEPI bridges the perceptive 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 Aurangabad region, which is a place of great importance due to its location on the famous Silk Route that traversed across the breadth of Asia to reach Europe. Aurangabad city typifies the landscape and the climatic conditions of the entire Marathwada region and is the Divisional Head Quarters of the Marathwada Region. The city is situated on the bank of river Kham a tributary of the Godavari River. s situated on the bank of river Kham a tributary of the Godavari River. The city is surrounded by hills of the Vindhya Ranges and the river Kham passes through it.

Aurangabad accounts for 4 MIDCs about with 1045 red category industries, 596 orange category industries and 3058 green category industries of various category engaged in the manufacturing of chemicals, dyes, dye-intermediates, Bulk drugs, pharmaceuticals, Textile auxiliaries, Pesticides, Petrochemicals, Iron and steel, 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 results of the application of the Comprehensive Environmental Pollution Index (CEPI) to selected industrial clusters or areas are presented in this report. The main objective of the study is to identify polluted industrial clusters or areas in order to take concerted action and to centrally monitor them at the national level to improve the current status of their environmental components such as air and water quality data, ecological damage, and visual environmental conditions. The index captures the various dimensions of environment including air, water and land. Comprehensive Environmental Pollution Index (CEPI), which is a rational number to characterize the environmental quality at a given location following the algorithm of source, pathway and receptor have been developed.

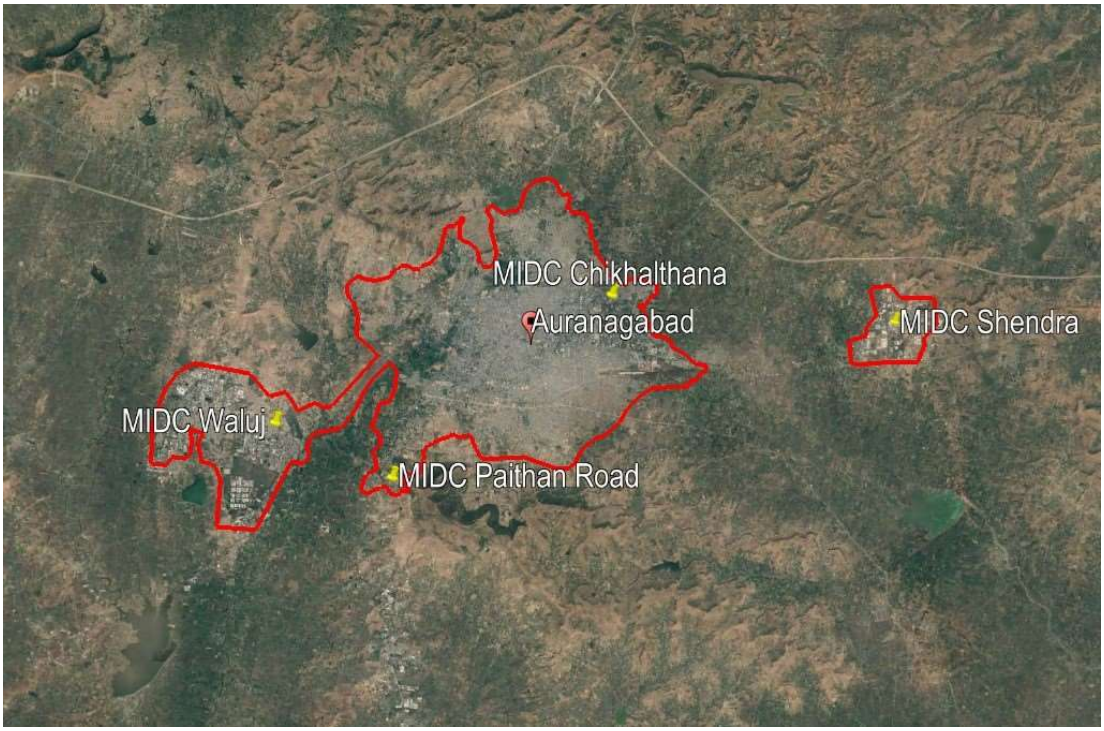


Fig: Aurangabad Region CEPI Monitoring Zone

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 the selected Pollution Industrial Areas (PIAs) of Aurangabad, 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 Aurangabad

Sampling Criteria	Number of sites	Total Sites	Monitoring Parameters
Ambient Air Quality	• MIDC Shendra-04 • MIDC Chikalthana - 04 • MIDC Waluj - 04 • MIDC Paithan Road - 04	**16**	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)	• MIDC Shendra-02 • MIDC Chikalthana - 02 • MIDC Waluj - 02 • MIDC Paithan Road - 02	**08**	Dichloromethane,Chloroform,CarbonTetrachloride, 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-Isopropyltoluene, M-Xylene, P-Xylene, Styrene, Cumene 1,2,3-Trichloropropane,N-Propylbenzene, 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-

Sampling Criteria	Number of sites	Total Sites	Monitoring Parameters
			Trichlorobenzene, Hexachlorobutadiene, 1,2,4-Trichlorobenzene, 2,2-Dichloropropane, Dibromomethane, 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
Water Quality Monitoring	**Surface water** • MIDC Shendra-06 • MIDC Chikalthana -06 • MIDC Waluj - 06 • MIDC Paithan Road - 06	**24**	**(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, 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 • MIDC Shendra-03 • MIDC Chikalthana - 03 • MIDC Waluj - 03 • MIDC Paithan Road - 03	**12**	

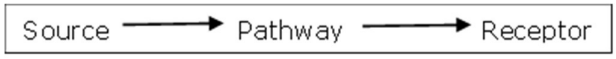
Table 3.2 Frequency of Sampling

	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

	Parameter	Round of Sampling	Frequency in Each Round
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 potential 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.

Methodology for sampling, preservation and analysis have been done according to the CPCB/ EPA/ APHA/ IS/ ASTM standard methods for the samples.

AIR ENVIRONMENT

5. Air Environment

For studying the Air Environment of Aurangabad 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 here.*

1. **MIDC Shendra:** In MIDC Shendra, four locations have been monitored to check the Ambient Air Quality (AAQ) in triplicate from 11thJan., 2023 to 15th Jan., 2023. All the 12 AAQ parameters were monitored as per National Ambient Air Quality Standards (NAAQS, 2009). Results of analysis show that the concentration of most the parameters at all studied locations is observed well within the limits. VOCs were monitored at 2 locations namely Radico NV Distillery and Wockhardt Biotech Ltd.

Table 5.1 MIDC Shendra - Details of Sampling Location of Ambient Air Quality Monitoring

S.No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Skoda Auto	19.872345N	75.489701E	11.01.2023	13.01.2023	15.01.2023
2.	Outside of Radico NV Distillery	19.883362N	75.502107E	11.01.2023	13.01.2023	15.01.2023
3.	Outside of Glenmark Pharmaceuticals Ltd.	19.872756N	75.502835E	11.01.2023	13.01.2023	15.01.2023
4.	Outside of Wockhardt Biotech Ltd.	19.873311N	75.491763E	11.01.2023	13.01.2023	15.01.2023

Table 5.2 MIDC Shendra - Details of Sampling Location of VOCs Monitoring

S.No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Outside of Radico NV Distillery	19.883362N	75.502107E	11.01.2023	13.01.2023	15.01.2023
2.	Outside of Glenmark Pharmaceuticals Ltd.	19.872756N	75.502835E	11.01.2023	13.01.2023	15.01.2023

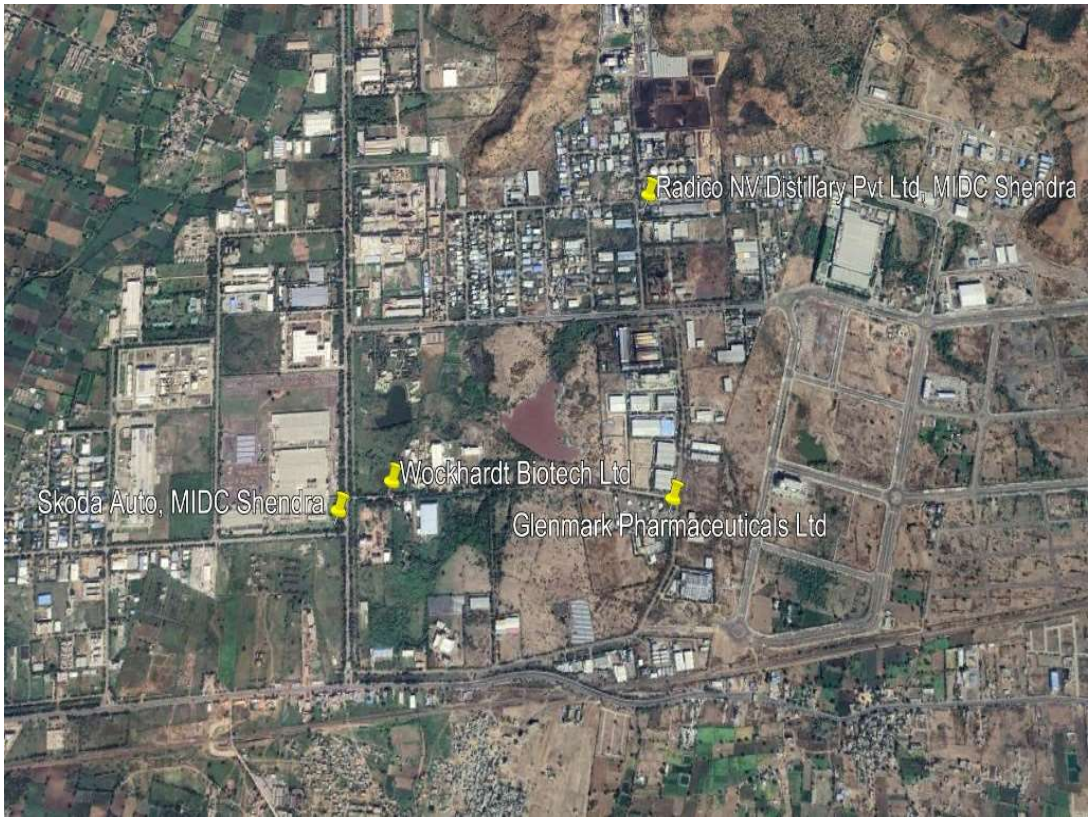


Fig: Geographical Locations of Ambient Air Quality Monitoring MIDC Shendra

Fig: Geographical Locations of VOCs Monitoring MIDC Shendra

Table 5.3 MIDC Shendra - Ambient Air Quality Monitoring Results

Parameters	Unit	Results			
		Skoda Auto	Outside of Radico NV Distillery	Outside of Glenmark Pharmaceuticals Ltd.	Outside of Wockhardt Biotech Ltd.
Sulphur Dioxide (SO_2)	µg/m³	7.49	48.30	55.50	22.11
Nitrogen Dioxide (NO_2)	µg/m³	29.40	17.42	16.43	19.32
Particulate Matter (size less than 10 µm) or PM_{10}	µg/m³	66	62	48	63
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	µg/m³	17	17	15	16
Ozone (O_3)	µg/m³	BLQ	BLQ	BLQ	BLQ
Lead (Pb)	µg/m³	BLQ	BLQ	BLQ	BLQ
Carbon Monoxide (1 h)	mg/m³	1.76	1.35	1.47	1.78
Carbon Monoxide (8 h)	mg/m³	2.09	1.79	1.64	2.26
Ammonia (NH_3)	µg/m³	33.60	33.80	24.40	BLQ
Benzene (C_6H_6)	µg/m³	2.18	2.69	2.27	3.02
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m³	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m³	0.65	0.92	0.53	1.16
Nickel (Ni)	ng/m³	BLQ	BLQ	BLQ	4.54

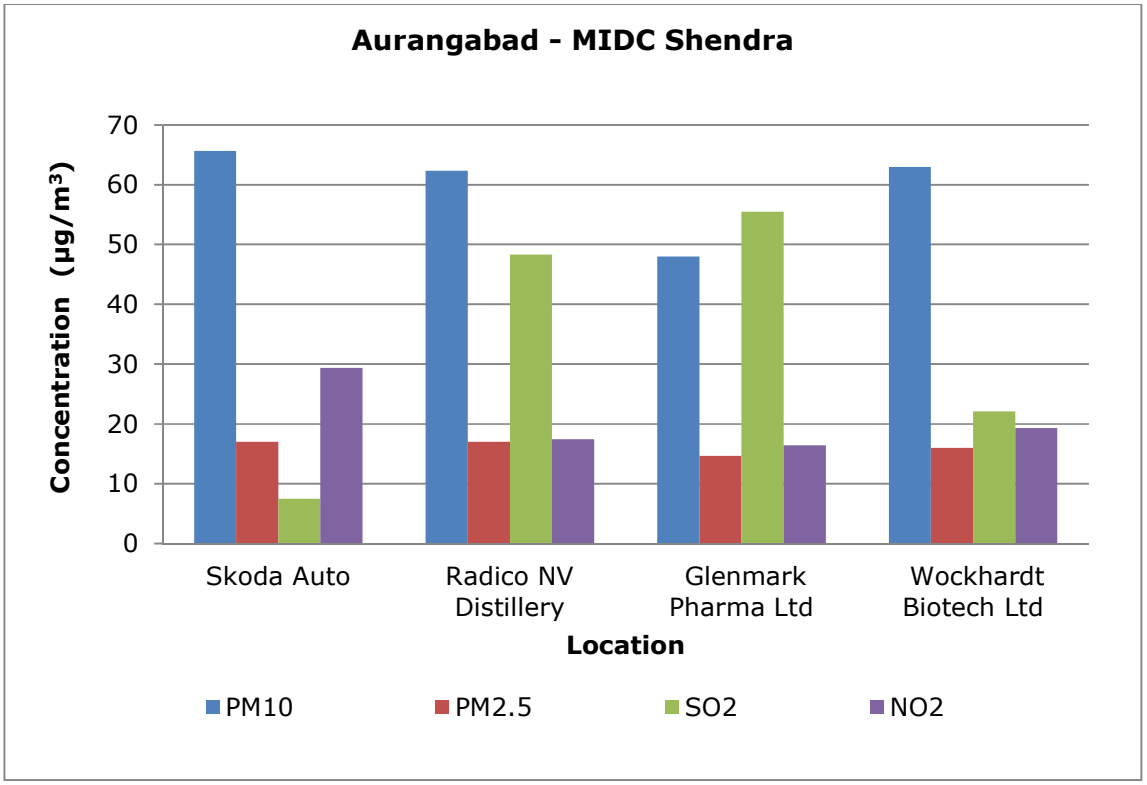
Table 5.4 MIDC Shendra - Volatile Organic Compounds (VOCs) in Ambient Air Results

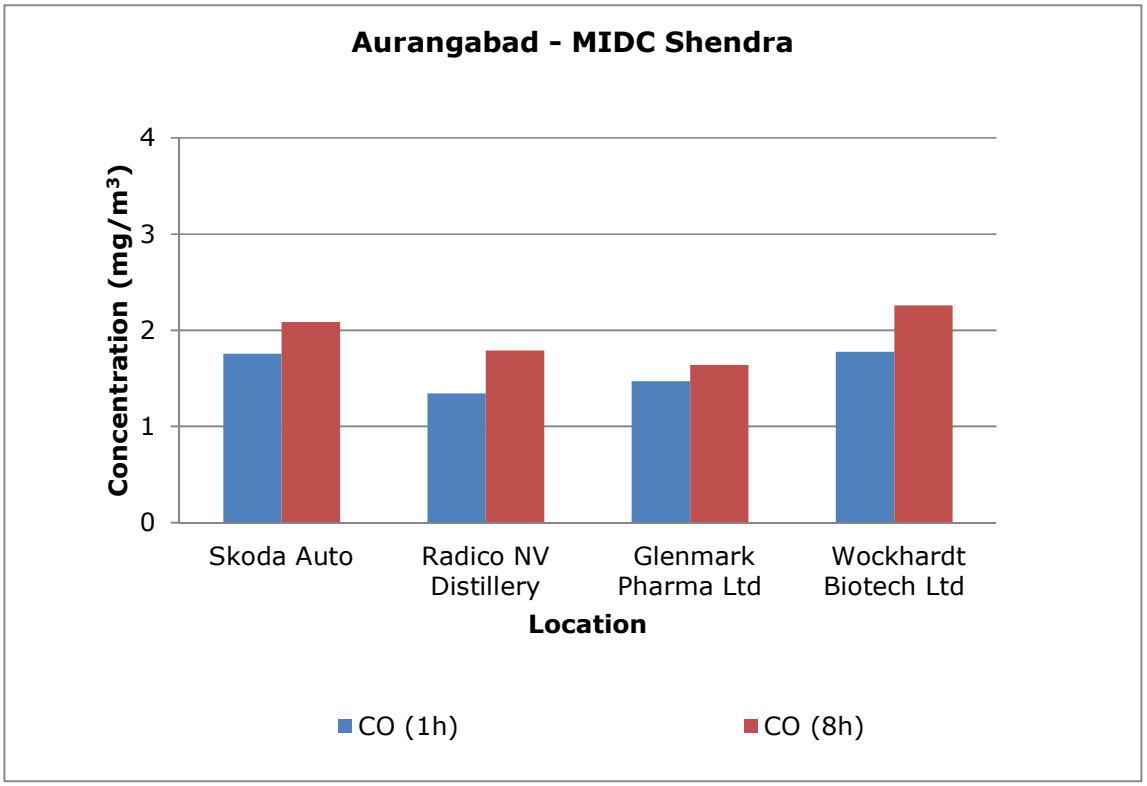
Parameters	Unit	Results	
		Outside of Radico NV Distillery	Outside of Glenmark Pharmaceuticals Ltd.
Dichloromethane	µg/m³	BLQ	BLQ
Chloroform	µg/m³	BLQ	BLQ
Carbon Tetrachloride	µg/m³	0.96	BLQ
Trichloroethylene	µg/m³	BLQ	BLQ
Bromodichloromethane	µg/m³	BLQ	BLQ
1,3-Dichloropropane	µg/m³	BLQ	BLQ

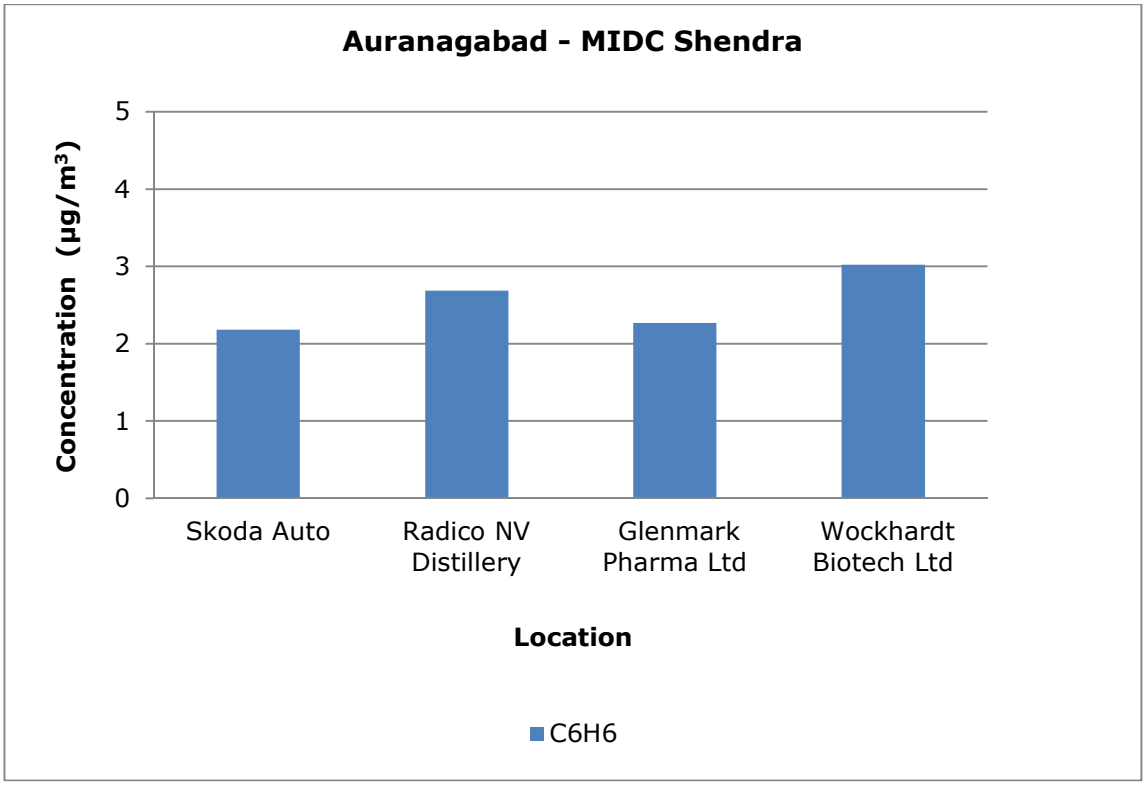
Parameters	Unit	Results	
		Outside of Radico NV Distillery	Outside of Glenmark Pharmaceuticals Ltd.
1,4-Dichlorobenzene	µg/m³	2.14	2.47
1,3-Dichlorobenzene	µg/m³	1.10	1.69
1,2-Dichlorobenzene	µg/m³	3.98	1.53
1,2-Dibromo-3-Chloropropane	µg/m³	BLQ	BLQ
Naphthalene	µg/m³	24.00	2.38
Bromobenzene	µg/m³	BLQ	BLQ
1,2,4-Trimethylbenzene	µg/m³	0.80	0.64
2-Chlorotoluene	µg/m³	BLQ	BLQ
Tert-Butylbenzene	µg/m³	BLQ	BLQ
SEC-Butylbenzene	µg/m³	BLQ	BLQ
P-Isopropyltoluene	µg/m³	1.15	1.23
M-Xylene	µg/m³	BLQ	BLQ
P-Xylene	µg/m³	BLQ	BLQ
Styrene	µg/m³	0.61	1.01
Cumene	µg/m³	BLQ	BLQ
1,2,3-Trichloropropane	µg/m³	BLQ	BLQ
N-Propylbenzene	µg/m³	0.61	0.65
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	0.98	BLQ
1,2-Dichloroethane	µg/m³	BLQ	BLQ
1,2-Dichloropropane	µg/m³	BLQ	BLQ
Trans-1,3-Dichloropropene	µg/m³	BLQ	BLQ
CIS 1,3-Dichloropropene	µg/m³	BLQ	BLQ
1,1,2-Trichloroethane	µg/m³	BLQ	BLQ
Tetrachloroethylene	µg/m³	BLQ	BLQ
1,3,5-Trimethylbenzene	µg/m³	BLQ	BLQ
N-Butylbenzene	µg/m³	BLQ	BLQ

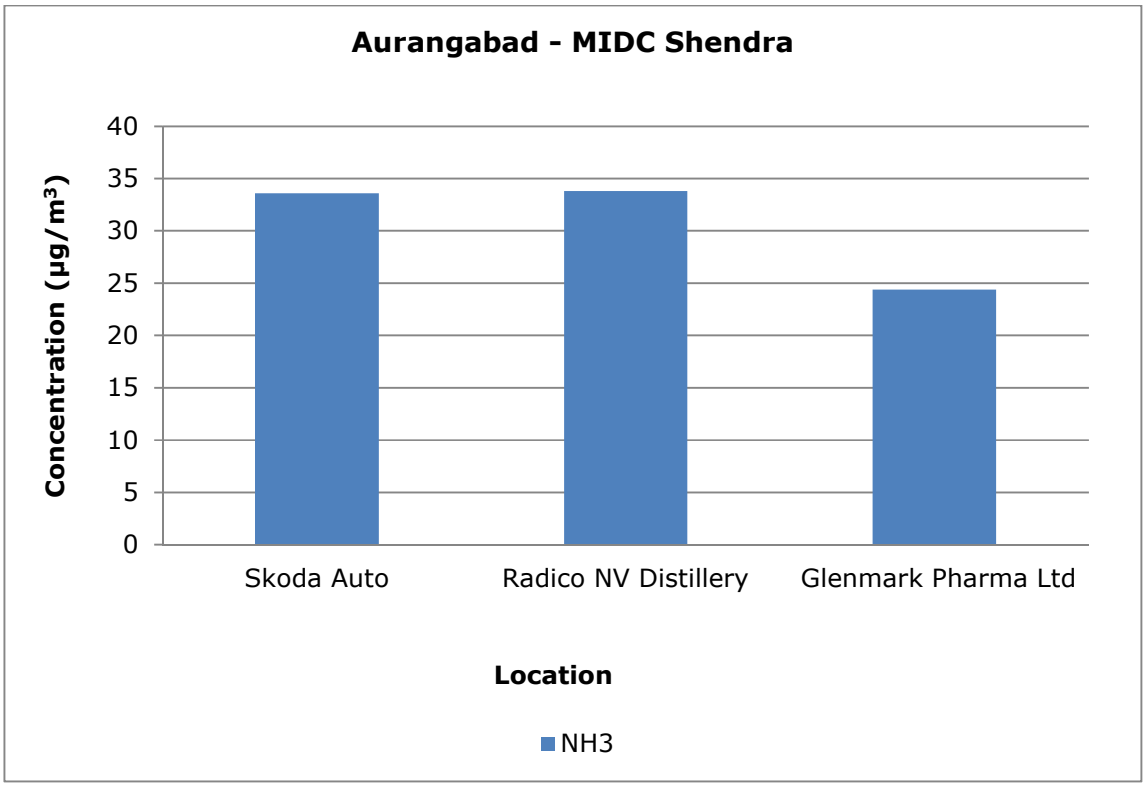
Parameters	Unit	Results	
		Outside of Radico NV Distillery	Outside of Glenmark Pharmaceuticals Ltd.
1,2,3-Trichlorobenzene	µg/m³	BLQ	BLQ
Hexachlorobutadiene	µg/m³	BLQ	BLQ
1,2,4-Trichlorobenzene	µg/m³	2.16	2.17
2,2-Dichloropropane	µg/m³	BLQ	BLQ
Dibromomethane	µg/m³	BLQ	BLQ
Toluene	µg/m³	0.74	0.72
O-Xylene	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

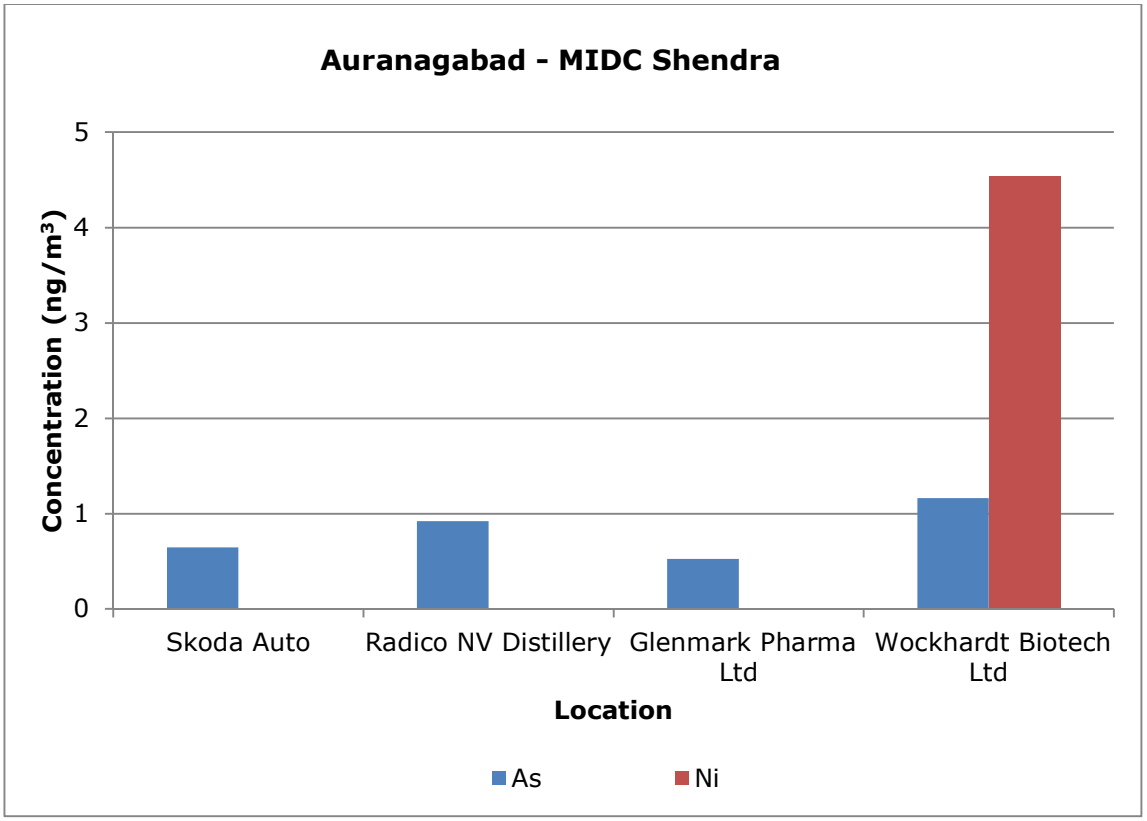
Graphs - Ambient Air Quality Monitoring - MIDC Shendra






Auranagabad - MIDC Shendra
Concentration (µg/m³)
5
4
3
2
1
0
Skoda Auto
Radico NV Distillery
Glenmark Pharma Ltd
Wockhardt Biotech Ltd
Location
C6H6


Aurangabad - MIDC Shendra
Concentration (µg/m³)
40
35
30
25
20
15
10
5
0
Skoda Auto
Radico NV Distillery
Glenmark Pharma Ltd
Location
NH3


Auranagabad - MIDC Shendra
Concentration (ng/m³)
5
4
3
2
1
0
Skoda Auto
Radico NV Distillery
Glenmark Pharma Ltd
Wockhardt Biotech Ltd
Location
As
Ni

2. MIDC Chikalthana: In MIDC Chikalthana, 4 locations were monitored to check the AAQ as per the NAAQS, 2009. Concentration of all the parameters (except Carbon monoxide) at all studied locations is observed well within the limits.

Table 5.5 MIDC Chikhalthana - 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.	Wockhardt Biotech Ltd. (R&D)	19.879034N	75.375937E	10.01.2023	12.01.2023	14.01.2023
2.	Harman Finochem Ltd.	19.878172N	75.383236E	10.01.2023	12.01.2023	14.01.2023
3.	ABD Distillery	19.873087N	75.388674E	10.01.2023	12.01.2023	14.01.2023
4.	Jolly Board Ltd.	19.895694N	75.378577E	10.01.2023	12.01.2023	14.01.2023

Table 5.6 MIDC Chikhalthana - Details of Sampling Location of VOCs Monitoring

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
5.	Concept Pharma	19.875251	75.376492	10.01.2023	12.01.2023	14.01.2023
6.	ABD Distillery	19.873087N	75.388674E	10.01.2023	12.01.2023	14.01.2023

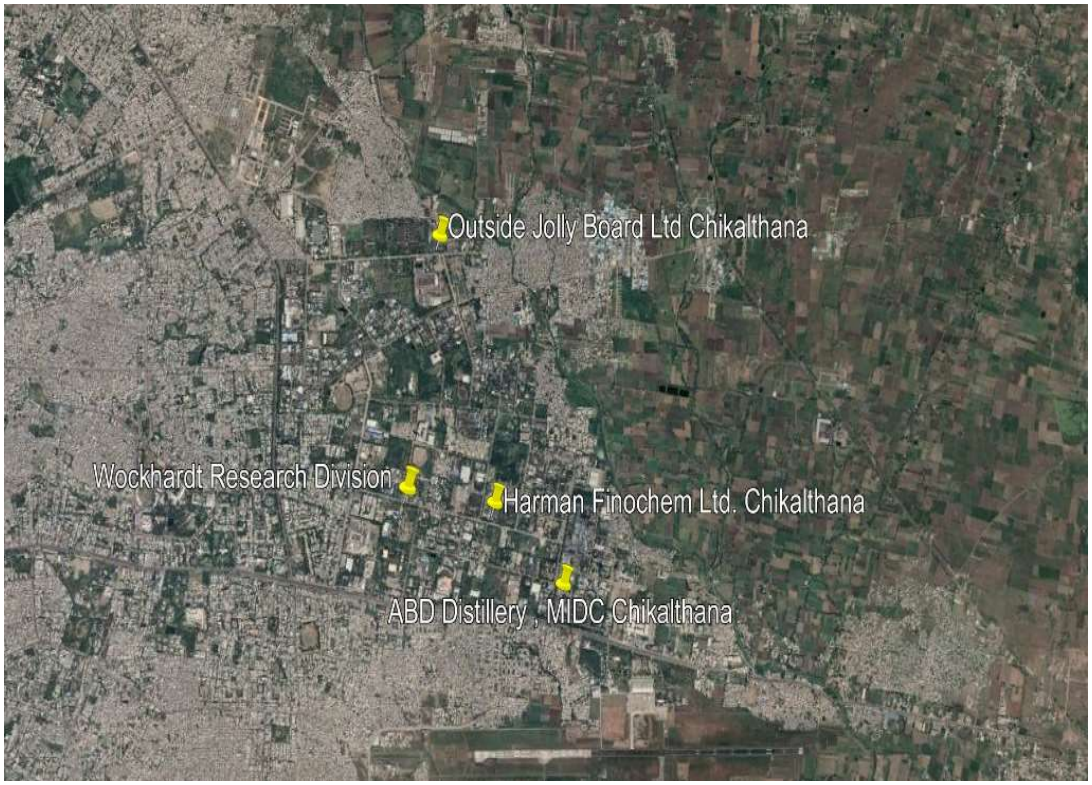


Fig: Geographical Locations of Ambient Air Quality Monitoring MIDC Chikhalthana

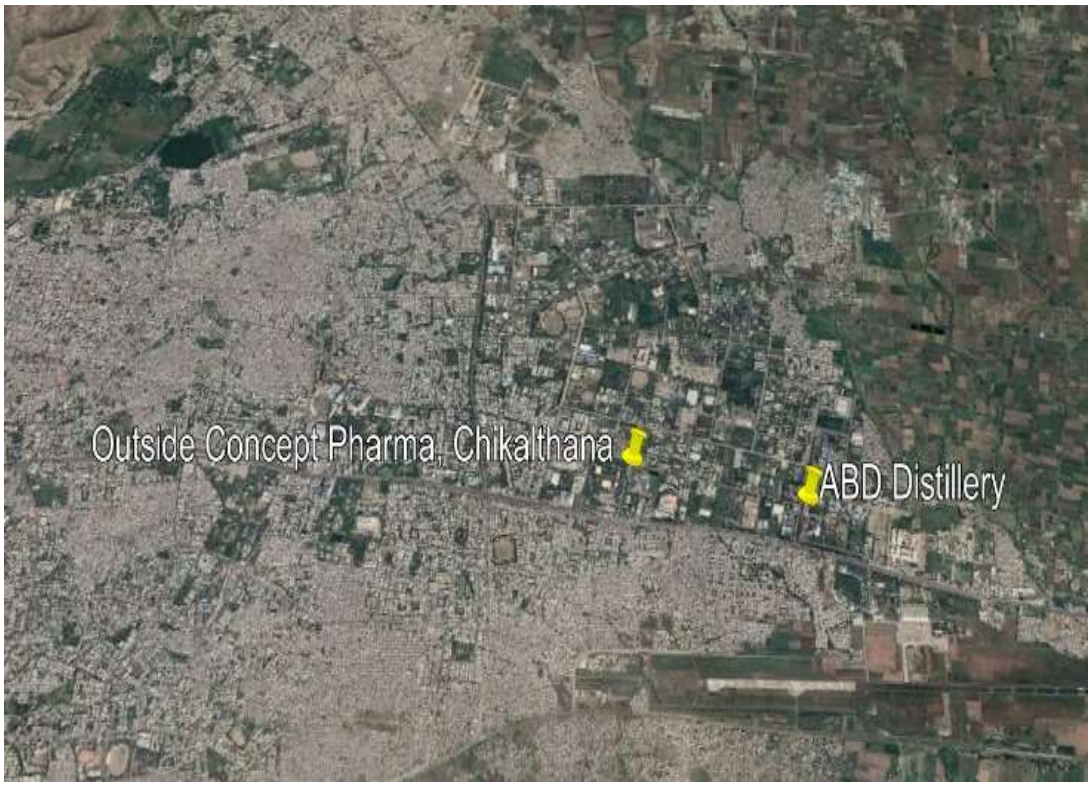


Fig: Geographical Locations of VOCs Monitoring MIDC Chikhalthana

Table 5.7 MIDC Chikhalthana - Ambient Air Quality Monitoring Results

Parameters	Unit	Results			
		Wockhardt Biotech Ltd. (R&D)	Harman Finochem Ltd.	ABD Distillery	Jolly Board Ltd.
Sulphur Dioxide (SO_2)	µg/m³	67.70	34.16	64.40	69.00
Nitrogen Dioxide (NO_2)	µg/m³	25.30	33.20	21.45	21.70
Particulate Matter (size less than 10 µm) or PM_{10}	µg/m³	63	79	77	59
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	µg/m³	17	21	23	15
Ozone (O_3)	µg/m³	BLQ	BLQ	48.10	BLQ
Lead (Pb)	µg/m³	BLQ	BLQ	BLQ	BLQ
Carbon Monoxide (CO) (1h)	mg/m³	1.32	1.40	1.41	1.35
Carbon Monoxide (CO) (8h)	mg/m³	1.96	1.63	2.04	1.68
Ammonia (NH_3)	µg/m³	20.40	BLQ	BLQ	21.40
Benzene (C_6H_6)	µg/m³	3.00	3.09	3.27	2.32
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m³	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m³	0.90	0.80	1.45	0.99
Nickel (Ni)	ng/m³	3.41	5.52	3.22	3.19

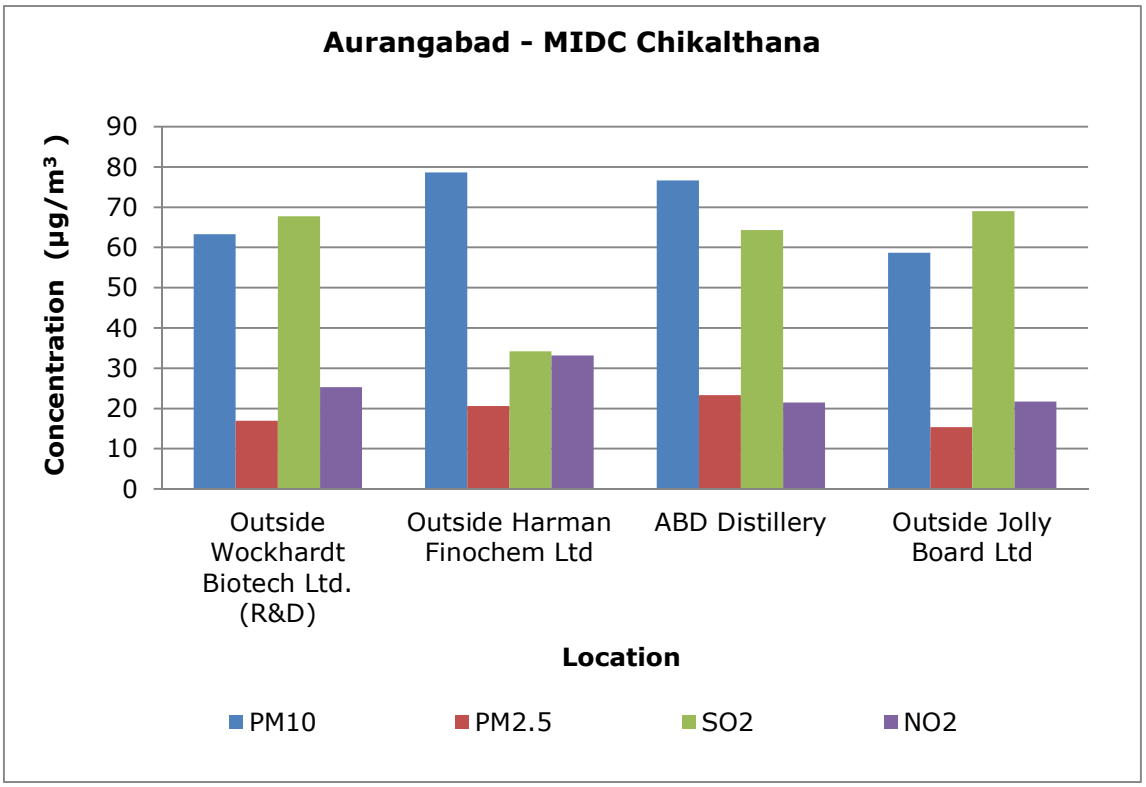
Table 5.8 MIDC Chikhalthana - Volatile Organic Compounds (VOCs) in Ambient Air Results

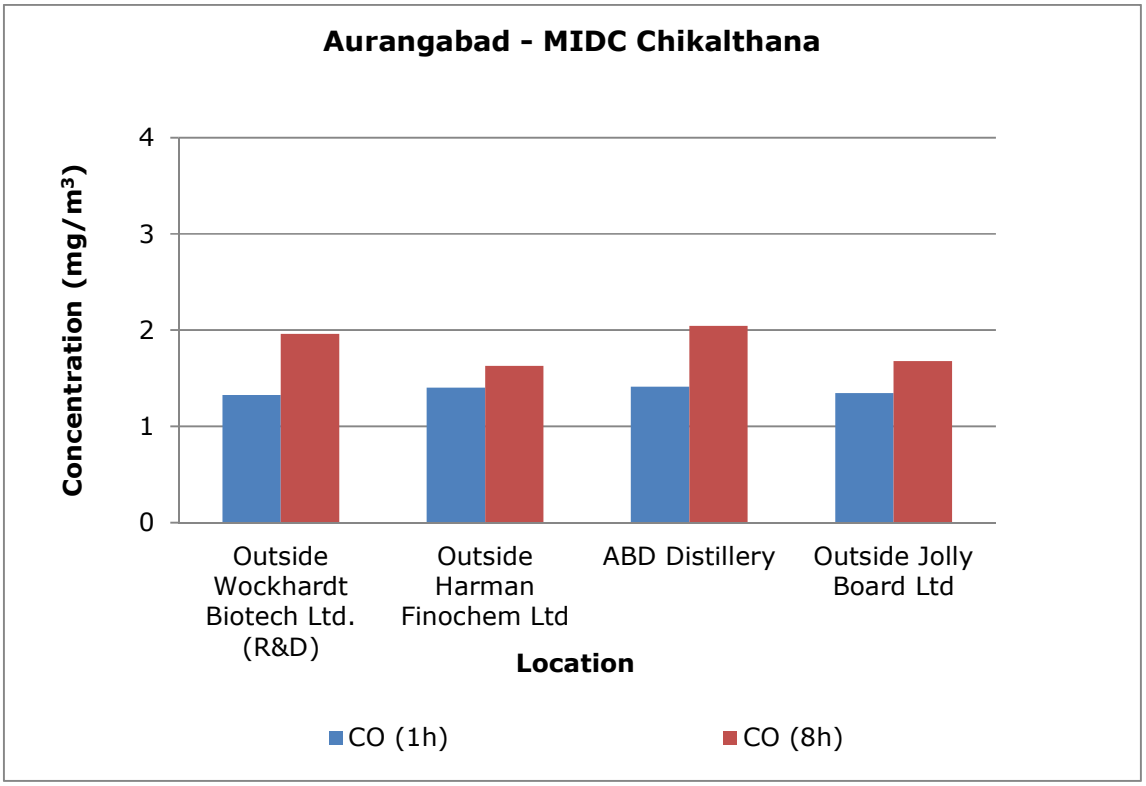
Parameters	Unit	Results	
		ABD Distillery	Outside Concept Pharma
Dichloromethane	µg/m³	BLQ	BLQ
Chloroform	µg/m³	BLQ	BLQ
Carbon Tetrachloride	µg/m³	BLQ	BLQ
Trichloroethylene	µg/m³	BLQ	BLQ
Bromodichloromethane	µg/m³	BLQ	BLQ
1,3-Dichloropropane	µg/m³	BLQ	BLQ
1,4-Dichlorobenzene	µg/m³	6.29	4.29

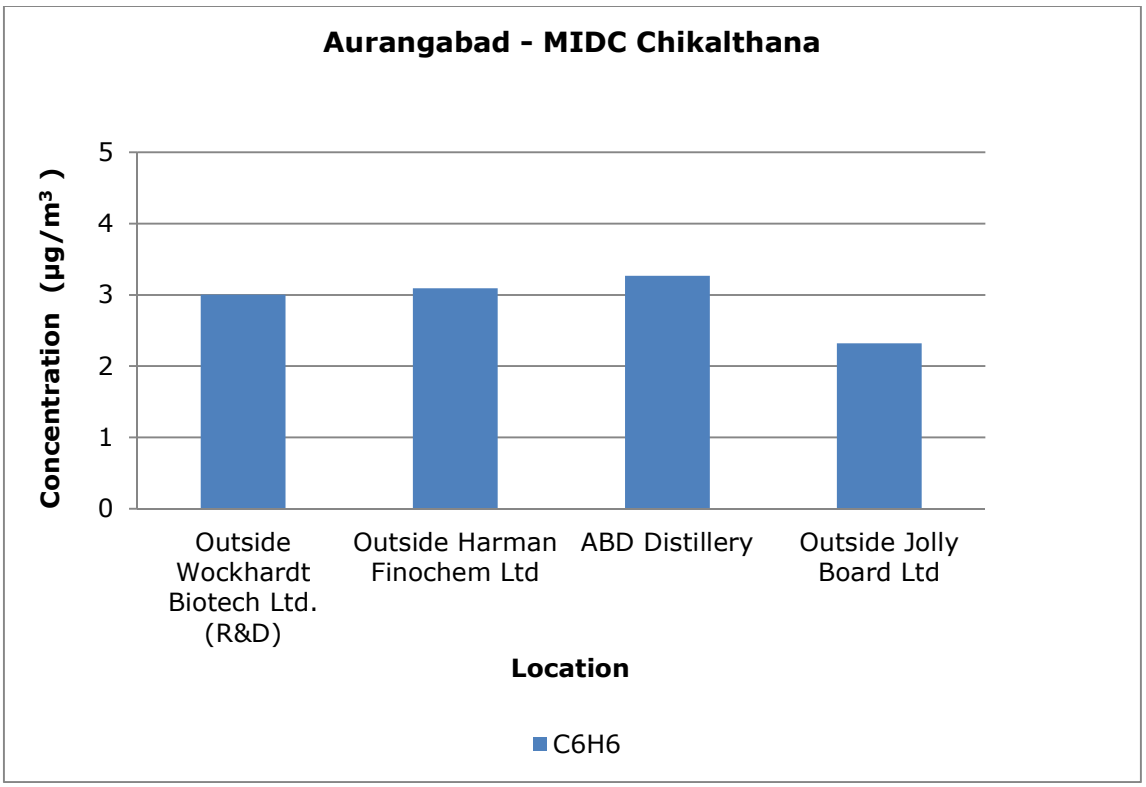
Parameters	Unit	Results	
		ABD Distillery	Outside Concept Pharma
1,3-Dichlorobenzene	µg/m³	5.19	2.60
1,2-Dichlorobenzene	µg/m³	BLQ	4.13
1,2-Dibromo-3-Chloropropane	µg/m³	BLQ	BLQ
Napthalene	µg/m³	19.11	8.98
Bromobenzene	µg/m³	BLQ	BLQ
1,2,4-Trimethylbenzene	µg/m³	BLQ	BLQ
2-Chlorotoluene	µg/m³	BLQ	BLQ
Tert-Butylbenzene	µg/m³	BLQ	BLQ
SEC-Butylbenzene	µg/m³	BLQ	BLQ
P-Isopropyltoluene	µg/m³	1.10	1.45
M-Xylene	µg/m³	BLQ	BLQ
P-Xylene	µg/m³	BLQ	BLQ
Styrene	µg/m³	0.71	BLQ
Cumene	µg/m³	BLQ	BLQ
1,2,3-Trichloropropane	µg/m³	BLQ	BLQ
N-Propylbenzene	µg/m³	BLQ	BLQ
Dibromochloromethane	µg/m³	BLQ	BLQ
1,2-Dibromoethane	µg/m³	BLQ	BLQ
Chlorobenzene	µg/m³	BLQ	BLQ
1,1,1,2-Tetrachloroethane	µg/m³	BLQ	BLQ
Ethylbenzene	µg/m³	BLQ	BLQ
1,1-Dichloropropylene	µg/m³	BLQ	BLQ
1,2-Dichloroethane	µg/m³	BLQ	BLQ
1,2-Dichloropropane	µg/m³	BLQ	BLQ
Trans-1,3-Dichloropropene	µg/m³	BLQ	BLQ
CIS 1,3-Dichloropropene	µg/m³	BLQ	BLQ
1,1,2-Trichloroethane	µg/m³	BLQ	BLQ
Tetrachloroethylene	µg/m³	BLQ	BLQ
1,3,5-Trimethylbenzene	µg/m³	BLQ	BLQ
N-Butylbenzene	µg/m³	BLQ	BLQ
1,2,3-Trichlorobenzene	µg/m³	84.20	38.40
Hexachlorobutadiene	µg/m³	0.76	BLQ

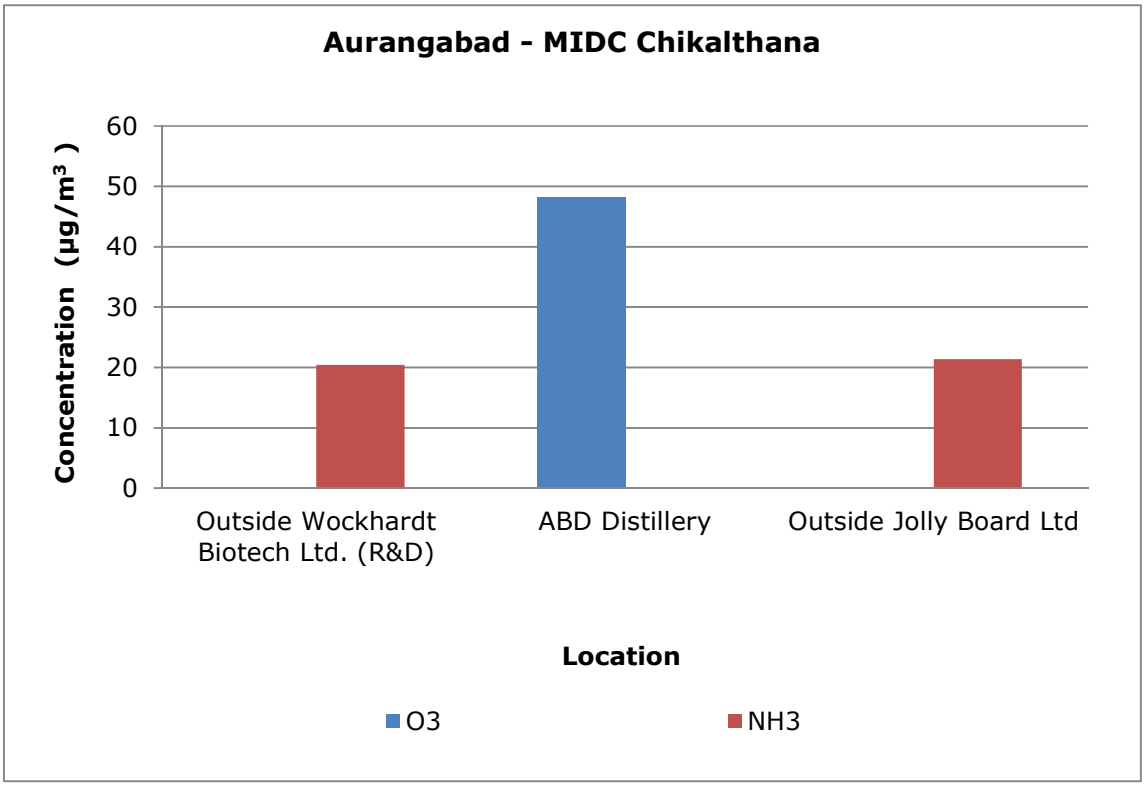
Parameters	Unit	Results	
		ABD Distillery	Outside Concept Pharma
1,2,4-Trichlorobenzene	µg/m³	50.60	12.76
2,2-Dichloropropane	µg/m³	BLQ	BLQ
Dibromomethane	µg/m³	BLQ	BLQ
Toluene	µg/m³	3.95	0.74
O-Xylene	µg/m³	BLQ	BLQ
Bromoform	µg/m³	BLQ	BLQ
1,1,2,2-Tetrachloroethane	µg/m³	BLQ	BLQ
4-Chlorotoluene	µg/m³	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

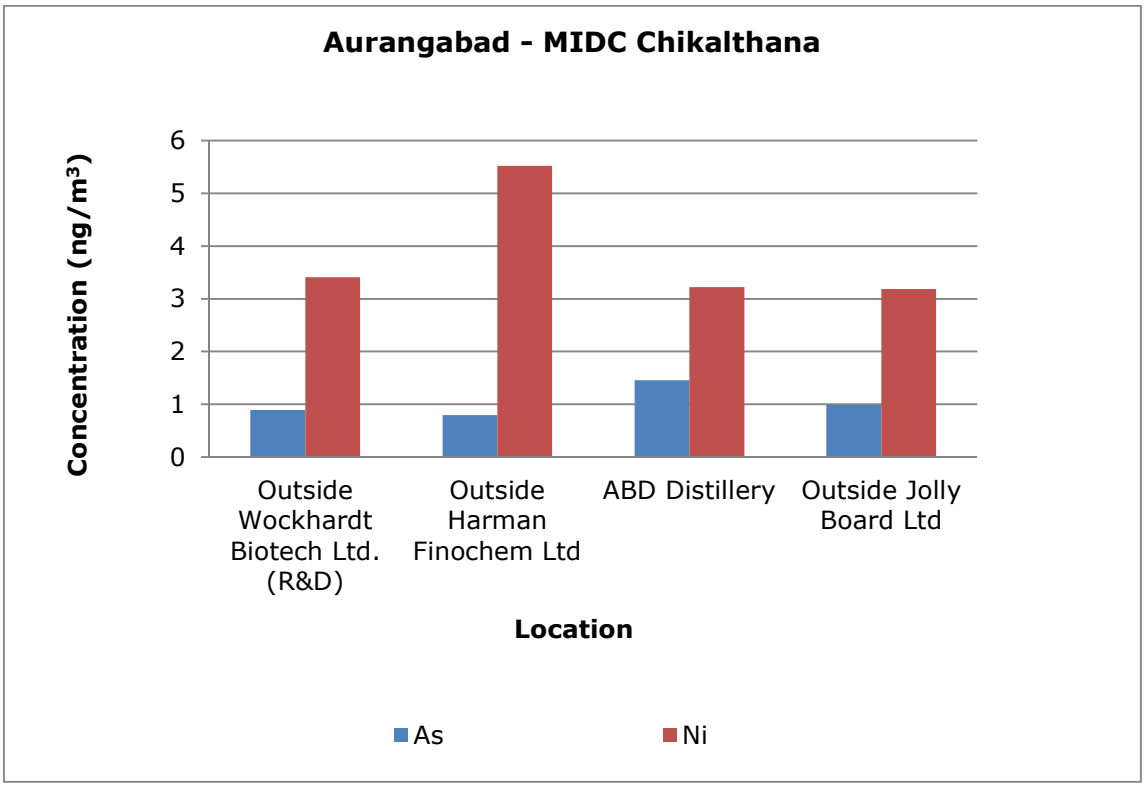
Graphs - Ambient Air Quality Monitoring - MIDC Chikalthana






Aurangabad - MIDC Chikalthana
Concentration (µg/m³)
5
4
3
2
1
0
Outside Wockhardt Biotech Ltd. (R&D)
Outside Harman Finochem Ltd
ABD Distillery
Outside Jolly Board Ltd
Location
C6H6


Aurangabad - MIDC Chikalthana
Concentration (µg/m³)
60
50
40
30
20
10
0
Outside Wockhardt Biotech Ltd. (R&D)
ABD Distillery
Outside Jolly Board Ltd
Location
O3
NH3


Aurangabad - MIDC Chikalthana
Concentration (ng/m³)
6
5
4
3
2
1
0
Outside Wockhardt Biotech Ltd. (R&D)
Outside Harman Finochem Ltd
ABD Distillery
Outside Jolly Board Ltd
Location
As
Ni

3. **<u>MIDC Waluj</u>:** In MIDC Waluj, at all 4 locations monitored, the concentration of all the ambient air parameters was found within the limits of NAAQS. However, concentration of Sulphur dioxide found to exceed in the ambient air of DIPL (101 µg/m^3) and Varroc Plant VIII (135 µg/m^3).

Table 5.9 MIDC Waluj - 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.	Goodyear South Asia tyres	19.855897N	75.207807E	17.01.2023	19.01.2023	21.01.2023
2.	DIPL	19.85722N	75.227666E	17.01.2023	19.01.2023	21.01.2023
3.	Varroc Plant VIII, Jogeshwari	19.830828N	75.20329E	17.01.2023	19.01.2023	21.01.2023
4.	IPCA Laboratory Pvt Ltd.	19.862256N	75.218847E	17.01.2023	19.01.2023	21.01.2023

Table 5.10 MIDC Waluj - Details of Sampling Location of VOCs Monitoring

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Outside of Endurance Tech.	19.852291N	75.206165E	17.01.2023	19.01.2023	21.01.2023
2.	DIPL	19.85722N	75.227666E	17.01.2023	19.01.2023	21.01.2023

Fig: Geographical Locations of Ambient Air Quality Monitoring MIDC Waluj

Fig: Geographical Locations of VOCs Monitoring MIDC Waluj

Table 5.11 MIDC Waluj - Ambient Air Quality Monitoring Results

Parameters	Unit	Results			
		Goodyear South Asia Tyres	DIPL	Varroc Plant VIII, Jogeshwari	IPCA Laboratory Pvt Ltd.
Sulphur Dioxide (SO_2)	µg/m³	BLQ	101.00	135.00	BLQ
Nitrogen Dioxide (NO_2)	µg/m³	20.50	21.65	28.00	16.80
Particulate Matter (size less than 10 µm) or PM_{10}	µg/m³	68	59	48	53
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	µg/m³	19	17	14	15
Ozone (O_3)	µg/m³	BLQ	BLQ	BLQ	BLQ
Lead (Pb)	µg/m³	BLQ	BLQ	0.03	BLQ
Carbon Monoxide (CO) (1 h)	mg/m³	1.49	1.50	1.57	1.85
Carbon Monoxide (CO) (8 h)	mg/m³	1.64	1.91	1.87	2.13
Ammonia (NH_3)	µg/m³	92.77	132.10	62.85	86.45
Benzene (C_6H_6)	µg/m³	2.91	3.07	2.85	2.34
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m³	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m³	0.40	BLQ	0.37	BLQ
Nickel (Ni)	ng/m³	BLQ	5.62	BLQ	BLQ

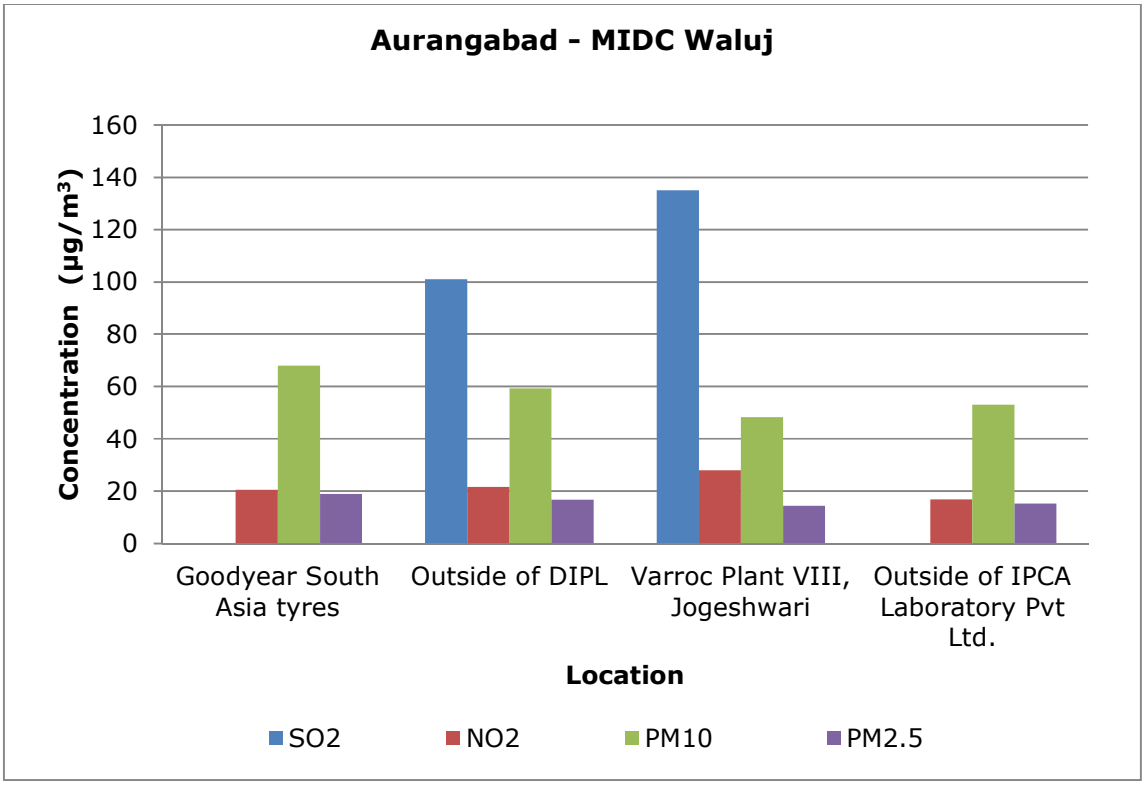
Table 5.12 MIDC Waluj - Volatile Organic Compounds (VOCs) in Ambient Air Results

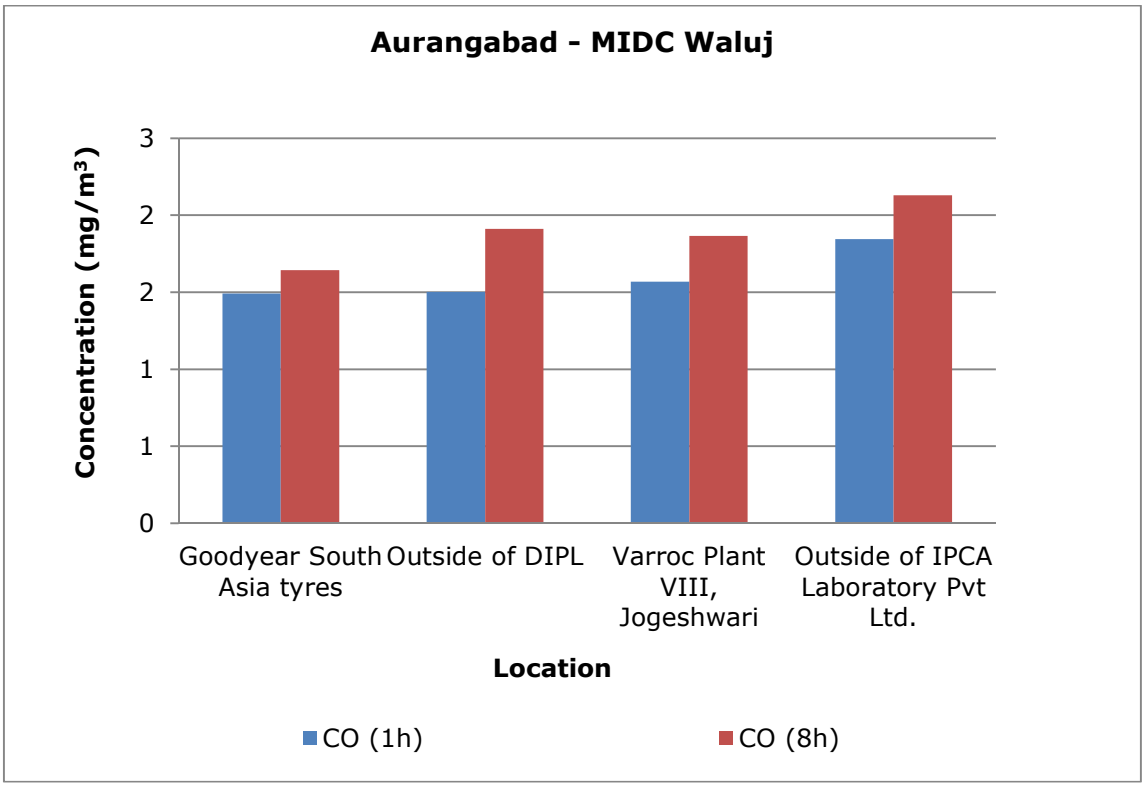
Parameters	Unit	Results	
		DIPL	Endurance Tech, K-120
Dichloromethane	µg/m³	BLQ	BLQ
Chloroform	µg/m³	BLQ	BLQ
Carbon Tetrachloride	µg/m³	BLQ	BLQ
Trichloroethylene	µg/m³	BLQ	BLQ
Bromodichloromethane	µg/m³	BLQ	BLQ
1,3-Dichloropropane	µg/m³	BLQ	BLQ
1,4-Dichlorobenzene	µg/m³	1.57	1.23
1,3-Dichlorobenzene	µg/m³	1.18	2.10
1,2-Dichlorobenzene	µg/m³	BLQ	BLQ

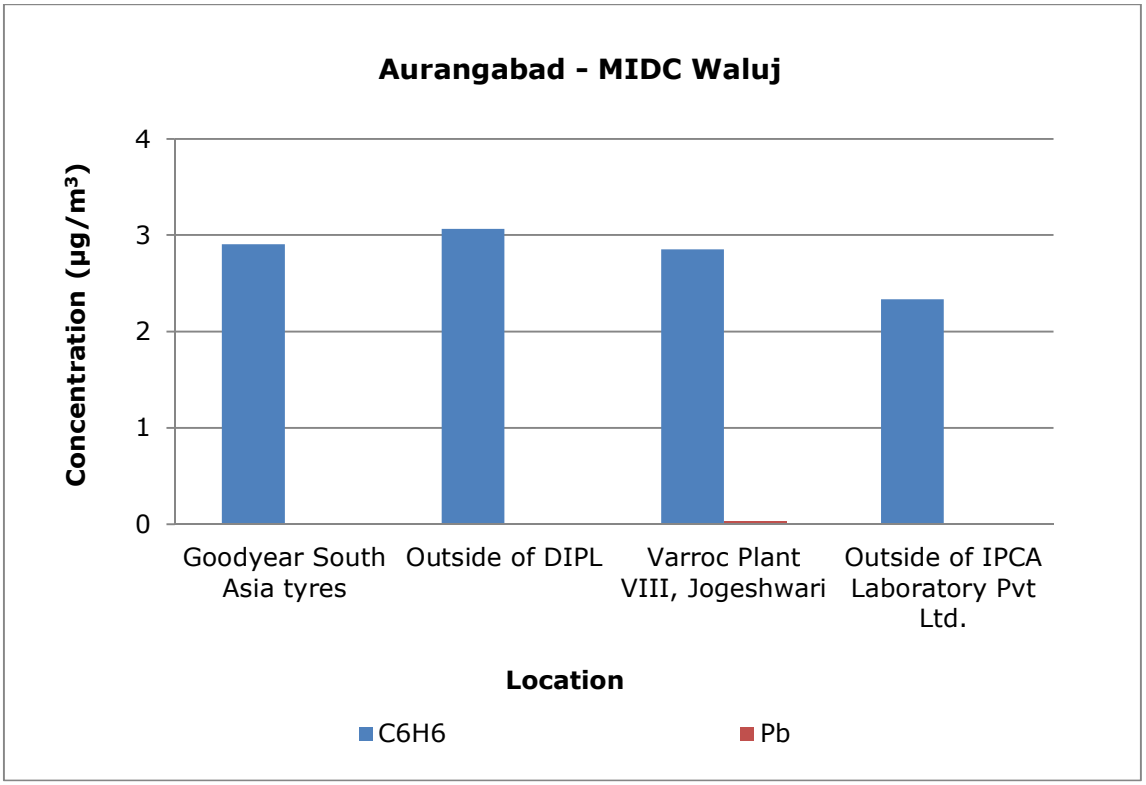
Parameters	Unit	Results	
		DIPL	Endurance Tech, K-120
1,2-Dibromo-3-Chloropropane	µg/m³	1.24	BLQ
Napthalene	µg/m³	3.35	2.61
Bromobenzene	µg/m³	BLQ	BLQ
1,2,4-Trimethylbenzene	µg/m³	BLQ	BLQ
2-Chlorotoluene	µg/m³	BLQ	BLQ
Tert-Butylbenzene	µg/m³	BLQ	BLQ
SEC-Butylbenzene	µg/m³	BLQ	BLQ
P-Isopropyltoluene	µg/m³	0.54	0.68
M-Xylene	µg/m³	BLQ	BLQ
P-Xylene	µg/m³	BLQ	BLQ
Styrene	µg/m³	1.15	BLQ
Cumene	µg/m³	BLQ	BLQ
1,2,3-Trichloropropane	µg/m³	BLQ	BLQ
N-Propylbenzene	µg/m³	BLQ	BLQ
Dibromochloromethane	µg/m³	BLQ	BLQ
1,2-Dibromoethane	µg/m³	BLQ	BLQ
Chlorobenzene	µg/m³	BLQ	BLQ
1,1,1,2-Tetrachloroethane	µg/m³	BLQ	BLQ
Ethylbenzene	µg/m³	BLQ	BLQ
1,1-Dichloropropylene	µg/m³	BLQ	BLQ
1,2-Dichloroethane	µg/m³	BLQ	BLQ
1,2-Dichloropropane	µg/m³	BLQ	BLQ
Trans-1,3-Dichloropropene	µg/m³	BLQ	BLQ
CIS 1,3-Dichloropropene	µg/m³	BLQ	BLQ
1,1,2-Trichloroethane	µg/m³	BLQ	BLQ
Tetrachloroethylene	µg/m³	BLQ	BLQ
1,3,5-Trimethylbenzene	µg/m³	BLQ	BLQ
N-Butylbenzene	µg/m³	BLQ	BLQ
1,2,3-Trichlorobenzene	µg/m³	BLQ	BLQ
Hexachlorobutadiene	µg/m³	BLQ	BLQ
1,2,4-Trichlorobenzene	µg/m³	3.17	2.39
2,2-Dichloropropane	µg/m³	BLQ	BLQ

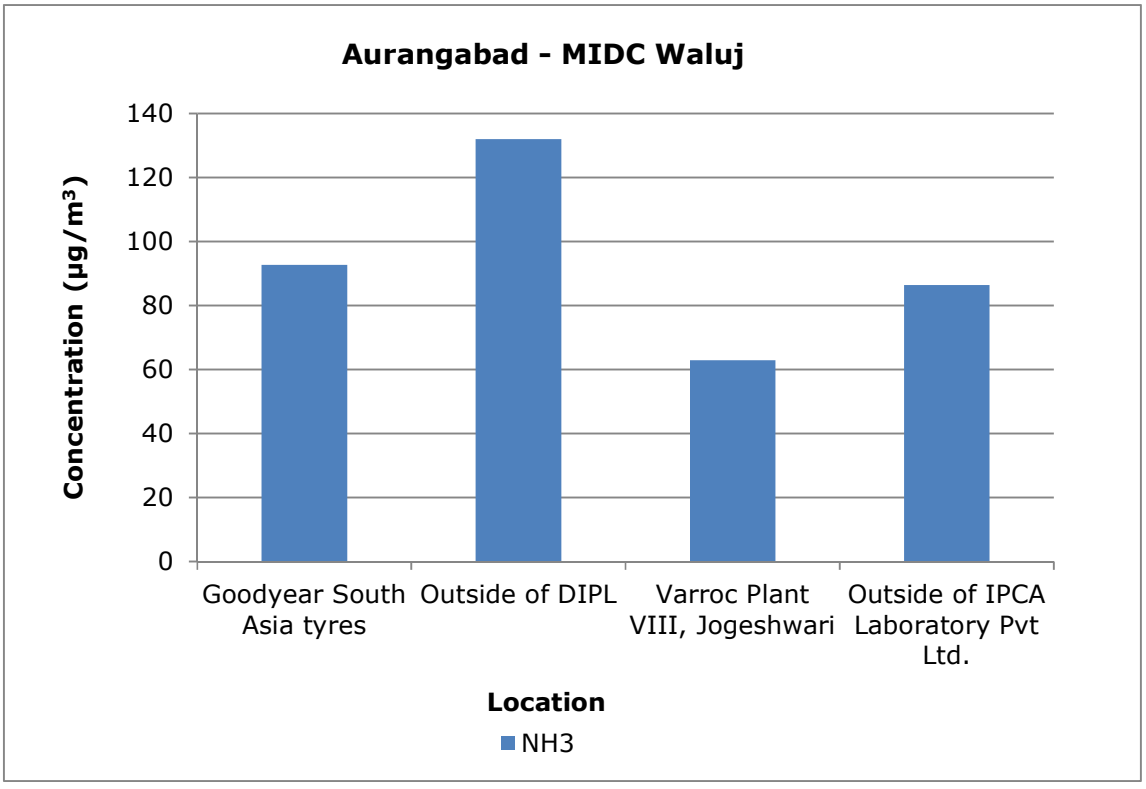
Parameters	Unit	Results	
		DIPL	Endurance Tech, K-120
Dibromomethane	µg/m³	BLQ	BLQ
Toluene	µg/m³	3.34	2.42
O-Xylene	µg/m³	BLQ	BLQ
Bromoform	µg/m³	BLQ	BLQ
1,1,2,2-Tetrachloroethane	µg/m³	BLQ	BLQ
4-Chlorotoluene	µg/m³	BLQ	BLQ
1,1-Dichloroethylene	µg/m³	BLQ	BLQ
Trans-1,2-Dichloroethylene	µg/m³	BLQ	BLQ
1,1-Dichloroethane	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

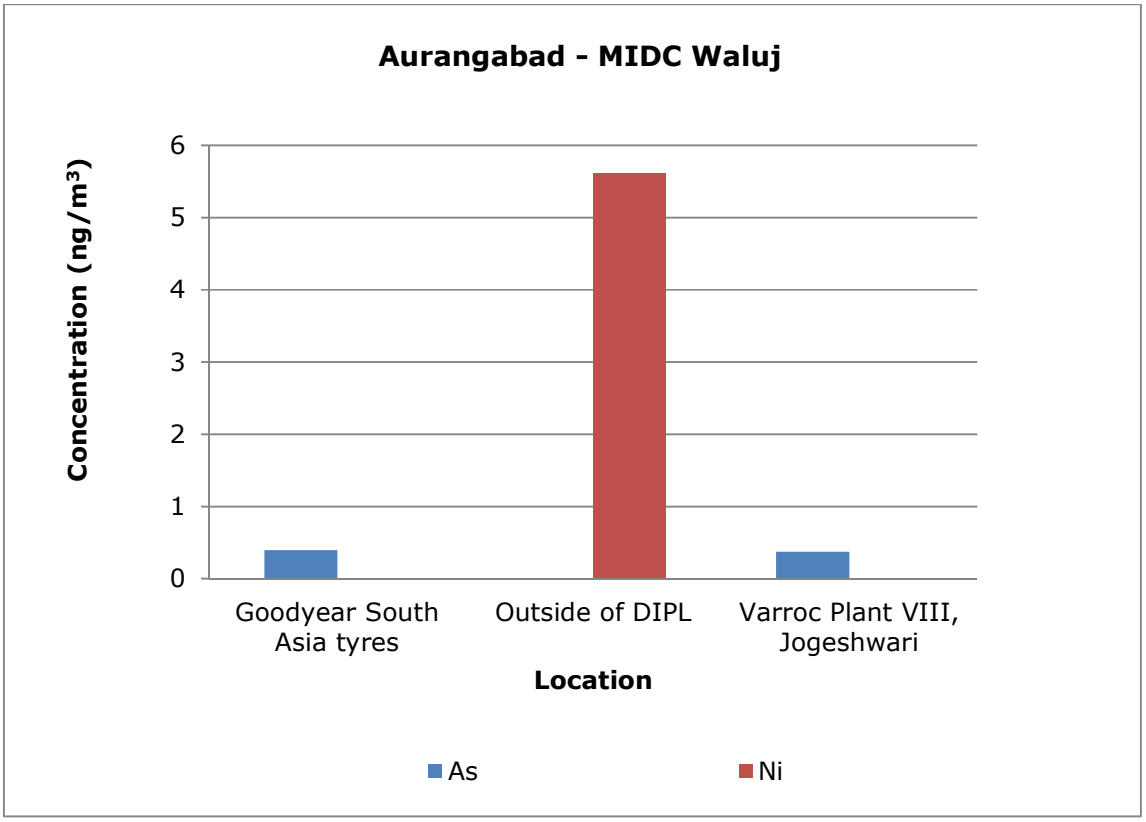
Graphs - Ambient Air Quality Monitoring - MIDC Waluj






Aurangabad - MIDC Waluj
Concentration (µg/m³)
4
3
2
1
0
Goodyear South Asia tyres
Outside of DIPL
Varroc Plant VIII, Jogeshwari
Outside of IPCA Laboratory Pvt Ltd.
Location
C6H6
Pb


Aurangabad - MIDC Waluj
Concentration (µg/m³)
140
120
100
80
60
40
20
0
Goodyear South Asia tyres
Outside of DIPL
Varroc Plant VIII, Jogeshwari
Outside of IPCA Laboratory Pvt Ltd.
Location
NH3


Aurangabad - MIDC Waluj
Concentration (ng/m³)
6
5
4
3
2
1
0
Goodyear South Asia tyres
Outside of DIPL
Varroc Plant VIII, Jogeshwari
Location
As
Ni

4. **MIDC Paithan:** In MIDC Paithan, at all the 4 locations monitored, the concentration of all the ambient air parameters was found within the permissible limits of NAAQS.

Table 5.13 MIDC Paithan - 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.	Outside of Badve Engineering	19.783535N	75.27903E	16.01.2023	18.01.2023	19.01.2023
2.	Aurangabad Electrical, Unit III	19.755292N	75.297828E	16.01.2023	18.01.2023	19.01.2023
3.	Allana Frigarifico	19.77544N	75.290826E	16.01.2023	18.01.2023	19.01.2023
4.	Outside of Machhar Packaging	19.741876N	75.295112E	16.01.2023	18.01.2023	19.01.2023

Table 5.14 MIDC Paithan - Details of Sampling Location of VOCs Monitoring

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Outside of Badve Engineering	19.783535N	75.27903E	16.01.2023	18.01.2023	19.01.2023
2.	Aurangabad Electrical, Unit III	19.755292N	75.297828E	16.01.2023	18.01.2023	19.01.2023

Fig: Geographical Locations of Ambient Air Quality Monitoring MIDC Paithan

Fig: Geographical Locations of VOCs Monitoring MIDC Paithan

Table 5.15 MIDC Paithan- Ambient Air Quality Monitoring Results

Parameters	Unit	Results			
		Outside of Badve Engineering	Aurangabad Electrical, Unit III	Allana Frigarifico	Outside of Machhar Packaging
Sulphur Dioxide (SO_2)	µg/m³	39.10	36.60	24.40	24.10
Nitrogen Dioxide (NO_2)	µg/m³	17.16	17.37	20.60	16.80
Particulate Matter (size less than 10 µm) or PM_{10}	µg/m³	64	48	48	45
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	µg/m³	18	14	14	12
Ozone (O_3)	µg/m³	BLQ	BLQ	BLQ	BLQ
Lead (Pb)	µg/m³	0.03	BLQ	BLQ	BLQ
Carbon Monoxide (CO) (1 h)	mg/m³	1.53	1.49	1.42	1.57
Carbon Monoxide (CO) (8 h)	mg/m³	1.66	1.80	1.61	1.88
Ammonia (NH_3)	µg/m³	112.10	187.67	176.07	148.10
Benzene (C_6H_6)	µg/m³	3.47	3.55	3.09	3.58
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m³	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m³	0.33	0.39	0.67	0.84
Nickel (Ni)	ng/m³	BLQ	BLQ	BLQ	BLQ

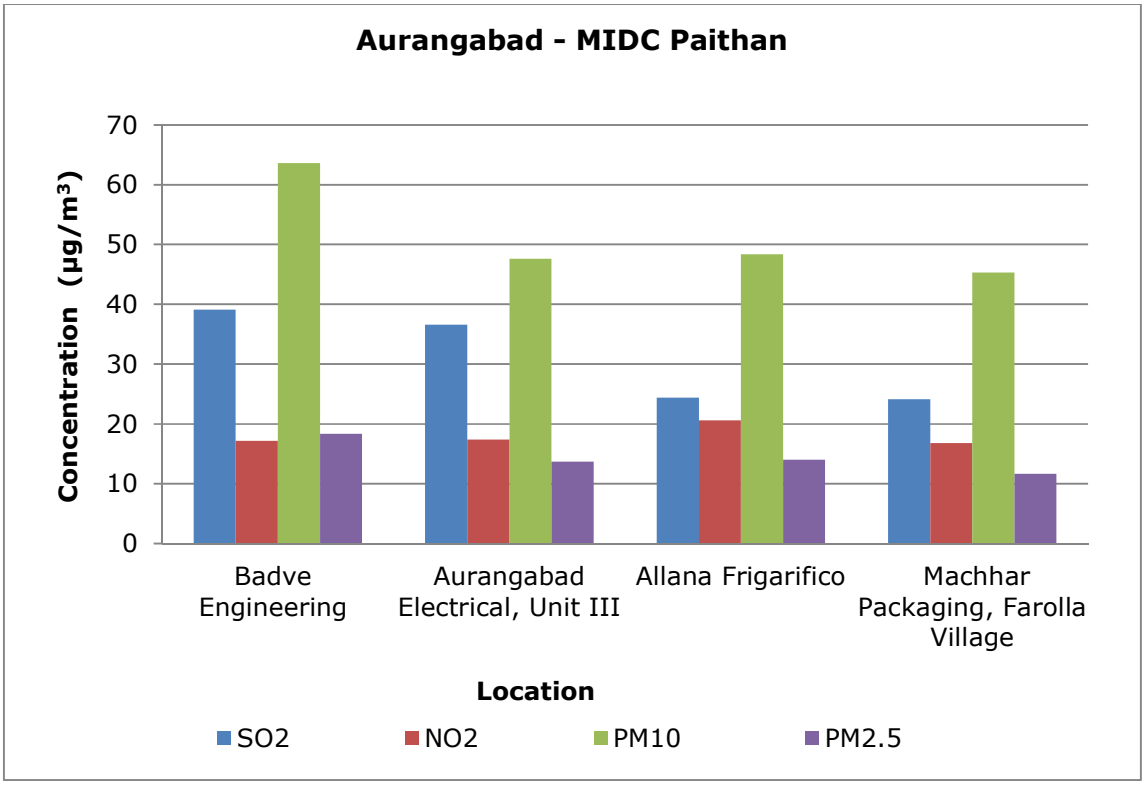
Table 5.16 MIDC Paithan- Volatile Organic Compounds (VOCs) in Ambient Air Results

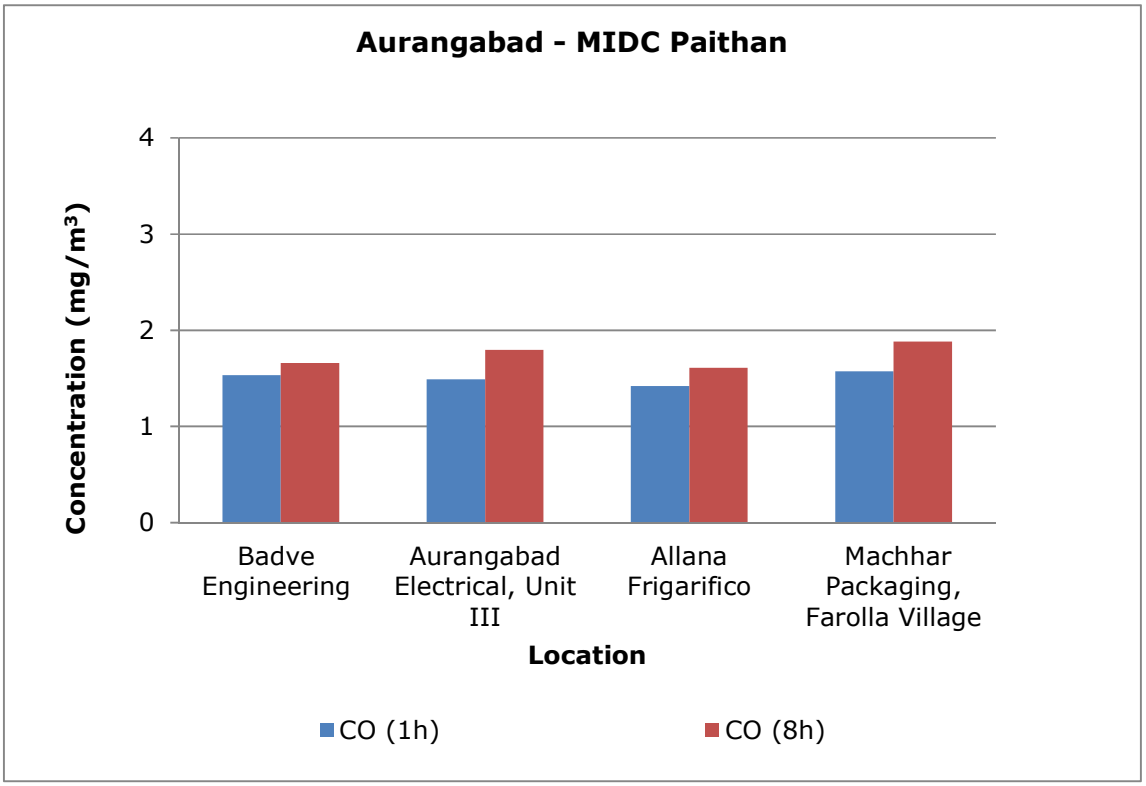
Parameters	Unit	Results	
		DIPL	Endurance Tech, K-120
Dichloromethane	µg/m³	BLQ	BLQ
Chloroform	µg/m³	BLQ	BLQ
Carbon Tetrachloride	µg/m³	BLQ	BLQ
Trichloroethylene	µg/m³	BLQ	BLQ
Bromodichloromethane	µg/m³	BLQ	BLQ
1,3-Dichloropropane	µg/m³	BLQ	BLQ
1,4-Dichlorobenzene	µg/m³	2.87	2.92

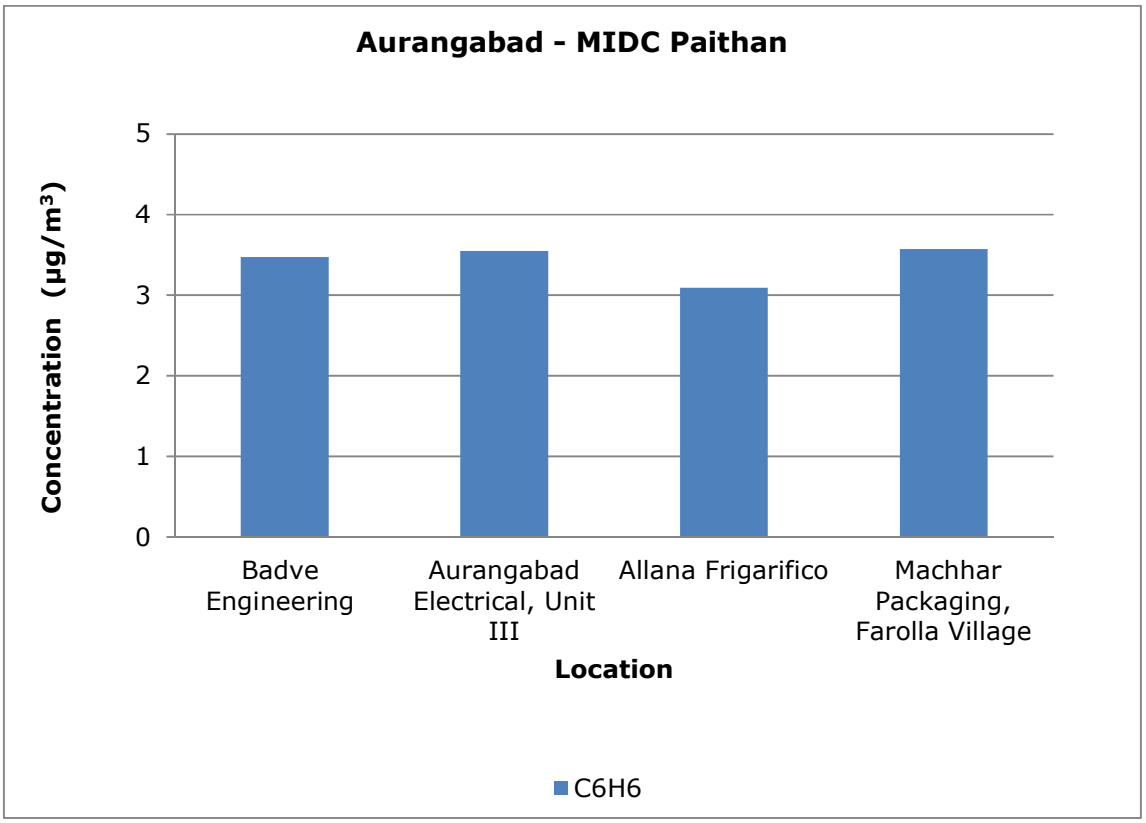
Parameters	Unit	Results	
		DIPL	Endurance Tech, K-120
1,3-Dichlorobenzene	µg/m³	2.14	2.03
1,2-Dichlorobenzene	µg/m³	3.02	1.42
1,2-Dibromo-3-Chloropropane	µg/m³	BLQ	BLQ
Napthalene	µg/m³	3.13	BLQ
Bromobenzene	µg/m³	BLQ	BLQ
1,2,4-Trimethylbenzene	µg/m³	BLQ	BLQ
2-Chlorotoluene	µg/m³	BLQ	BLQ
Tert-Butylbenzene	µg/m³	BLQ	BLQ
SEC-Butylbenzene	µg/m³	BLQ	BLQ
P-Isopropyltoluene	µg/m³	2.50	1.39
M-Xylene	µg/m³	BLQ	BLQ
P-Xylene	µg/m³	BLQ	BLQ
Styrene	µg/m³	BLQ	0.67
Cumene	µg/m³	BLQ	0.54
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	0.62
1,1,1,2-Tetrachloroethane	µg/m³	BLQ	BLQ
Ethylbenzene	µg/m³	BLQ	BLQ
1,1-Dichloropropylene	µg/m³	BLQ	BLQ
1,2-Dichloroethane	µg/m³	BLQ	BLQ
1,2-Dichloropropane	µg/m³	BLQ	BLQ
Trans-1,3-Dichloropropene	µg/m³	BLQ	BLQ
CIS 1,3-Dichloropropene	µg/m³	BLQ	BLQ
1,1,2-Trichloroethane	µg/m³	BLQ	BLQ
Tetrachloroethylene	µg/m³	2.78	3.03
1,3,5-Trimethylbenzene	µg/m³	BLQ	BLQ
N-Butylbenzene	µg/m³	1.43	BLQ
1,2,3-Trichlorobenzene	µg/m³	1.95	BLQ
Hexachlorobutadiene	µg/m³	BLQ	BLQ

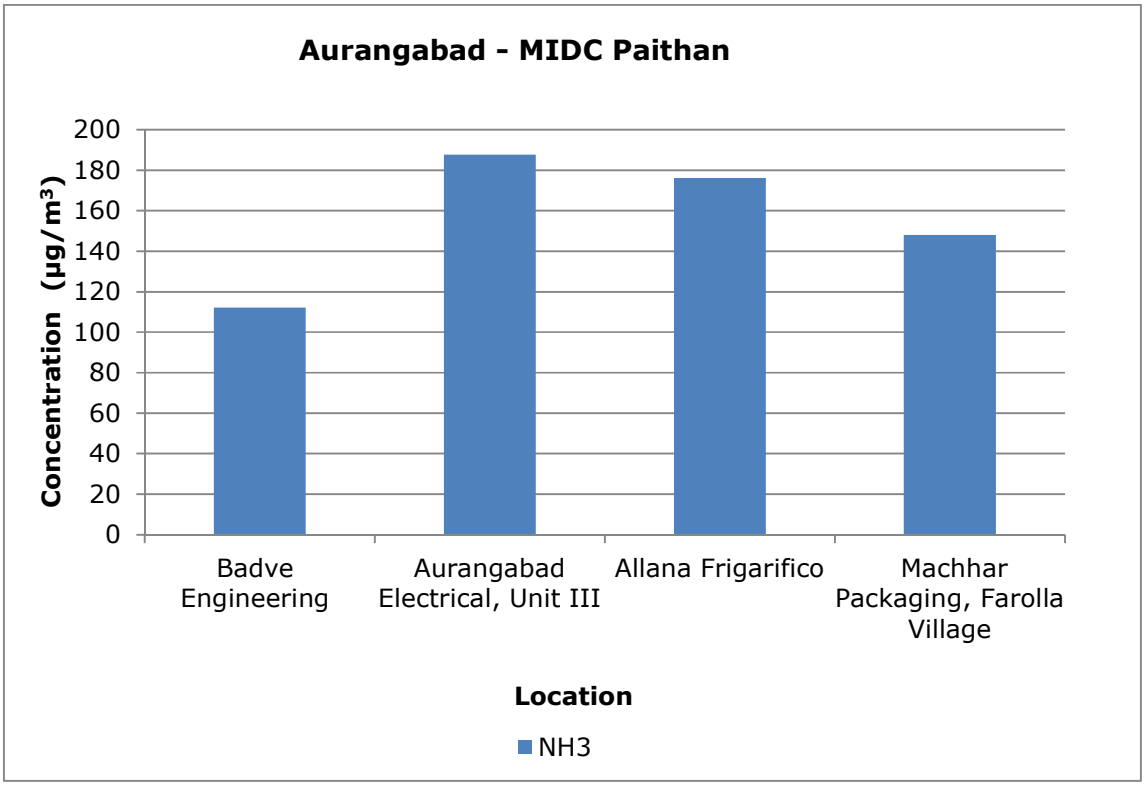
Parameters	Unit	Results	
		DIPL	Endurance Tech, K-120
1,2,4-Trichlorobenzene	µg/m³	1.51	BLQ
2,2-Dichloropropane	µg/m³	BLQ	BLQ
Dibromomethane	µg/m³	BLQ	BLQ
Toluene	µg/m³	1.72	2.18
O-Xylene	µg/m³	BLQ	BLQ
Bromoform	µg/m³	BLQ	BLQ
1,1,2,2-Tetrachloroethane	µg/m³	BLQ	BLQ
4-Chlorotoluene	µg/m³	BLQ	BLQ
1,1-Dichloroethylene	µg/m³	BLQ	BLQ
Trans-1,2-Dichloroethylene	µg/m³	BLQ	BLQ
1,1-Dichloroethane	µg/m³	BLQ	BLQ
CIS-1,2-Dichloroethylene	µg/m³	BLQ	BLQ
Bromochloromethane	µg/m³	BLQ	BLQ
1,1,1-Trichloroethane	µg/m³	BLQ	BLQ

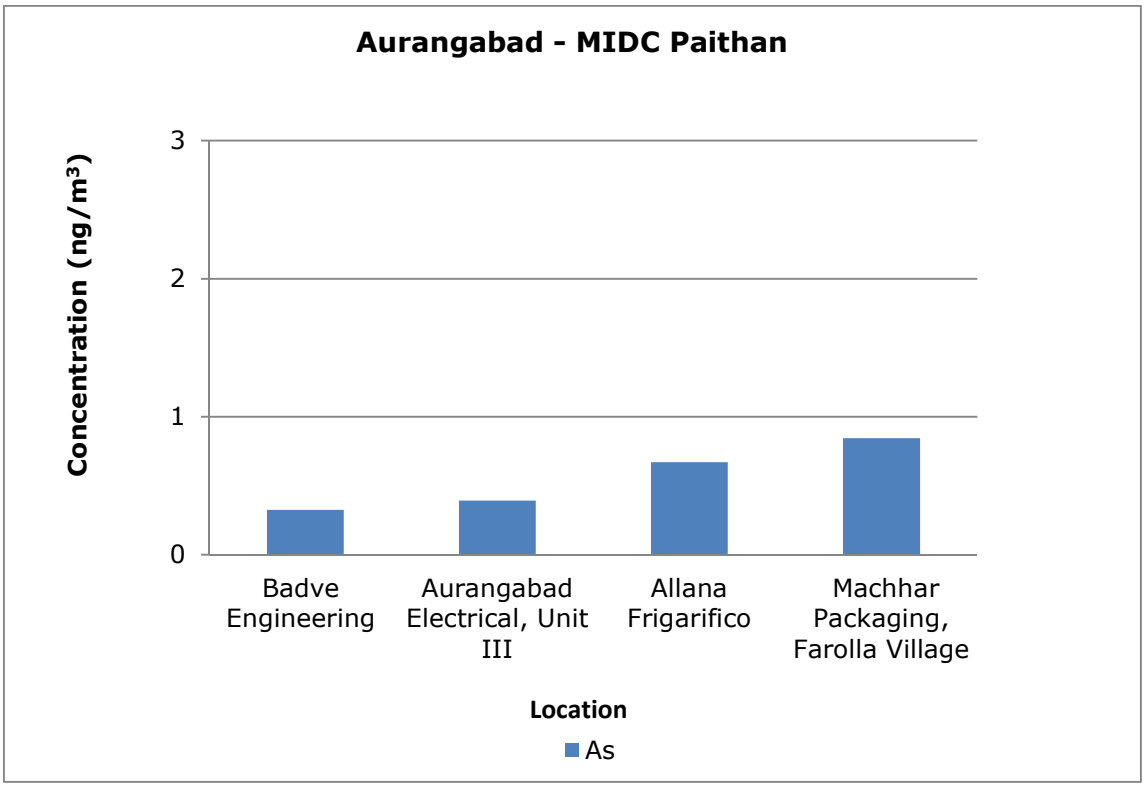
Graphs - Ambient Air Quality Monitoring of MIDC Paithan






Aurangabad - MIDC Paithan
Concentration (µg/m³)
5
4
3
2
1
0
Badve Engineering
Aurangabad Electrical, Unit III
Allana Frigarifico
Machhar Packaging, Farolla Village
Location
C6H6


Aurangabad - MIDC Paithan
Concentration (µg/m³)
200
180
160
140
120
100
80
60
40
20
0
Badve Engineering
Aurangabad Electrical, Unit III
Allana Frigarifico
Machhar Packaging, Farolla Village
Location
NH3


Aurangabad - MIDC Paithan
Concentration (ng/m3)
3
2
1
0
Badve Engineering
Aurangabad Electrical, Unit III
Allana Frigarifico
Machhar Packaging, Farolla Village
Location
As

WATER ENVIRONMENT

6. Water Environment

For studying the water environment of Aurangabad area, six samples of surface water were collected from Nallah, Lake and River. A total of 24 samples were collected from all four MIDCs i.e. six samples from each MIDC.

1. **MIDC Shendra:** Six surface water samples were collected from the MIDC Shendra region.

- General parameters like pH, dissolved oxygen (DO), electrical conductivity and suspended solids are also observed well within the limits in all the samples.
- Concentration of Biological Oxygen Demand (BOD) was observed to exceed the permissible limit at all the locations except at Adgaon Village.
- Concentration of Total Kjeldahl Nitrogen (TKN) was also found beyond the acceptable limit at all the studied locations.
- In fish bioassay, 40-97% fish survival was observed in the water sample of MIDC Shendra.
- All metals like Arsenic, Nickel, Copper, Iron, Hexavalent Chromium (Cr^{6+}) etc. are also observed either below the limit of quantification (BLQ) or below their standard limits.
- Parameters like Total Residual Chlorine, Nitrogen, 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 MIDC Shendra - Details of Sampling Location of Surface Water

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Pond Water, Nath Nagar	19.908202N	75.493505E	10.01.2023	12.01.2023	14.01.2023
2.	Nallah Water, Back side of Perkins India Pvt Ltd	19.880532N	75.513534E	10.01.2023	12.01.2023	14.01.2023
3.	Lake Water, Near Radico Distillery	19.890415N	75.501071E	10.01.2023	12.01.2023	14.01.2023
4.	Nallah Water, Near Shendra Village	19.865945N	75.465972E	10.01.2023	12.01.2023	14.01.2023
5.	Adgaon Pond Water, Near Tongaon	19.844573N	75.516399E	10.01.2023	12.01.2023	14.01.2023

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
6.	Adgaon Lake	19.860916N	75.527914E	10.01.2023	12.01.2023	14.01.2023

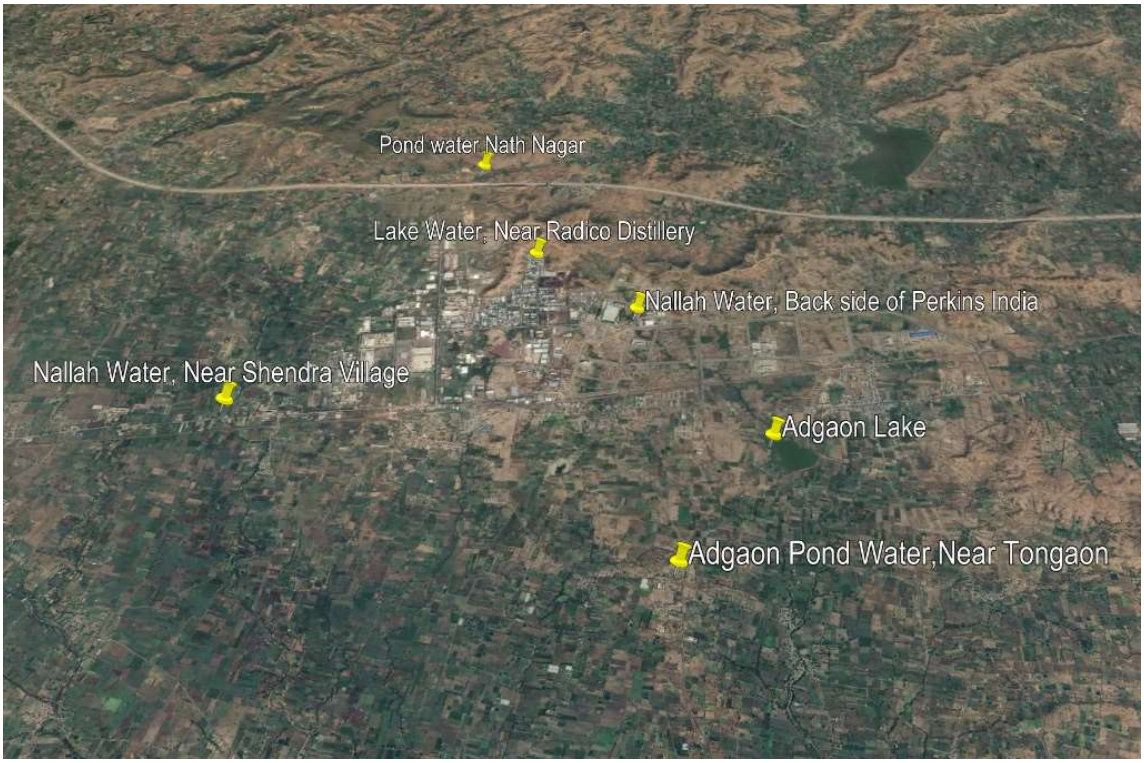


Fig: Geographical Locations of Surface Water Sampling MIDC Shendra

Table 6.2 MIDC Shendra - Results of Surface Water

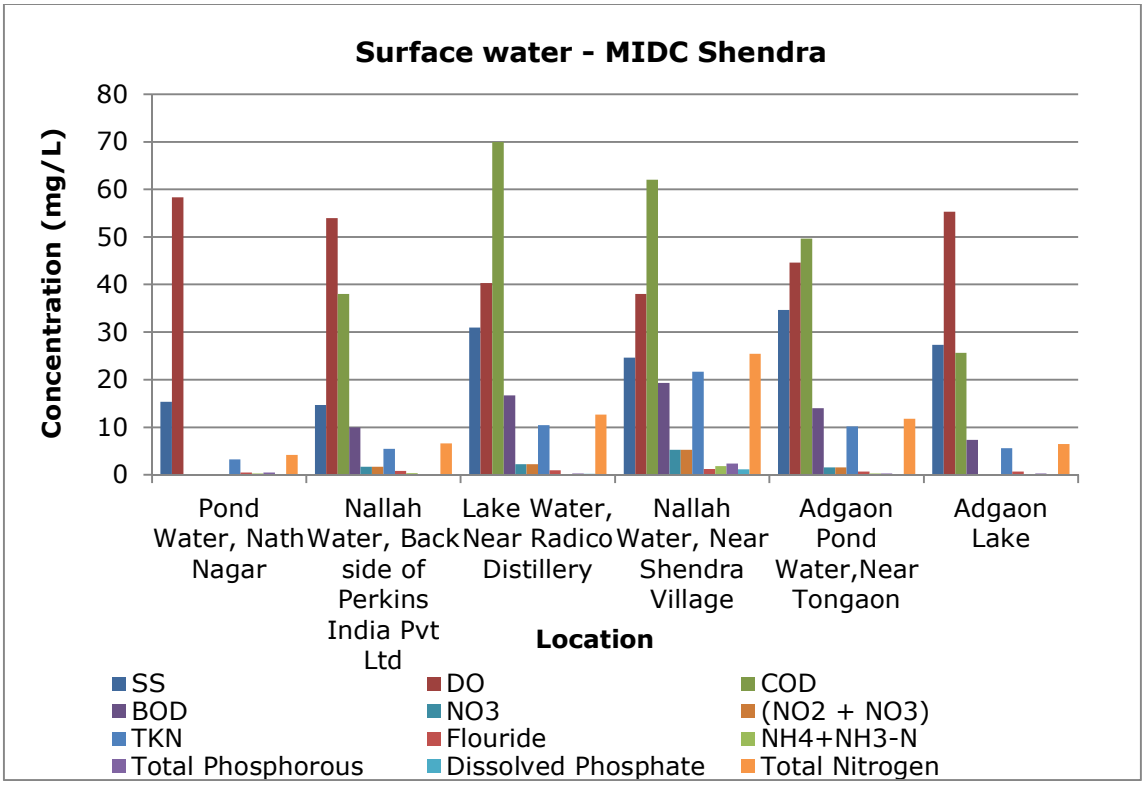
Parameters	Unit	Results					
		Pond Water, Nath Nagar	Nallah Water, Back side of Perkins India Pvt Ltd	Lake Water, Near Radico Distillery	Nallah Water, Near Shendra Village	Adgaon Pond Water,Near Tongaon	Adgaon Lake
Sanitary Survey	-	Generally clean neighbourhood	Generally clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Generally clean neighbourhood	Reasonably clean neighbourhood
General Appearance	-	No Floating Matter	No Floating Matter	Floating Matter evident	Floating Matter evident	Floating Matter evident	Floating Matter evident
Transparency	m	0.70	2.20	0.70	0.83	1.43	1.10
Temperature	°C	18	21	20	22	19	19
Colour	Hazen	1	1	2	3	3	2

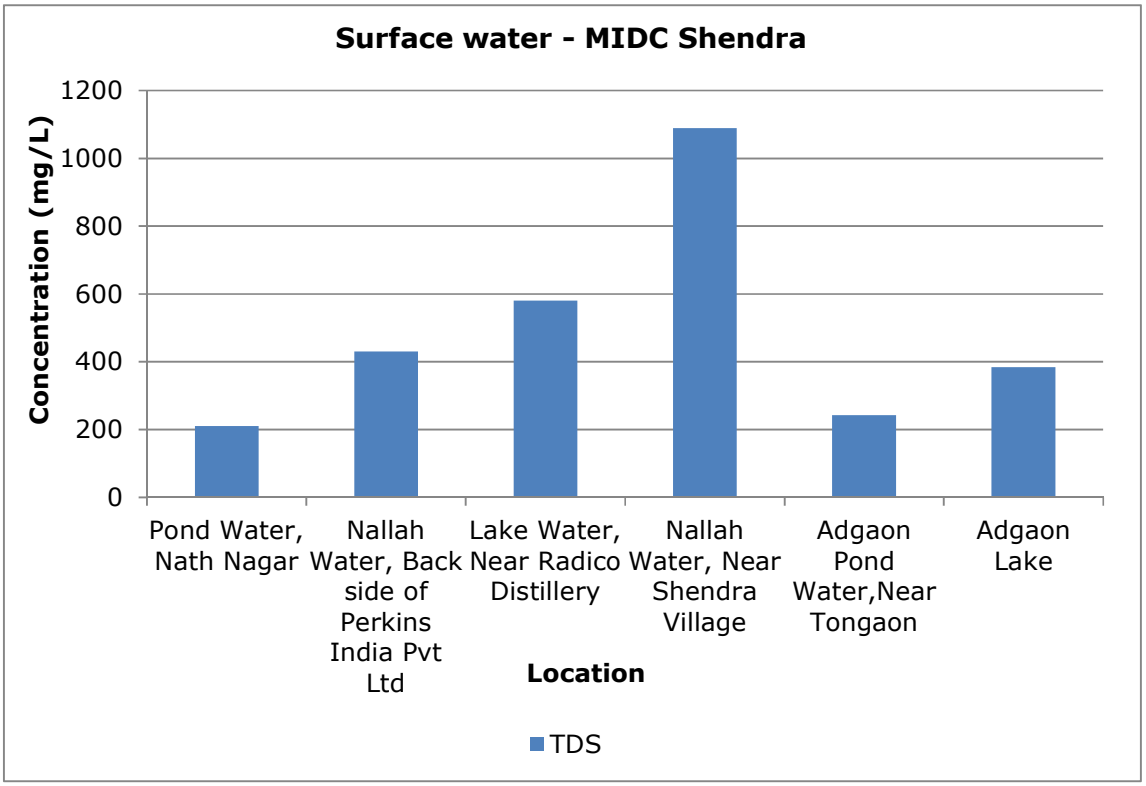
Parameters	Unit	Results					
		Pond Water, Nath Nagar	Nallah Water, Back side of Perkins India Pvt Ltd	Lake Water, Near Radico Distillery	Nallah Water, Near Shendra Village	Adgaon Pond Water,Near Tongaon	Adgaon Lake
Smell	-	Agreeable	Agreeable	Not Agreeable	Agreeable	Agreeable	Agreeable
pH	-	8.58	8.47	8.19	8.66	8.60	8.51
Oil & Grease	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Suspended Solids	mg/L	15	15	31	25	35	27
Total Dissolved Solids	mg/L	211	431	580	1089	242	384
Dissolved Oxygen (% Saturation)	%	58.33	54.00	40.33	38.00	44.67	55.33
Chemical Oxygen Demand	mg/L	BLQ	38	70	62	50	26
Biochemical Oxygen Demand (3 days,27^{o}C)	mg/L	BLQ	10	17	19	14	7
Electrical Conductivity (at 25 ^{o}C)	µmho/ cm	375	768	1034	1942	430	684
Nitrite Nitrogen (as NO_2)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Nitrate Nitrogen (as NO_3)	mg/L	BLQ	1.68	2.20	5.25	1.59	BLQ
(NO_2 + NO_3)-Nitrogen	mg/L	BLQ	1.68	2.20	5.25	1.59	BLQ
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	BLQ	BLQ	0.07	BLQ	BLQ	BLQ
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	0.47	0.80	0.93	1.17	0.67	0.70
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.18	BLQ	0.26	1.15	BLQ	0.12
Sodium Adsorption Ratio	-	0.59	1.68	2.76	4.27	3.88	1.97

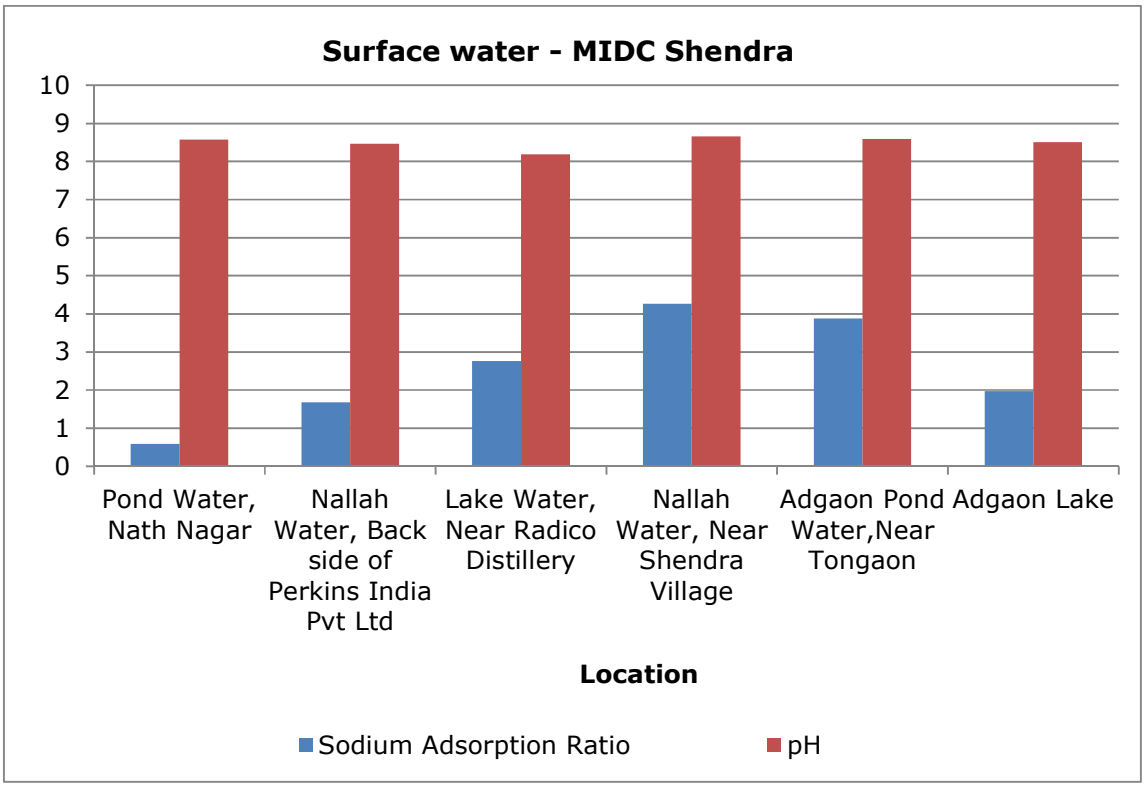
Parameters	Unit	Results					
		Pond Water, Nath Nagar	Nallah Water, Back side of Perkins India Pvt Ltd	Lake Water, Near Radico Distillery	Nallah Water, Near Shendra Village	Adgaon Pond Water,Near Tongaon	Adgaon Lake
Total Coliforms	MPN Index/ 100 ml	581	611	634	64	191	545
Faecal Coliforms	MPN Index/ 100 ml	581	611	97	15	54	20
Total Phosphate (as P)	mg/L	0.52	0.21	0.31	2.42	0.30	0.28
Total Kjeldahl Nitrogen (as N)	mg/L	3.21	5.49	10.45	21.68	10.19	5.60
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.30	0.38	0.20	1.83	0.29	0.16
Phenols (as C_6H_5OH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Anionic Detergents (as MBAS Calculated as LAS, mol.wt.288.38)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Organo Chlorine Pesticides	µg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Polynuclear aromatic hydrocarbons (as PAH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Nickel (as Ni)	mg/L	BLQ	BLQ	0.01	0.01	BLQ	BLQ
Copper (as Cu)	mg/L	BLQ	BLQ	BLQ	BLQ	0.02	BLQ
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Arsenic (as As)	mg/L	BLQ	BLQ	0.01	0.01	0.01	0.01
Lead (as Pb)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ

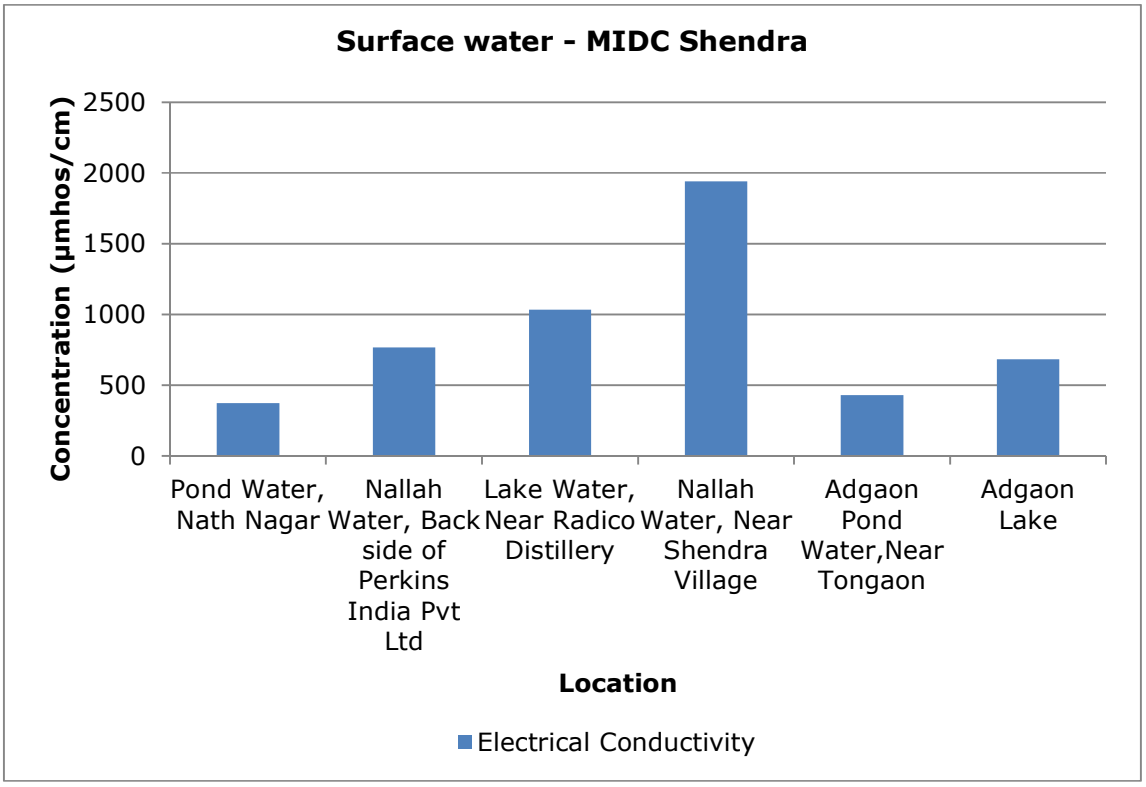
Parameters	Unit	Results					
		Pond Water, Nath Nagar	Nallah Water, Back side of Perkins India Pvt Ltd	Lake Water, Near Radico Distillery	Nallah Water, Near Shendra Village	Adgaon Pond Water,Near Tongaon	Adgaon Lake
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	BLQ	0.06	0.11	0.34	0.19	0.06
Iron (as Fe)	mg/L	0.28	0.35	0.28	1.18	0.71	0.14
Vanadium (as V)	mg/L	0.06	0.14	0.04	0.04	0.08	0.03
Selenium (as Se)	mg/L	BLQ	BLQ	0.02	0.02	0.01	0.01
Boron (as B)	mg/L	BLQ	0.18	0.15	0.40	0.20	0.13
Total Nitrogen	mg/L	4.15	6.64	12.63	25.44	11.79	6.45
Bioassay Test on fish	% survival	83	97	73	40	73	77

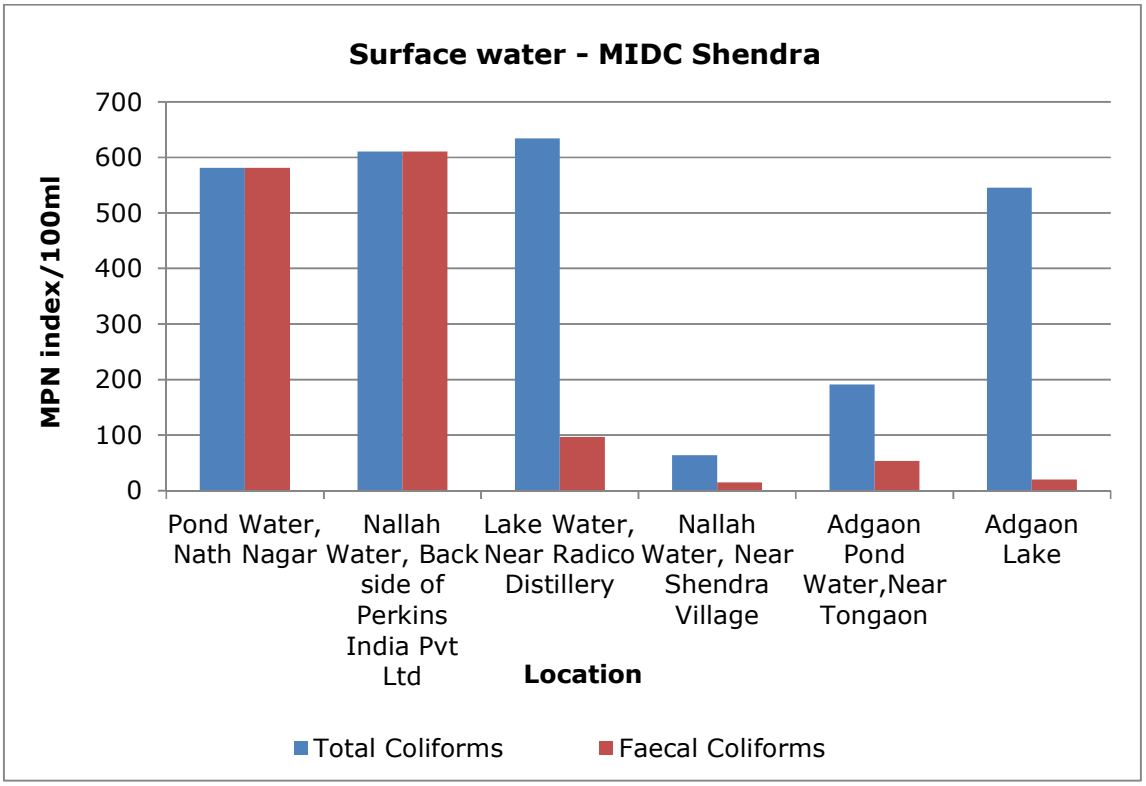
Graphs - Surface water of MIDC Shendra

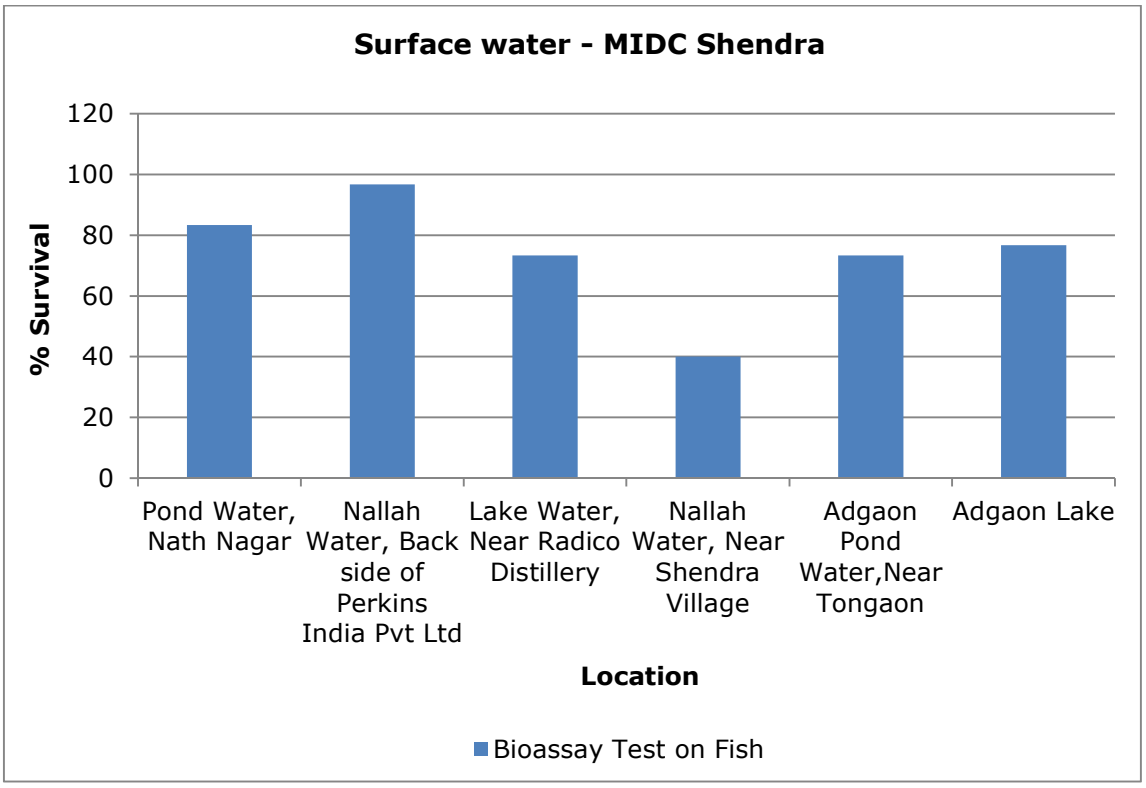





Surface water - MIDC Shendra
10
9
8
7
6
5
4
3
2
1
0
Pond Water, Nath Nagar
Nallah Water, Back side of Perkins India Pvt Ltd
Lake Water, Near Radico Distillery
Nallah Water, Near Shendra Village
Adgaon Pond Water,Near Tongaon
Adgaon Lake
Location
Sodium Adsorption Ratio
pH


Surface water - MIDC Shendra
Concentration (µmhos/cm)
2500
2000
1500
1000
500
0
Pond Water, Nath Nagar
Nallah Water, Back side of Perkins India Pvt Ltd
Lake Water, Near Radico Distillery
Nallah Water, Near Shendra Village
Adgaon Pond Water,Near Tongaon
Adgaon Lake
Location
Electrical Conductivity


Surface water - MIDC Shendra
MPN index/100ml
700
600
500
400
300
200
100
0
Pond Water, Nath Nagar
Nallah Water, Back side of Perkins India Pvt Ltd
Lake Water, Near Radico Distillery
Nallah Water, Near Shendra Village
Adgaon Pond Water,Near Tongaon
Adgaon Lake
Location
Total Coliforms
Faecal Coliforms


Surface water - MIDC Shendra
% Survival
120
100
80
60
40
20
0
Pond Water, Nath Nagar
Nallah Water, Back side of Perkins India Pvt Ltd
Lake Water, Near Radico Distillery
Nallah Water, Near Shendra Village
Adgaon Pond Water,Near Tongaon
Adgaon Lake
Location
Bioassay Test on Fish

2. **MIDC Chikalthana:** From MIDC Chikalthana also, six surface water samples were collected.

- All six water samples collected were found acceptable in general appearance.
- Smell/odour of water samples collected from Sukhna Dam and Nallah water in front of Harman industries are found not agreeable/unpleasant odour
- General parameters like pH, electrical conductivity, suspended solids and Total Dissolved Solids (TDS) were also observed well within the limits in all the samples.
- Concentration of Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Total Kjeldahl Nitrogen (TKN) is found above acceptable limits in the water samples of Nallah Water in front of Harman and Sukhana River near Shani Mandir.
- In fish bioassay, 33% fish survival was observed in the water sample of Dam water of Sukhna dam and 100% survival of fishes was achieved in the water sample of Harsul lake.
- Metals such as Arsenic, Nickel, Copper, Iron, Hexavalent Chromium (Cr^{6+}) etc. were also observed either below the limit of quantification or below their standard limits.
- Parameters like Total Residual Chlorine, Nitrogen, 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 6.3 MIDC Chikhalthana - 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.	Sukhna Dam	19.807943N	75.51566E	10.01.2023	12.01.2023	14.01.2023
2.	Zaltaphata	19.855765N	75.43684E	11.01.2023	13.01.2023	15.01.2023
3.	Nallah Water, Behind NHK	19.888545N	75.378792E	11.01.2023	13.01.2023	15.01.2023
4.	Nallah Water, In front of Harman	19.880309N	75.382849E	11.01.2023	13.01.2023	15.01.2023
5.	Sukhana River, Near Shani Mandir	19.858852N	75.414729E	11.01.2023	13.01.2023	15.01.2023
6.	Harsul Lake	19.923124N	75.335116E	11.01.2023	13.01.2023	15.01.2023

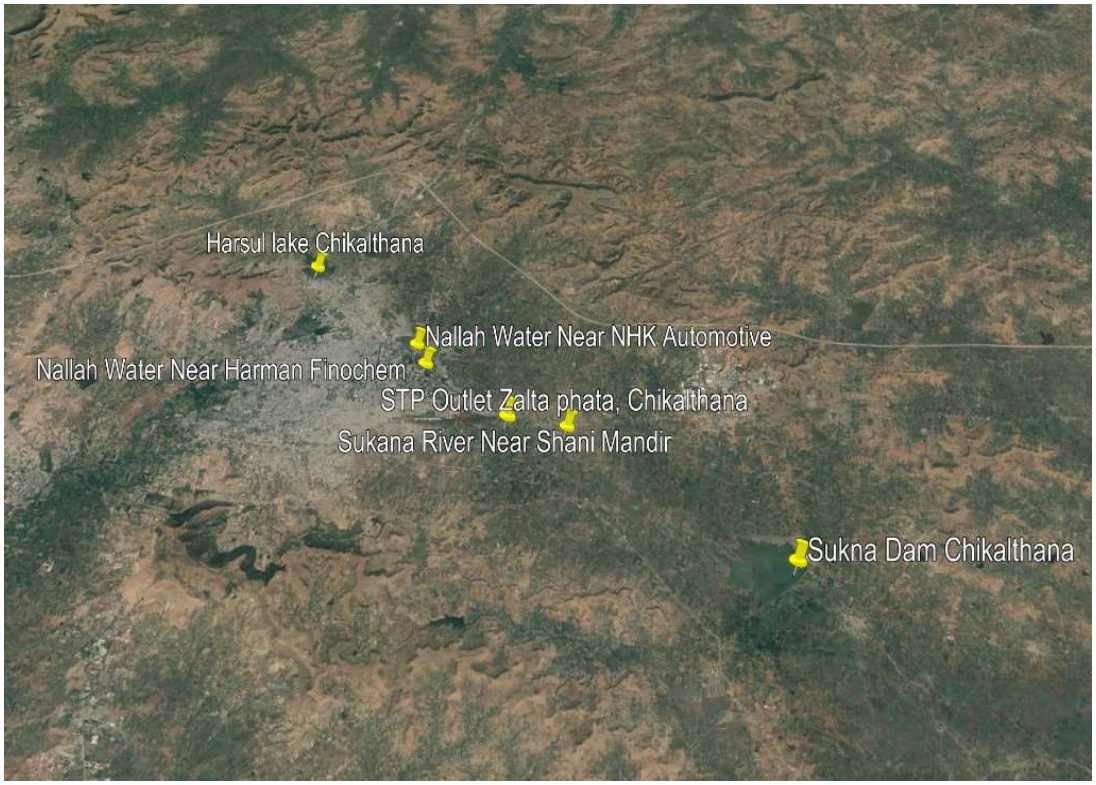


Fig: Geographical Locations of Surface Water Sampling MIDC Chikalthana

Table 6.4 MIDC Chikhalthana - Results of Surface Water

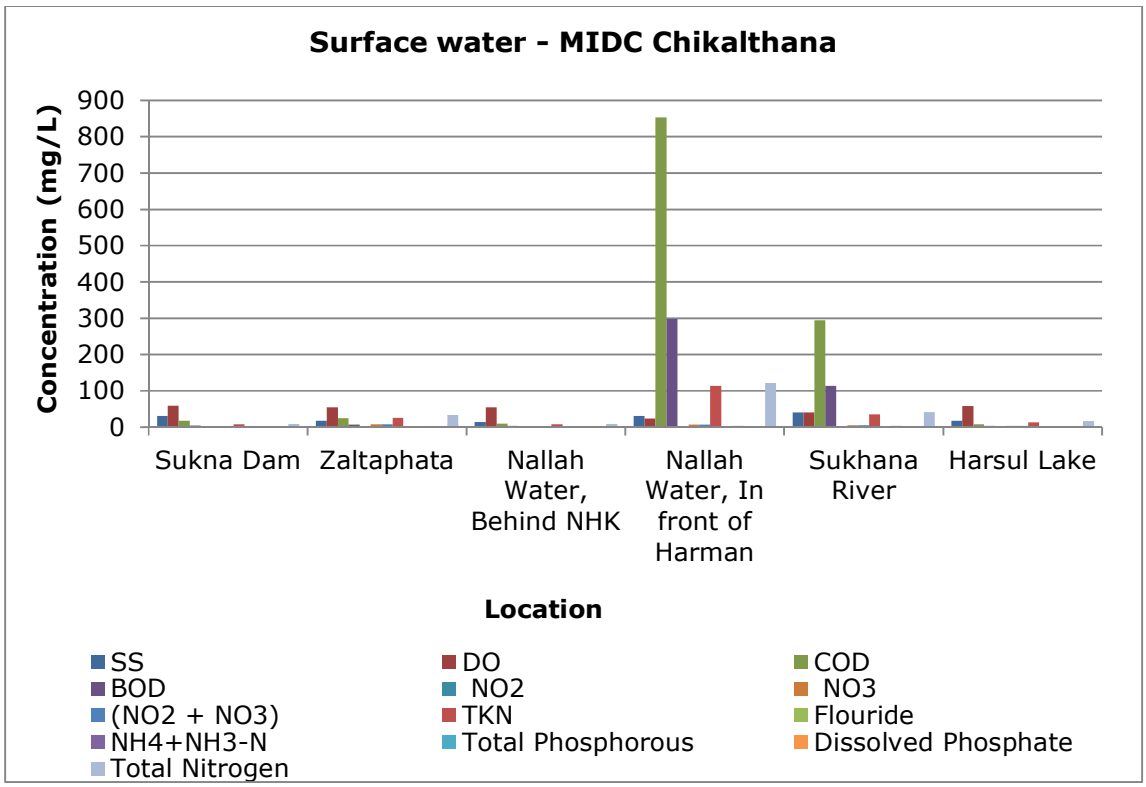
Parameters	Unit	Results					
		Sukhna Dam	**Zaltaphata**	**Nallah Water, Behind NHK**	**Nallah Water, In front of Harman**	**Sukhana River, Near Shani Mandir**	**Harsul Lake**
Sanitary Survey	-	Generally clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Generally clean neighbourhood
General Appearance	-	No Floating Matter	No Floating Matter	No Floating Matter	No Floating Matter	No Floating Matter	No floating matter
Transparency	m	2.43	0.80	0.83	1.07	0.70	1.07
Temperature	°C	21	21	21	22	20	23
Colour	Hazen	2	1	1	2	5	1
Smell	-	Not Agreeable	Agreeable	Agreeable	Not Agreeable	Agreeable	Agreeable
pH	-	8.24	8.30	8.35	7.88	8.41	8.74
Oil & Grease	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Suspended Solids	mg/L	31	18	14	31	40	17
Total Dissolved Solids	mg/L	439	1042	536	1119	1681	299

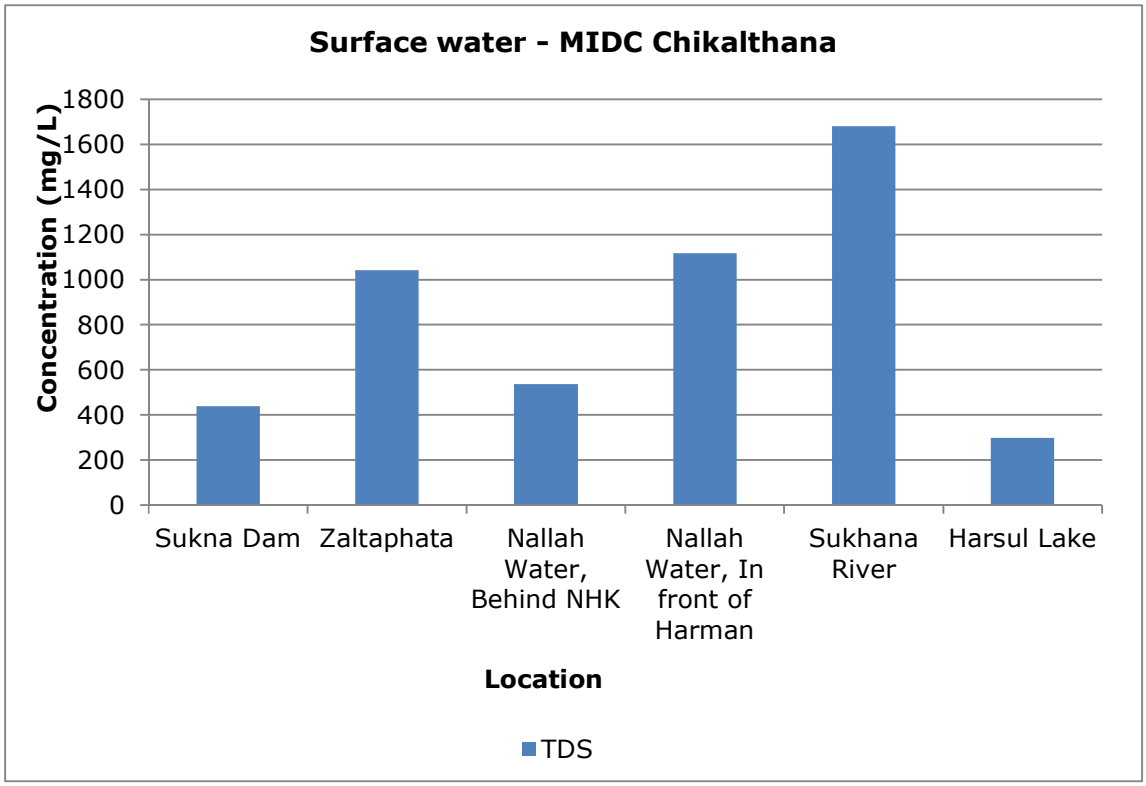
Parameters	Unit	Results					
		Sukhna Dam	Zaltaphata	Nallah Water, Behind NHK	Nallah Water, In front of Harman	Sukhana River, Near Shani Mandir	Harsul Lake
Dissolved Oxygen (% Saturation)	%	59.33	54.00	54.00	23.33	40.00	57.67
Chemical Oxygen Demand	mg/L	17	24	10	853	295	8
Biochemical Oxygen Demand (3 days,27°C)	mg/L	5	7	3	298	114	3
Electrical Conductivity (at 25 °C)	µmho/ cm	780	1859	953	1995	2897	464
Nitrite Nitrogen (as NO_2)	mg/L	BLQ	0.37	BLQ	BLQ	0.06	0.04
Nitrate Nitrogen (as NO_3)	mg/L	1.09	7.71	1.07	7.05	5.67	3.02
(NO_2 + NO_3)-Nitrogen	mg/L	1.09	8.08	1.07	7.05	5.69	3.06
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	0.06
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	0.80	1.13	0.90	1.07	1.37	0.63
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	BLQ	0.24	0.24	0.18	0.57	0.20
Sodium Adsorption Ratio	-	2.82	4.47	1.31	1.95	3.63	1.12
Total Coliforms	MPN Index/ 100 ml	121	413	865	723	666	220
Faecal Coliforms	MPN Index/ 100 ml	102	169	865	613	96	85
Total Phosphate (as P)	mg/L	0.18	0.39	0.38	0.64	1.08	0.32
Total Kjeldahl Nitrogen (as N)	mg/L	7.85	25.67	7.95	114.00	35.20	13.11

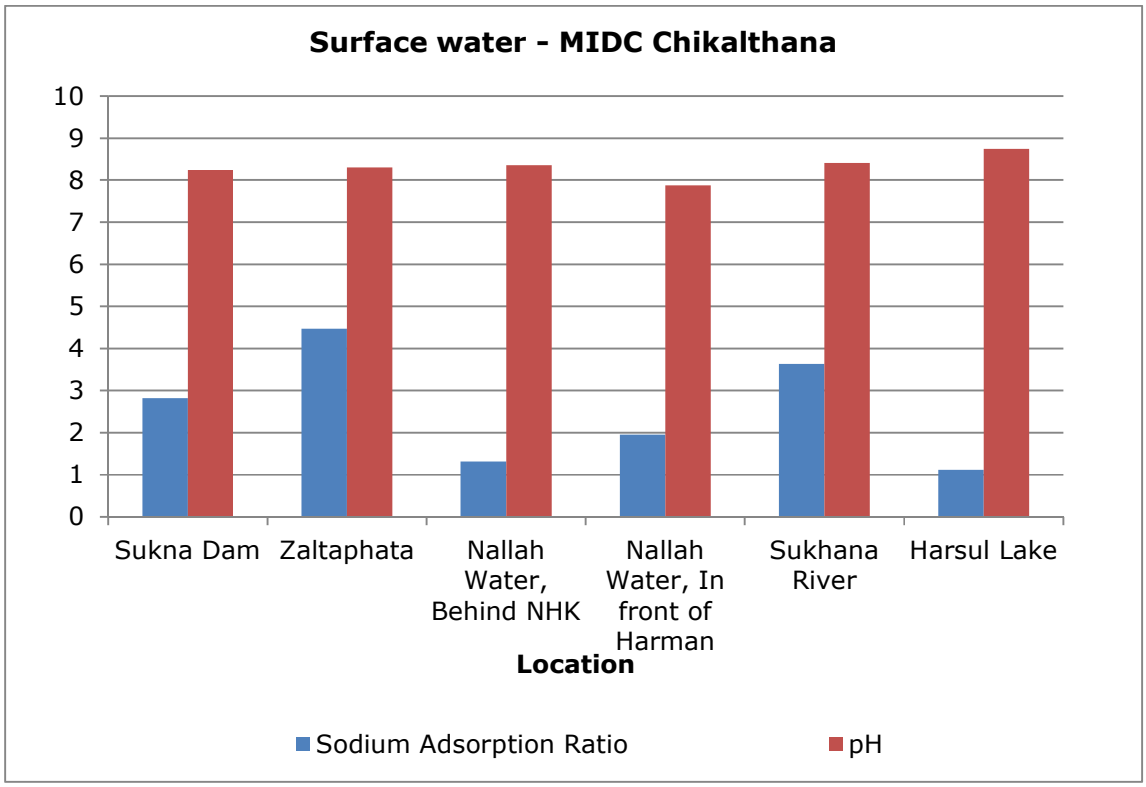
Parameters	Unit	Results					
		Sukhna Dam	Zaltaphata	Nallah Water, Behind NHK	Nallah Water, In front of Harman	Sukhana River, Near Shani Mandir	Harsul Lake
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.25	0.30	0.26	3.03	3.17	0.25
Phenols (as C_6H_5OH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Anionic Detergents (as MBAS Calculated as LAS, mol.wt.288.38)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Organo Chlorine Pesticides	µg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Polynuclear aromatic hydrocarbons (as PAH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	BLQ	BLQ	BLQ	0.26	BLQ	BLQ
Nickel (as Ni)	mg/L	0.02	0.01	0.01	0.04	0.02	0.02
Copper (as Cu)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Arsenic (as As)	mg/L	BLQ	0.01	BLQ	BLQ	BLQ	BLQ
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	0.08	0.93	0.66	0.02
Iron (as Fe)	mg/L	0.19	0.21	0.18	0.95	0.74	0.16
Vanadium (as V)	mg/L	0.02	0.12	0.03	0.01	0.03	0.09
Selenium (as Se)	mg/L	0.01	0.02	0.01	0.02	0.02	0.01
Boron (as B)	mg/L	0.19	0.46	0.28	0.39	1.09	0.14

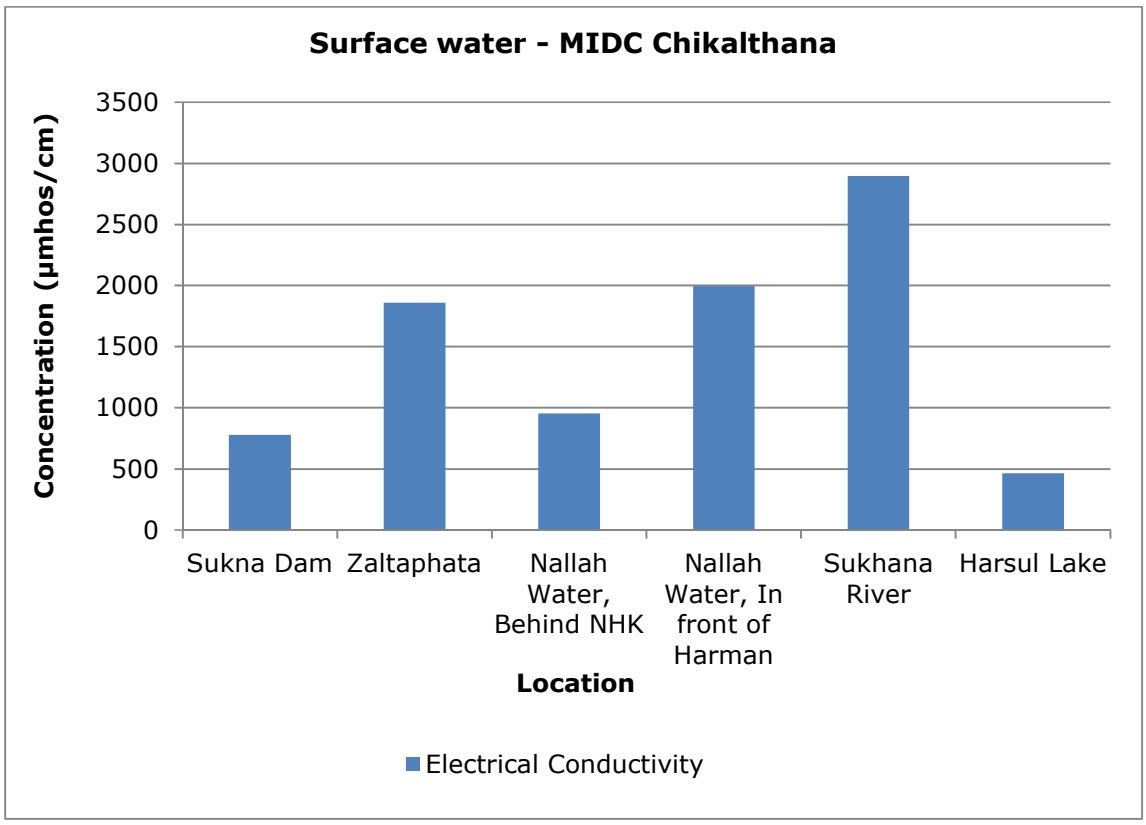
Parameters	Unit	Results					
		Sukhna Dam	Zaltaphata	Nallah Water, Behind NHK	Nallah Water, In front of Harman	Sukhana River, Near Shani Mandir	Harsul Lake
Total Nitrogen	mg/L	8.94	33.77	8.75	121.33	40.87	16.17
Bioassay Test on fish	% survival	83	97	87	40	33	100

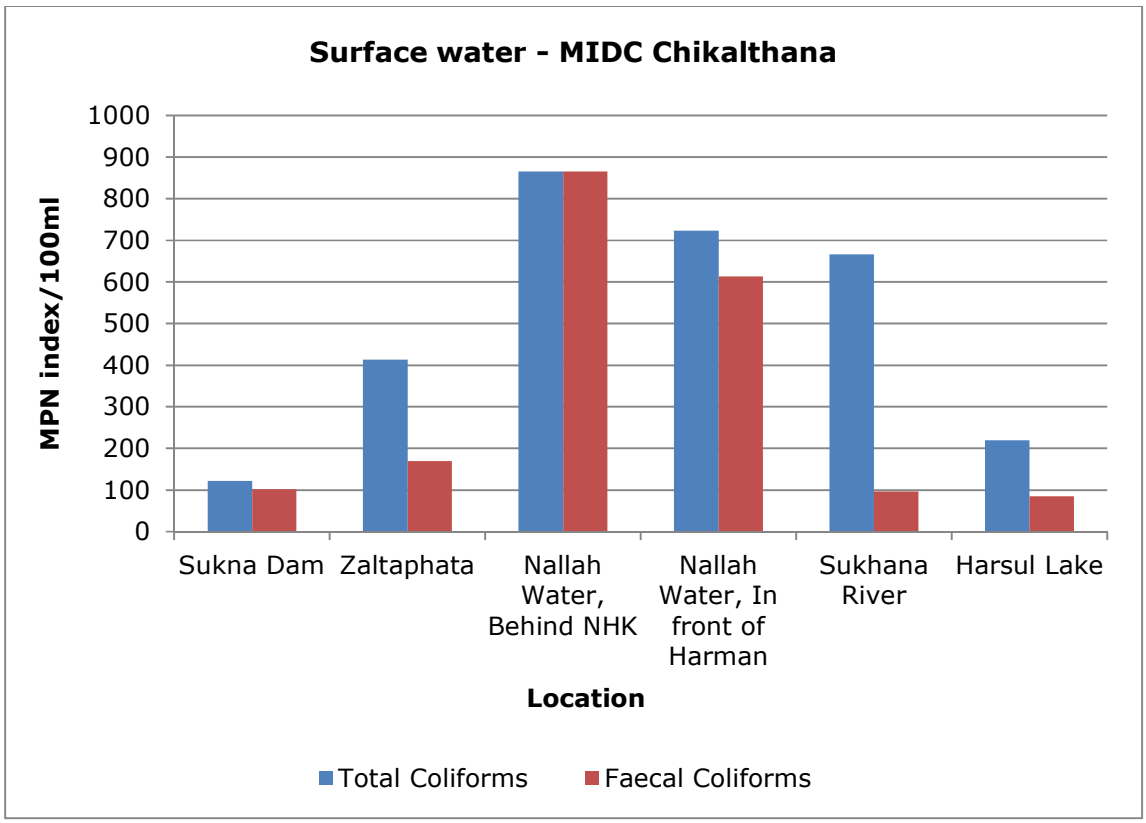
Graphs - Surface water of MIDC Chikalthana

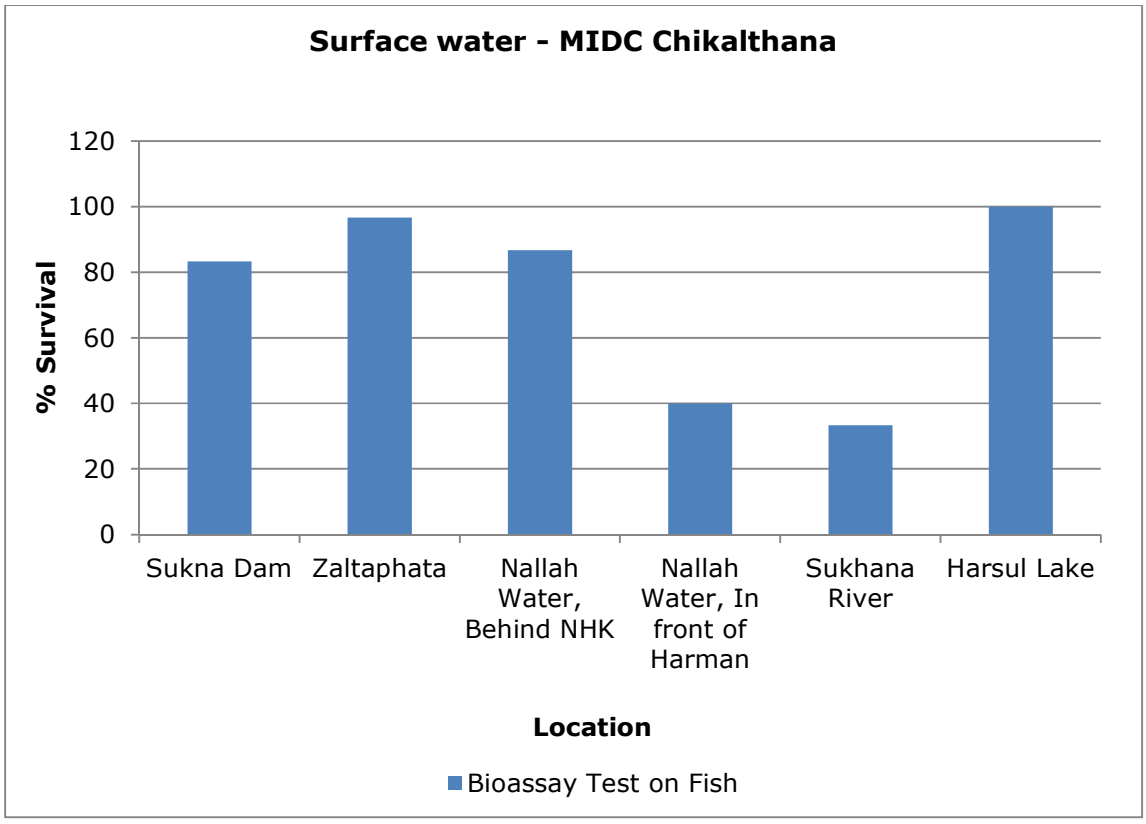





Surface water - MIDC Chikalthana
10
9
8
7
6
5
4
3
2
1
0
Sukna Dam
Zaltaphata
Nallah Water, Behind NHK
Nallah Water, In front of Harman
Sukhana River
Harsul Lake
Location
Sodium Adsorption Ratio
pH


Surface water - MIDC Chikalthana
Concentration (µmhos/cm)
3500
3000
2500
2000
1500
1000
500
0
Sukna Dam
Zaltaphata
Nallah Water, Behind NHK
Nallah Water, In front of Harman
Sukhana River
Harsul Lake
Location
Electrical Conductivity


Surface water - MIDC Chikalthana
MPN index/100ml
1000
900
800
700
600
500
400
300
200
100
0
Sukna Dam
Zaltaphata
Nallah Water, Behind NHK
Nallah Water, In front of Harman
Sukhana River
Harsul Lake
Location
Total Coliforms
Faecal Coliforms


Surface water - MIDC Chikalthana
% Survival
120
100
80
60
40
20
0
Sukna Dam
Zaltaphata
Nallah Water, Behind NHK
Nallah Water, In front of Harman
Sukhana River
Harsul Lake
Location
Bioassay Test on Fish

3. **MIDC Waluj:** Six surface water samples were collected from MIDC Waluj.

- Water in Waluj MIDC was found relatively of poor quality as most of the parameters exceed the acceptable limits.
- All six water samples collected were seen with floating matter in general appearance. Parameters like colour and smell, both exceed the acceptable limits.
- Whereas, the general parameters like pH, electrical conductivity and suspended solids were observed well within the limits in all the samples.
- Concentration of Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Total Kjeldahl Nitrogen (TKN) was found beyond the standard limits at all the studied locations.
- In fish bioassay, 47% fish survival was observed in the water sample of lake water behind K sector, whereas 100% in Pond water, SMS CETP Waluj Pvt Ltd.
- All metals like Arsenic, Nickel, Copper, Iron, Hexavalent Chromium (Cr^{6+}) etc. were also observed either below limit of quantification or below their standard limits.
- Parameters like Total Residual Chlorine, Nitrogen, 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 also observed below the limit of quantification in all the studied samples.

Table 6.5 MIDC Waluj - 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.	Upstream Kham River Water	19.811226N	75.249706E	17.01.2023	19.01.2023	21.01.2023
2.	Lake Water, Behind K Sector	19.852938N	75.214652E	17.01.2023	19.01.2023	21.01.2023
3.	CETP Discharge Point	19.828446N	75.239729E	17.01.2023	19.01.2023	21.01.2023
4.	Lake Water, Jogeshwari	19.816966N	75.205336E	17.01.2023	19.01.2023	21.01.2023
5.	Pond Water, SMS CETP	19.828926N	75.239306E	17.01.2023	19.01.2023	21.01.2023
6.	Nallah Water IPCA (Paschim Chem)	19.858766N	75.223034E	17.01.2023	19.01.2023	21.01.2023

Fig: Geographical Locations of Surface Water Sampling MIDC Waluj

Table 6.6 MIDC Waluj - Results of Surface Water

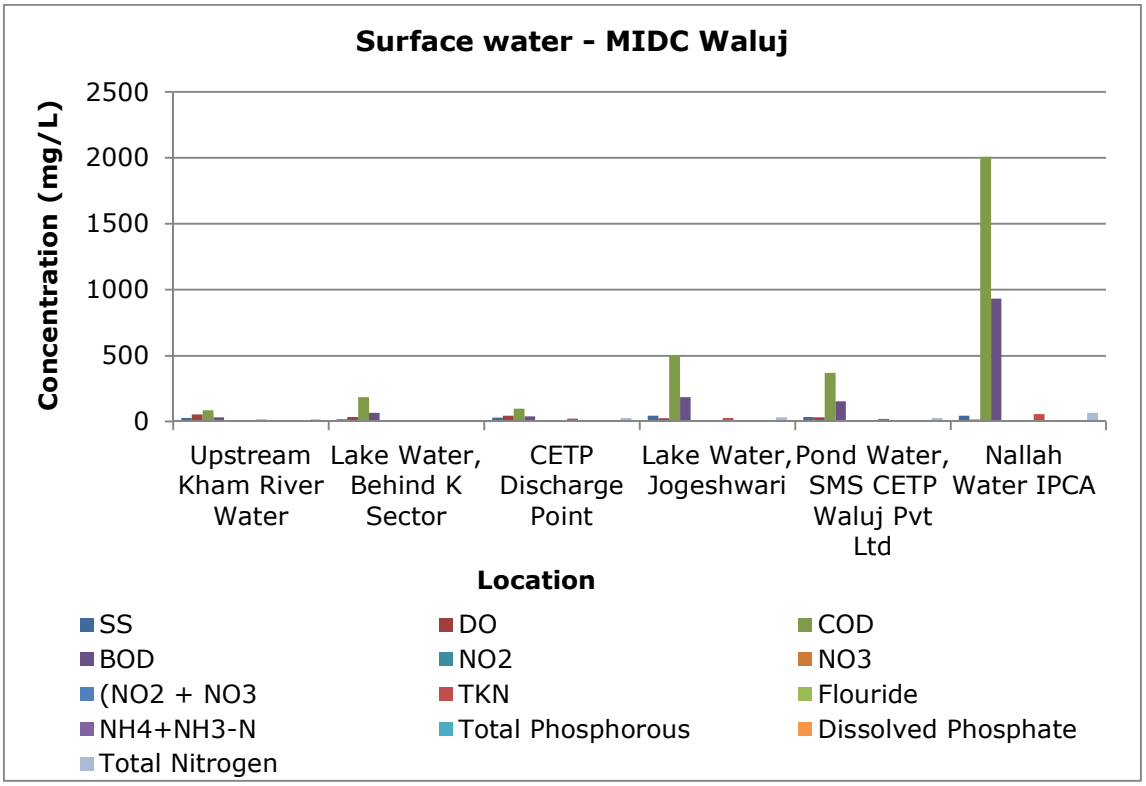
Parameters	Unit	Results					
		Upstream Kham River Water	**Lake Water, Behind K Sector**	**CETP Discharge Point**	**Lake Water, Jogeshwari**	**Pond Water, SMS CETP**	**Nallah Water IPCA (Paschim Chem)**
Sanitary Survey	-	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Generally clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood
General Appearance	-	Floating Matter evident	Floating Matter Evident	Floating Matter evident	Floating Matter evident	Floating Matter evident	Floating Matter evident
Transparency	m	0.30	0.70	0.50	0.60	0.60	0.80
Temperature	^{o}C	25	26	23	25	25	25
Colour	Hazen	2	1	3	7	4	5
Smell	-	Agreeable	Agreeable	Not Agreeable	Not Agreeable	Not Agreeable	Not Agreeable
pH	-	7.96	8.38	8.09	8.40	8.70	7.67
Oil & Grease	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Suspended Solids	mg/L	26	17	29	45	33	45
Total Dissolved Solids	mg/L	781	1203	1398	897	1318	3141

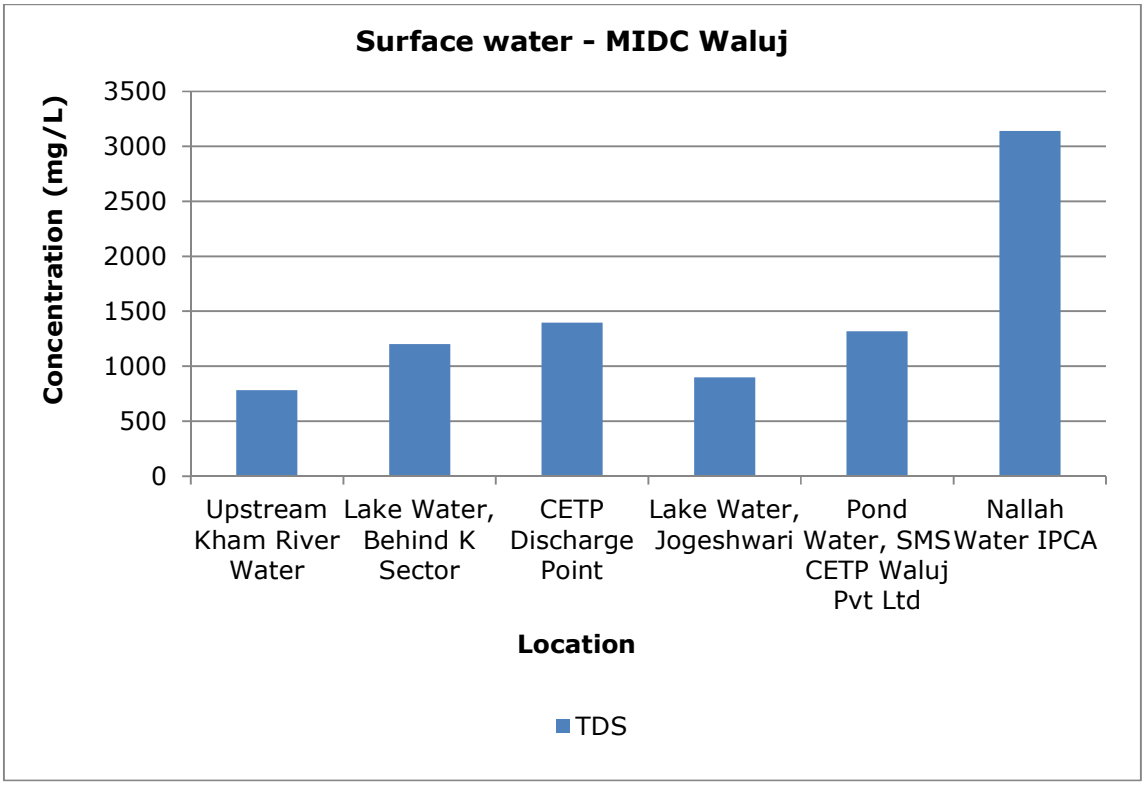
Parameters	Unit	Results					
		Upstream Kham River Water	Lake Water, Behind K Sector	CETP Discharge Point	Lake Water, Jogeshwari	Pond Water, SMS CETP	Nallah Water IPCA (Paschim Chem)
Dissolved Oxygen (% Saturation)	%	54.67	34.00	44.67	23.33	32.33	14.33
Chemical Oxygen Demand	mg/L	86	187	96	500	370	2007
Biochemical Oxygen Demand (3 days,27°C)	mg/L	32	65	40	184	155	933
Electrical Conductivity (at 25 °C)	µmho/ cm	1394	2147	2493	1600	2353	5607
Nitrite Nitrogen (as NO_2)	mg/L	0.35	0.43	0.62	0.30	0.29	0.03
Nitrate Nitrogen (as NO_3)	mg/L	3.18	4.27	4.31	3.99	4.69	8.82
(NO_2 + NO_3)-Nitrogen	mg/L	3.53	4.70	4.93	4.29	4.98	8.83
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	BLQ	0.06	BLQ	BLQ	BLQ	BLQ
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	1.07	1.43	1.53	1.27	1.53	2.17
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.41	0.75	0.52	0.72	0.72	3.35
Sodium Adsorption Ratio	-	3.48	3.09	11.21	2.40	8.52	10.85
Total Coliforms	MPN Index/ 100 ml	865	283	581	130	807	657
Faecal Coliforms	MPN Index/ 100 ml	840	171	865	25	804	462
Total Phosphate (as P)	mg/L	0.83	1.65	0.88	1.41	1.57	5.57

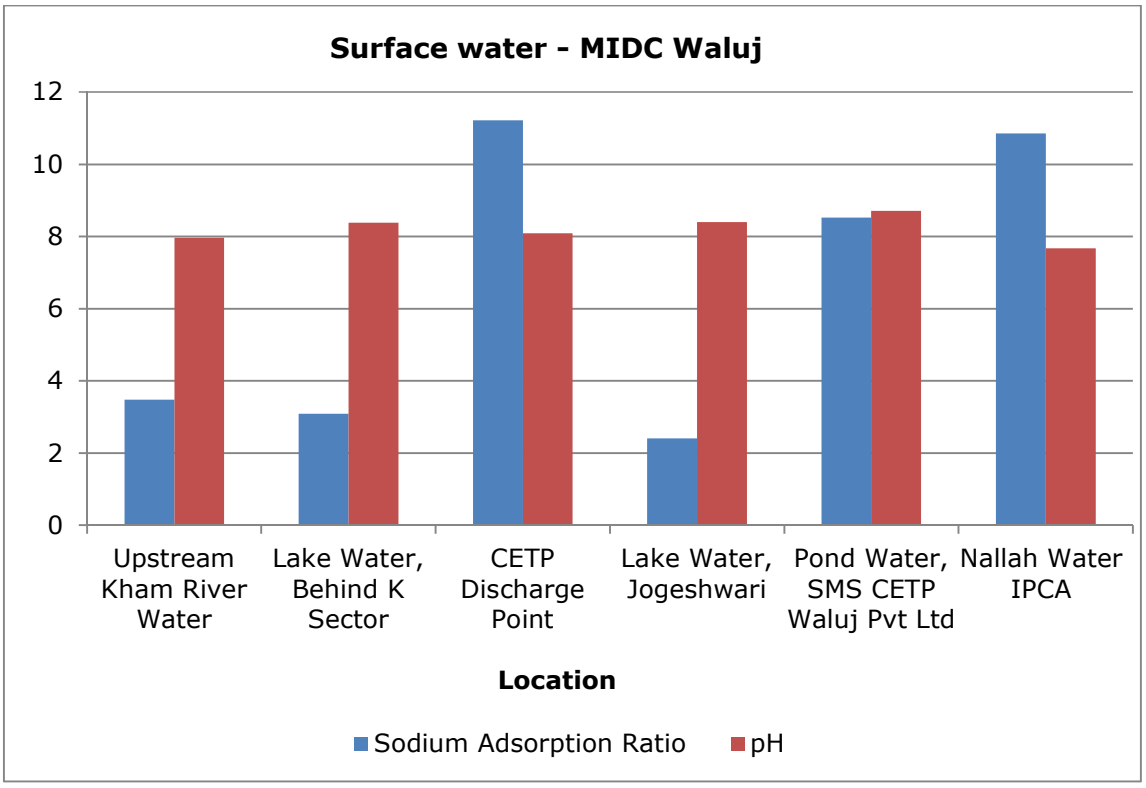
Parameters	Unit	Results					
		Upstream Kham River Water	Lake Water, Behind K Sector	CETP Discharge Point	Lake Water, Jogeshwari	Pond Water, SMS CETP	Nallah Water IPCA (Paschim Chem)
Total Kjeldahl Nitrogen (as N)	mg/L	14.21	4.67	21.83	26.70	20.90	56.20
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.90	0.59	1.37	1.57	1.54	3.17
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	0.24	BLQ	0.23	0.21	BLQ	0.26
Nickel (as Ni)	mg/L	0.03	0.04	0.23	0.02	0.08	0.06
Copper (as Cu)	mg/L	0.03	BLQ	BLQ	BLQ	BLQ	0.04
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	0.02	BLQ	BLQ	BLQ	BLQ	BLQ
Total Arsenic (as As)	mg/L	BLQ	0.01	BLQ	BLQ	BLQ	0.01
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	0.30	0.37	0.07	0.26	0.11	4.13
Iron (as Fe)	mg/L	1.62	0.80	0.27	0.13	0.09	4.95
Vanadium (as V)	mg/L	0.05	0.06	0.01	0.01	BLQ	0.01

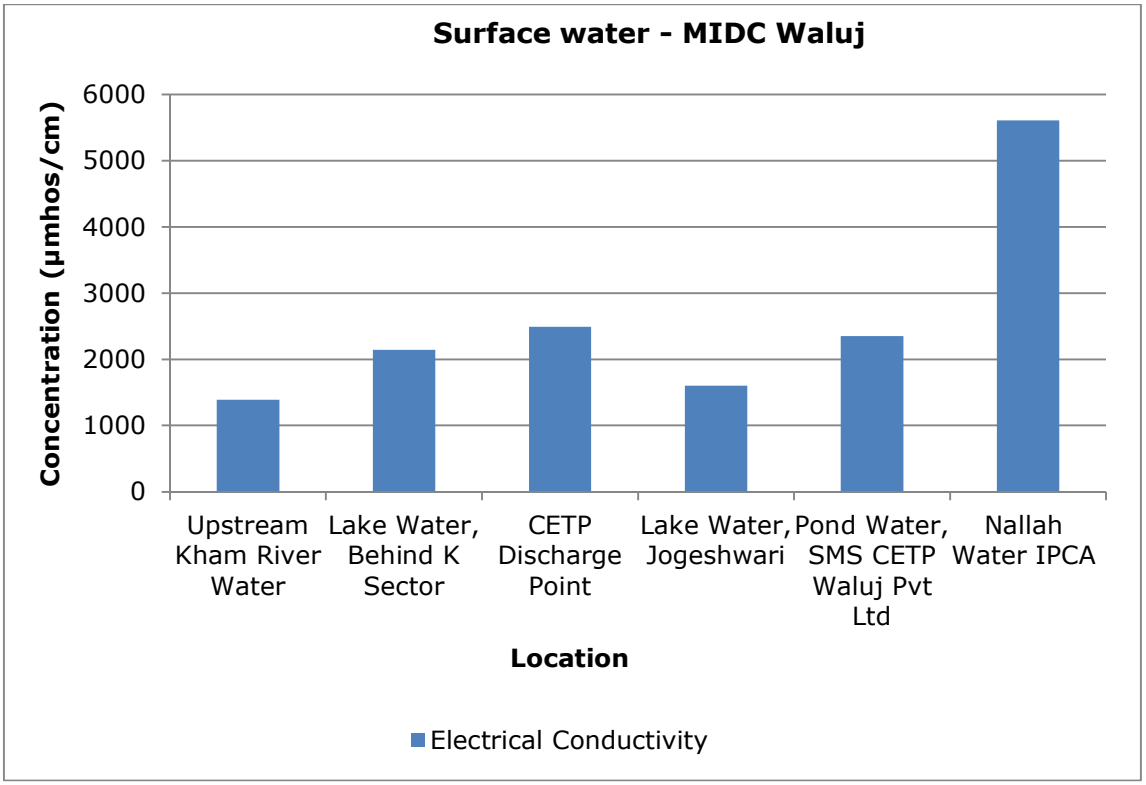
Parameters	Unit	Results					
		Upstream Kham River Water	Lake Water, Behind K Sector	CETP Discharge Point	Lake Water, Jogeshwari	Pond Water, SMS CETP	Nallah Water IPCA (Paschim Chem)
Selenium (as Se)	mg/L	0.01	0.02	0.01	0.01	0.01	0.01
Boron (as B)	mg/L	0.25	0.38	0.99	0.39	1.89	0.36
Total Nitrogen	mg/L	17.77	9.35	26.77	31.00	25.89	65.17
Bioassay Test on fish	% survival	67	47	67	80	100	67

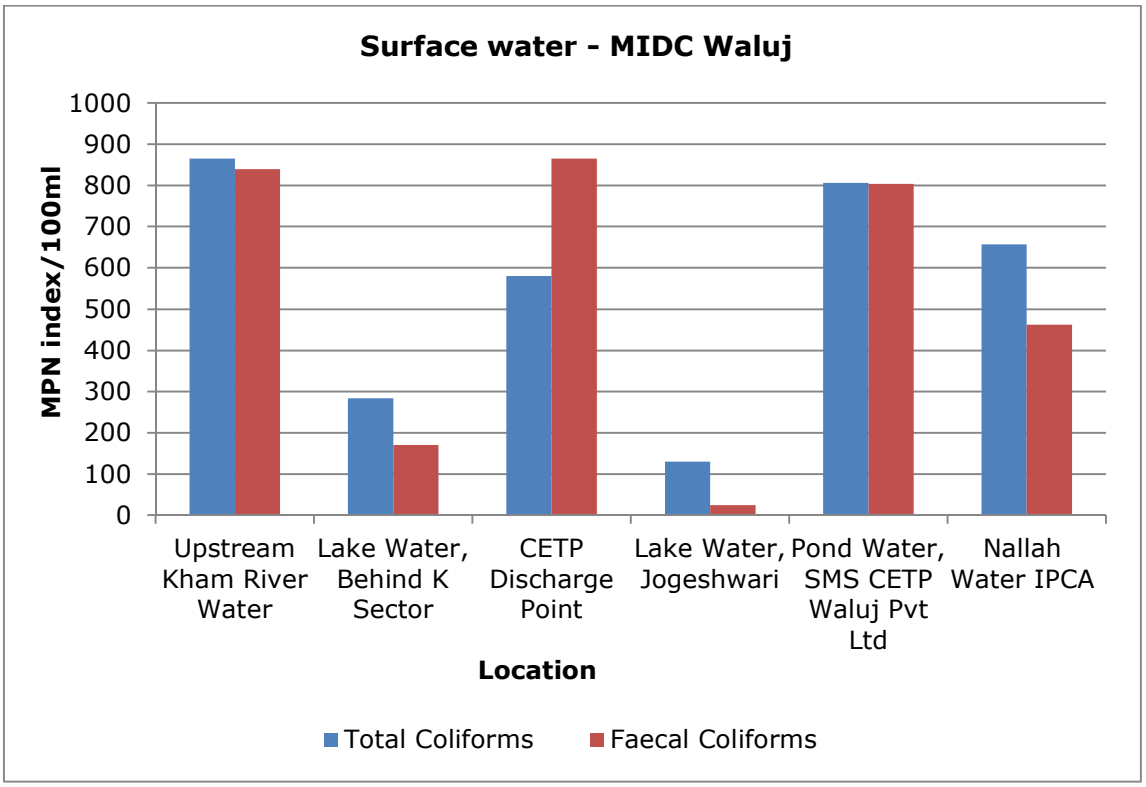
Graphs - Surface water of MIDC Waluj

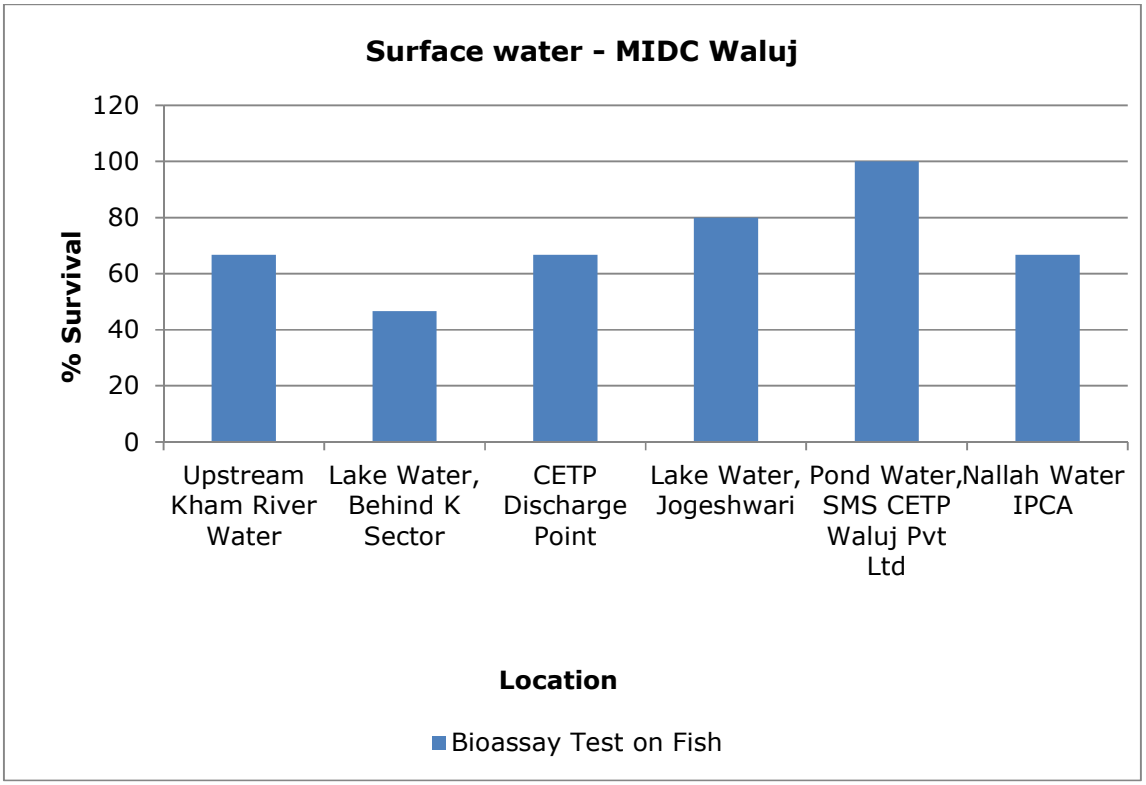



Surface water - MIDC Waluj
Concentration (mg/L)
3500
3000
2500
2000
1500
1000
500
0
Upstream Kham River Water
Lake Water, Behind K Sector
CETP Discharge Point
Lake Water, Jogeshwari
Pond Water, SMS CETP Waluj Pvt Ltd
Nallah Water IPCA
Location
TDS


Surface water - MIDC Waluj
12
10
8
6
4
2
0
Upstream Kham River Water
Lake Water, Behind K Sector
CETP Discharge Point
Lake Water, Jogeshwari
Pond Water, SMS CETP Waluj Pvt Ltd
Nallah Water IPCA
Location
Sodium Adsorption Ratio
pH


Surface water - MIDC Waluj
Concentration (µmhos/cm)
6000
5000
4000
3000
2000
1000
0
Upstream Kham River Water
Lake Water, Behind K Sector
CETP Discharge Point
Lake Water, Jogeshwari
Pond Water, SMS CETP Waluj Pvt Ltd
Nallah Water IPCA
Location
Electrical Conductivity


Surface water - MIDC Waluj
MPN index/100ml
1000
900
800
700
600
500
400
300
200
100
0
Upstream Kham River Water
Lake Water, Behind K Sector
CETP Discharge Point
Lake Water, Jogeshwari
Pond Water, SMS CETP Waluj Pvt Ltd
Nallah Water IPCA
Location
Total Coliforms
Faecal Coliforms


Surface water - MIDC Waluj
120
100
80
60
40
20
0
% Survival
Upstream Kham River Water
Lake Water, Behind K Sector
CETP Discharge Point
Lake Water, Jogeshwari
Pond Water, SMS CETP Waluj Pvt Ltd
Nallah Water IPCA
Location
Bioassay Test on Fish

4. **MIDC Paithan:** Six surface water samples were collected from MIDC Paithan.

- Out of six water samples, four samples were found acceptable in general appearance, colour, smell and transparency.
- General parameters like pH, electrical conductivity and suspended solids are also observed well within the limits in all the samples.
- Except for the water sample of Nallah water in front of Badve Engg. and Nallah water station MIDC, the concentration of Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Total Kjeldahl Nitrogen (TKN) was found within the standard limits at all the studied locations.
- 100% fish survival was observed in three water samples during fish bioassay.
- All metals like Arsenic, Nickel, Copper, Iron, Hexavalent Chromium (Cr^{6+}) etc. were also observed either below the limit of quantification or below their standard limits.
- Parameters like Total Residual Chlorine, Nitrogen, 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 also observed below the limit of quantification in all the studied samples.

Table 6.7 MIDC Paithan - 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.	Dam Water Back Side of WTP	19.755413N	75.307286E	16.01.2023	18.01.2023	20.01.2023
2.	Nallah water Infront of Badve Engg.	19.78685N	75.278677E	16.01.2023	18.01.2023	20.01.2023
3.	Nallah water, Farolla village	19.730742N	75.295845E	16.01.2023	18.01.2023	20.01.2023
4.	Nallah water, Near R. L. Steel	19.742626N	75.293119E	16.01.2023	18.01.2023	20.01.2023
5.	Patil Lake Water Near Walmi, Beed Bypass	19.832217N	75.315335E	16.01.2023	18.01.2023	20.01.2023
6.	Nallah Water, Station MIDC	19.854414N	75.318355E	18.01.2023	20.01.2023	22.01.2023

Fig: Geographical Locations of Surface Water Sampling MIDC Paithan

Table 6.8 MIDC Paithan - Results of Surface Water

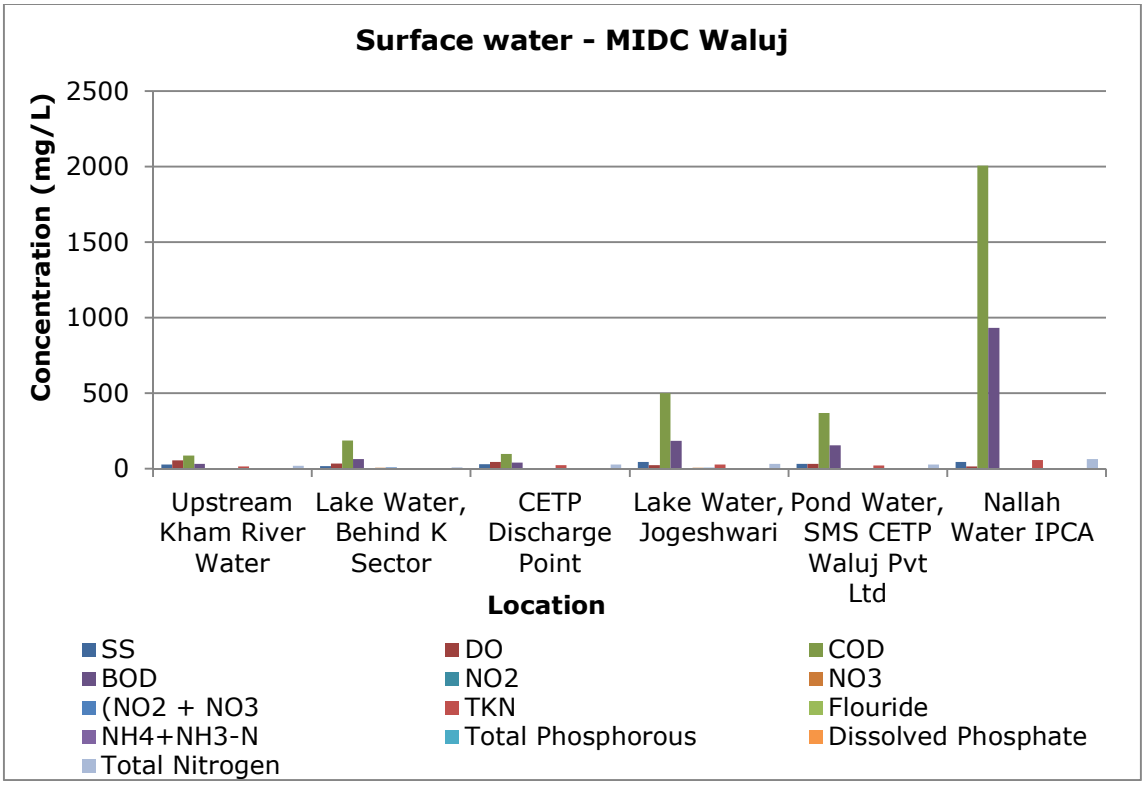
Parameters	Unit	Results					
		Dam Water Back Side of WTP	**Nallah water Infront of Badve Engg.**	**Nallah water, Farolla village**	**Nallah water, Near R. L. Steel**	**Patil Lake Water Near Walmi, Beed Bypass**	**Nallah Water, Station MIDC**
Sanitary Survey	-	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Generally clean neighbourhood	Reasonably clean neighbourhood
General Appearance	-	No floating matter	Floating Matter evident	Floating Matter evident	No floating matter	No floating matter	No floating matter
Transparency	m	1.50	1.00	0.80	0.90	1.50	0.50
Temperature	°C	22	23	24	24	25	25
Colour	Hazen	3	2	2	1	1	3
Smell	-	Agreeable	Not Agreeable	Agreeable	Agreeable	Agreeable	Not Agreeable
pH	-	8.73	8.14	8.42	8.43	8.81	8.31
Oil & Grease	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Suspended Solids	mg/L	27	45	25	12	19	58

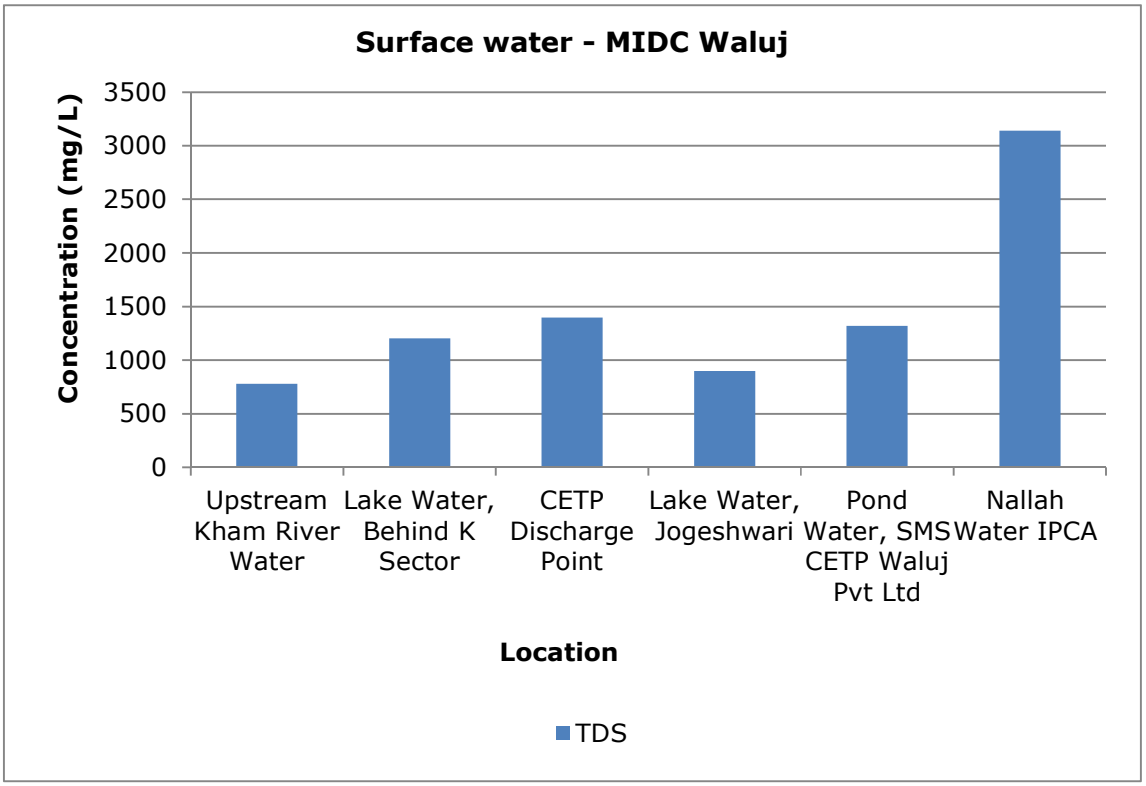
Parameters	Unit	Results					
		Dam Water Back Side of WTP	Nallah water Infront of Badve Engg.	Nallah water, Farolla village	Nallah water, Near R. L. Steel	Patil Lake Water Near Walmi, Beed Bypass	Nallah Water, Station MIDC
Total Dissolved Solids	mg/L	215	801	380	1030	319	699
Dissolved Oxygen (% Saturation)	%	62.33	35.00	58.67	42.33	65.00	30.67
Chemical Oxygen Demand	mg/L	BLQ	340	17	22	26	542
Biochemical Oxygen Demand (3 days,27°C)	mg/L	BLQ	152	6	7	7	245
Electrical Conductivity (at 25 °C)	µmho/cm	381	1421	676	1835	568	1248
Nitrite Nitrogen (as NO_2)	mg/L	BLQ	0.28	0.07	0.52	BLQ	BLQ
Nitrate Nitrogen (as NO_3)	mg/L	BLQ	1.56	1.24	3.78	BLQ	3.14
(NO_2 + NO_3)-Nitrogen	mg/L	BLQ	1.84	1.32	4.30	BLQ	3.14
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	0.53	1.03	0.60	1.37	0.60	1.07
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	BLQ	0.33	0.16	0.40	0.20	0.28
Sodium Adsorption Ratio	-	2.07	3.15	2.29	6.34	8.18	3.94
Total Coliforms	MPN Index/ 100 ml	545	160	693	240	44	1247
Faecal Coliforms	MPN Index/ 100 ml	472	79	53	21	35	657

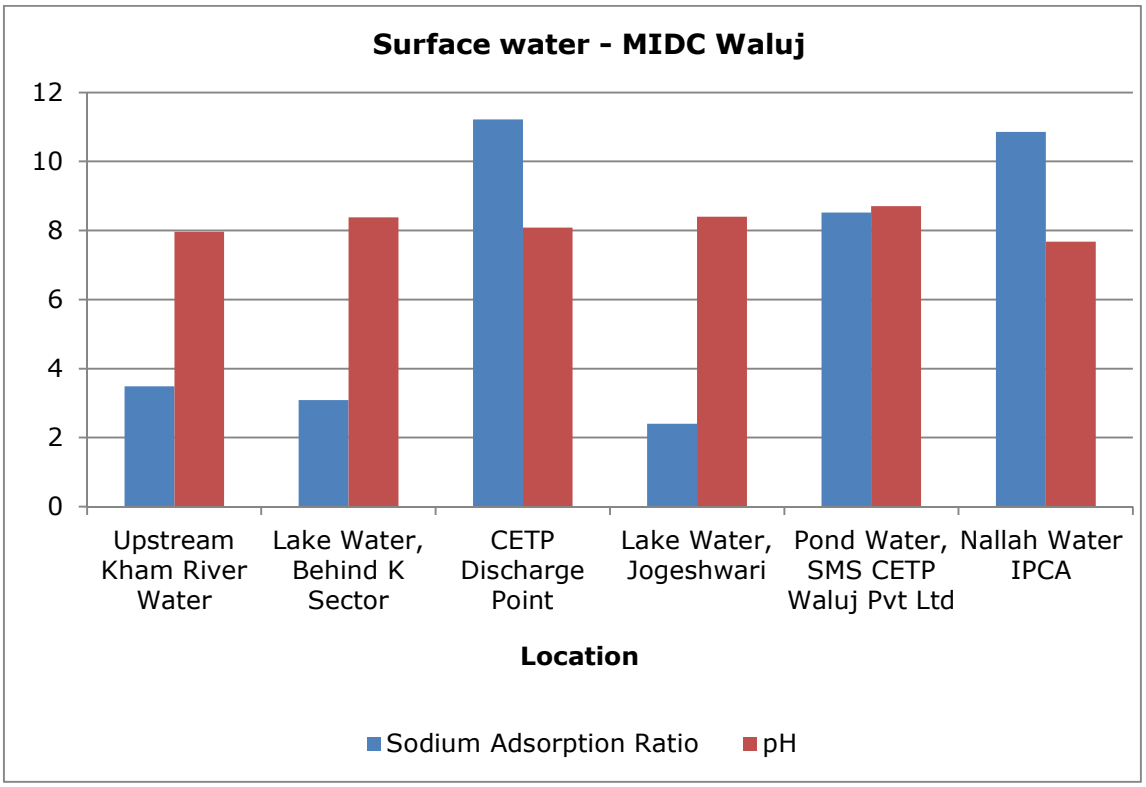
Parameters	Unit	Results					
		Dam Water Back Side of WTP	Nallah water Infront of Badve Engg.	Nallah water, Farolla village	Nallah water, Near R. L. Steel	Patil Lake Water Near Walmi, Beed Bypass	Nallah Water, Station MIDC
Total Phosphate (as P)	mg/L	0.20	0.38	0.24	0.72	0.32	0.81
Total Kjeldahl Nitrogen (as N)	mg/L	3.17	10.26	3.92	9.70	2.05	7.09
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.32	1.91	0.51	0.36	0.32	1.78
Phenols (as C_6H_5OH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Anionic Detergents (as MBAS Calculated as LAS, mol.wt.288.38)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Organo Chlorine Pesticides	µg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Polynuclear aromatic hydrocarbons (as PAH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Nickel (as Ni)	mg/L	BLQ	0.02	BLQ	0.01	BLQ	BLQ
Copper (as Cu)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Arsenic (as As)	mg/L	BLQ	BLQ	BLQ	0.01	BLQ	0.01
Lead (as Pb)	mg/L	BLQ	BLQ	BLQ	BLQ	0.01	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	0.06	0.28	0.06	BLQ	0.03	0.27

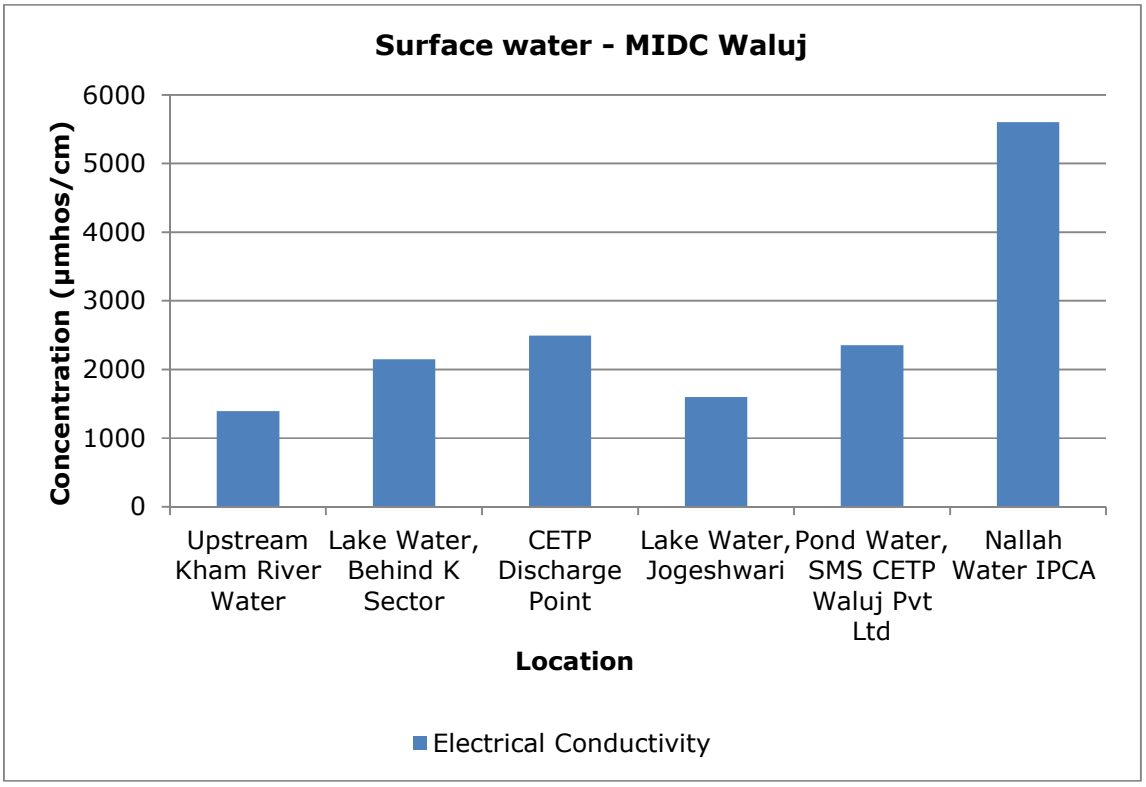
Parameters	Unit	Results					
		Dam Water Back Side of WTP	Nallah water Infront of Badve Engg.	Nallah water, Farolla village	Nallah water, Near R. L. Steel	Patil Lake Water Near Walmi, Beed Bypass	Nallah Water, Station MIDC
Iron (as Fe)	mg/L	0.13	0.12	0.24	0.08	0.09	0.42
Vanadium (as V)	mg/L	0.03	0.03	0.03	0.07	0.11	0.09
Selenium (as Se)	mg/L	0.01	0.01	0.01	0.02	0.01	0.01
Boron (as B)	mg/L	0.55	0.12	0.11	1.03	BLQ	0.16
Total Nitrogen	mg/L	3.95	12.10	5.24	13.99	2.52	10.23
Bioassay Test on fish	% survival	100	100	67	83	80	100

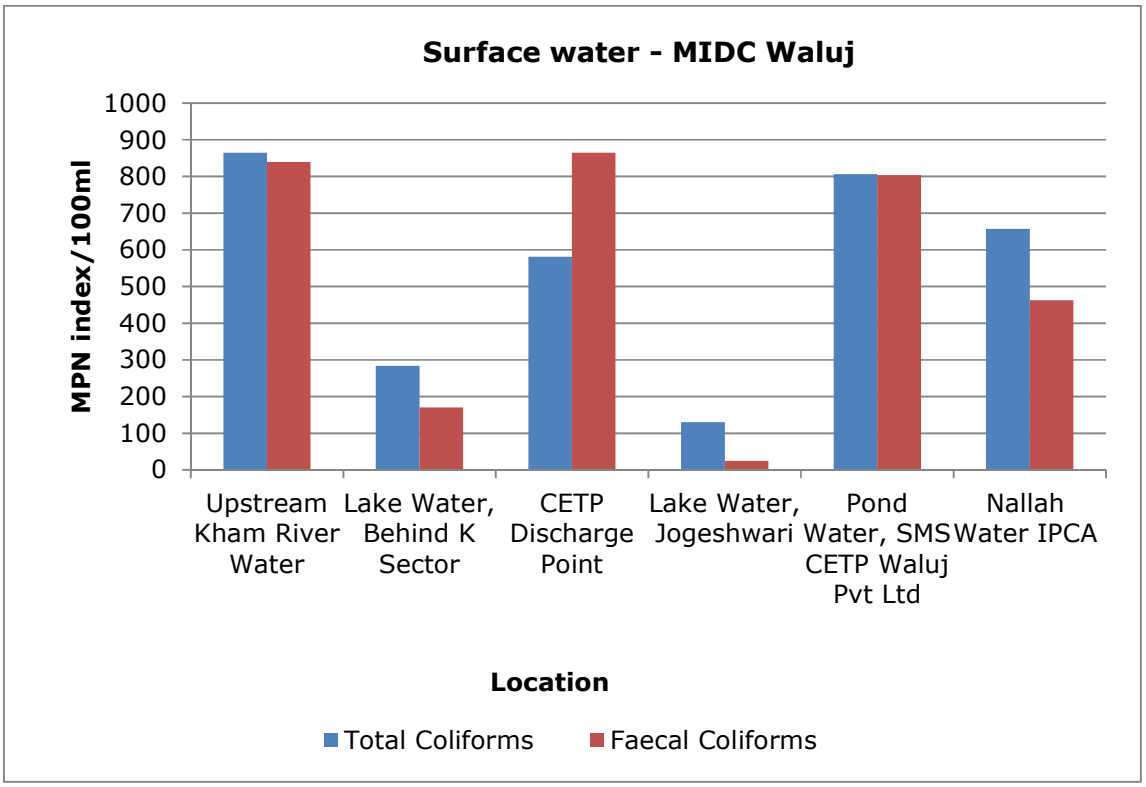
Graphs - Surface water of MIDC Paithan Road

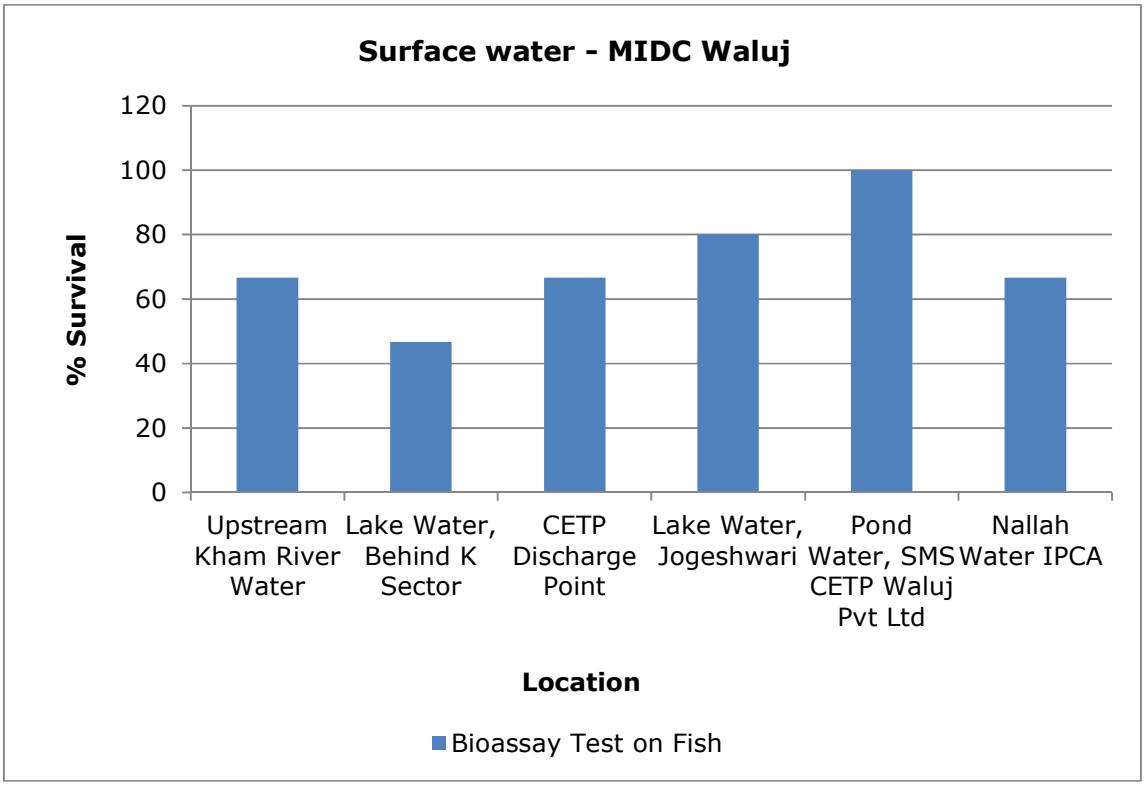





Surface water - MIDC Waluj
12
10
8
6
4
2
0
Upstream Kham River Water
Lake Water, Behind K Sector
CETP Discharge Point
Lake Water, Jogeshwari
Pond Water, SMS CETP Waluj Pvt Ltd
Nallah Water IPCA
Location
Sodium Adsorption Ratio
pH


Surface water - MIDC Waluj
Concentration (µmhos/cm)
6000
5000
4000
3000
2000
1000
0
Upstream Kham River Water
Lake Water, Behind K Sector
CETP Discharge Point
Lake Water, Jogeshwari
Pond Water, SMS CETP Waluj Pvt Ltd
Nallah Water IPCA
Location
Electrical Conductivity


Surface water - MIDC Waluj
MPN index/100ml
1000
900
800
700
600
500
400
300
200
100
0
Upstream Kham River Water
Lake Water, Behind K Sector
CETP Discharge Point
Lake Water, Jogeshwari
Pond Water, SMS CETP Waluj Pvt Ltd
Nallah Water IPCA
Location
Total Coliforms
Faecal Coliforms


Surface water - MIDC Waluj
% Survival
120
100
80
60
40
20
0
Upstream Kham River Water
Lake Water, Behind K Sector
CETP Discharge Point
Lake Water, Jogeshwari
Pond Water, SMS CETP Waluj Pvt Ltd
Nallah Water IPCA
Location
Bioassay Test on Fish

6. Land Environment

For studying the land Environment of Aurangabad area, ground water was collected from Bore well. Dug well, and Hand Pump. A total of 12 samples were collected from MIDC Shendra, MIDC Chikalthana, MIDC Paithan and MIDC Waluj.

1. **MIDC Shendra:** Three groundwater samples were collected from the MIDC Aurangabad region.

- All three water samples collected were found acceptable in general appearance, colour, smell and transparency.
- All the general parameters like pH, suspended solids, BOD, and COD are also well within the limits at all three samples collected.
- Electrical conductivity of open well water from Ramrao Kulkarni was high with 2128 µmhos/cm.
- 100% fish survival was achieved in the water sample of open well water from Ramrao Kulkarni during the Fish Bioassay.
- All metals like Arsenic, Nickel, Copper, Iron, Hexavalent Chromium (Cr6+) etc. were observed either below the limit of 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.
- Polynuclear aromatic hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB) were determined below the limit of quantification in all 3 samples collected.
- Organo Chlorine Pesticides were also observed below the limit of quantification in all 3 samples collected.

Table 7.1 MIDC Shendra - 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.	Shendra Village, Near Hanuman Temple	19.872643N	75.470643E	10.01.2023	12.01.2023	14.01.2023
2.	Open Well, Ramrao Kulkarni, Gat no 95, Kumbhephal	19.858383N	75.490362E	10.01.2023	12.01.2023	14.01.2023
3.	Open Well, Wockhardt Ltd.	19.874766N	75.48838E	10.01.2023	12.01.2023	14.01.2023

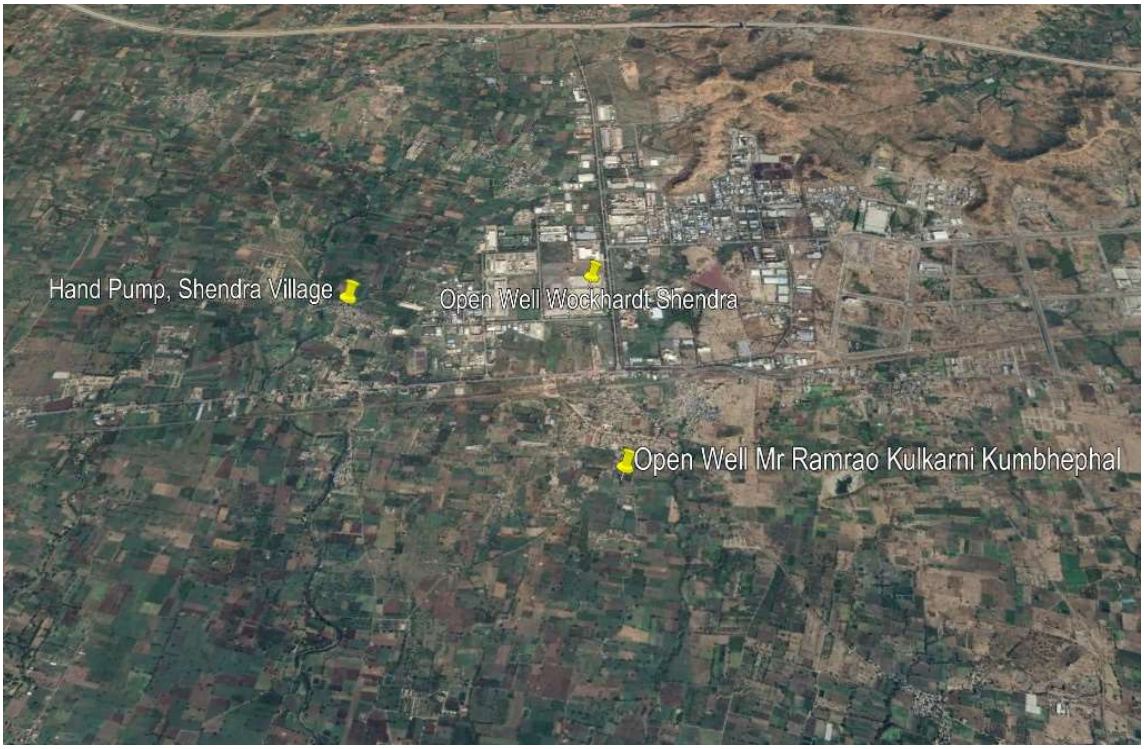


Fig: Geographical Locations of Ground Water Sampling MIDC Shendra

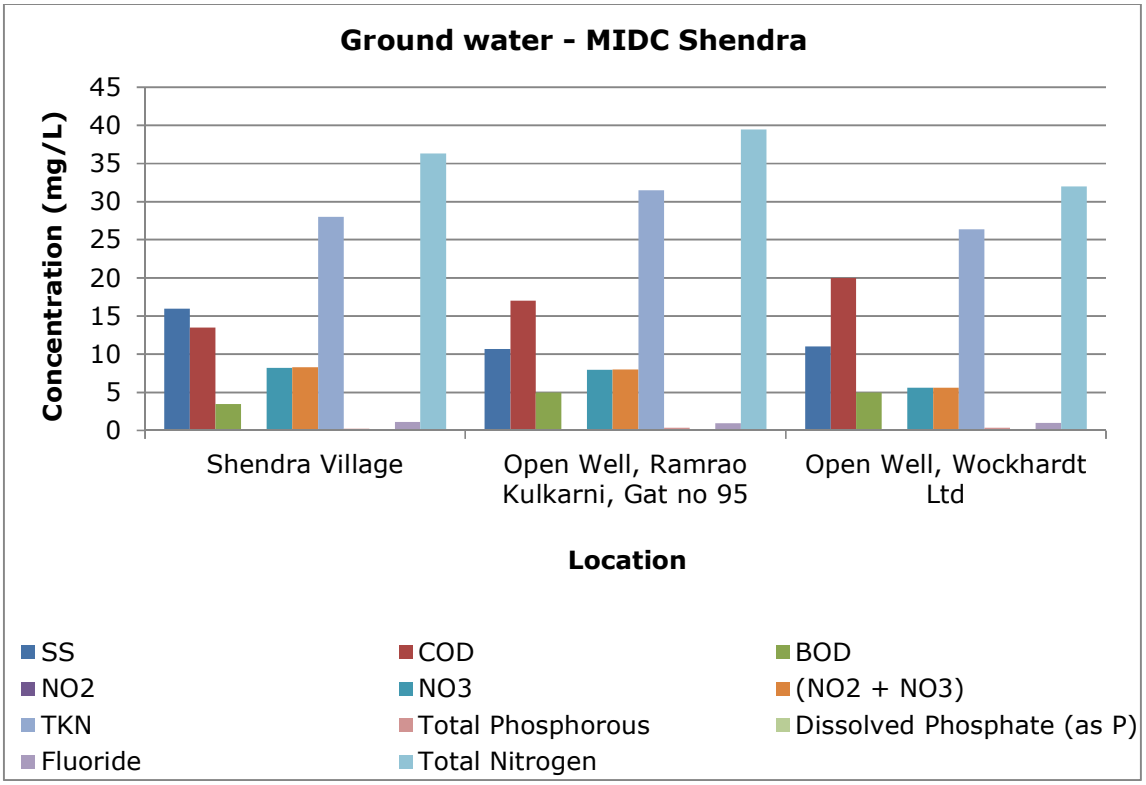
Table 7.2 MIDC Shendra - Results of Ground Water

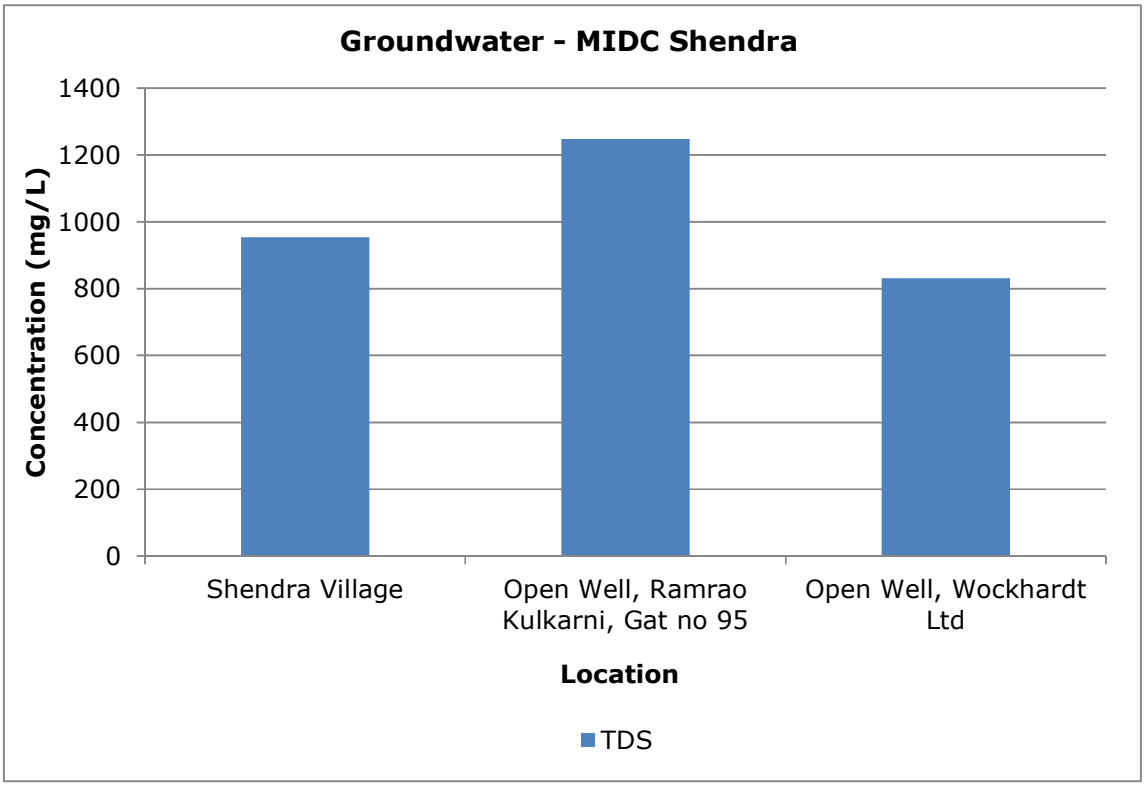
Parameters	Unit	Results		
		Shendra Village, Near Hanuman Temple	**Open Well, Ramrao Kulkarni, Gat no 95, Kumbhephal**	**Open Well, Wockhardt Ltd.**
Sanitary Survey	-	Very Clean Neighbourhood and Catchment	Generally clean neighbourhood	Generally clean neighbourhood
General Appearance	-	No floating matter	No floating matter	Floating matter evident
Transparency	m	2.50	2.13	2.47
Temperature	Hazen	21	20	18
Colour	^{o}C	2	1	1
Smell	-	Agreeable	Agreeable	Agreeable
pH	-	8.19	7.84	8.02
Oil & Grease	mg/L	BLQ	BLQ	BLQ
Total Suspended Solids	mg/L	16	11	11
Total Dissolved Solids	mg/L	954	1247	831
Chemical Oxygen Demand	mg/L	14	17	20
Biochemical Oxygen Demand (3 days,27^{o}C)	mg/L	4	5	5
Electrical Conductivity (at 25^{o}C)	µmho/cm	1701	2128	1483

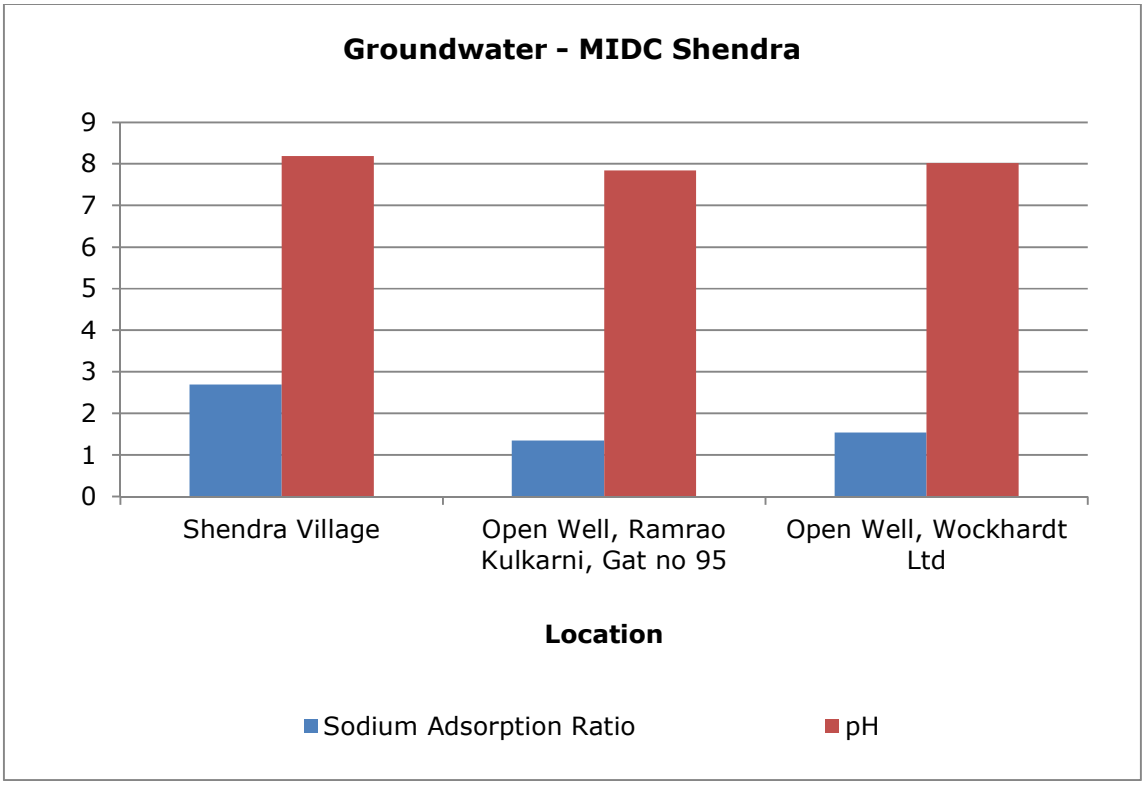
Parameters	Unit	Results		
		Shendra Village, Near Hanuman Temple	Open Well, Ramrao Kulkarni, Gat no 95, Kumbhephal	Open Well, Wockhardt Ltd.
Nitrite Nitrogen (as NO_2)	mg/L	0.07	0.14	BLQ
Nitrate Nitrogen (as NO_3)	mg/L	8.22	7.93	5.62
(NO_2 + NO_3)-Nitrogen	mg/L	8.29	7.98	5.62
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	BLQ	BLQ	BLQ
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	1.10	0.97	1.00
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.11	0.14	0.16
Sodium Adsorption Ratio	-	2.69	1.34	1.54
Total Coliforms	MPN Index /100 mL	210	825	720
Faecal Coliforms	MPN Index /100 mL	88	182	167
Total Phosphate (as P)	mg/L	0.25	0.37	0.37
Total Kjeldahl Nitrogen (as N)	mg/L	28.00	31.50	26.37
Total Ammonia (NH4+NH3)-Nitrogen)	mg/L	0.27	0.24	0.71
Phenols (as C_6H_5OH)	mg/L	BLQ	BLQ	BLQ
Anionic Detergents (as MBAS)	mg/L	BLQ	BLQ	BLQ
Organo Chlorine Pesticides	µg/L	BLQ	BLQ	BLQ
Polynuclear aromatic hydrocarbons(PAH)	mg/L	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	0.27	BLQ	BLQ
Nickel (as Ni)	mg/L	0.01	0.01	0.02
Copper (as Cu)	mg/L	BLQ	0.02	BLQ
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	BLQ	BLQ
Total Arsenic (as As)	mg/L	BLQ	0.01	BLQ
Lead (as Pb)	mg/L	BLQ	BLQ	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	0.05	0.03	0.04

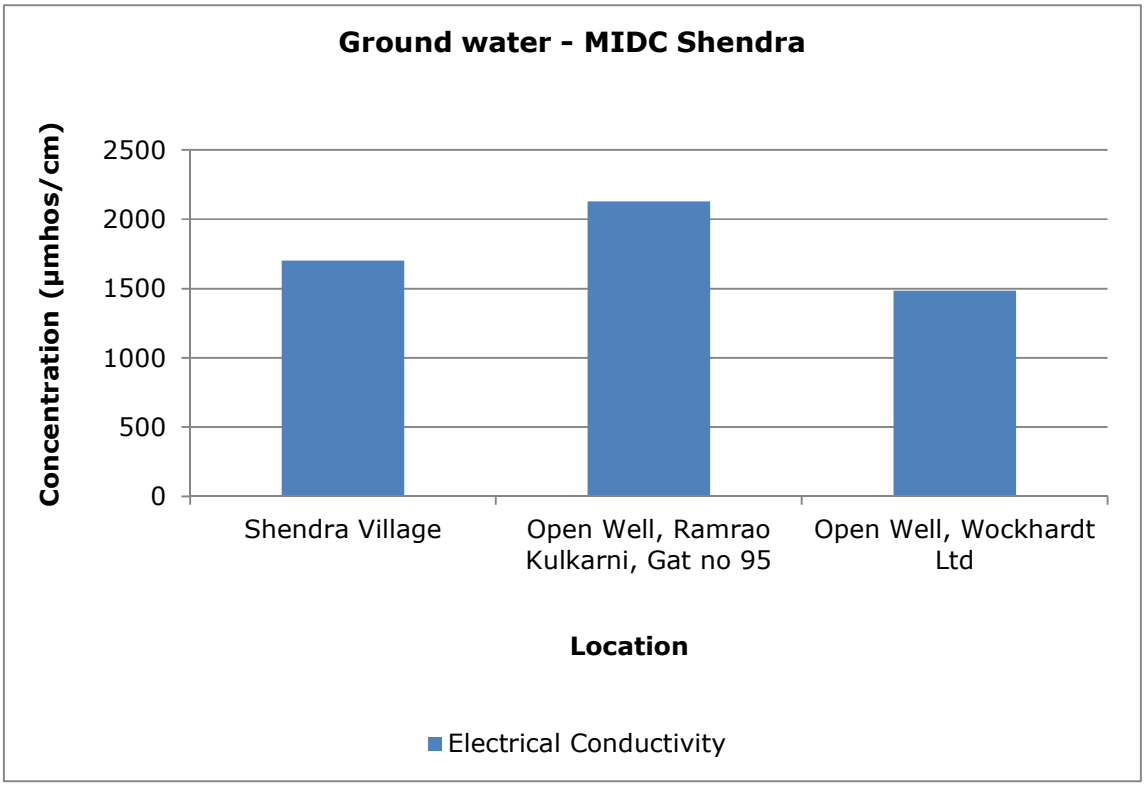
Parameters	Unit	Results		
		Shendra Village, Near Hanuman Temple	Open Well, Ramrao Kulkarni, Gat no 95, Kumbhephal	Open Well, Wockhardt Ltd.
Iron (as Fe)	mg/L	1.77	0.11	0.12
Vanadium (as V)	mg/L	0.08	0.04	0.05
Selenium (as Se)	mg/L	0.02	0.02	0.01
Boron (as B)	mg/L	0.26	0.13	0.13
Total Nitrogen	mg/L	36.30	39.47	32.00
Bioassay Test on fish	% survival	87	100	90

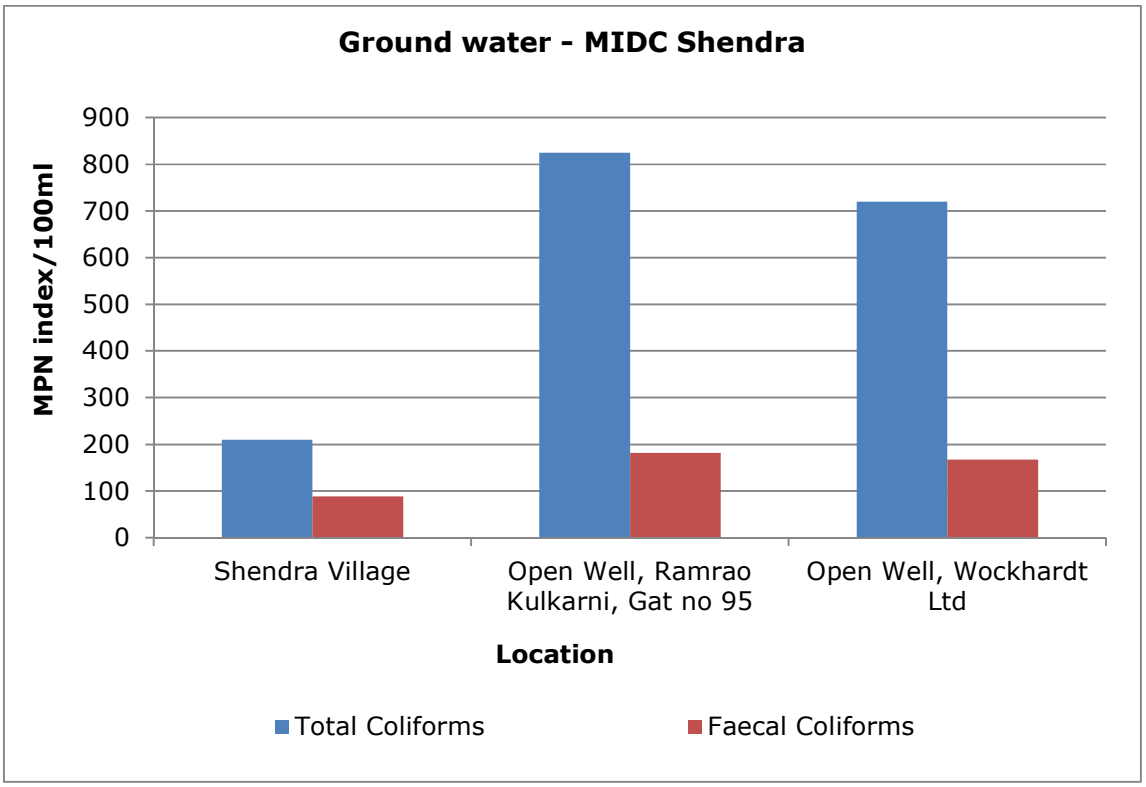
Graphs - Ground Water of MIDC Aurangabad

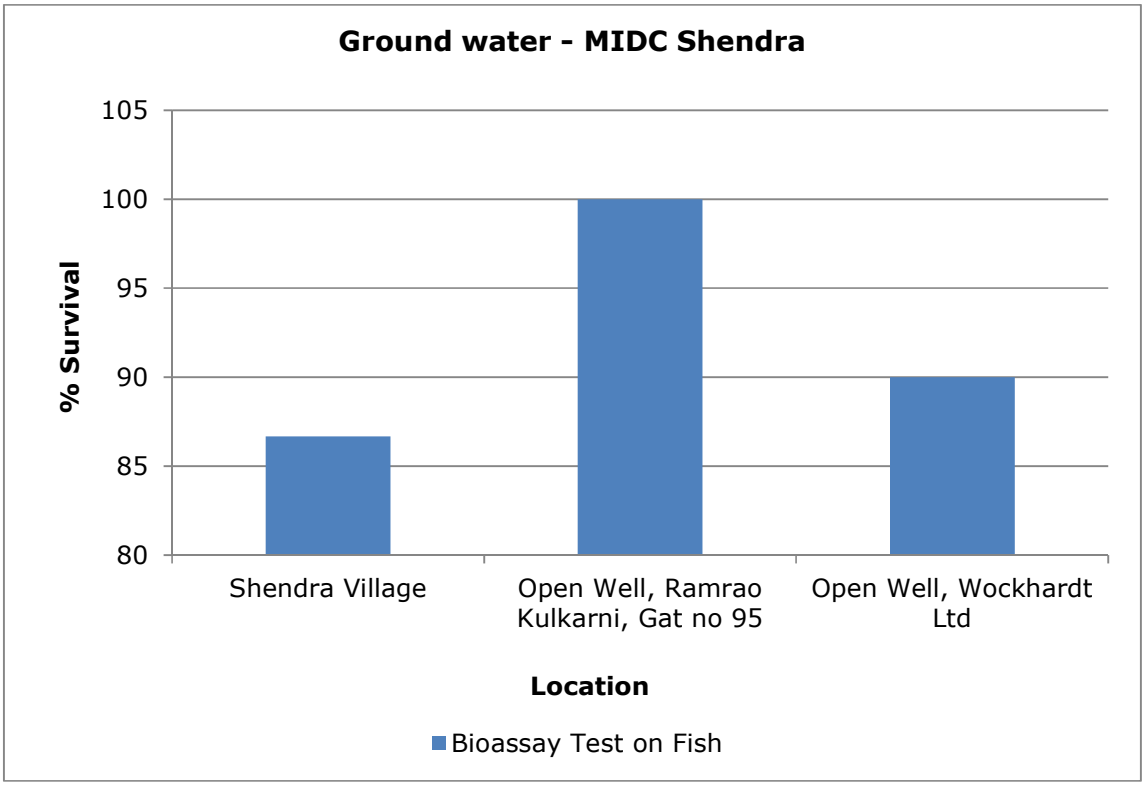





Groundwater - MIDC Shendra
9
8
7
6
5
4
3
2
1
0
Shendra Village
Open Well, Ramrao Kulkarni, Gat no 95
Open Well, Wockhardt Ltd
Location
Sodium Adsorption Ratio
pH


Ground water - MIDC Shendra
Concentration (µmhos/cm)
2500
2000
1500
1000
500
0
Shendra Village
Open Well, Ramrao Kulkarni, Gat no 95
Open Well, Wockhardt Ltd
Location
Electrical Conductivity


Ground water - MIDC Shendra
MPN index/100ml
900
800
700
600
500
400
300
200
100
0
Shendra Village
Open Well, Ramrao Kulkarni, Gat no 95
Open Well, Wockhardt Ltd
Location
Total Coliforms
Faecal Coliforms


Ground water - MIDC Shendra
% Survival
105
100
95
90
85
80
Shendra Village
Open Well, Ramrao Kulkarni, Gat no 95
Open Well, Wockhardt Ltd
Location
Bioassay Test on Fish

2. **MIDC Chikalthana:** From MIDC Chikalthana also, three ground water samples were collected.

- All three water samples collected were found acceptable in general appearance, colour, smell and transparency.
- pH, suspended solids, BOD, and COD were also well within the limits at all three samples collected.
- Electrical conductivity of all the water samples is observed within acceptable limits.
- 100% survival was achieved in all three water samples during the Fish Bioassay.
- 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 met the criteria as prescribed by CPCB.
- Polynuclear aromatic hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB) were below the limit of quantification (BLQ) in all 3 samples collected.
- Organo Chlorine Pesticides were also below the limit of quantification in all 3 samples collected.

Table 7.3 MIDC Chikhalthana - 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.	RD Bhalerao HADCO Corner	19.911352N	75.349639E	11.01.2023	13.01.2023	15.01.2023
2.	Universal High School	19.889666N	75.368118E	11.01.2023	13.01.2023	15.01.2023
3.	Hand Pump, Manik nagar, Galli no. 2, Naregaon	19.894404N	75.383411E	11.01.2023	13.01.2023	15.01.2023

Fig: Geographical Locations of Ground Water Sampling MIDC Chikhalthana

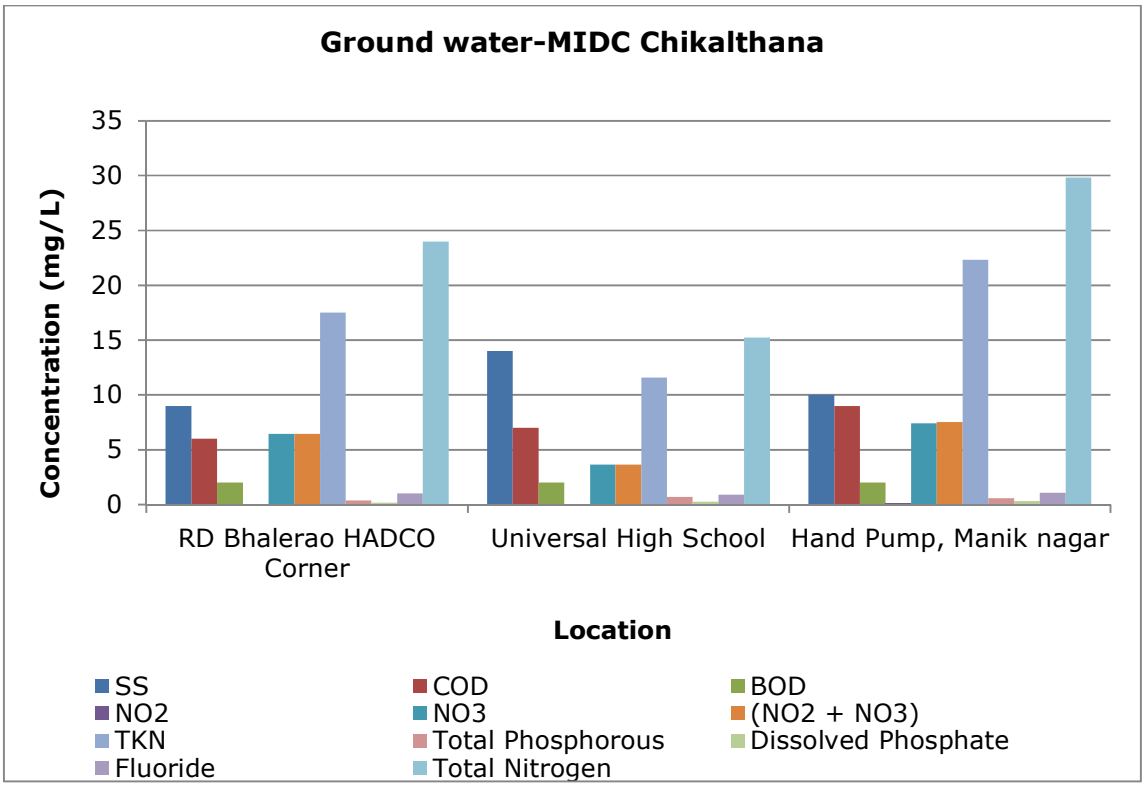
Table 7.4 MIDC Chikhalthana - Results of Ground Water

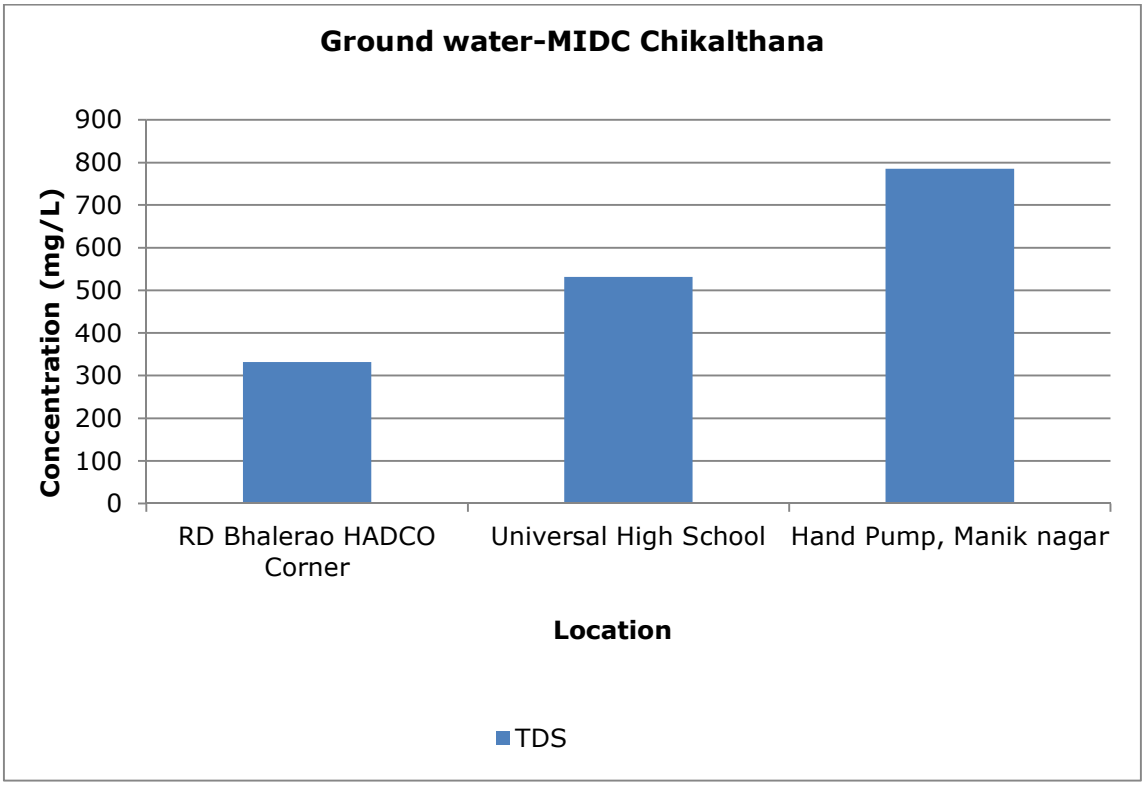
Parameters	Unit	Results		
		RD Bhalerao HADCO Corner	**Universal High School**	**Hand Pump, Manik nagar, Galli no. 2, Naregaon**
Sanitary Survey	-	Generally clean neighbourhood	Generally clean neighbourhood	Generally clean neighbourhood
General Appearance	-	No floating matter	No floating matter	No floating matter
Transparency	m	2.43	2.80	2.57
Temperature	Hazen	20	20	19
Colour	oC	1	1	1
Smell	-	Agreeable	Agreeable	Agreeable
pH	-	8.13	7.77	7.96
Oil & Grease	mg/L	BLQ	BLQ	BLQ
Total Suspended Solids	mg/L	9	14	10
Total Dissolved Solids	mg/L	332	531	785
Chemical Oxygen Demand	mg/L	6	7	9
Biochemical Oxygen Demand (3 days,27^{o}C)	mg/L	2	2	2
Electrical Conductivity (at 25^{o}C)	µmho/cm	843	949	1400
Nitrite Nitrogen (as NO_2)	mg/L	BLQ	BLQ	0.10

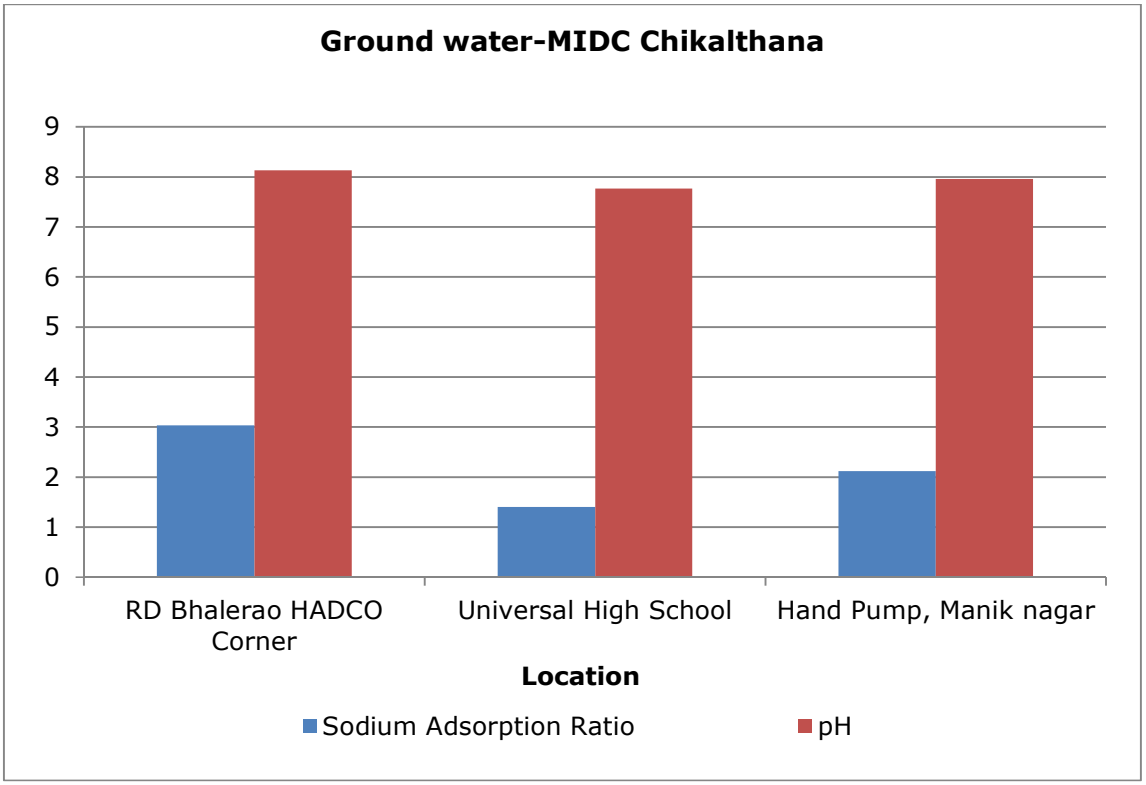
Parameters	Unit	Results		
		RD Bhalerao HADCO Corner	Universal High School	Hand Pump, Manik nagar, Galli no. 2, Naregaon
Nitrate Nitrogen (as NO_3)	mg/L	6.45	3.64	7.41
(NO_2 + NO_3)-Nitrogen	mg/L	6.45	3.64	7.51
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	BLQ	BLQ	BLQ
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	1.00	0.90	1.07
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.16	0.24	0.31
Sodium Adsorption Ratio	-	3.03	1.40	2.12
Total Coliforms	MPN Index /100 mL	76	471	7
Faecal Coliforms	MPN Index /100 mL	24	14	5
Total Phosphate (as P)	mg/L	0.39	0.69	0.58
Total Kjeldahl Nitrogen (as N)	mg/L	17.50	11.57	22.33
Total Ammonia (NH4+NH3)-Nitrogen)	mg/L	0.22	0.36	0.13
Phenols (as C_6H_5OH)	mg/L	BLQ	BLQ	BLQ
Anionic Detergents (as MBAS)	mg/L	BLQ	BLQ	BLQ
Organo Chlorine Pesticides	µg/L	BLQ	BLQ	BLQ
Polynuclear aromatic hydrocarbons (PAH)	mg/L	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	BLQ	BLQ	0.18
Nickel (as Ni)	mg/L	BLQ	BLQ	0.02
Copper (as Cu)	mg/L	BLQ	BLQ	0.02
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	BLQ	BLQ
Total Arsenic (as As)	mg/L	BLQ	BLQ	BLQ
Lead (as Pb)	mg/L	0.03	BLQ	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	BLQ	BLQ	0.04
Iron (as Fe)	mg/L	0.23	0.10	2.56
Vanadium (as V)	mg/L	0.13	0.23	0.14
Selenium (as Se)	mg/L	0.01	0.02	0.02
Boron (as B)	mg/L	0.40	0.53	0.79

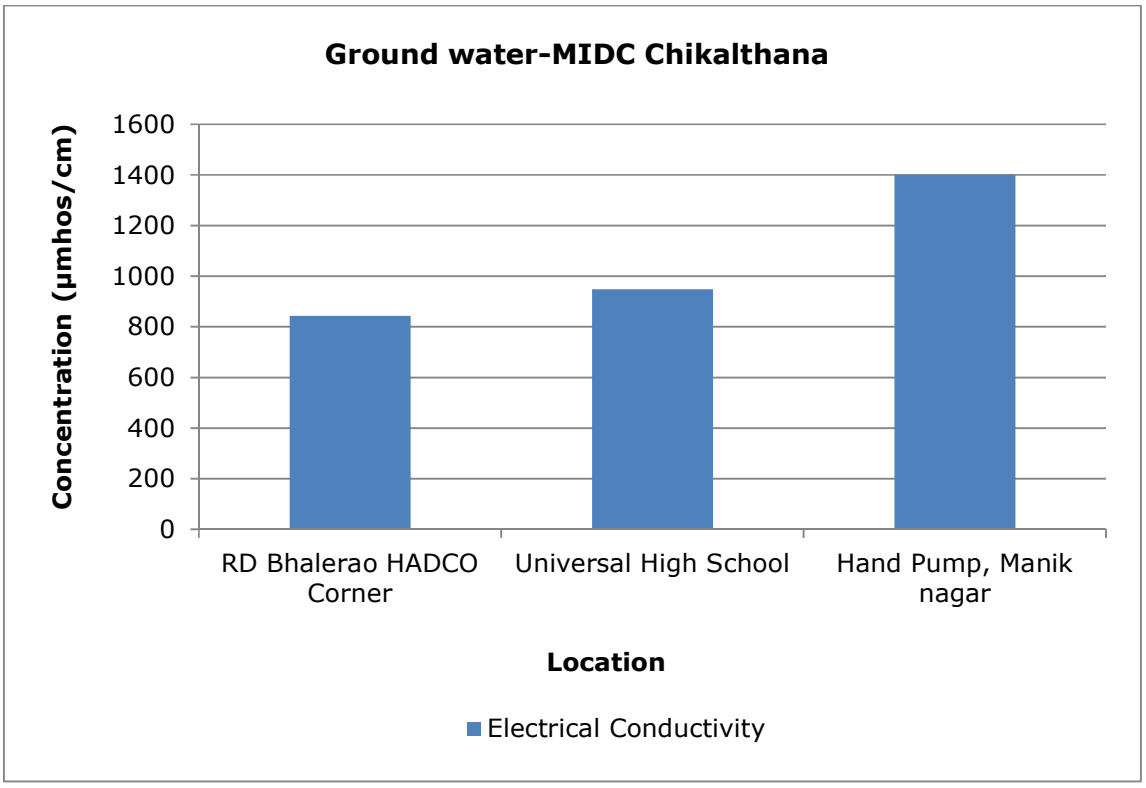
Parameters	Unit	Results		
		RD Bhalerao HADCO Corner	Universal High School	Hand Pump, Manik nagar, Galli no. 2, Naregaon
Total Nitrogen	mg/L	23.97	15.23	29.83
Bioassay Test on fish	% survival	100	100	100

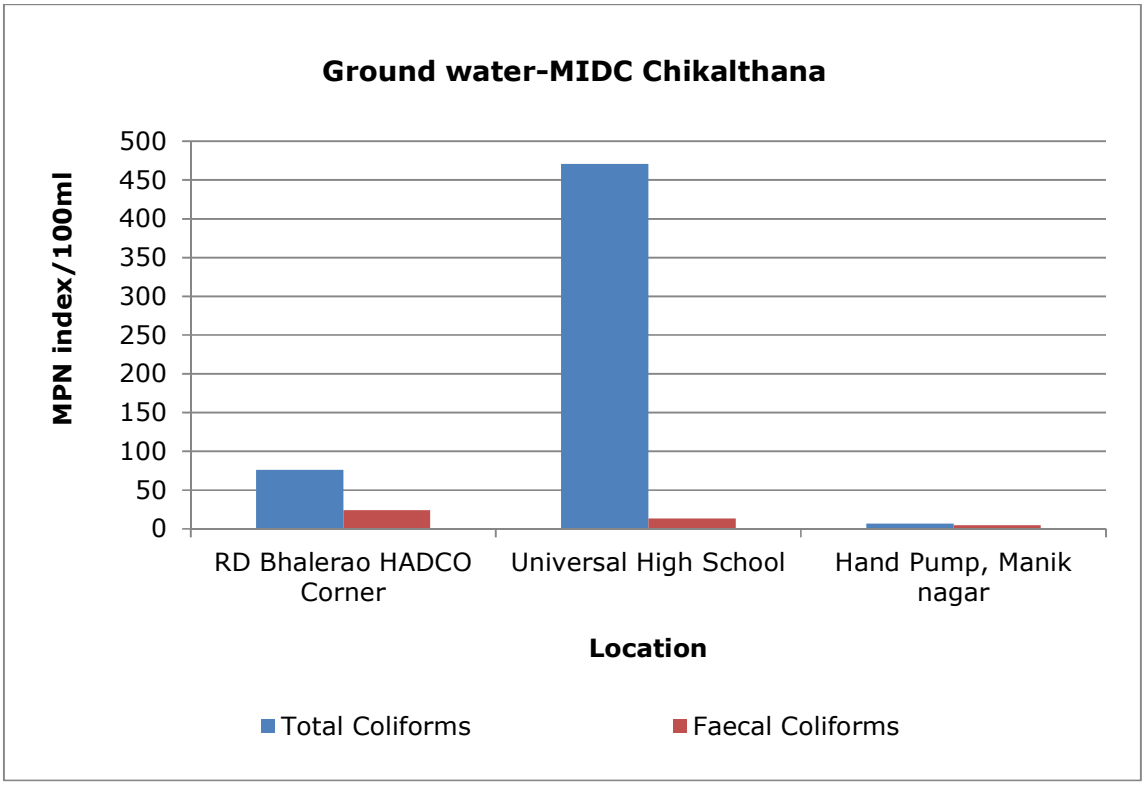
Graphs - Ground Water of MIDC Chikalthana

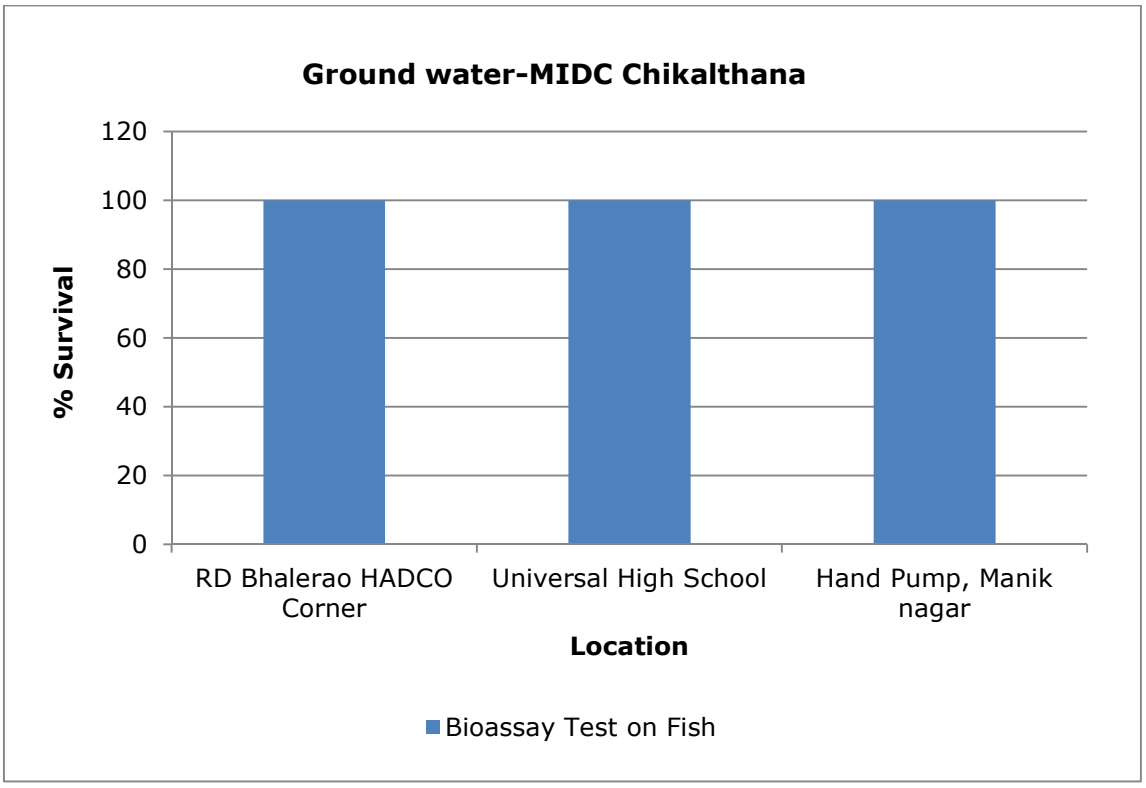





Ground water-MIDC Chikalthana
9
8
7
6
5
4
3
2
1
0
RD Bhalerao HADCO Corner
Universal High School
Hand Pump, Manik nagar
Location
Sodium Adsorption Ratio
pH


Ground water-MIDC Chikalthana
Concentration (µmhos/cm)
1600
1400
1200
1000
800
600
400
200
0
RD Bhalerao HADCO Corner
Universal High School
Hand Pump, Manik nagar
Location
Electrical Conductivity


Ground water-MIDC Chikalthana
MPN index/100ml
500
450
400
350
300
250
200
150
100
50
0
RD Bhalerao HADCO Corner
Universal High School
Hand Pump, Manik nagar
Location
Total Coliforms
Faecal Coliforms


Ground water-MIDC Chikalthana
% Survival
120
100
80
60
40
20
0
RD Bhalerao HADCO Corner
Universal High School
Hand Pump, Manik nagar
Location
Bioassay Test on Fish

3. **MIDC Waluj:** Three ground water samples were collected from MIDC Waluj.

- All three water samples collected were observed as acceptable in general appearance, colour, smell and transparency.
- General parameters like pH, suspended solids, Electrical conductivity, BOD, and COD were also well within the limits at all three samples collected.
- 100% survival was achieved in Fish Bioassay of borewell water near Sanskar School, followed by open well water sample collected near Ranjangaon with 97%.
- All metals like Arsenic, Nickel, Copper, Iron, Hexavalent Chromium etc.were observed either below the limit of quantification (BLQ) or below their standard limits.
- Parameters like Total Residual Chlorine, Cyanide, Fluoride, Sulphide, Dissolved Phosphate, Total Ammonical Nitrogen and Phenolic compounds, also met the criteria as prescribed by CPCB.
- Total Kjeldahl Nitrogen of all three water samples found to exceed the acceptable limit.
- Polynuclear aromatic hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB) were either below the limit of quantification (BLQ) or below their standard limits in all 3 samples collected.
- Organo Chlorine Pesticides were also below the limit of quantification in all 3 samples collected.

Table 7.5 MIDC Waluj - 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.	Bore Well, Near Sanskar School, CIDCO	19.84994	75.242643	17.01.2023	19.01.2023	21.01.2023
2.	Open Well, Hiwale Well, Near Ranjangaon	19.836334	75.224642	17.01.2023	19.01.2023	21.01.2023
3.	Mr. Gayke well Near Goodyear South Asia Tyres	19.85973	75.203666	17.01.2023	19.01.2023	21.01.2023

Fig: Geographical Locations of Ground Water Sampling MIDC Waluj

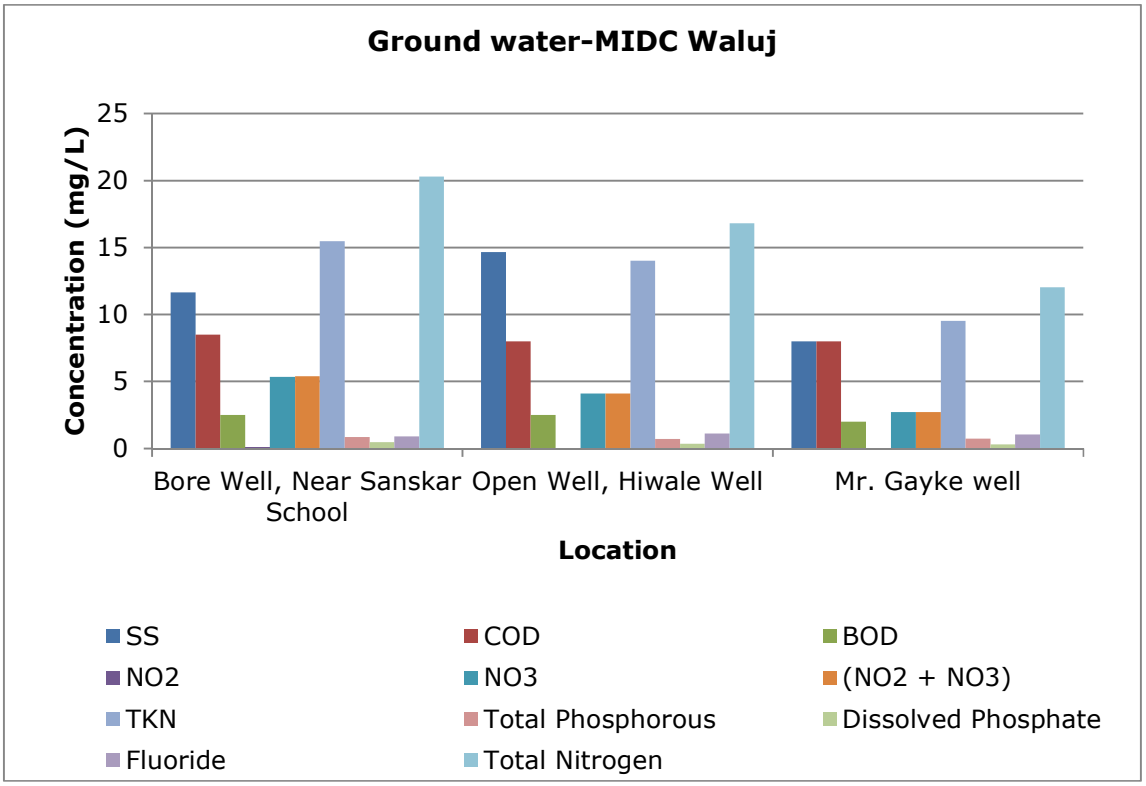
Table 7.6 MIDC Waluj - Results of Ground Water

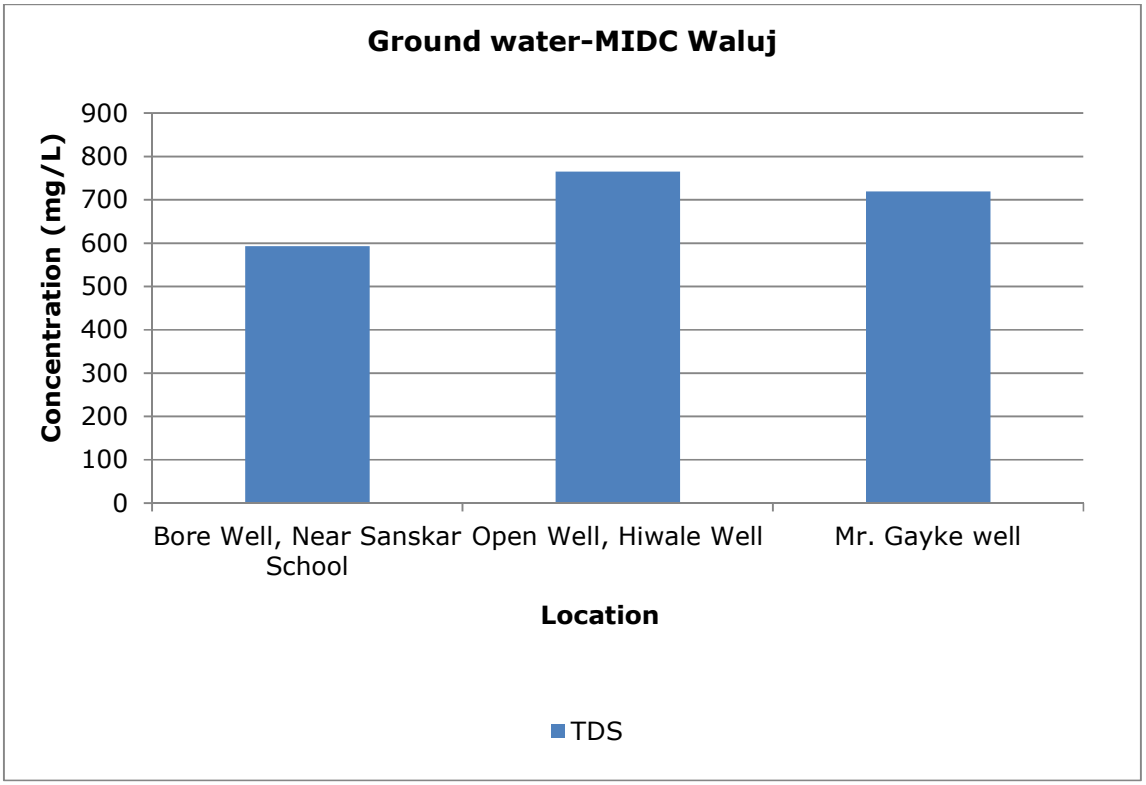
Parameters	Unit	Results		
		Bore Well, Near Sanskar School, CIDCO	**Open Well, Hiwale Well, Near Ranjangaon**	**Mr. Gayke well Near Goodyear South Asia Tyres**
Sanitary Survey	-	Generally clean neighbourhood	Generally clean neighbourhood	Reasonably clean neighbourhood
General Appearance	-	No floating matter	No floating matter	No floating matter
Transparency	m	Not Applicable	3.00	2.30
Temperature	Hazen	25	25	24
Colour	$_{o}C$	1	1	1
Smell	-	Agreeable	Agreeable	Agreeable
pH	-	7.96	7.82	7.44
Oil & Grease	mg/L	BLQ	BLQ	BLQ
Total Suspended Solids	mg/L	12	15	8
Total Dissolved Solids	mg/L	593	765	719
Chemical Oxygen Demand	mg/L	9	8	8
Biochemical Oxygen Demand (3 days,27^{o}C)	mg/L	3	3	2
Electrical Conductivity (at 25^{o}C)	µmho/cm	1057	1363	1282
Nitrite Nitrogen (as NO_2)	mg/L	BLQ	BLQ	BLQ

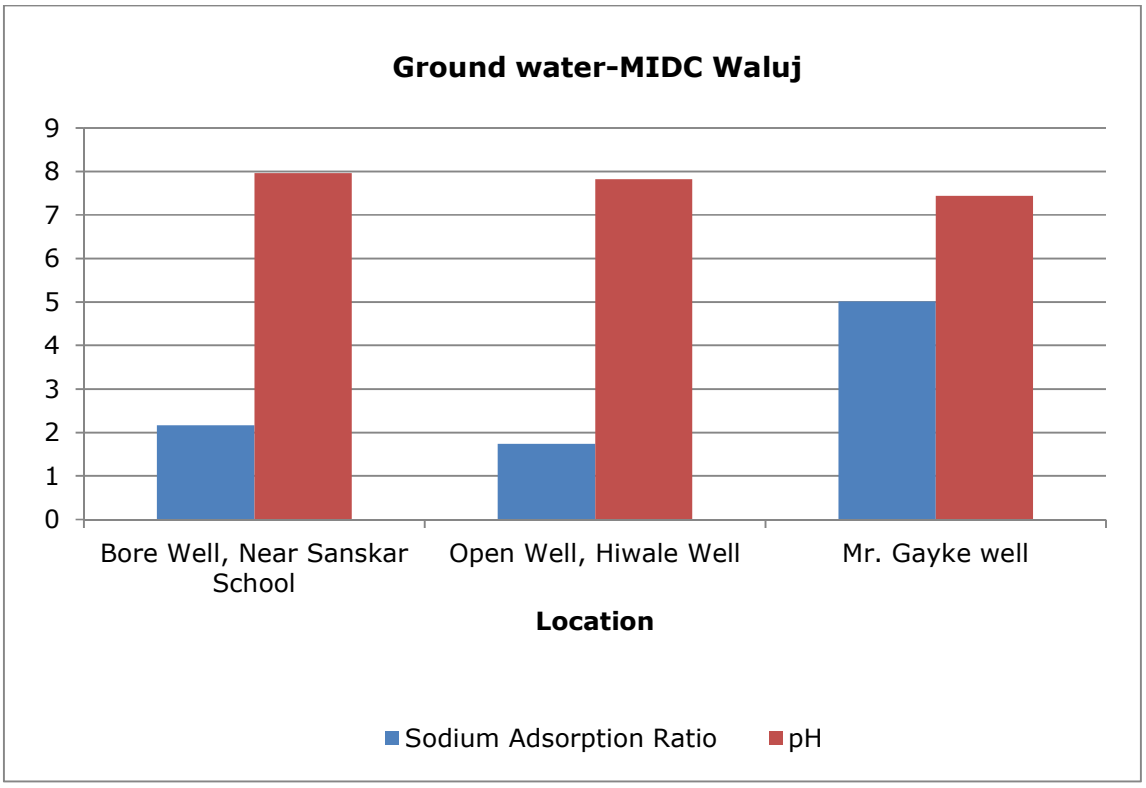
Parameters	Unit	Results		
		Bore Well, Near Sanskar School, CIDCO	Open Well, Hiwale Well, Near Ranjangaon	Mr. Gayke well Near Goodyear South Asia Tyres
Nitrate Nitrogen (as NO_3)	mg/L	4.80	2.77	2.52
(NO_2 + NO_3)-Nitrogen	mg/L	4.80	2.77	2.52
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	BLQ	BLQ	BLQ
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	0.90	1.10	1.03
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.47	0.35	0.30
Sodium Adsorption Ratio	-	2.17	1.74	5.01
Total Coliforms	MPN Index /100 mL	171	162	169
Faecal Coliforms	MPN Index /100 mL	38	15	30
Total Phosphate (as P)	mg/L	0.85	0.70	0.71
Total Kjeldahl Nitrogen (as N)	mg/L	15.49	14.02	9.53
Total Ammonia (NH_4+NH_3)-Nitrogen)	mg/L	1.31	0.78	0.94
Phenols (as C_6H_5OH)	mg/L	BLQ	BLQ	BLQ
Anionic Detergents (as MBAS)	mg/L	BLQ	BLQ	BLQ
Organo Chlorine Pesticides	µg/L	BLQ	BLQ	BLQ
Polynuclear aromatic hydrocarbons (PAH)	mg/L	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	BLQ	BLQ	BLQ
Nickel (as Ni)	mg/L	BLQ	0.02	0.02
Copper (as Cu)	mg/L	BLQ	BLQ	BLQ
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	BLQ	BLQ
Total Arsenic (as As)	mg/L	BLQ	BLQ	BLQ
Lead (as Pb)	mg/L	BLQ	BLQ	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	0.30	BLQ	0.04
Iron (as Fe)	mg/L	1.97	0.10	0.10
Vanadium (as V)	mg/L	0.04	0.09	0.08
Selenium (as Se)	mg/L	BLQ	0.01	0.01

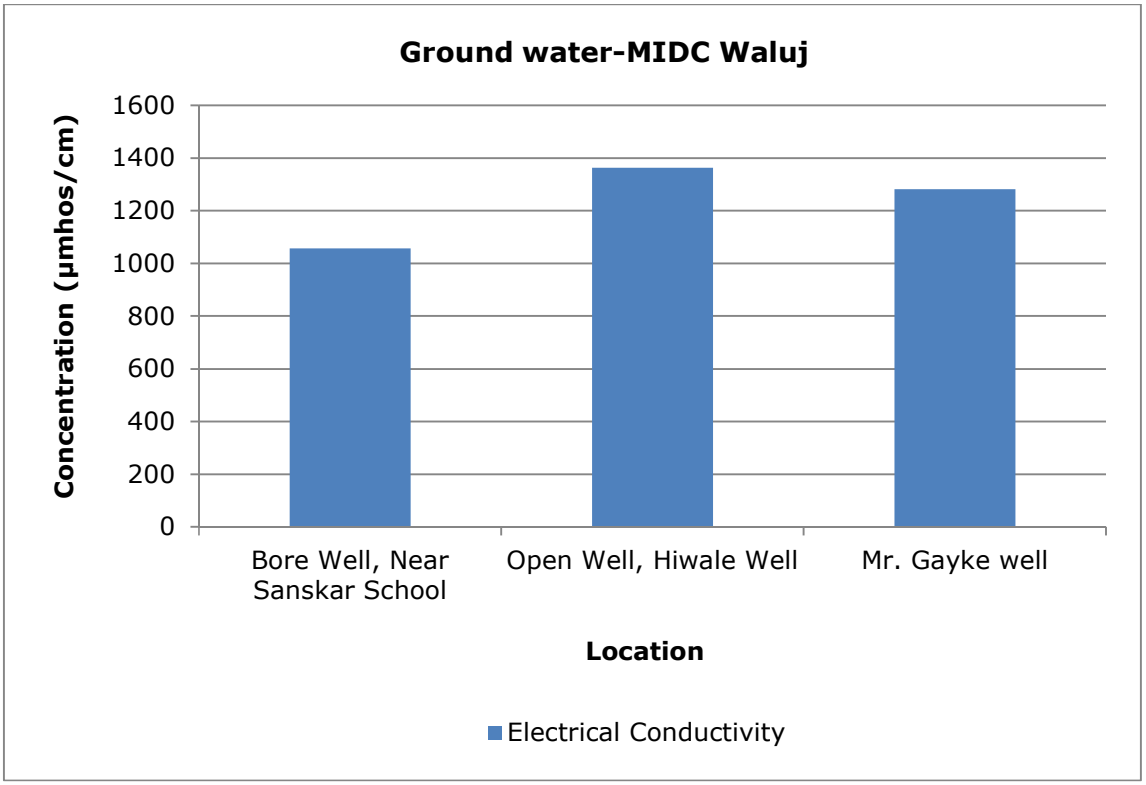
Parameters	Unit	Results		
		Bore Well, Near Sanskar School, CIDCO	Open Well, Hiwale Well, Near Ranjangaon	Mr. Gayke well Near Goodyear South Asia Tyres
Boron (as B)	mg/L	0.16	0.48	0.32
Total Nitrogen	mg/L	20.31	16.82	12.04
Bioassay Test on fish	% survival	100	97	90

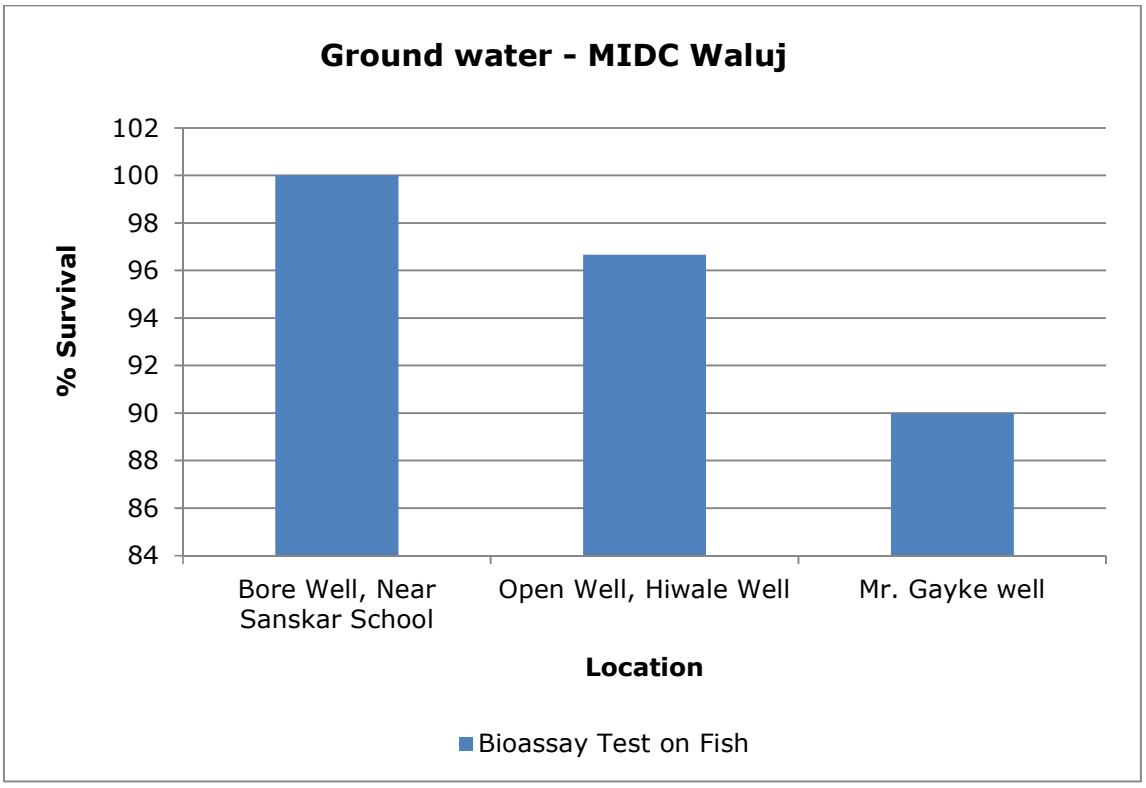
Graphs - Ground Water-MIDC Waluj




Ground water-MIDC Waluj
Concentration (mg/L)
900
800
700
600
500
400
300
200
100
0
Bore Well, Near Sanskar School
Open Well, Hiwale Well
Mr. Gayke well
Location
TDS


Ground water-MIDC Waluj
9
8
7
6
5
4
3
2
1
0
Bore Well, Near Sanskar School
Open Well, Hiwale Well
Mr. Gayke well
Location
Sodium Adsorption Ratio
pH


Ground water-MIDC Waluj
Concentration (µmhos/cm)
1600
1400
1200
1000
800
600
400
200
0
Bore Well, Near Sanskar School
Open Well, Hiwale Well
Mr. Gayke well
Location
Electrical Conductivity


Ground water - MIDC Waluj
% Survival
102
100
98
96
94
92
90
88
86
84
Bore Well, Near Sanskar School
Open Well, Hiwale Well
Mr. Gayke well
Location
Bioassay Test on Fish

4. **MIDC Paithan:** Three ground water samples are collected from MIDC Paithan.

- All three water samples collected were acceptable in general appearance, colour, smell and transparency.
- General parameters like pH, suspended solids, Electrical conductivity, BOD, and COD were also well within the limits at all three samples collected.
- 100% fish survival was achieved in two of the water samples collected for Fish Bioassay.
- All metals like Arsenic, Nickel, Copper, Iron, Hexavalent Chromium etc. are observed either below the limit of quantification (BLQ) or below their standard limits.
- Parameters like Total Residual Chlorine, Cyanide, Fluoride, Sulphide, Dissolved Phosphate, Total Ammonical Nitrogen and Phenolic compounds, also met the criteria as prescribed by CPCB.
- Polynuclear aromatic hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB) were found below the limit of quantification (BLQ) in all 3 samples collected.
- Organo Chlorine Pesticides were also below the detectable limit in all 3 samples collected.

Table 7.7 MIDC Paithan - 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.	Mr. Ram Babu Well near Ajeet Seeds	19.765212N	75.288325E	16.01.2023	18.01.2023	20.01.2023
2.	Bore Well Matoshri Aashram	19.739217N	75.294277E	16.01.2023	18.01.2023	20.01.2023
3.	Hand Pump Farola Village, Near WTP	19.725494N	75.296154E	16.01.2023	18.01.2023	20.01.2023

Ground Water Quality locations of MIDC Paithan Road

Fig: Geographical Locations of Ground Water Sampling MIDC Paithan

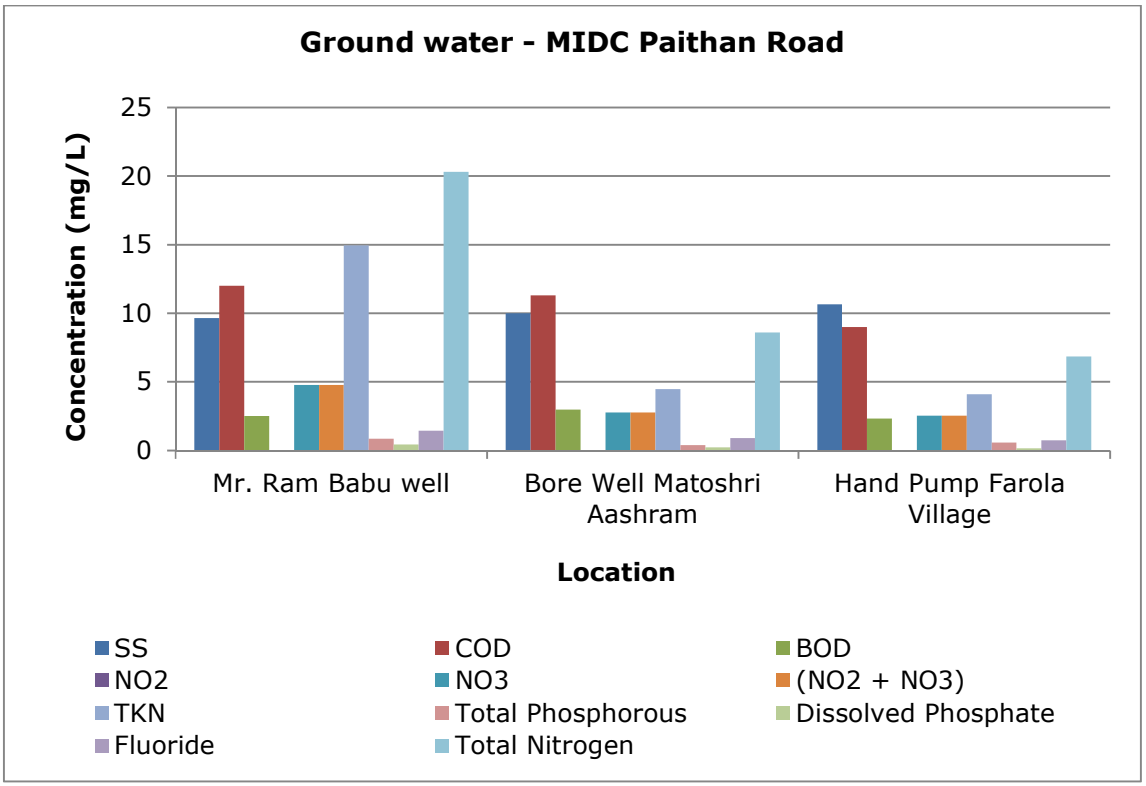
Table 7.8 MIDC Paithan - Results of Ground Water

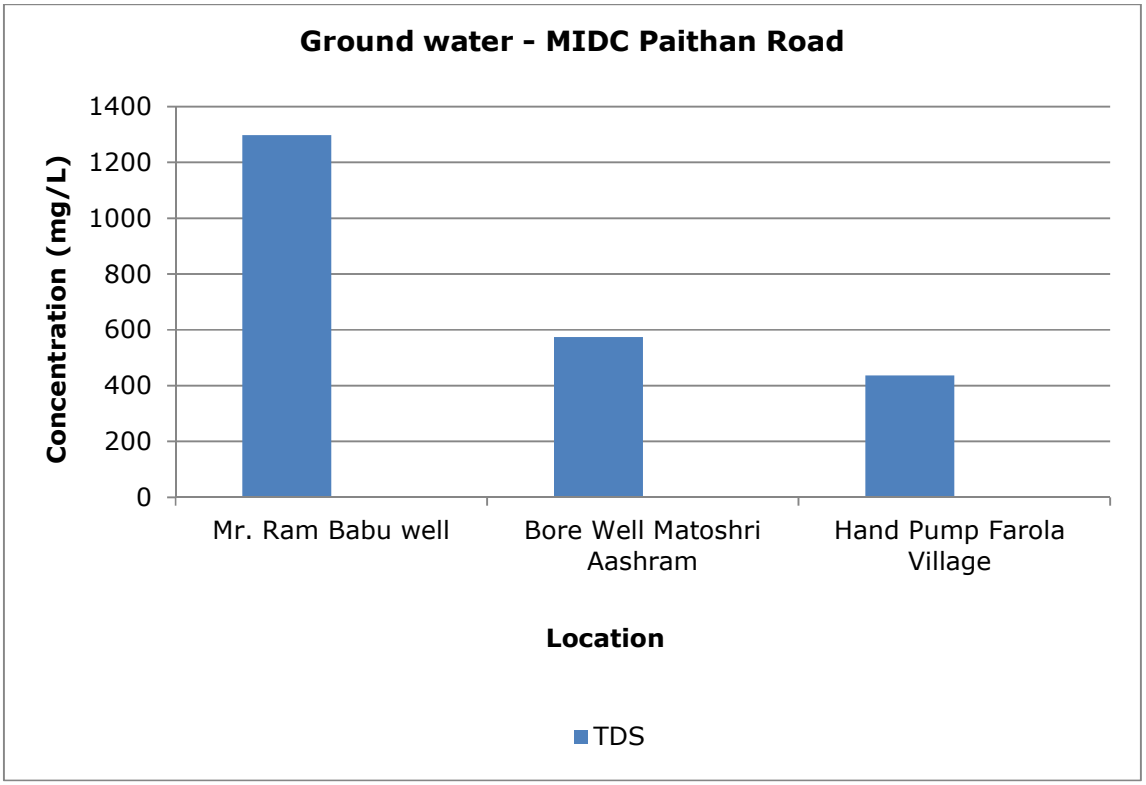
Parameters	Unit	Results		
		Mr. Ram Babu Well near Ajeet Seeds	Bore Well Matoshri Aashram	Hand Pump Farola Village, Near WTP
Sanitary Survey	-	Reasonably clean neighbourhood	Generally clean neighbourhood	Reasonably clean neighbourhood
General Appearance	-	No floating matter	No floating matter	No floating matter
Transparency	m	3.00	Not Applicable	2.80
Temperature	Hazen	23	24	24
Colour	°C	1	1	1
Smell	-	Agreeable	Agreeable	Agreeable
pH	-	8.34	8.25	8.24
Oil & Grease	mg/L	BLQ	BLQ	BLQ
Total Suspended Solids	mg/L	10	10	11
Total Dissolved Solids	mg/L	1297	574	436
Chemical Oxygen Demand	mg/L	12	11	9
Biochemical Oxygen Demand (3 days,27°C)	mg/L	3	3	2
Electrical Conductivity (at 25°C)	µmho/cm	2313	1022	777
Nitrite Nitrogen (as NO_2)	mg/L	0.09	BLQ	BLQ

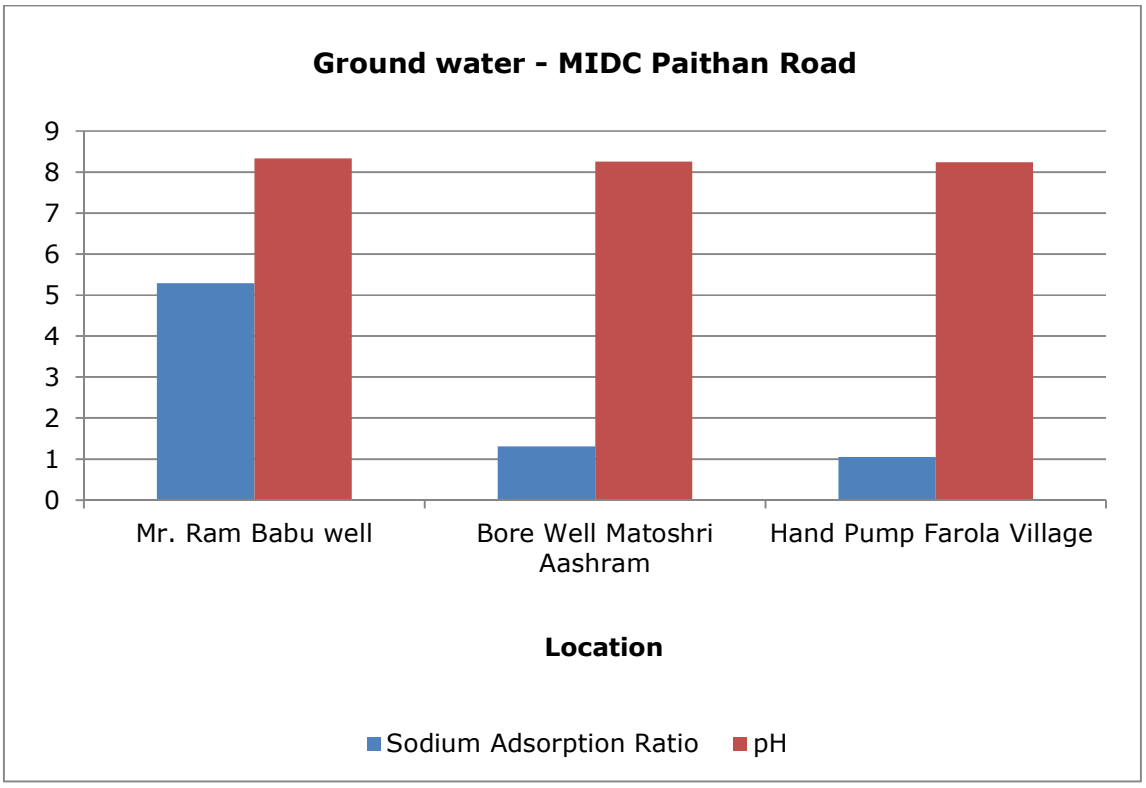
Parameters	Unit	Results		
		Mr. Ram Babu Well near Ajeet Seeds	Bore Well Matoshri Aashram	Hand Pump Farola Village, Near WTP
Nitrate Nitrogen (as NO_3)	mg/L	5.35	4.11	2.72
(NO_2 + NO_3)-Nitrogen	mg/L	5.38	4.11	2.72
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	0.08	BLQ	0.06
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	1.43	0.90	0.73
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.46	0.23	0.16
Sodium Adsorption Ratio	-	5.29	1.30	1.05
Total Coliforms	MPN Index /100 mL	276	700	121
Faecal Coliforms	MPN Index /100 mL	176	197	117
Total Phosphate (as P)	mg/L	0.86	0.40	0.57
Total Kjeldahl Nitrogen (as N)	mg/L	14.93	4.48	4.12
Total Ammonia (NH_4+NH_3)-Nitrogen)	mg/L	0.33	0.42	0.34
Phenols (as C_6H_5OH)	mg/L	BLQ	BLQ	BLQ
Anionic Detergents (as MBAS)	mg/L	BLQ	BLQ	BLQ
Organo Chlorine Pesticides	µg/L	BLQ	BLQ	BLQ
Polynuclear aromatic hydrocarbons (PAH)	mg/L	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	BLQ	BLQ	BLQ
Nickel (as Ni)	mg/L	BLQ	BLQ	BLQ
Copper (as Cu)	mg/L	BLQ	BLQ	BLQ
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	BLQ	BLQ
Total Arsenic (as As)	mg/L	BLQ	BLQ	BLQ
Lead (as Pb)	mg/L	BLQ	BLQ	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	BLQ	BLQ	BLQ
Iron (as Fe)	mg/L	BLQ	BLQ	0.17
Vanadium (as V)	mg/L	BLQ	BLQ	0.03
Selenium (as Se)	mg/L	BLQ	BLQ	0.01
Boron (as B)	mg/L	0.23	BLQ	0.12

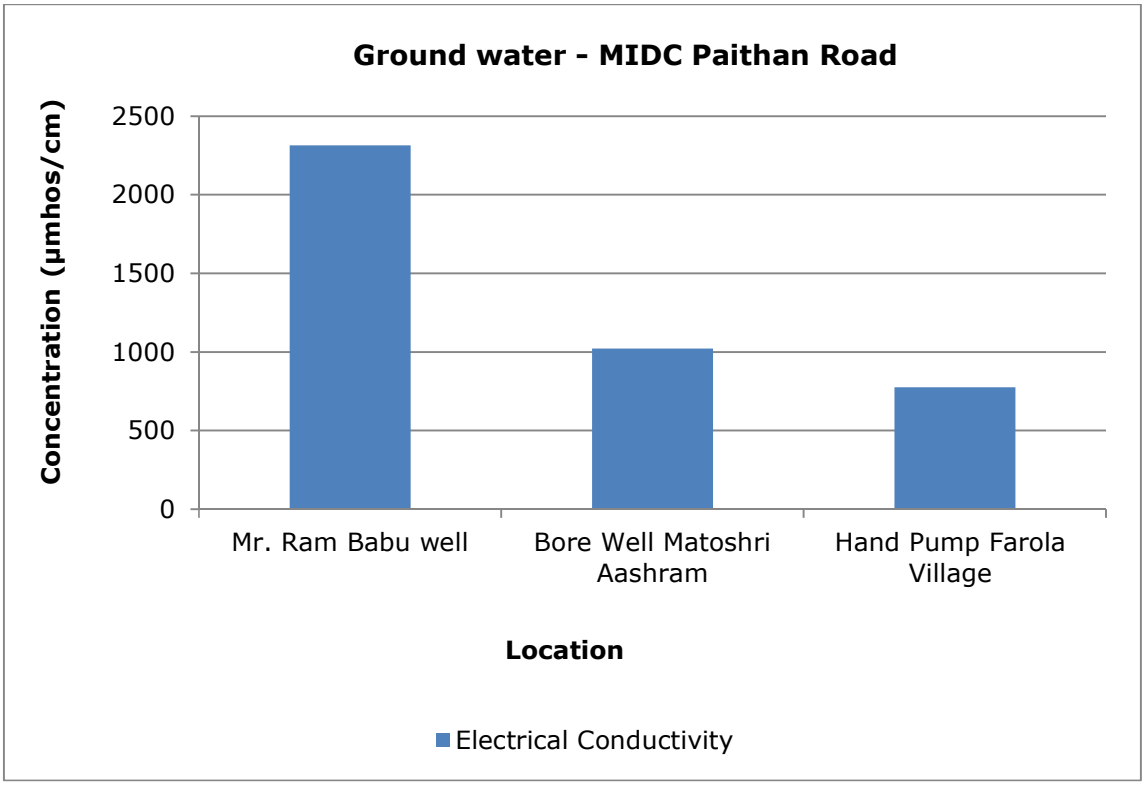
Parameters	Unit	Results		
		Mr. Ram Babu Well near Ajeet Seeds	Bore Well Matoshri Aashram	Hand Pump Farola Village, Near WTP
Total Nitrogen	mg/L	20.32	8.60	6.84
Bioassay Test on fish	% survival	97	100	100

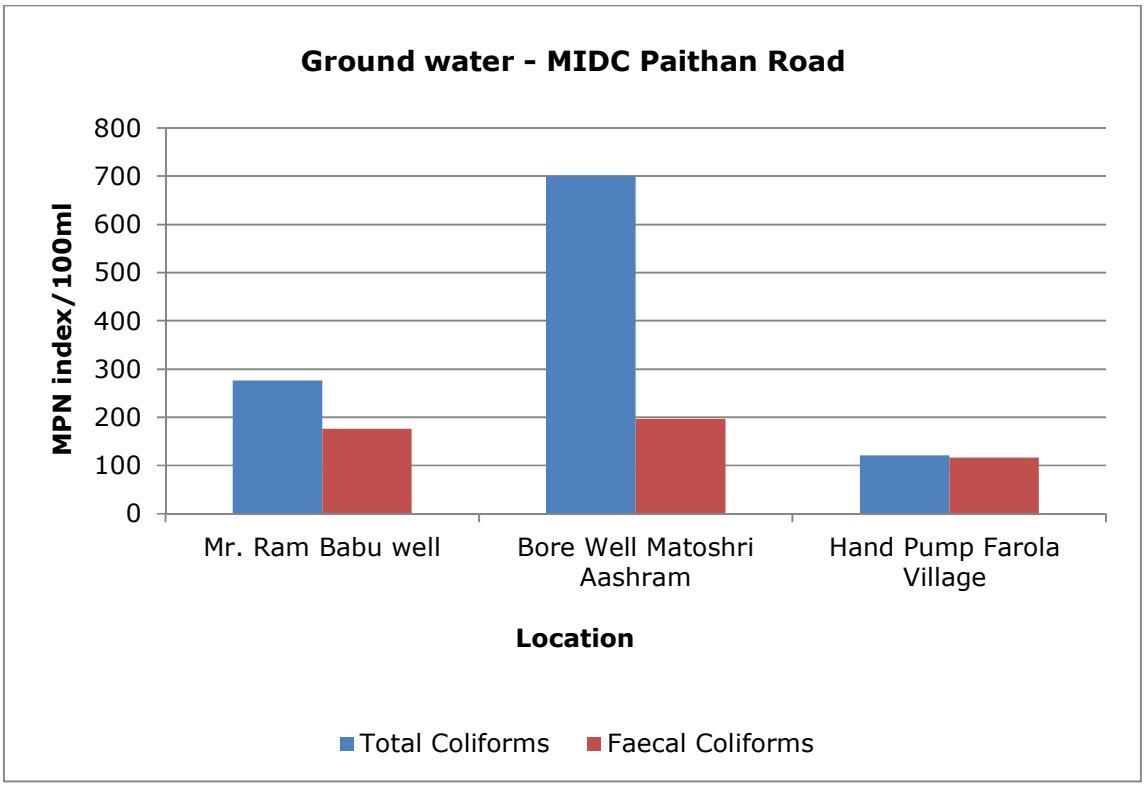
Graphs - Ground Water of MIDC Paithan

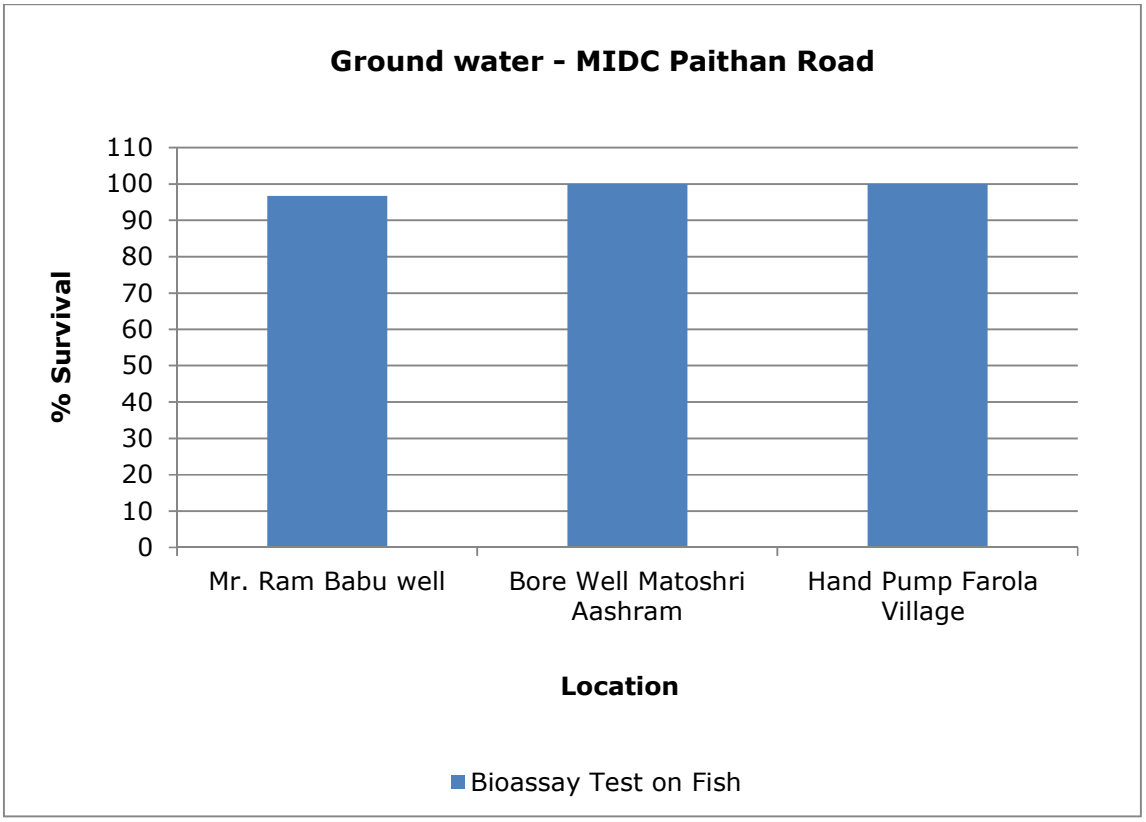



Ground water - MIDC Paithan Road
Concentration (mg/L)
1400
1200
1000
800
600
400
200
0
Mr. Ram Babu well
Bore Well Matoshri Aashram
Hand Pump Farola Village
Location
TDS


Ground water - MIDC Paithan Road
9
8
7
6
5
4
3
2
1
0
Mr. Ram Babu well
Bore Well Matoshri Aashram
Hand Pump Farola Village
Location
Sodium Adsorption Ratio
pH


Ground water - MIDC Paithan Road
Concentration (µmhos/cm)
2500
2000
1500
1000
500
0
Mr. Ram Babu well
Bore Well Matoshri Aashram
Hand Pump Farola Village
Location
Electrical Conductivity


Ground water - MIDC Paithan Road
MPN index/100ml
800
700
600
500
400
300
200
100
0
Mr. Ram Babu well
Bore Well Matoshri Aashram
Hand Pump Farola Village
Location
Total Coliforms
Faecal Coliforms


Ground water - MIDC Paithan Road
% Survival
110
100
90
80
70
60
50
40
30
20
10
0
Mr. Ram Babu well
Bore Well Matoshri Aashram
Hand Pump Farola Village
Location
Bioassay Test on Fish

8. Health Related Data

C: Receptor

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

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

Annexure – I Health Related Data enclosed.

9. CEPI Score

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

Table 8.1 CEPI score of the Post monsoon season 2023 is given below:

	A1	A2	A	B	C	D	CEPI
Air Index	2.75	2.5	6.875	0	10	5	**21.88**
Water Index	3.25	2.5	8.125	32.75	10	5	**55.88**
Land Index	1.5	2.5	3.75	17.25	10	5	**36.00**
						Aggregated CEPI	**59.36**

Table 8.2 Comparison of CEPI Scores

	Air Index	Water Index	Land Index	CEPI
CEPI Score March 2023	21.88	55.88	36.00	**59.36**
CEPI Score June 2021	15.5	54.38	53.00	**58.12**
CEPI Score March 2021	23	53.9	53.8	**59.60**
CEPI score March 2020	53.80	34.50	38.50	**59.90**
CEPI score June 2019	25.00	58.50	17.50	**60.31**
CEPI score March 2019	22.75	23.25	62.00	**64.01**
CEPI score June 2018	36.25	55.25	56.25	**65.01**
CEPI score March 2018	56.00	34.00	50.00	**64.38**
CPCB CEPI score March 2018	45.00	65.38	28.75	**69.85**

The result shows that CEPI score of present report is 59.36. The present study is the compilation of post monsoon season, which also affects the score value, due to dilution of air and water samples. This time CEPI is observed lower than the CPCB CEPI score March 2018 which was 69.85.

CEPI Score Calculation:

Aurangabad
Ambient Air Analysis Report

Pollutant	Group	A1	A2	A= (A1 X A2)
PM_{10}	B	2	Moderate	
NO_2	A	0.25		
$PM_{2.5}$	B	0.5		
		2.75	**2.5**	**6.875**

Pollutant	Avg (1)	Std (2)	EF (3) [(3)=(1)/(2)]	No. of samples Exceeding (4)	Total no. of samples (5)	SNLF Value (6) [(6)=(4)/(5)x(3)]	SNLF score (B)	
PM_{10}	59.38	100	0.59	0	16	0.00	L	0
NO_2	21.44	80	0.27	0	16	0.00	L	0
$PM_{2.5}$	16.5	60	0.28	0	16	0.00	L	0
B score = (B1+B2+B3)							**B**	**0**

C	**10**	**>10%**
D	**5**	**A-IA-A**

Air CEPI Score	**(A+B+C+D)**	**21.88**

Water Quality Analysis Report

Pollutant	Group	A1	A2	A (A1 X A2)
BOD	B	2	Moderate	
TDS	A	0.25		
As	C	1		
		3.25	**2.5**	**8.125**

Pollutant	Avg (1)	Std (2)	EF (3) [(3)=(1)/(2)]	No. of samples Exceeding (4)	Total no. of samples (5)	SNLF Value (6) [(6)=(4)/(5)x(3)]	SNLF score (B)	
BOD	105.57	8	13.20	14	24	7.70	C	30
TDS	843.14	2000	0.42	1	24	0.02	M	2.75
As	0.01	0.2	0.05	0	24	0.00	L	0
B score = (B1+B2+B3)							**B**	**32.75**

C	**10**	**>10 %**
D	**5**	**A-IA-A**

Water CEPI Score	(A+B+C+D)	55.88

Ground Water Quality Analysis Report

Pollutant	Group	A1	A2	A (A1 X A2)
Fe	A	1	Moderate	
TDS	A	0.25		
TN	A	0.25		
		1.5	**2.5**	**3.75**

Pollutant	Avg (1)	Std (2)	EF (3) [(3)=(1)/(2)]	No. of samples Exceeding (4)	Total no. of samples (5)	SNLF Value (6) [(6)=(4)/(5)x(3)]	SNLF score (B)	
Fe	0.72	0.3	2.40	0	12	0.00	H	17.25
TDS	755.42	2000	0.38	0	12	0.00	L	0
TN	21.81	45	0.48	0	12	0.00	L	0
B score = (B1+B2+B3)							**B**	**17.25**

C	10	>10 %
D	5	A-IA-A

Land CEPI Score	(A+B+C+D)	36.00

Water CEPI Score (im) **55.88**

Land CEPI Score (i2) **36.00**

Air Score (i3) **21.88**

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 **59.36**

10. Conclusion

Ambient Air Quality

- In the present study, 16 AAQ stations of 4 MIDCs namely: MIDC Shendra, MIDC Chikalthana, MIDC Waluj and MIDC Paithan, 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.
- In the CEPI score calculated for Air environment by CPCB in March 2018, the concentration of PM_{10} and $PM_{2.5}$ has exceeded at 50% of the studied locations, which contributed to air index (45.00). 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 (21.88).

Surface Water Quality

- To understand the quality of treated effluent, samples were collected from 24 locations of different MIDCs.
- Concentration of BOD, COD and Total phosphates was found to exceed the acceptable limits at few places, especially in the water samples of MIDC Waluj.
- All the industries in Aurangabad 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 TKN and TP were higher and exceeded at 50% of studied locations as observed in the present study also.

Ground Water Quality

- Total 12 ground water samples were collected from different Dug well, well and Bore well in different regions of four MIDCs.
- All the parameters of groundwater analysis were found within the permissible limits, except Total Kjeldahl Nitrogen (TKN), which is found to exceed in all the water samples.
- In the CEPI score calculated for Land Environment by CPCB in March 2018, all the critical parameters were observed within the permissible limits.

CEPI Score

- The CEPI Score post monsoon season is 59.36.
- During the calculation of CEPI score, water Index is calculated highest with 55.88, followed by the land Index 36.00 and Air index as 21.88. The parameters of surface water and ground water

in Aurangabad region are observed well within the limits. Hence, aggregated CEPI score is calculated as 59.36, which is lower than the CPCB CEPI score March 2018 which was 69.85.

- In CEPI score of CPCB 2018, Air index and water index were higher as compared to the present (March, 2023) indices. However, land index of present CEPI (36.0) is little higher than the land CEPI (28.75) calculated by CPCB in 2018
- In comparison with the CEPI Score of March 2021, there is a decrease in the air and water Index, but little rise is observed in land index.
- As per the CPCB CEPI calculation revised in 2016, Health statistics represented by Receptor C in CEPI Calculation, also plays an important role.
- By 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 water & land Environment. However, in the CEPI score calculated by CPCB (2018), the receptor C (the health data) score is 5 for water and land environment.
- Collective efforts of regional office of MPCB, NMMC, administration and environmental organizations are resulting in significant reduction in pollution level over the years.
- 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 post monsoon season, which results in dilution of environmental samples resulting in lower pollution load, hence also affects the total score.
- In conclusion, approximately 15% decrease in CEPI score is observed from 69.85 in 2018 to 59.36 in 2023.

11. Efforts taken by MPCB to control and reduce Environmental Pollution Index

- Encouragement to the industries to switchover to cleaner fuel from exiting fuel coal.
- All the water polluting industries to change their underground ETP tank to overhead fo
- Waste collection and segregation centres: The AMC has already installed and commissioned the MSW Processing Plant of 150MT/day capacity at Chikalthana and Padegaon. The Biogas Plant at Kanchanwadi of 30 TPD Biomethanization Technology has been installed and commissioned.
- Construction of one Common Effluent Treatment plant (CETP).
- Sixteen CEMS are installed for Air and Water in Large and Medium scale RED category industries
- Arrangement of scientific collection and treatment of sewage generated: Aurangabad Municipal Corporation has provided Sewage Treatment Plants at Kanchanwadi — 161 MLD, Zalta — 35MLD, Padegaon — 10 MLD and Dr. Salim Ali Lake — 5 MLD, which is of adequate capacity for treating the domestic sewage generated from Aurangabad city.
- Installation of three Continuous Ambient Air Quality Monitoring Stations (CAAQMS) i.e. in MIDC Waluj, Deogiri Engineering College premises and at MPCB Office premises.
- Nine monitoring stations under National Water Quality Monitoring Programme (NWMP) are also installed to check the water quality of the area.
- Steps are taken for industrial area/other units to recycle 100% treated effluent to achieve zero liquid discharge (ZLD). Time to time directions were issued to the industries to provide ZLD systems &to recycle 100 % treated effluent to achieve ZLD. Total 23 industries have provided ZLD system.
- Steps taken to reduce dust emission:
  a) AMC has widened the roads and squares for avoiding traffic congestion.
  b) Road sweeping machines has been provided by AMC.
  c) Condition of city roads improved under Smart City.
  d) The industries have been instructed to operate the Air Pollution Control System like dust collector, scrubber efficiently to achieve the consented standards.
- Tree plantation in last one year (2021-2022): Steps taken by MPCB to increase tree plantation in industrial premises upto 40 %.
- Other initiatives taken to control and reduce pollution in air, surface water and groundwater in last one year (2021-2022)
- The work of MSW Processing Plant of 150 MT/day capacity (Each) at Harsool is in progress.
- Public awareness campaign is taken.
- Continuous vigilance & monitoring of industries carried out by MPCB.

- State Govt. has approved DPR of Rs. 243.89 Crs for underground sewage network in Satara Deolai Area.

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

12. Photographs

Ambient Air Sampling at ABD Distillery – MIDC Chikalthana

Ambient Air Sampling at Chittegaon

Ambient Air Sampling at Wockhardt Research Division – MIDC Chikalthana

Ambient Air Sampling at Endurance technology – MIDC Waluj

	
Surface Water Sampling –MIDC Chikalthana	**Groundwater Sampling – Kubhephal- MIDC Shendra**
	
Groundwater Sampling – Well water Kamanagar-MIDC Shendra	**Groundwater Sampling – borewell water at Kubhepal-MIDC Shendra**

HELATH STATICTICS

Required for Comprehensive Environmental Pollution Index (CEPI) Study by

Maharashtra Pollution Control Board (MPCB)

6/02/2023

Name of the Polluted Industrial Area (PIA)	Aurangabad
Name of the major health centre/ Organization	CIDCO N-8, Hospital, Municipal Corporation, Aurangabad.
Name & designation of the Contract person	
Address	Cidco N-8 Hospital

Sr. no.	Diseases	No. of Patients Reported	
		2022 (Jan-Dec)	2021 (Jan-Dec)
Airborne Diseases			
1.	Asthma	03	03
2.	Acute Respiratory Infection	2320	1327
3.	Bronchitis	—	—
4.	Cancer	01	—
Waterborne Diseases			
1.	Gastroenteritis	03	01
2.	Diarrhea	23	11
3.	Renal Diseases	—	—
4.	Cancer	—	—

MEDICAL OFFICER
CIDCO Hospital,
Municipal Corporation,
Aurangabad

Date: Signature

HELATH STATICTICS

Required for Comprehensive Environmental Pollution Index (CEPI) Study by

Maharashtra Pollution Control Board (MPCB)

Name of the Polluted Industrial Area (PIA)	Aurangabad
Name of the major health centre/ Organization	United Citigma Hospital Aurangabad
Name & designation of the Contract person	Anjali Kulkarni Cordinator - MRD
Address	6,7 Shahamoorwadi, Daroga Road, Aurangabad 431005

Sr. no.	Diseases	No. of Patients Reported	
		2022 (Jan-Dec)	2021 (Jan-Dec)
Airborne Diseases			
1.	Asthma	1800	1500
2.	Acute Respiratory Infection	1000	1200
3.	Bronchitis	1200	1000
4.	Cancer	40	50
Waterborne Diseases			
1.	Gastroenteritis	450	400
2.	Diarrhea	350	310
3.	Renal Diseases	1200	1000
4.	Cancer	1800	1500

Date: 16/02/2023

Signature

UNITED CITIGMA INSTITUTE OF MEDICAL SCIENCES PVT. LTD.

HELATH STATICTICS

Required for Comprehensive Environmental Pollution Index (CEPI) Study by

Maharashtra Pollution Control Board (MPCB)

Name of the Polluted Industrial Area (PIA)	Aurangabad
Name of the major health centre/ Organization	MGM medical college & Hsp.
Name & designation of the Contract person	Dean
Address	N-6, cidco, Aurangabad

Sr. no.	Diseases	No. of Patients Reported	
		2022 (Jan-Dec)	2021 (Jan-Dec)
Airborne Diseases			
1.	Asthma	16	08
2.	Acute Respiratory Infection	674	504
3.	Bronchitis	35	31
4.	Cancer	-	06
Waterborne Diseases			
1.	Gastroenteritis	427	133
2.	Diarrhea	13	1
3.	Renal Diseases	1632	167
4.	Cancer	-	10

Date: 14/2/23

Signature

14/2/23

MGM Hospital N-6, Cidco, Aurangabad.