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

CHANDRAPUR

Pre-Monsoon (April 2023 to June 2023)

MAHARASHTRA

LiFE Lifestyle for Environment

Maharashtra Pollution Control Board

Kalptaru Point, Sion East, Mumbai – 400 022

Index

ABBREVIATIONS

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

1. Executive Summary

The Chandrapur CEPI area including MIDC Chandrapur, MIDC Tadali, MIDC Ballarpur, and MIDC Ghugus was monitored for Ambient Air Quality, Ground and Surface Waters quality and CEPI Score was calculated based on the Latest directions 120 of Letter No. B-29012/ESS (CPA)/2015-16 dated 26th April 2016 of Central Pollution Control Board (CPCB). Maharashtra Pollution Control Board (MPCB) has carried out monitoring at CPCB location with the additional location of samplings for ambient air, surface and ground Water in consideration with the previous CEPI monitoring and covering the entire CEPI Impact Zone. The pre monsoon monitoring was carried out during the period of April 2023 to June 2023 to verify the Ambient Air Quality, Surface water and Groundwater.

The Ambient Air Quality stations were identified considering the upwind and cross wind direction in the CEPI impact area. The concentration of all 12 Parameters is well within the limit prescribed by NAAQS at the locations. In the surface water of Chandrapur CEPI region, mainly the concentration of Total Phosphate, Biochemical Oxygen Demand, Fluoride, Iron, etc. have exceeded in some all the samples collected. In ground water also, the concentration of Total Phosphate, Biochemical Oxygen Demand, Fluoride, Iron, etc. is high in some of the samples collected. Phosphates from farm fertilizers may penetrate into the groundwater.

The CEPI score is the combination of A (Source), B (Pathway), C (Impact on Human Health) and D (Additional High Risk Element) factors. Maharashtra Pollution Control Board has worked on controlling and mitigating the air and water pollution with installation of CAAQMS, CETPs, online VOC analysers etc.

Maharashtra Pollution Control Board has taken various initiatives in reducing the CPCB CEPI Score of 76.41 of 2018 to 66.32 of June 2023. Based on the study results of April 2023 to June 2023 the CEPI score as per the revised CEPI 2016, the CEPI index of Pre-Monsoon - Ambient Air is 26.88, Surface Water is 51.75, and Ground Water is 60.88. The overall CEPI score for Chandrapur area for the Pre-monsoon 2023 is 66.32.

The analysis of the aggregated CEPI score shows that the pollution in Chandrapur industrial clusters has reduced in the last three years. Approximately 13% decrease in CEPI score is observed from 76.41 (CPCB CEPI score) in 2018 to 66.32 in June 2023.

2. Introduction

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

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

In view of this, Central Pollution Control Board (CPCB) has evolved the concept of the Comprehensive Environmental Pollution Index (CEPI) during 2009-10 as a tool for comprehensive environmental assessment of prominent industrial clusters and formulation of remedial Action Plans for the identified critically polluted areas. Later in 2016, the revised concept of CEPI was formulated by eliminating the subjective factors but retaining the factors which are monitorable CEPI bridges the 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 MIDC Chandrapur, MIDC Tadali, MIDC Ballarpur, and MIDC Ghugus which are industrial areas under Chandrapur. Chandrapur district is known for its super thermal power station, and its vast reserves of coal in Wardha Valley Coalfield. Chandrapur also has large reservoirs of limestone which is a raw material for cement manufacturing in the district. Chandrapur city is in the top 10 cleanest cities in India and 2 in Maharashtra after Navi Mumbai by the Minister of housing and urban affairs rank cities based on the cleanliness index.

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 the 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.

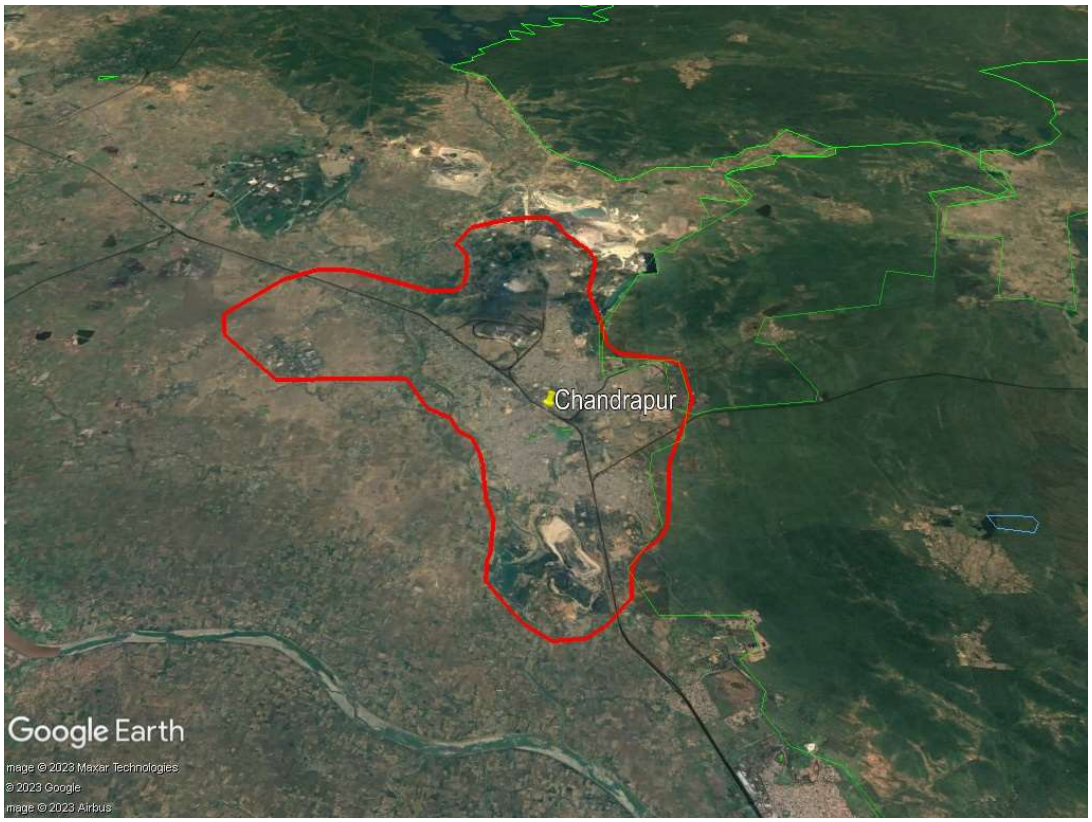


Fig. Chandrapur region CEPI monitoring zone

3. Scope of Work

The major scope of work includes:

I. The scope of the present study is to perform three (3) rounds of "Monitoring, Sampling and Analysis for Ambient Air Quality, VOCs in Ambient Air, Surface Water Quality & Ground Water Quality in selected Pollution Industrial Areas (PIAs) of Chandrapur, 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 Chandrapur

Sampling Criteria	Number of sites	Total Sites	Monitoring Parameters
Ambient Air Quality	• MIDC Tadali-04 • MIDC Chandrapur-04 • MIDC Ghugus -04 • MIDC Ballarpur -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 Tadali-02 • MIDC Chandrapur-02 • MIDC Ghugus -02 • MIDC Ballarpur -02	**08**	Dichloromethane, Chloroform, Carbon Tetrachloride, Trichloroethylene, Bromodichloromethane, 1,3-Dichloropropane, 1,4-Dichlorobenzene, 1,3-Dichlorobenzene, 1,2-Dichlorobenzene, 1,2-Dibromo-3-Chloropropane, Naphthalene, Bromobenzene,1,2,4-Trimethylbenzene, 2-Chlorotoluene, Tert-Butylbenzene, SEC-Butylbenzene, P-Isopropyl toluene, M-Xylene, P-Xylene, Styrene, Cumene 1,2,3-Trichloropropane, N-Propyl benzene, Dibromochloromethane, 1,2-Dibromoethane, Chlorobenzene, 1,1,1,2-Tetrachloroethane, Ethylbenzene, 1,1-Dichloropropylene, 1,2-Dichloroethane, 1,2-Dichloropropane, Trans-1,3-Dichloropropene, CIS 1,3-Dichloropropene, 1,1,2-Trichloroethane,

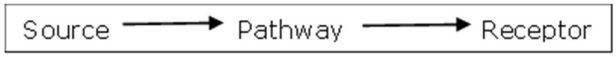
Sampling Criteria	Number of sites	Total Sites	Monitoring Parameters
			Tetrachloroethylene, 1,3,5-Trimethylbenzene, N-Butylbenzene, 1,2,3-Trichlorobenzene, Hexachlorobutadiene, 1,2,4-Trichlorobenzene, 2,2-Dichloropropane, Dibromo methane, Toluene, O-Xylene, Bromoform, 1,1,2,2-Tetrachloroethane, 4-Chlorotoluene, 1,1-Dichloroethylene, Trans-1,2-Dichloroethylene, 1,1-Dichloroethane, CIS-1,2-Dichloroethylene, Bromochloromethane, 1,1,1-Trichloroethane
Water Quality Monitoring	**Surface water** • MIDC Tadali-03 • MIDC Chandrapur-03 • MIDC Ghugus -03 • MIDC Ballarpur -03	**12**	**(i) Simple Parameters** Sanitary Survey, General Appearance, Colour, Smell, Transparency and Ecological **(ii) Regular Monitoring Parameters** pH, O & G, Suspended Solids, DO, COD, BOD, TDS, Electrical Conductivity, Total Dissolved Solids, Nitrite–Nitrogen, Nitrate-Nitrogen, (NO_2+NO_3) total nitrogen, Free Ammonia, Total Residual Chlorine, Cyanide, Fluoride, Chloride, Sulphate, Sulphides, Total Hardness, Dissolved Phosphates, SAR, Total Coliforms, Faecal Coliform **(iii) Special Parameters** Total Phosphorous, TKN, Total Ammonia (NH_4+NH_3)-Nitrogen, Phenols, Surface Active Agents, Anionic detergents, Organo-Chlorine Pesticides, PAH, PCB and PCT, Zinc, Nickel, Copper, Hexa-valent Chromium, Chromium (Total), Arsenic (Total), Lead, Cadmium, Mercury, Manganese, Iron, Vanadium, Selenium, Boron **(iv) Bio-assay (zebra Fish)** Test – For specified samples only.
	Groundwater • MIDC Tadali-03 • MIDC Chandrapur-03 • MIDC Ghugus -03 • MIDC Ballarpur -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 h each
2.	Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	03	1 Shift of 24 h
3.	Sulphur Dioxide (SO_2)	03	6 Shifts of 4 h each
4.	Nitrogen Dioxide (NO_2)	03	6 Shifts of 4 h each
5.	Ammonia (NH_3)	03	6 Shifts of 4 h each
6.	Ozone (O_3)	03	24 Shifts of 1 h each
7.	Benzene (C_6H_6)	03	1 Shifts of 24 h
8.	Carbon Monoxide (CO)	03	24 Shifts of 1 h each
9.	Benzo (a) Pyrene (BaP) – particulate phase only	03	3 Shifts of 8 h each
10.	Lead (Pb)	03	3 Shifts of 8 h each
11.	Arsenic (As)	03	3 Shifts of 8 h each
12.	Nickel (Ni)	03	3 Shifts of 8 h each
B	**Volatile Organic Compounds (VOCs)**		
	As mentioned in Table 3.1	03	3 Shifts of 24 h 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:



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 Chandrapur 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.*

1. **Tadali:** In Tadali four locations have been monitored of checking the AAQ. All 12 parameters monitored as per NAAQS are observed well within the limits in all four locations.

Table 5.1 MIDC Tadali - 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.	Boundary Wall of Dhariwal Infrastructure Ltd.	20°01'01.3"N	79°11'57.9"E	22.05.2023	24.05.2023	26.05.2023
2.	NAMP Growth Centre	20°59'15.8"N	79°11'08.7"E	22.05.2023	24.05.2023	26.05.2023
3.	Near Chaman Metalic Boundary Wall	19° 00'50.9"N	79°11'05.0"E	22.05.2023	24.05.2023	26.05.2023
4.	MIDC WTP Building	20°01'04.3"N	79°11'34.9"E	22.05.2023	24.05.2023	26.05.2023

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

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Boundary Wall of Dhariwal Infrastructure Ltd.	20° 01'01.3" N	79°11'57.9"E	22.05.2023	24.05.2023	26.05.2023
2.	NAMP Growth Centre	20°59'15.8"N	79°11'08.7"E	22.05.2023	24.05.2023	26.05.2023

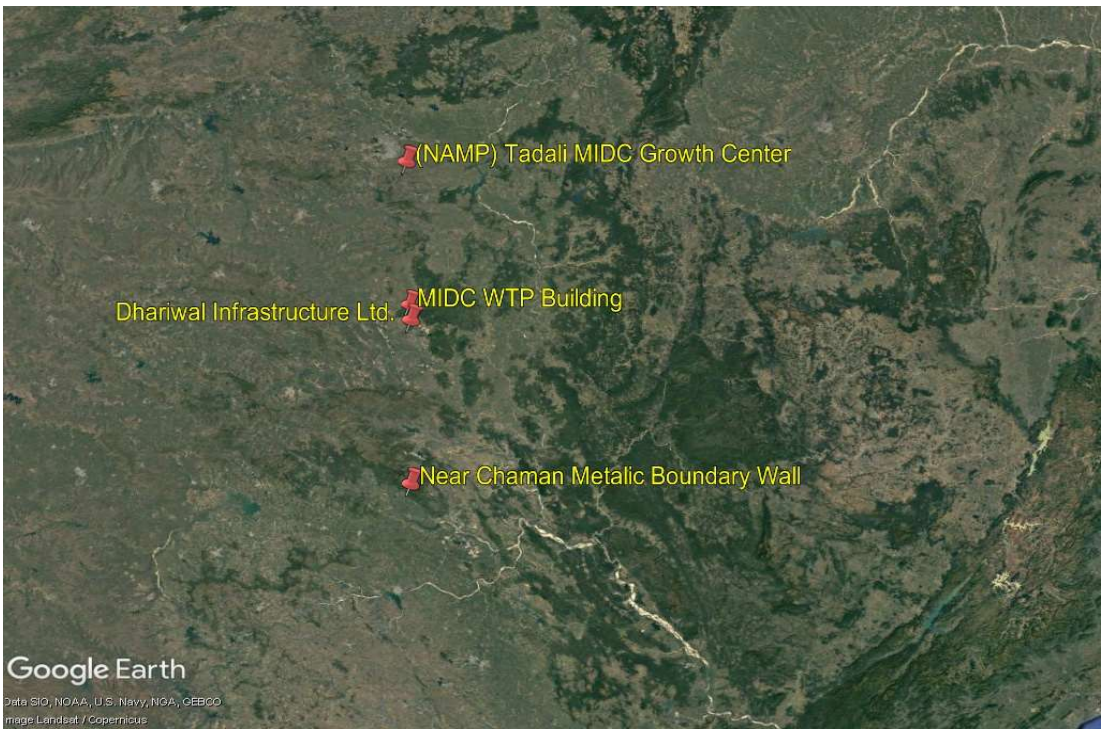


Fig. Geographical Locations of Ambient Air Quality Monitoring MIDC Tadali

Fig. Geographical Locations of VOCs Monitoring MIDC Tadali

Table 5.3 MIDC Tadali – Results of Ambient Air Quality Monitoring

Parameters	Unit	Results			
		Boundary Wall of Dhariwal Infrastructure Ltd.	NAMP Growth Centre	Near Chaman Metalic Boundary Wall	MIDC WTP Building
Sulphur Dioxide (SO_2)	µg/m^3	5.12	BLQ	4.57	5.78
Nitrogen Dioxide (NO_2)	µg/m^3	10.95	21.65	24.15	18.90
Particulate Matter (size less than 10 µm) or PM_{10}	µg/m^3	52	87	60	53
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	µg/m^3	12	23	15	13
Ozone (O_3)	µg/m^3	BLQ	19.6	BLQ	19.7
Lead (Pb)	µg/m^3	BLQ	BLQ	BLQ	BLQ
Carbon Monoxide (CO) (1 h)	mg/m^3	1.41	1.65	1.35	1.44
Carbon Monoxide (CO) (8 h)	mg/m^3	1.66	1.88	1.88	1.68
Ammonia (NH_3)	µg/m^3	35	61	73	40
Benzene (C_6H_6)	µg/m^3	2.88	2.46	2.07	2.50
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m^3	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m^3	0.37	BLQ	BLQ	BLQ
Nickel (Ni)	ng/m^3	BLQ	BLQ	BLQ	BLQ

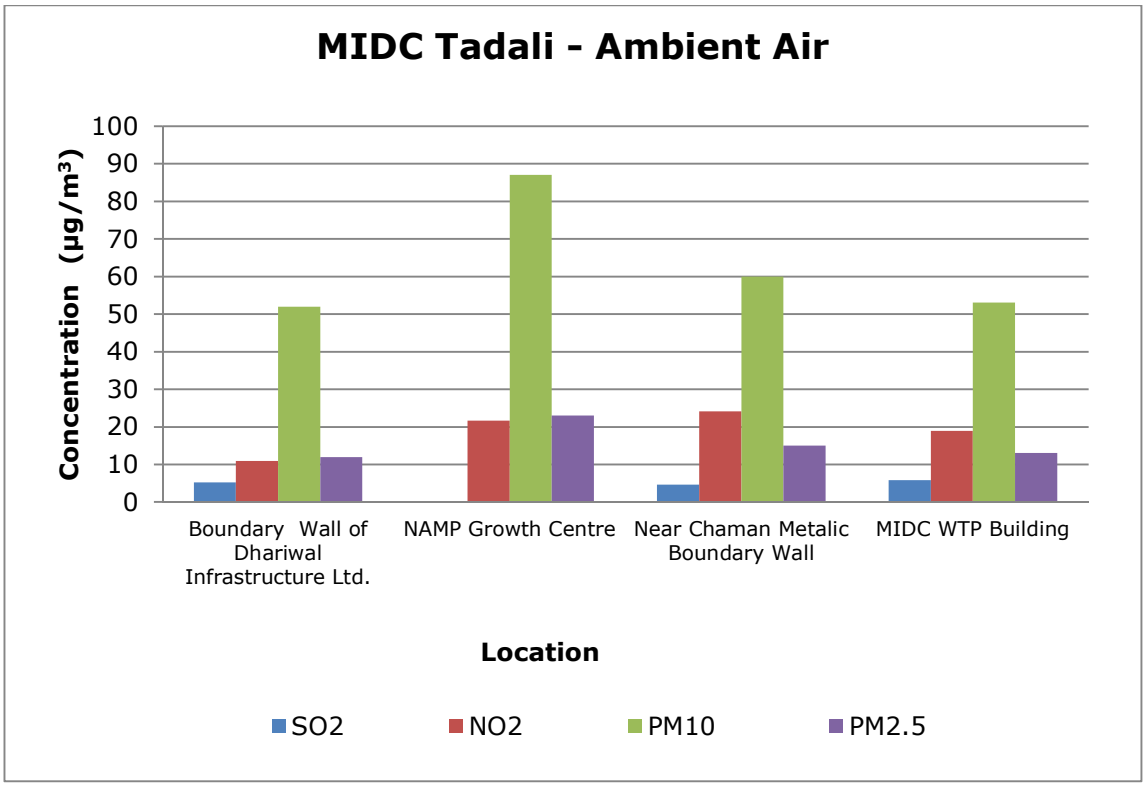
Table 5.4 MIDC Tadali - Volatile Organic Compounds (VOCs) in Ambient Air Results

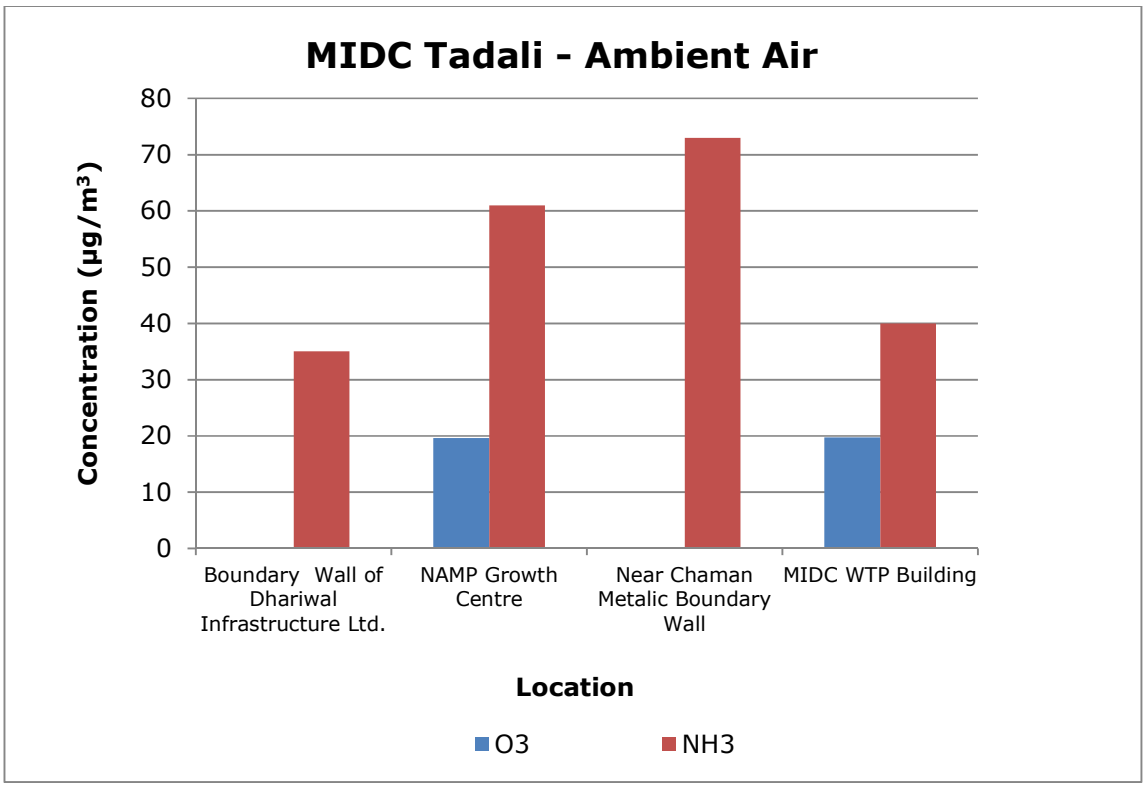
Parameters	Unit	Results	
		Boundary Wall of Dhariwal Infrastructure Ltd.	NAMP Growth Centre
Dichloromethane	µg/m³	0.53	BLQ
Chloroform	µg/m³	0.51	BLQ
Carbon Tetrachloride	µg/m³	0.51	0.53
Trichloroethylene	µg/m³	1.82	0.67
Bromodichloromethane	µg/m³	BLQ	BLQ
1,3-Dichloropropane	µg/m³	BLQ	BLQ
1,4-Dichlorobenzene	µg/m³	BLQ	13.20
1,3-Dichlorobenzene	µg/m³	BLQ	BLQ
1,2-Dichlorobenzene	µg/m³	BLQ	BLQ

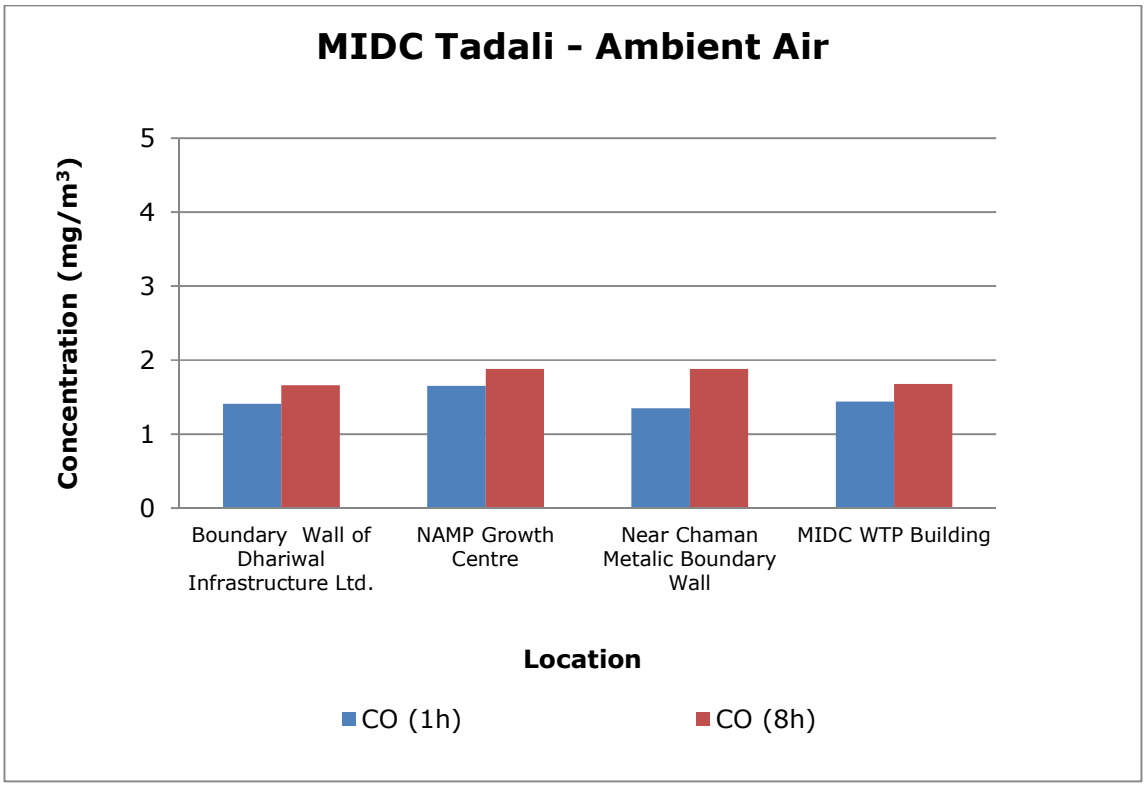
Parameters	Unit	Results	
		Boundary Wall of Dhariwal Infrastructure Ltd.	NAMP Growth Centre
1,2-Dibromo-3-Chloropropane	µg/m³	BLQ	BLQ
Napthalene	µg/m³	BLQ	BLQ
Bromobenzene	µg/m³	BLQ	BLQ
1,2,4-Trimethylbenzene	µg/m³	4.09	BLQ
2-Chlorotoluene	µg/m³	BLQ	BLQ
Tert-Butylbenzene	µg/m³	13.7	BLQ
SEC-Butylbenzene	µg/m³	BLQ	BLQ
P-Isopropyltoluene	µg/m³	BLQ	2.9
M-Xylene	µg/m³	19.2	7.61
P-Xylene	µg/m³	4.26	11.55
Styrene	µg/m³	BLQ	BLQ
Cumene	µg/m³	BLQ	BLQ
1,2,3-Trichloropropane	µg/m³	BLQ	BLQ
N-Propylbenzene	µg/m³	BLQ	0.88
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	12.8	3.96
1,1-Dichloropropylene	µg/m³	BLQ	0.52
1,2-Dichloroethane	µg/m³	2.12	1.90
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	3.51	1.84
1,3,5-Trimethylbenzene	µg/m³	BLQ	BLQ
N-Butylbenzene	µg/m³	BLQ	BLQ
1,2,3-Trichlorobenzene	µg/m³	BLQ	BLQ
Hexachlorobutadiene	µg/m³	BLQ	BLQ
1,2,4-Trichlorobenzene	µg/m³	BLQ	BLQ
2,2-Dichloropropane	µg/m³	BLQ	BLQ

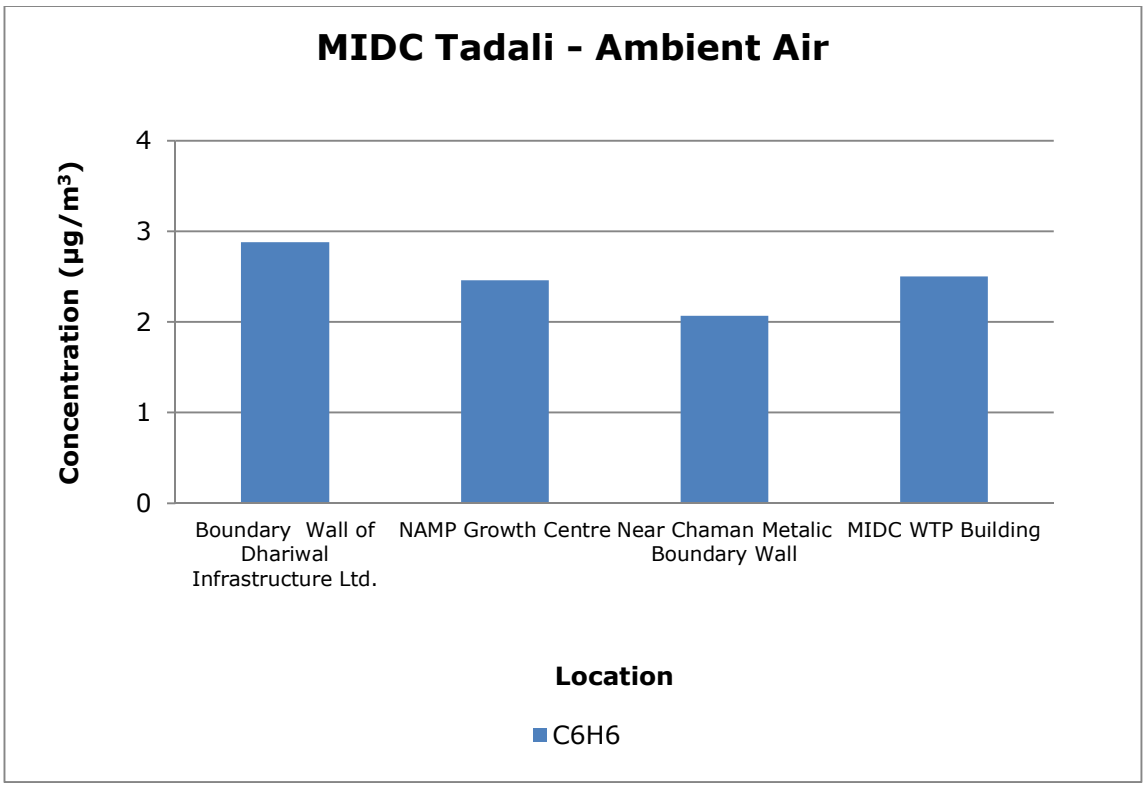
Parameters	Unit	Results	
		Boundary Wall of Dhariwal Infrastructure Ltd.	NAMP Growth Centre
Dibromomethane	µg/m³	BLQ	BLQ
Toluene	µg/m³	1.23	2.24
O-Xylene	µg/m³	1.47	BLQ
Bromoform	µg/m³	BLQ	BLQ
1,1,2,2-Tetrachloroethane	µg/m³	BLQ	BLQ
4-Chlorotoluene	µg/m³	BLQ	BLQ
1,1-Dichloroethylene	µg/m³	BLQ	BLQ
Trans-1,2-Dichloroethylene	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

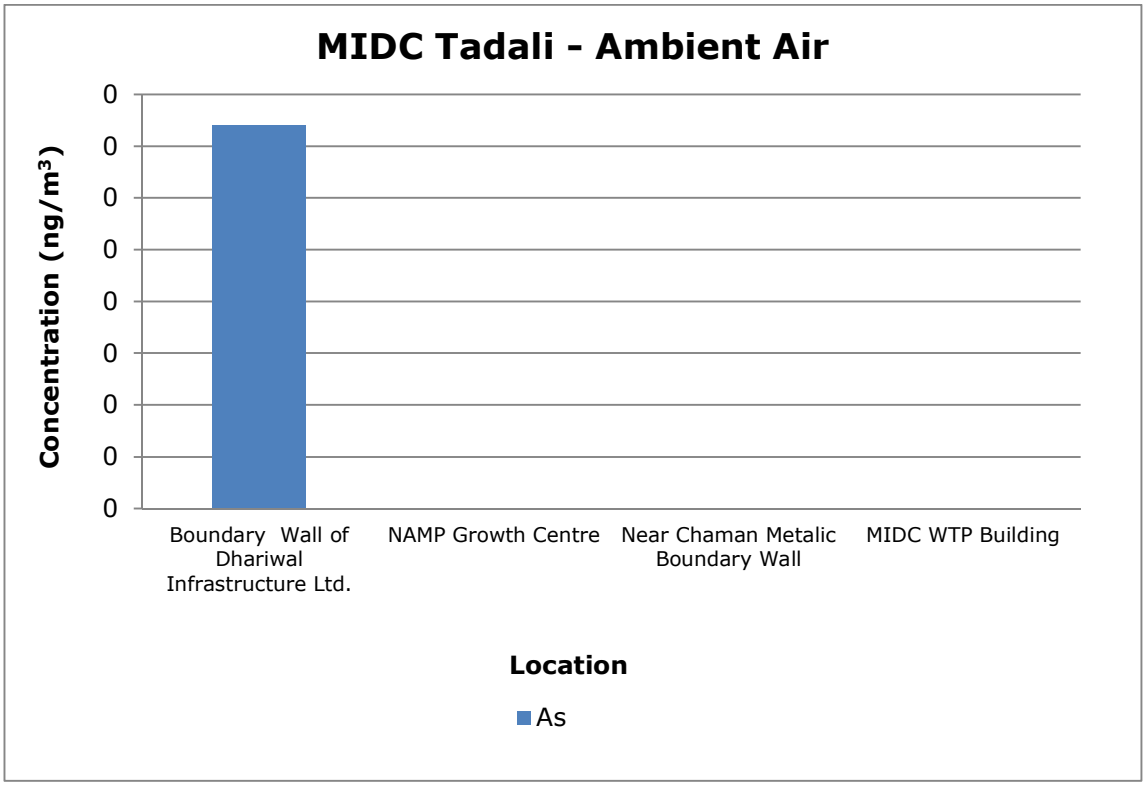
Graphs - Ambient Air Quality Monitoring of Tadali




MIDC Tadali - Ambient Air
Concentration (µg/m³)
80
70
60
50
40
30
20
10
0
Boundary Wall of Dhariwal Infrastructure Ltd.
NAMP Growth Centre
Near Chaman Metalic Boundary Wall
MIDC WTP Building
Location
O3
NH3


MIDC Tadali - Ambient Air
Concentration (mg/m³)
5
4
3
2
1
0
Boundary Wall of Dhariwal Infrastructure Ltd.
NAMP Growth Centre
Near Chaman Metalic Boundary Wall
MIDC WTP Building
Location
CO (1h)
CO (8h)


MIDC Tadali - Ambient Air
Concentration (µg/m³)
4
3
2
1
0
Boundary Wall of Dhariwal Infrastructure Ltd.
NAMP Growth Centre
Near Chaman Metalic Boundary Wall
MIDC WTP Building
Location
C6H6


MIDC Tadali - Ambient Air
Concentration (ng/m³)
0
0
0
0
0
0
0
Boundary Wall of Dhariwal Infrastructure Ltd.
NAMP Growth Centre
Near Chaman Metalic Boundary Wall
MIDC WTP Building
Location
As

2. **MIDC Chandrapur:** In MIDC Chandrapur, at all 4 locations monitored for 12 parameters are well within the limit prescribed as per the NAAQS.

Table 5.5 MIDC Chandrapur – 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.	Behind Earth Green Tech Pvt. Ltd., MIDC Chandrapur	19°58'46.8"N	79°13'53.6"E	29.05.2023	31.05.2023	02.06.2023
2.	Multi Organics, Chandrapur MIDC	19°58'51.5"N	79°13'55.4"E	29.05.2023	31.05.2023	02.06.2023
3.	Opposite Super Hygienic CBMW Site	19°58'19.2"N	79°14'21.4"E	29.05.2023	31.05.2023	02.06.2023
4.	Near HPCL, MIDC Chandrapur	19°59'12.7"N	79°15'36.3"E	29.05.2023	31.05.2023	02.06.2023

Table 5.6 MIDC Chandrapur - Details of Sampling Location of Volatile Organic Compounds (VOCs) Monitoring

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Multi Organics, Chandrapur MIDC	19°58'51.5"N	79°13'55.4"E	29.05.2023	31.05.2023	02.06.2023
2.	Opposite Super Hygienic CBMW Site	19°58'19.2"N	79°14'21.4"E	29.05.2023	31.05.2023	02.06.2023

Fig. Geographical Locations of Ambient Air Quality Monitoring MIDC Chandrapur

Fig. Geographical Locations of VOCs Monitoring MIDC Chandrapur

Table 5.7 MIDC Chandrapur – Results of Ambient Air Quality Monitoring

Parameters	Unit	Results			
		Behind Earth Green Tech Pvt. Ltd.	Multi Organics	Opposite Super Hygienic CBMW Site	Near HPCL
Sulphur Dioxide (SO_2)	µg/m³	14.10	14.50	73.00	12.90
Nitrogen Dioxide (NO_2)	µg/m³	16.60	14.80	13.20	16.60
Particulate Matter (size less than 10 µm) or PM_{10}	µg/m³	62	73	58	69
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	µg/m³	18	19	17	19
Ozone (O_3)	µg/m³	BLQ	BLQ	BLQ	BLQ
Lead (Pb)	µg/m³	0.02	0.05	0.02	BLQ
Carbon Monoxide (CO) (1 h)	mg/m³	1.53	1.78	1.34	1.51
Carbon Monoxide (CO) (8 h)	mg/m³	1.90	1.90	1.85	1.82
Ammonia (NH_3)	µg/m³	87	67	115	115
Benzene (C_6H_6)	µg/m³	2.63	2.81	2.97	3.28
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m³	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m³	BLQ	BLQ	0.78	0.59
Nickel (Ni)	ng/m³	BLQ	6.825	BLQ	3.63

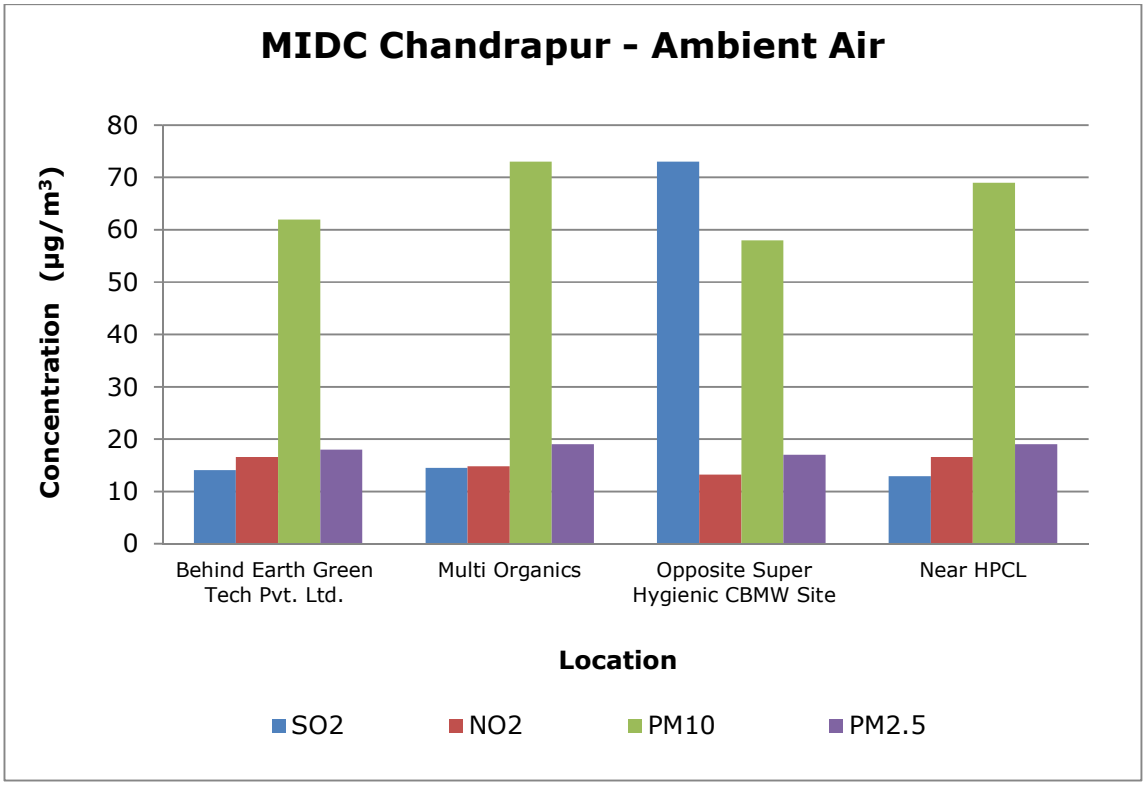
Table 5.8 MIDC Chandrapur - Volatile Organic Compounds (VOCs) in Ambient Air Results

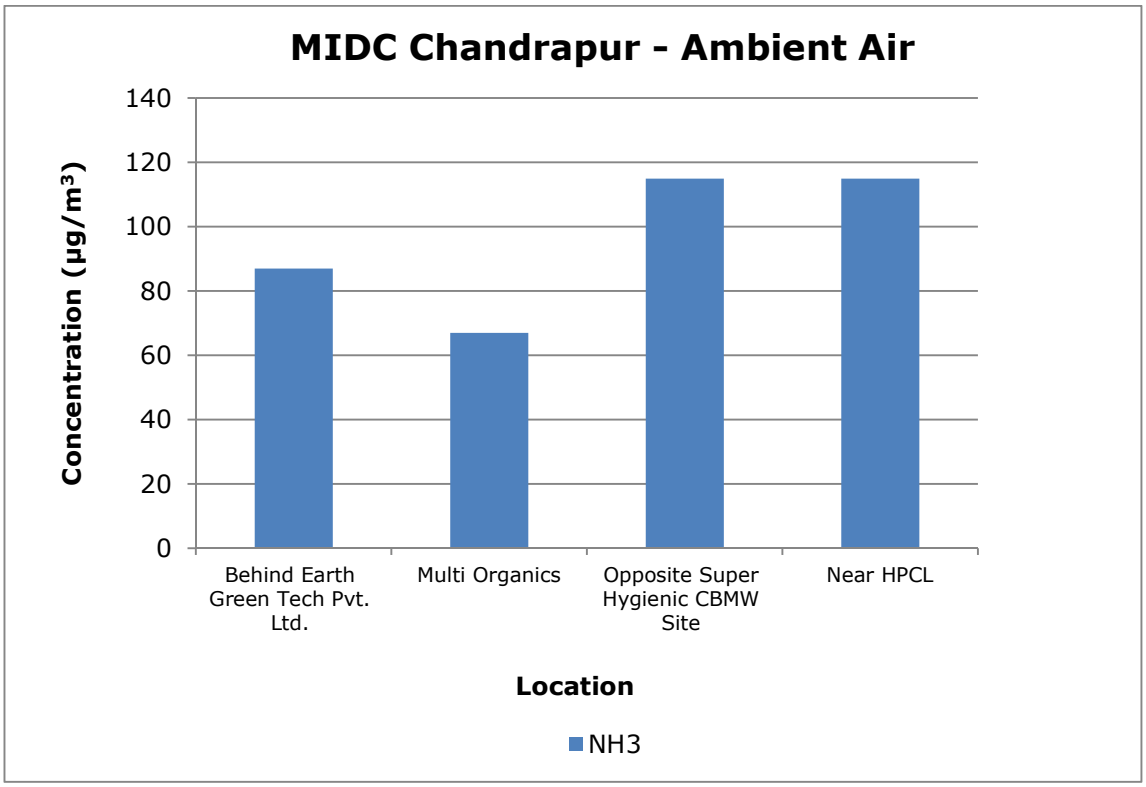
Parameters	Unit	Results	
		Multi Organics	Opposite Super Hygienic CBMW Site
Dichloromethane	µg/m³	BLQ	0.512
Chloroform	µg/m³	BLQ	BLQ
Carbon Tetrachloride	µg/m³	BLQ	BLQ
Trichloroethylene	µg/m³	2.12	1.09
Bromodichloromethane	µg/m³	BLQ	BLQ
1,3-Dichloropropane	µg/m³	BLQ	BLQ
1,4-Dichlorobenzene	µg/m³	BLQ	BLQ
1,3-Dichlorobenzene	µg/m³	9.54	BLQ
1,2-Dichlorobenzene	µg/m³	BLQ	BLQ
1,2-Dibromo-3-Chloropropane	µg/m³	BLQ	BLQ

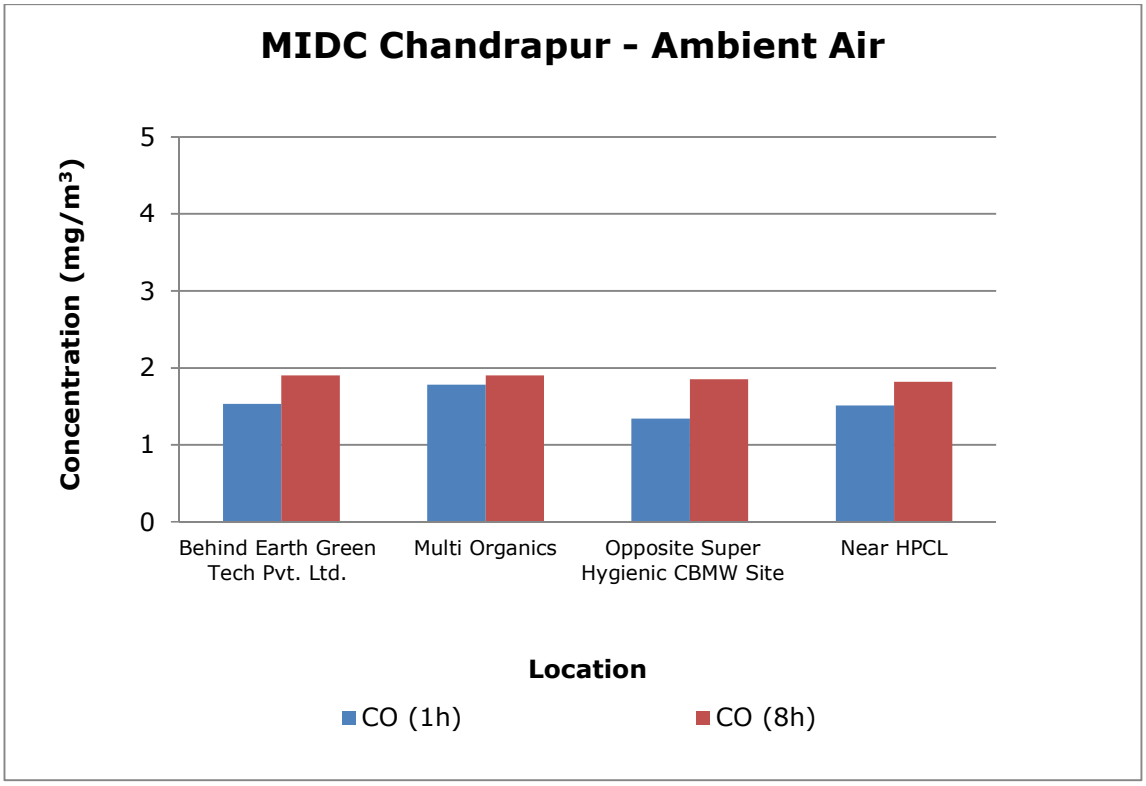
Parameters	Unit	Results	
		Multi Organics	Opposite Super Hygienic CBMW Site
Napthalene	µg/m³	BLQ	BLQ
Bromobenzene	µg/m³	BLQ	BLQ
1,2,4-Trimethylbenzene	µg/m³	BLQ	6.4
2-Chlorotoluene	µg/m³	BLQ	BLQ
Tert-Butylbenzene	µg/m³	BLQ	BLQ
SEC-Butylbenzene	µg/m³	BLQ	BLQ
P-Isopropyltoluene	µg/m³	2.64	5.11
M-Xylene	µg/m³	BLQ	4.03
P-Xylene	µg/m³	11.3	8.97
Styrene	µg/m³	BLQ	BLQ
Cumene	µg/m³	BLQ	BLQ
1,2,3-Trichloropropane	µg/m³	BLQ	BLQ
N-Propylbenzene	µg/m³	BLQ	7.3
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	14.3	1.42
1,1-Dichloropropylene	µg/m³	BLQ	BLQ
1,2-Dichloroethane	µg/m³	2.70	3.25
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	8.98	2.89
1,3,5-Trimethylbenzene	µg/m³	BLQ	BLQ
N-Butylbenzene	µg/m³	BLQ	BLQ
1,2,3-Trichlorobenzene	µg/m³	BLQ	BLQ
Hexachlorobutadiene	µg/m³	BLQ	BLQ
1,2,4-Trichlorobenzene	µg/m³	BLQ	BLQ
2,2-Dichloropropane	µg/m³	BLQ	BLQ
Dibromomethane	µg/m³	BLQ	BLQ

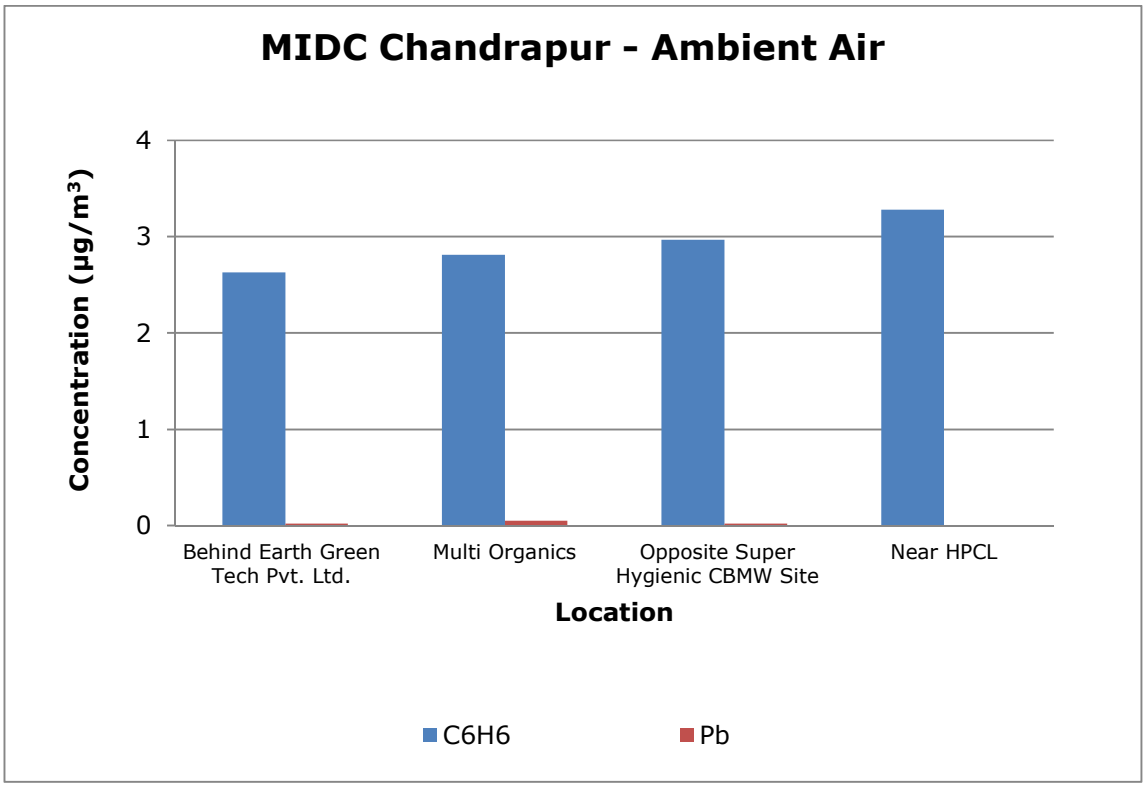
Parameters	Unit	Results	
		Multi Organics	Opposite Super Hygienic CBMW Site
Toluene	µg/m³	0.64	BLQ
O-Xylene	µg/m³	BLQ	BLQ
Bromoform	µg/m³	BLQ	BLQ
1,1,2,2-Tetrachloroethane	µg/m³	BLQ	BLQ
4-Chlorotoluene	µg/m³	BLQ	BLQ
1,1-Dichloroethylene	µg/m³	BLQ	BLQ
Trans-1,2-Dichloroethylene	µg/m³	BLQ	BLQ
1,1-Dichloroethane	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

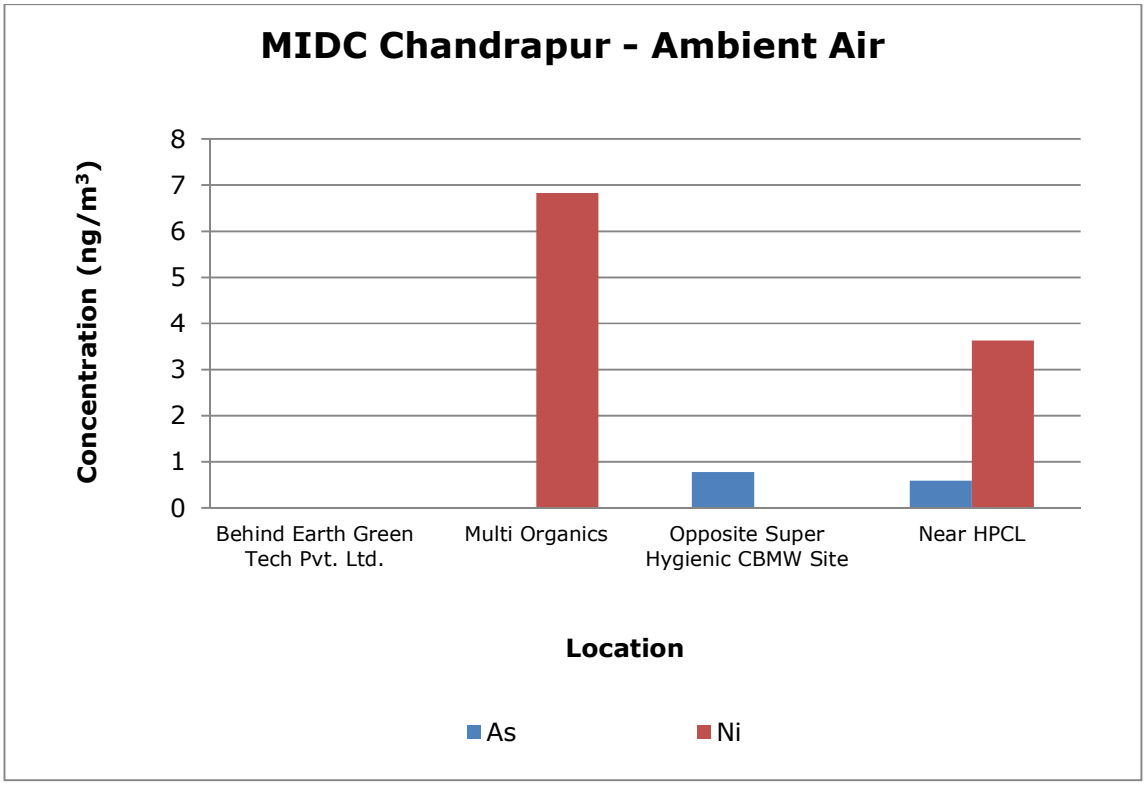
Graphs - Ambient Air Quality Monitoring of MIDC Chandrapur




MIDC Chandrapur - Ambient Air
Concentration (µg/m³)
140
120
100
80
60
40
20
0
Behind Earth Green Tech Pvt. Ltd.
Multi Organics
Opposite Super Hygienic CBMW Site
Near HPCL
Location
NH3


MIDC Chandrapur - Ambient Air
Concentration (mg/m³)
5
4
3
2
1
0
Behind Earth Green Tech Pvt. Ltd.
Multi Organics
Opposite Super Hygienic CBMW Site
Near HPCL
Location
CO (1h)
CO (8h)


MIDC Chandrapur - Ambient Air
Concentration (µg/m³)
4
3
2
1
0
Behind Earth Green Tech Pvt. Ltd.
Multi Organics
Opposite Super Hygienic CBMW Site
Near HPCL
Location
C6H6
Pb


MIDC Chandrapur - Ambient Air
Concentration (ng/m³)
8
7
6
5
4
3
2
1
0
Behind Earth Green Tech Pvt. Ltd.
Multi Organics
Opposite Super Hygienic CBMW Site
Near HPCL
Location
As
Ni

3. **MIDC Ghugus:** In MIDC Ghugus also all 4 locations monitored for 12 parameters are well within the limit prescribed as per the NAAQS.

Table 5.9 MIDC Ghugus – 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.	Terrace of Transit Hostel Rajiv Colony WCL Ghugus Area	19°05'06.22''N	79°66'12.8''E	29.05.2023	31.05.2023	02.06.2023
2.	WTP Water Supply Tank, Ghugus	19°56'26.8''N	79°07'13.0''E	29.05.2023	31.05.2023	02.06.2023
3.	(NAMP) Near Gram Panchayat Ghugus	19°56'22.8''N	79°06'50.9''E	29.05.2023	31.05.2023	02.06.2023
4.	Guest House of ACC Cement	19°55'41.4''N	79°06'45.3''E	29.05.2023	31.05.2023	02.06.2023

Table 5.10 MIDC Ghugus - Details of Sampling Location of Volatile Organic Compounds (VOCs) Monitoring

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Terrace of Transit Hostel Rajiv Colony WCL Ghugus Area	19°05'06.22''N	79°66'12.8''E	29.05.2023	31.05.2023	02.06.2023
2.	Guest House of ACC Cement	19°55'41.4''N	79°06'45.3''E	29.05.2023	31.05.2023	02.06.2023

Fig. Geographical Locations of Ambient Air Quality Monitoring MIDC Ghugus

Fig. Geographical Locations of VOCs MIDC Ghugus

Table 5.11 MIDC Ghugus – Results of Ambient Air Quality Monitoring

Parameters	Unit	Results			
		Terrace of Transit Hostel Rajiv Colony WCL Ghugus Area	WTP Water Supply Tank, Ghugus	(NAMP) Near Gram Panchayat Ghugus	Guest House of ACC Cement
Sulphur Dioxide (SO_2)	µg/m^3	8.29	14.10	13.10	12.40
Nitrogen Dioxide (NO_2)	µg/m^3	16.47	18.30	16.70	16.50
Particulate Matter (size less than 10 µm) or PM_{10}	µg/m^3	77	52	58	69
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	µg/m^3	20	14	15	18
Ozone (O_3)	µg/m^3	BLQ	BLQ	BLQ	BLQ
Lead (Pb)	µg/m^3	BLQ	0.06	BLQ	BLQ
Carbon Monoxide (CO) (1 h)	mg/m^3	1.42	1.22	1.66	1.13
Carbon Monoxide (CO) (8 h)	mg/m^3	1.73	1.47	1.96	1.45
Ammonia (NH_3)	µg/m^3	87	65	112	53
Benzene (C_6H_6)	µg/m^3	2.96	2.71	3.29	2.99
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m^3	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m^3	BLQ	0.45	0.78	BLQ
Nickel (Ni)	ng/m^3	BLQ	8.3	3.45	BLQ

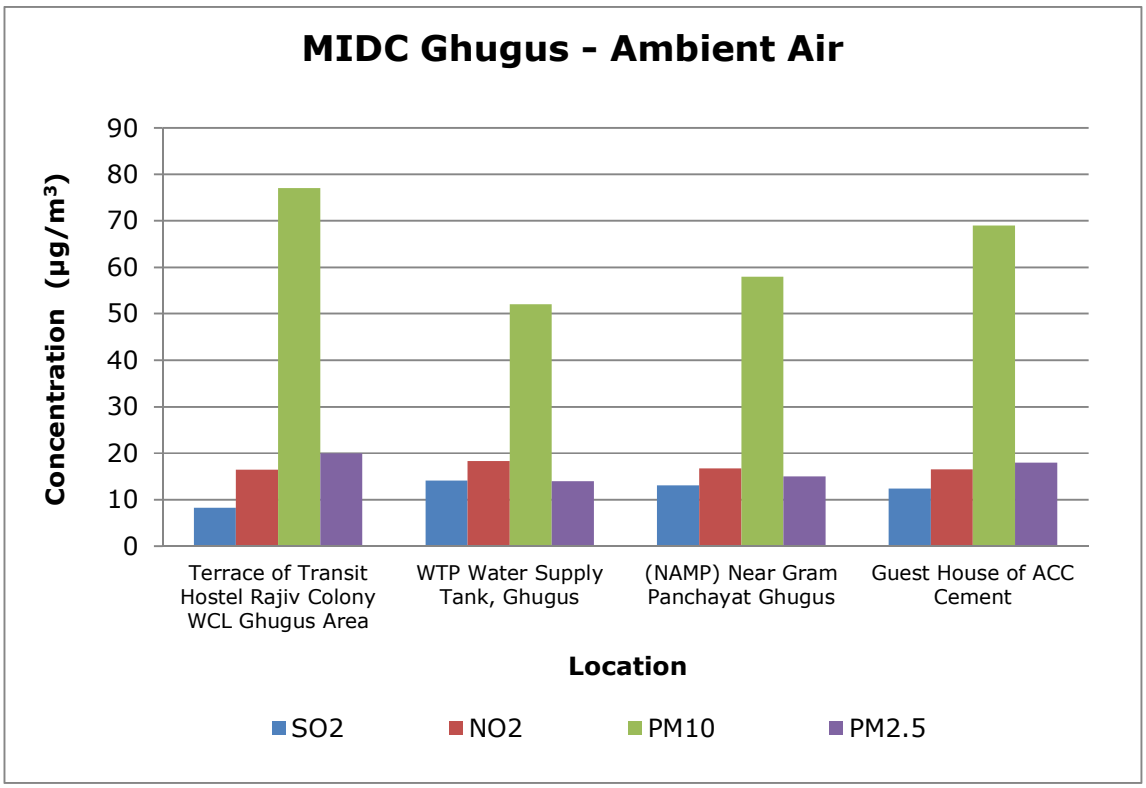
Table 5.12 MIDC Ghugus - Volatile Organic Compounds (VOCs) in Ambient Air Results

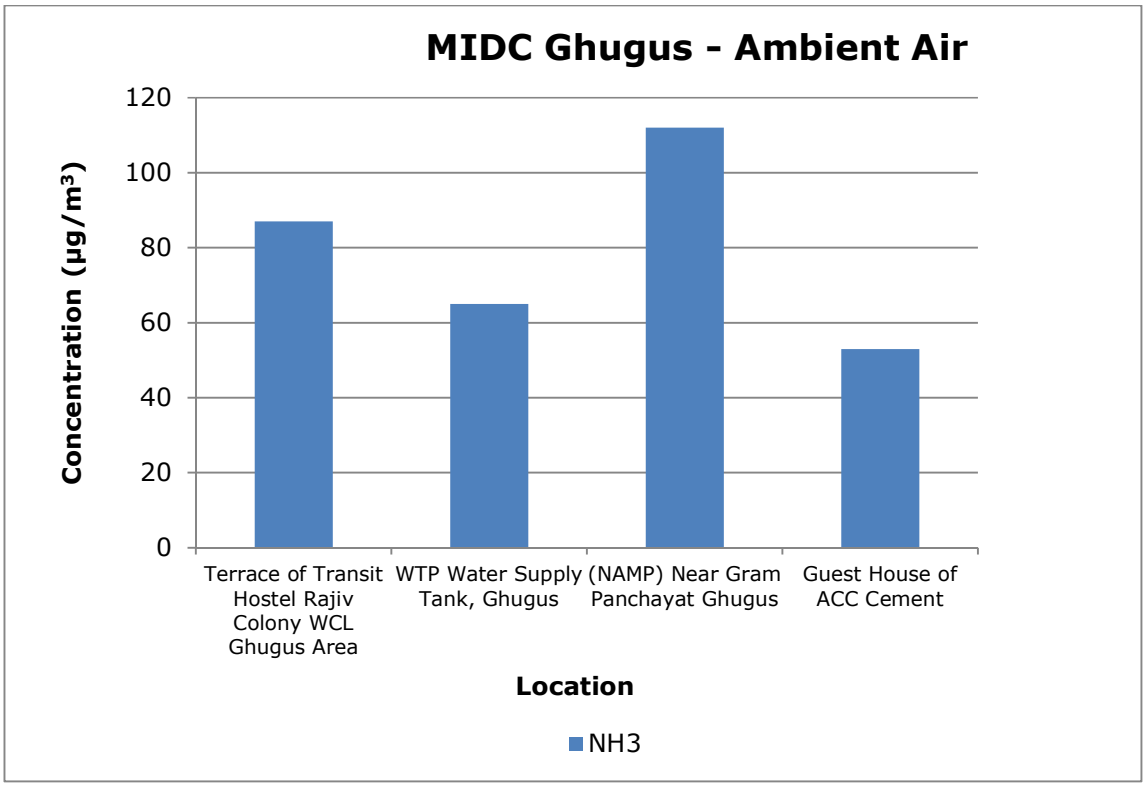
Parameters	Unit	Results	
		Terrace of Transit Hostel Rajiv Colony WCL Ghugus Area	Guest House of ACC Cement
Dichloromethane	µg/m³	0.52	0.52
Chloroform	µg/m³	BLQ	BLQ
Carbon Tetrachloride	µg/m³	BLQ	BLQ
Trichloroethylene	µg/m³	0.53	0.57
Bromodichloromethane	µg/m³	BLQ	BLQ
1,3-Dichloropropane	µg/m³	BLQ	BLQ
1,4-Dichlorobenzene	µg/m³	BLQ	BLQ
1,3-Dichlorobenzene	µg/m³	12.6	4.8
1,2-Dichlorobenzene	µg/m³	BLQ	BLQ

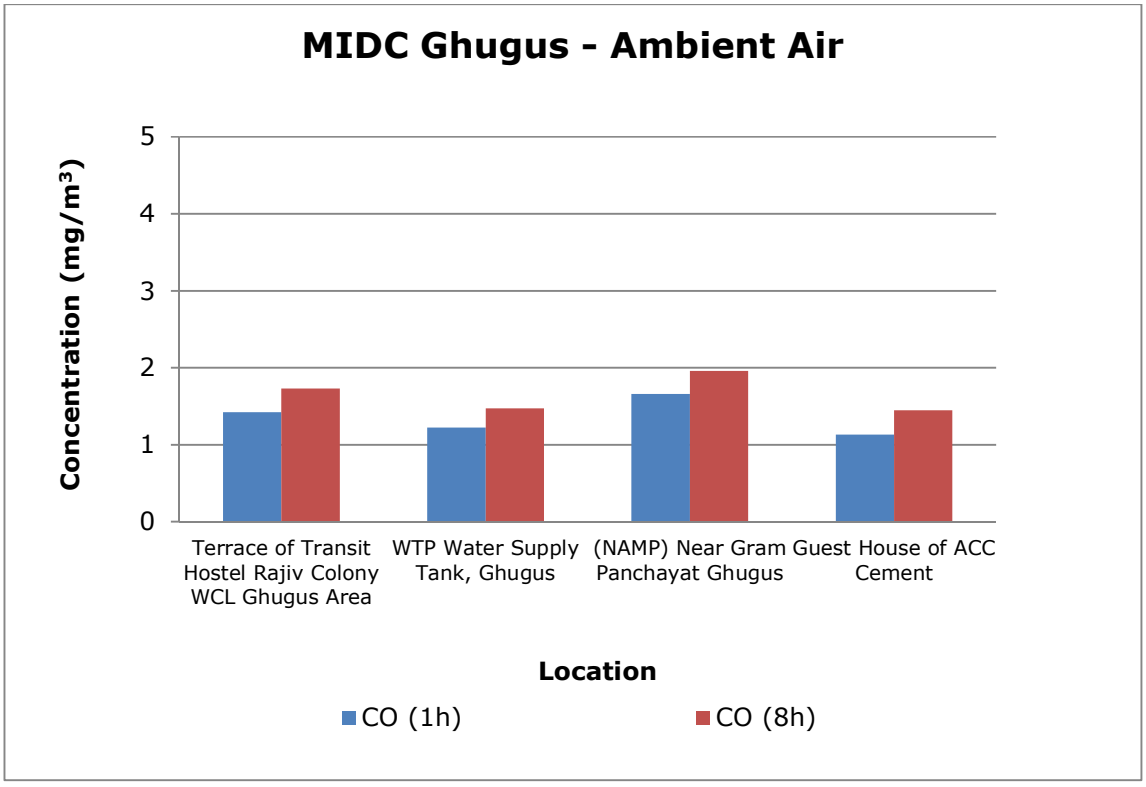
Parameters	Unit	Results	
		Terrace of Transit Hostel Rajiv Colony WCL Ghugus Area	Guest House of ACC Cement
1,2-Dibromo-3-Chloropropane	µg/m³	BLQ	BLQ
Napthalene	µg/m³	BLQ	BLQ
Bromobenzene	µg/m³	BLQ	BLQ
1,2,4-Trimethylbenzene	µg/m³	BLQ	BLQ
2-Chlorotoluene	µg/m³	BLQ	BLQ
Tert-Butylbenzene	µg/m³	BLQ	BLQ
SEC-Butylbenzene	µg/m³	BLQ	BLQ
P-Isopropyltoluene	µg/m³	BLQ	BLQ
M-Xylene	µg/m³	5.61	BLQ
P-Xylene	µg/m³	2.52	BLQ
Styrene	µg/m³	BLQ	BLQ
Cumene	µg/m³	BLQ	BLQ
1,2,3-Trichloropropane	µg/m³	BLQ	BLQ
N-Propylbenzene	µg/m³	BLQ	6.69
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	2.64	0.51
1,1-Dichloropropylene	µg/m³	BLQ	BLQ
1,2-Dichloroethane	µg/m³	2.77	3.075
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	1.47	0.53
1,3,5-Trimethylbenzene	µg/m³	BLQ	BLQ
N-Butylbenzene	µg/m³	BLQ	BLQ
1,2,3-Trichlorobenzene	µg/m³	BLQ	BLQ
Hexachlorobutadiene	µg/m³	BLQ	BLQ
1,2,4-Trichlorobenzene	µg/m³	BLQ	BLQ
2,2-Dichloropropane	µg/m³	BLQ	BLQ

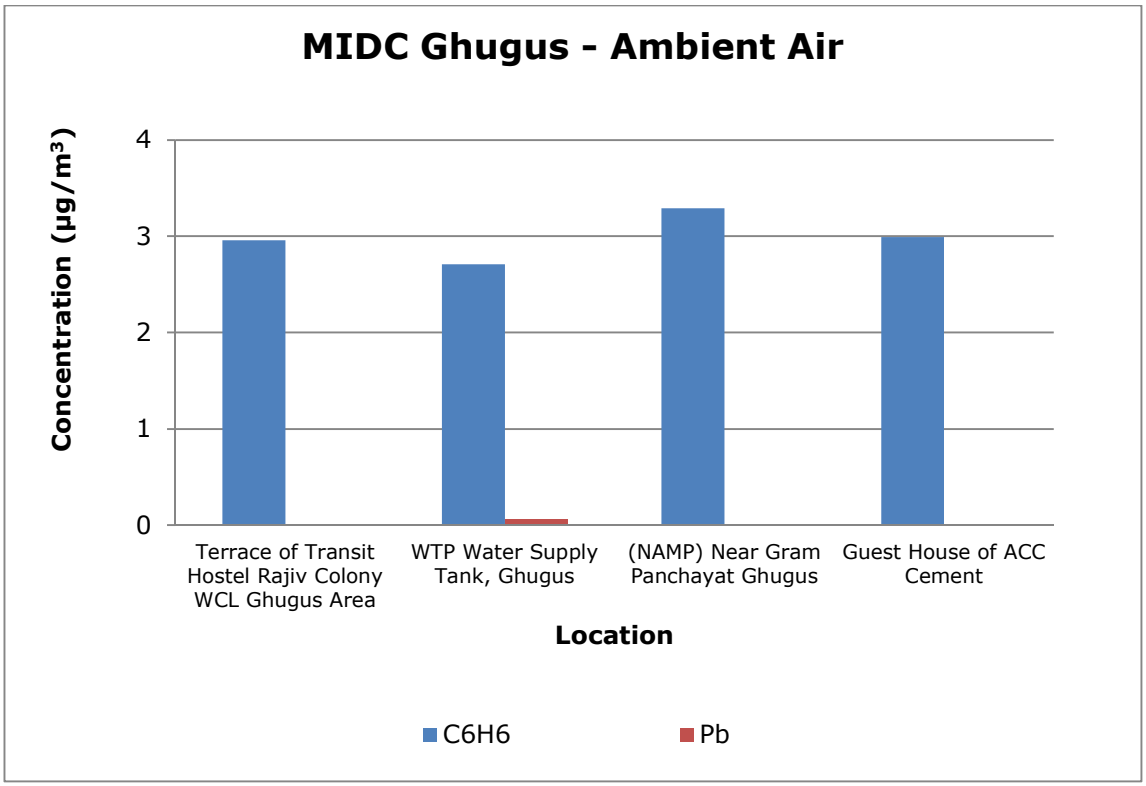
Parameters	Unit	Results	
		Terrace of Transit Hostel Rajiv Colony WCL Ghugus Area	Guest House of ACC Cement
Dibromomethane	µg/m³	BLQ	BLQ
Toluene	µg/m³	BLQ	BLQ
O-Xylene	µg/m³	1.65	0.77
Bromoform	µg/m³	BLQ	BLQ
1,1,2,2-Tetrachloroethane	µg/m³	BLQ	BLQ
4-Chlorotoluene	µg/m³	BLQ	BLQ
1,1-Dichloroethylene	µg/m³	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

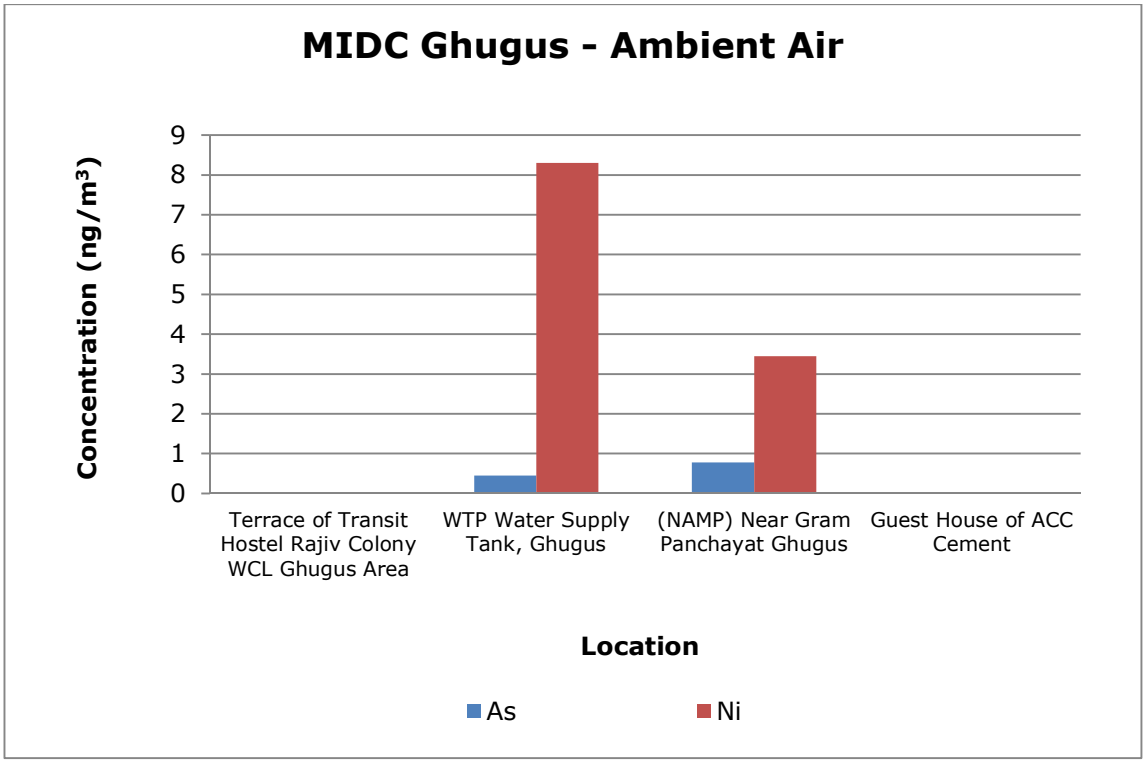
Graphs - Ambient Air Quality Monitoring of MIDC Ghugus




MIDC Ghugus - Ambient Air
Concentration (µg/m³)
120
100
80
60
40
20
0
Terrace of Transit Hostel Rajiv Colony WCL Ghugus Area
WTP Water Supply Tank, Ghugus
(NAMP) Near Gram Panchayat Ghugus
Guest House of ACC Cement
Location
NH3


MIDC Ghugus - Ambient Air
Concentration (mg/m³)
5
4
3
2
1
0
Terrace of Transit Hostel Rajiv Colony WCL Ghugus Area
WTP Water Supply Tank, Ghugus
(NAMP) Near Gram Panchayat Ghugus
Guest House of ACC Cement
Location
CO (1h)
CO (8h)


MIDC Ghugus - Ambient Air
Concentration (µg/m³)
4
3
2
1
0
Terrace of Transit Hostel Rajiv Colony WCL Ghugus Area
WTP Water Supply Tank, Ghugus
(NAMP) Near Gram Panchayat Ghugus
Guest House of ACC Cement
Location
C6H6
Pb


MIDC Ghugus - Ambient Air
Concentration (ng/m³)
9
8
7
6
5
4
3
2
1
0
Terrace of Transit Hostel Rajiv Colony WCL Ghugus Area
WTP Water Supply Tank, Ghugus
(NAMP) Near Gram Panchayat Ghugus
Guest House of ACC Cement
Location
As
Ni

4. **MIDC Ballarpur:** In MIDC Ballarpur also all 4 locations monitored for 12 parameters are well within the limit prescribed as per the NAAQS.

Table 5.13 MIDC Ballarpur – 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.	Ram Mandir, Near BILT Mangal Karyalaya, Ballarpur	19°52'17.0''N	79°20'38.8''E	22.05.2023	24.05.2023	26.05.2023
2.	Estate Office, BILT Colony, Ballarpur	19°52'07.9''N	79°20'22.8''E	22.05.2023	24.05.2023	26.05.2023
3.	(NAMP) Nagar Parishad Ballarpur	19°51'03.3''N	79°21'04.3''E	22.05.2023	24.05.2023	26.05.2023
4.	WCL Office, Ballarpur on Sasti Road	19°50'23.2''N	79°20'49.0''E	22.05.2023	24.05.2023	26.05.2023

Table 5.14 MIDC Ballarpur - Details of Sampling Location of Volatile Organic Compounds (VOCs) Monitoring

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Estate Office, BILT Colony, Ballarpur	19°52'07.9''N	79°20'22.8''E	22.05.2023	24.05.2023	26.05.2023
2.	(NAMP) Nagar Parishad Ballarpur	19°52'08.2''N	79°20'17.8''E	22.05.2023	24.05.2023	26.05.2023

Fig. Geographical Locations of Ambient Air Quality Monitoring MIDC Ballarpur

Fig. Geographical Locations of VOCs Monitoring MIDC Ballarpur

Table 5.15 MIDC Ballarpur – Details of Sampling Location of Ambient Air Quality Monitoring

Parameters	Unit	Results			
		Ram Mandir, Near BILT Mangal Karyalaya, Ballarpur	Estate Office, BILT Colony, Ballarpur	(NAMP) Nagar Parishad Ballarpur	WCL Office, Ballarpur on Sasti Road
Sulphur Dioxide (SO_2)	µg/m³	4.57	4.47	BLQ	4.47
Nitrogen Dioxide (NO_2)	µg/m³	24.15	17.00	17.85	13.29
Particulate Matter (size less than 10 µm) or PM_{10}	µg/m³	60	87	73	66
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	µg/m³	15	23	20	18
Ozone (O_3)	µg/m³	BLQ	BLQ	BLQ	BLQ
Lead (Pb)	µg/m³	BLQ	BLQ	BLQ	0.029
Carbon Monoxide (CO) (1 h)	mg/m³	1.35	1.36	1.40	1.28
Carbon Monoxide (CO) (8 h)	mg/m³	1.88	1.75	1.64	1.66
Ammonia (NH_3)	µg/m³	73	49	43	BLQ
Benzene (C_6H_6)	µg/m³	2.07	2.68	2.32	2.60
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m³	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m³	BLQ	0.42	0.53	1.20
Nickel (Ni)	ng/m³	BLQ	BLQ	3.44	BLQ

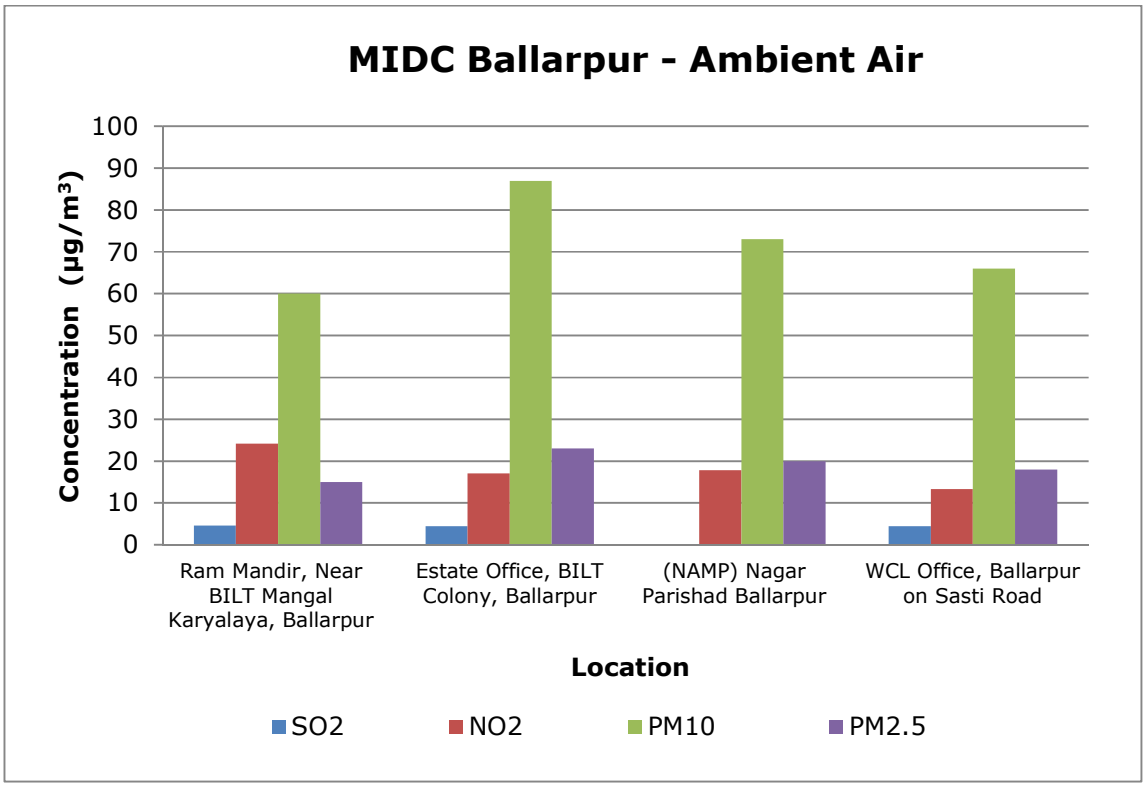
Table 5.16 MIDC Ballarpur - Volatile Organic Compounds (VOCs) in Ambient Air Results

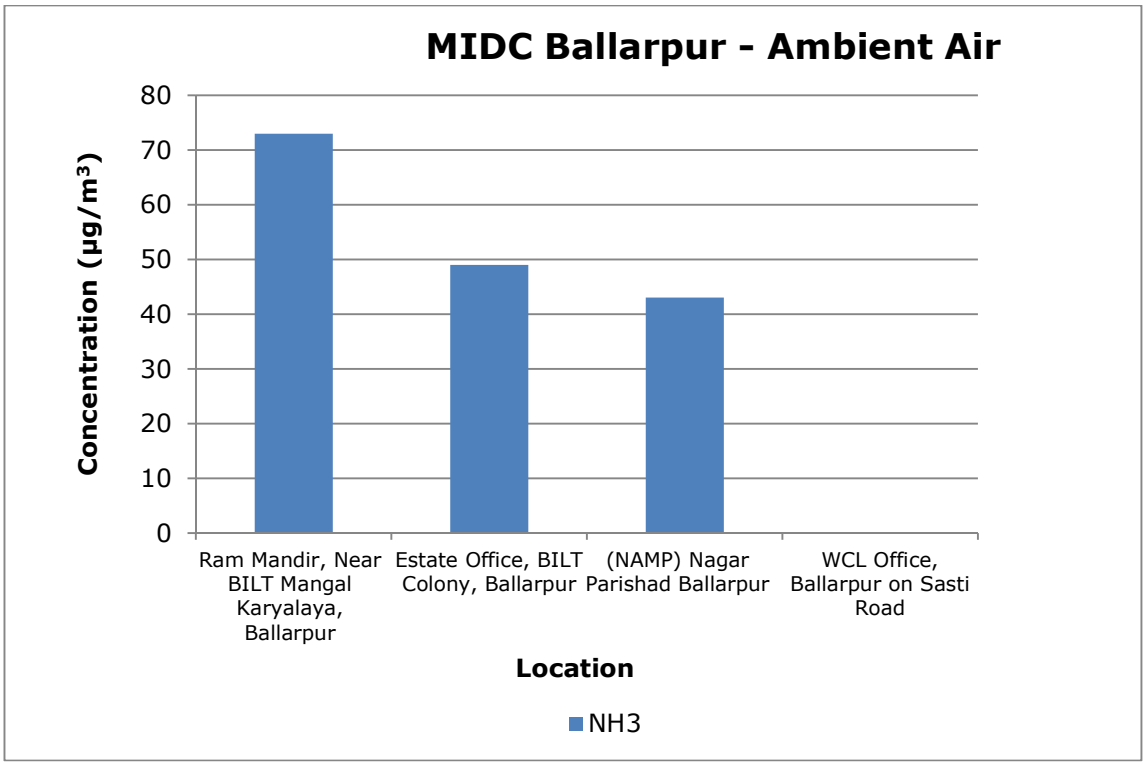
Parameters	Unit	Results	
		Estate Office, BILT Colony, Ballarpur	(NAMP) Nagar Parishad Ballarpur
Dichloromethane	µg/m³	BLQ	0.60
Chloroform	µg/m³	BLQ	0.72
Carbon Tetrachloride	µg/m³	BLQ	1.16
Trichloroethylene	µg/m³	0.75	1.57
Bromodichloromethane	µg/m³	BLQ	BLQ
1,3-Dichloropropane	µg/m³	BLQ	BLQ
1,4-Dichlorobenzene	µg/m³	BLQ	13.90
1,3-Dichlorobenzene	µg/m³	BLQ	BLQ
1,2-Dichlorobenzene	µg/m³	BLQ	BLQ

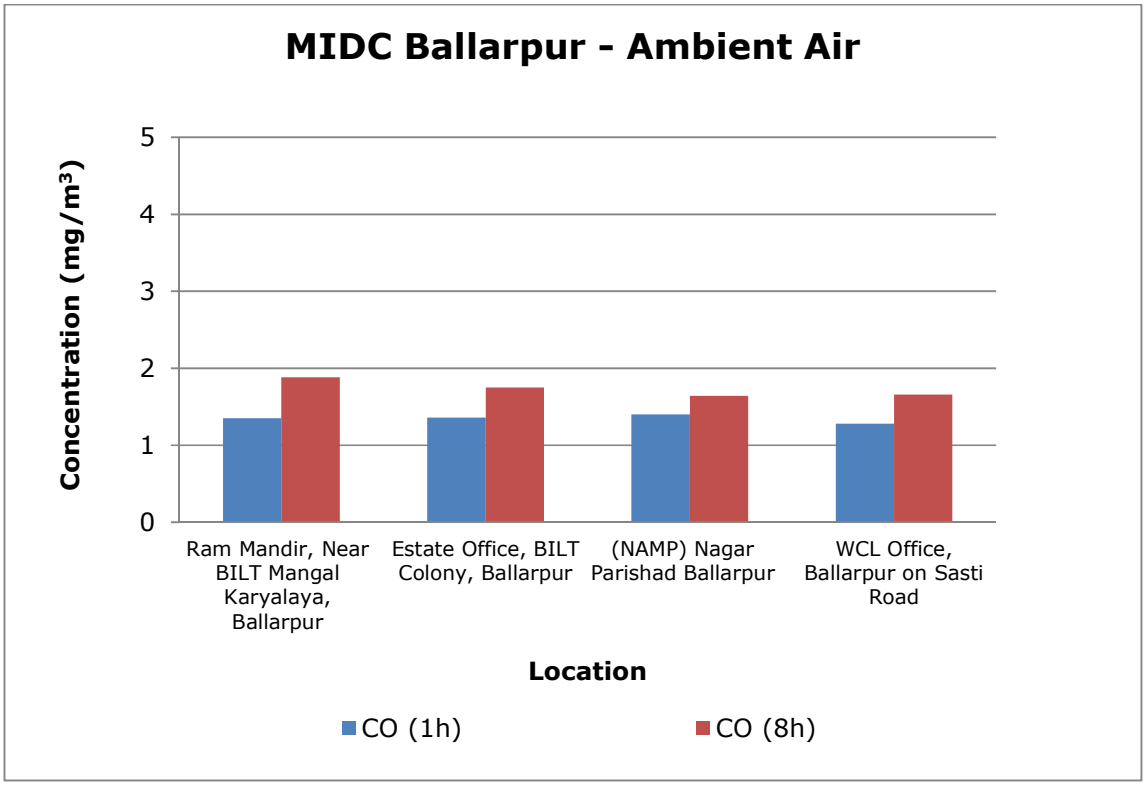
Parameters	Unit	Results	
		Estate Office, BILT Colony, Ballarpur	(NAMP) Nagar Parishad Ballarpur
1,2-Dibromo-3-Chloropropane	µg/m³	BLQ	BLQ
Napthalene	µg/m³	BLQ	BLQ
Bromobenzene	µg/m³	BLQ	BLQ
1,2,4-Trimethylbenzene	µg/m³	BLQ	11.51
2-Chlorotoluene	µg/m³	BLQ	BLQ
Tert-Butylbenzene	µg/m³	BLQ	BLQ
SEC-Butylbenzene	µg/m³	BLQ	BLQ
P-Isopropyltoluene	µg/m³	BLQ	7.89
M-Xylene	µg/m³	4.46	BLQ
P-Xylene	µg/m³	BLQ	9.35
Styrene	µg/m³	BLQ	BLQ
Cumene	µg/m³	BLQ	BLQ
1,2,3-Trichloropropane	µg/m³	BLQ	BLQ
N-Propylbenzene	µg/m³	BLQ	7.51
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	3.76	BLQ
1,1-Dichloropropylene	µg/m³	BLQ	1.66
1,2-Dichloroethane	µg/m³	1.70	2.40
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	1.72	4.13
1,3,5-Trimethylbenzene	µg/m³	BLQ	BLQ
N-Butylbenzene	µg/m³	BLQ	BLQ
1,2,3-Trichlorobenzene	µg/m³	BLQ	BLQ
Hexachlorobutadiene	µg/m³	BLQ	BLQ
1,2,4-Trichlorobenzene	µg/m³	BLQ	BLQ
2,2-Dichloropropane	µg/m³	BLQ	BLQ

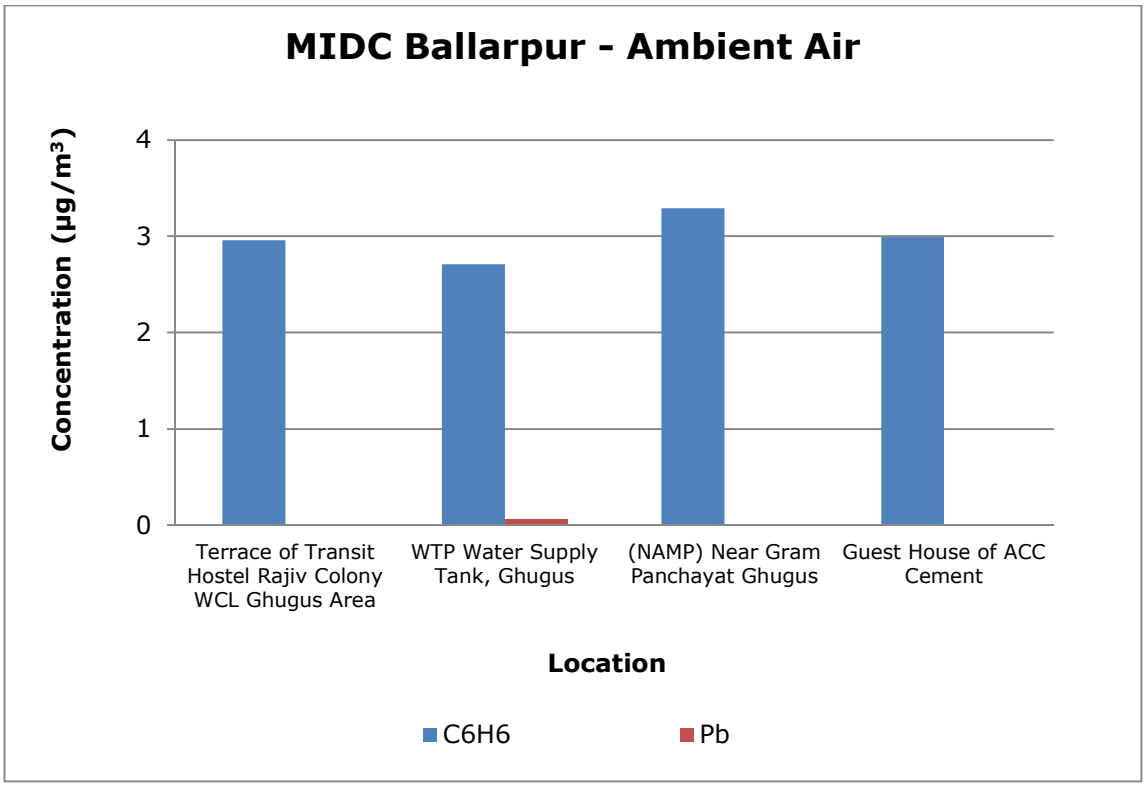
Parameters	Unit	Results	
		Estate Office, BILT Colony, Ballarpur	(NAMP) Nagar Parishad Ballarpur
Dibromomethane	µg/m³	BLQ	BLQ
Toluene	µg/m³	0.60	2.18
O-Xylene	µg/m³	BLQ	BLQ
Bromoform	µg/m³	BLQ	BLQ
1,1,2,2-Tetrachloroethane	µg/m³	BLQ	BLQ
4-Chlorotoluene	µg/m³	BLQ	BLQ
1,1-Dichloroethylene	µg/m³	BLQ	BLQ
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

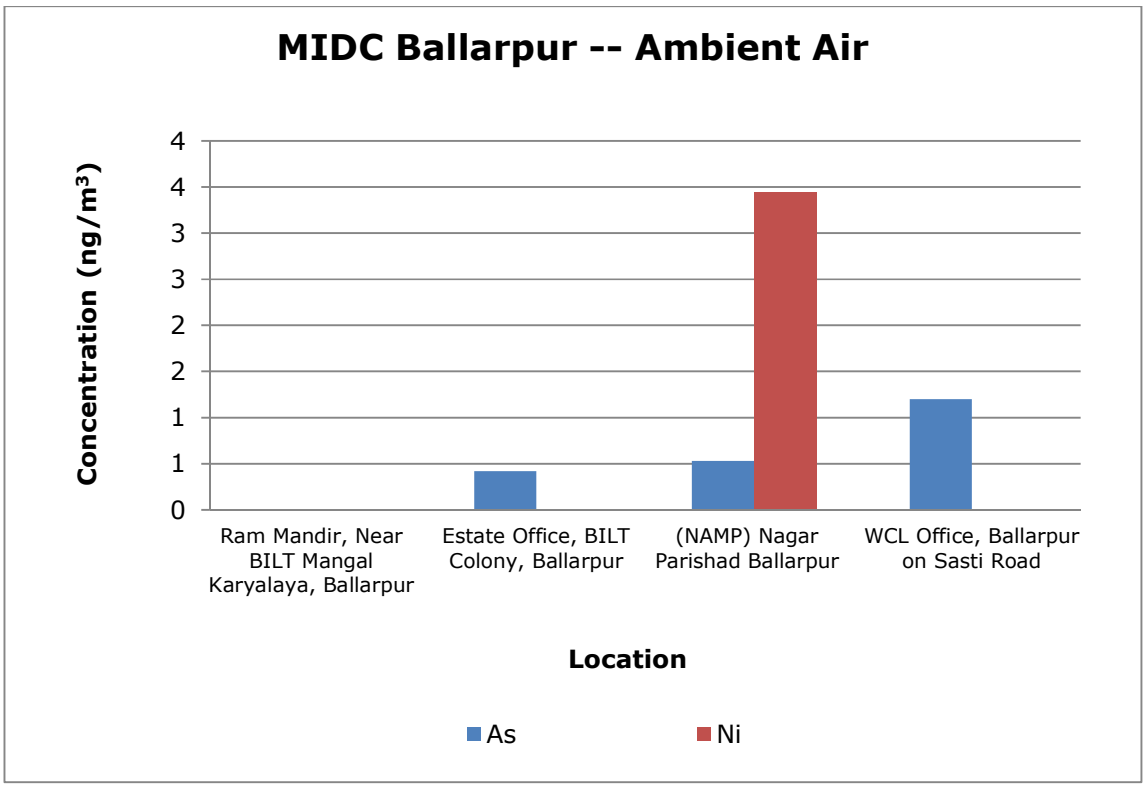
Graphs - Ambient Air Quality Monitoring of MIDC Ballarpur




MIDC Ballarpur - Ambient Air
Concentration (µg/m³)
80
70
60
50
40
30
20
10
0
Ram Mandir, Near BILT Mangal Karyalaya, Ballarpur
Estate Office, BILT Colony, Ballarpur
(NAMP) Nagar Parishad Ballarpur
WCL Office, Ballarpur on Sasti Road
Location
NH3


MIDC Ballarpur - Ambient Air
Concentration (mg/m³)
5
4
3
2
1
0
Ram Mandir, Near BILT Mangal Karyalaya, Ballarpur
Estate Office, BILT Colony, Ballarpur
(NAMP) Nagar Parishad Ballarpur
WCL Office, Ballarpur on Sasti Road
Location
CO (1h)
CO (8h)


MIDC Ballarpur - Ambient Air
Concentration (µg/m³)
4
3
2
1
0
Terrace of Transit Hostel Rajiv Colony WCL Ghugus Area
WTP Water Supply Tank, Ghugus
(NAMP) Near Gram Panchayat Ghugus
Guest House of ACC Cement
Location
C6H6
Pb


MIDC Ballarpur -- Ambient Air
Concentration (ng/m³)
4
4
3
3
2
2
1
1
0
Ram Mandir, Near BILT Mangal Karyalaya, Ballarpur
Estate Office, BILT Colony, Ballarpur
(NAMP) Nagar Parishad Ballarpur
WCL Office, Ballarpur on Sasti Road
Location
As
Ni

WATER ENVIRONMENT

6. Water Environment

For studying the water Environment of Chandrapur area, surface water was collected from Nallah, Lake and River. A total of 17 samples were collected from MIDC Chandrapur, MIDC Tadali, MIDC Ballarpur and MIDC Ghugus.

1. **MIDC Tadali:** from MIDC Tadali also three surface water samples are collected.

- All three water samples collected are acceptable in general appearance, colour, smell and transparency.
- Suspended solids, pH and BOD also well within the limits at all three samples collected.
- 100% survival was achieved in Fish Bioassay two samples out of all three samples.
- Metals like Zinc, Nickel, Copper, Hexavalent Chromium (Cr^{6+}), Total Chromium, Total Arsenic, Lead, Cadmium, etc. are observed either below limit of quantification or below their standard limits.
- Iron observed above their standard limits.
- Parameters like Free Residual Chlorine, Cyanide, Sulphide, Dissolved Phosphate, Total Ammonical Nitrogen and Phenolic compounds, also meet the criteria as prescribed by CPCB.
- The concentration of Total Phosphate exceeded and Fluoride prescribed limit.
- Polynuclear aromatic hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB) are below the limit of quantification in all three samples collected.
- Organo Chlorine Pesticides are also below the limit of quantification in all three samples collected.

Table 6.1 MIDC Tadali – 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.	Tadali Village Lake	20°01'48.0"N	79°11'21.8"E	23.05.2023	25.05.2023	27.05.2023
2.	Nallah adjacent to Grace Industries	20°00'28.1"N	79° 11'11.1"E	23.05.2023	25.05.2023	27.05.2023
3.	Raw Water of MIDC WTP	20°00'26.6"N	79°11'11.3"E	23.05.2023	25.05.2023	27.05.2023

Fig. Geographical Locations of Surface Water Sampling MIDC Tadali

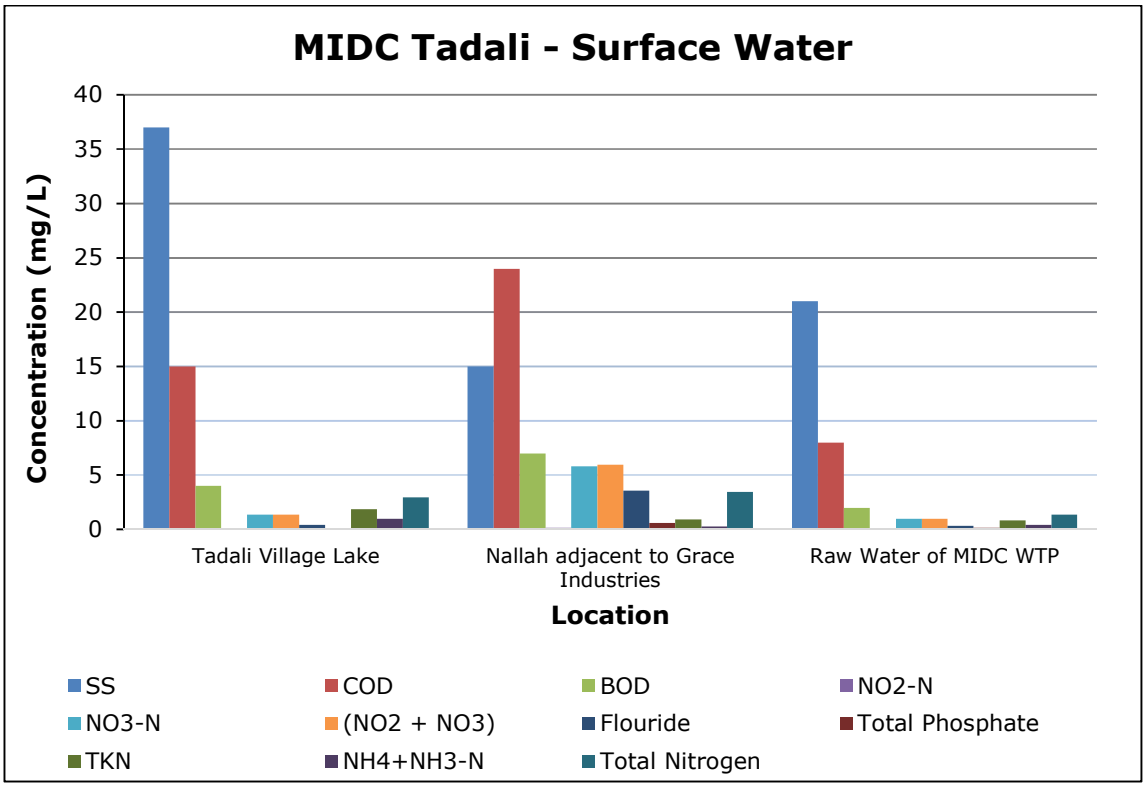
Table 6.2 MIDC Tadali – Results of Surface Water

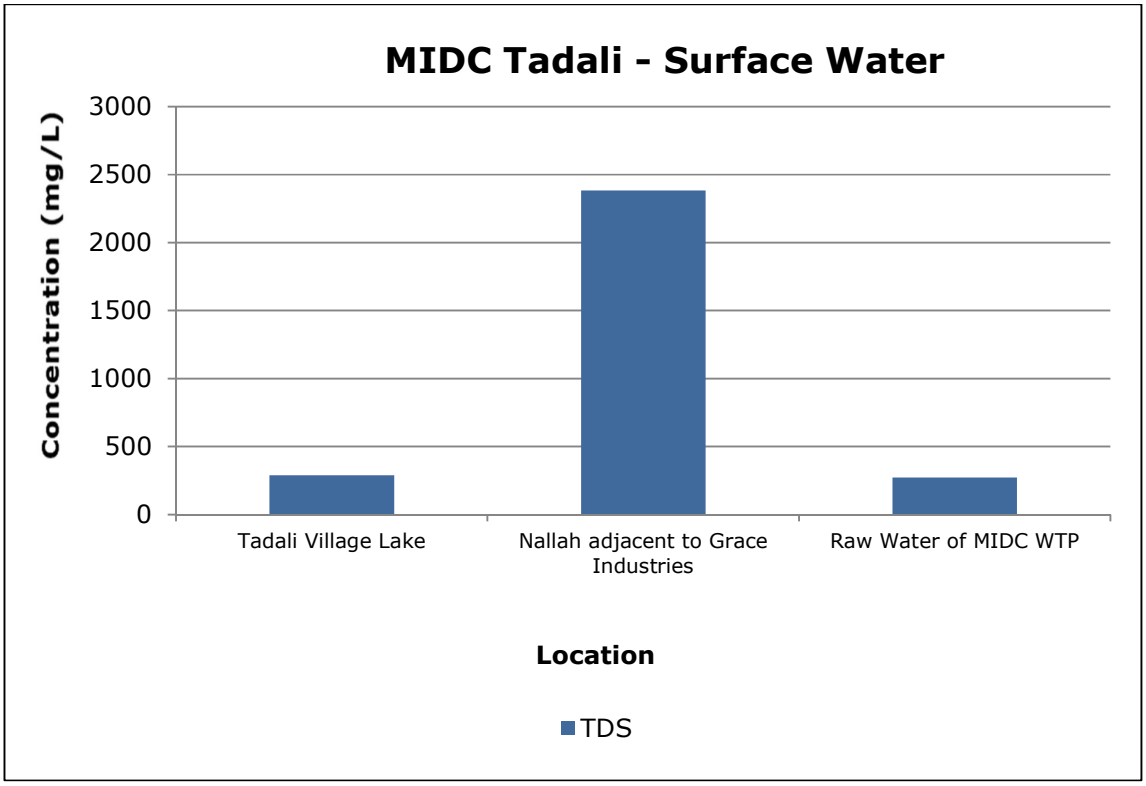
Parameters	Unit	Results		
		Tadali Village Lake	Nallah adjacent to Grace Industries	Raw Water of MIDC WTP
Sanitary Survey	-	Reasonably Clean Neighbourhood	Reasonably Clean Neighbourhood	Very Clean Neighbourhood and Catchment
General Appearance	-	Floating Matter Evident	Floating Matter Evident	No Floating Matter
Transparency	m	0.1	0.2	0.2
Temperature	^{o}C	34	30	32
Colour	Hazen	3	1	1
Odour	-	Agreeable	Agreeable	Agreeable
pH	-	7.23	6.99	7.73
Oil & Grease	mg/L	BLQ	BLQ	BLQ
Total Suspended Solids	mg/L	37	15	21
Total Dissolved Solids	mg/L	287	2383	272
Dissolved Oxygen (% Saturation)	%	58	67	84
Chemical Oxygen Demand	mg/L	15	24	8
Biochemical Oxygen Demand (3 days, 27^{o}C)	mg/L	4	7	2

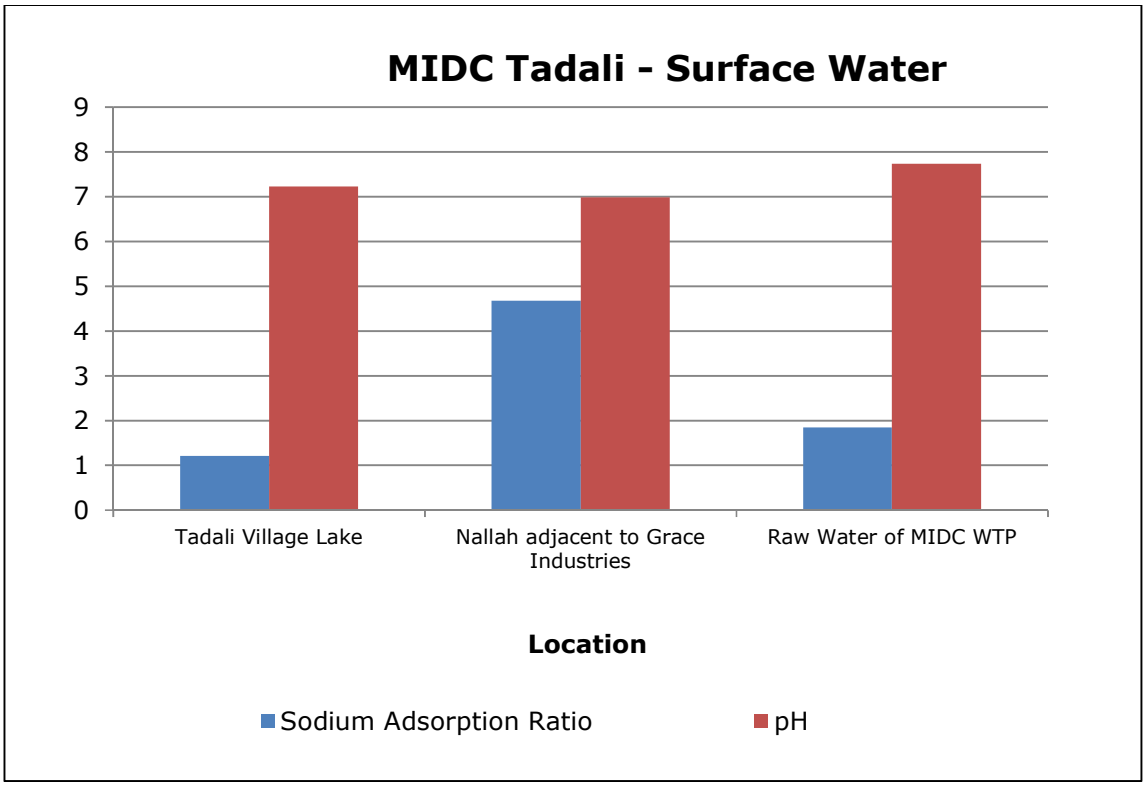
Parameters	Unit	Results		
		Tadali Village Lake	Nallah adjacent to Grace Industries	Raw Water of MIDC WTP
Electrical Conductivity (at 25°C)	µmhos/cm	511	4243	484
Nitrite Nitrogen	mg/L	BLQ	0.17	0.02
Nitrate Nitrogen	mg/L	1.35	5.81	1.00
(NO_2+ NO_3)-Nitrogen	mg/L	1.35	5.98	1.00
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ
Free Residual Chlorine	mg/L	0.24	0.23	0.42
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	0.40	3.57	0.33
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	BLQ	0.70	0.11
Sodium Adsorption Ratio	-	1.21	4.68	1.85
Total Coliforms	MPN Index/ 100 ml	680	467	27
Faecal Coliforms	MPN Index/ 100 ml	319	130	22
Total Phosphate (as P)	mg/L	BLQ	0.60	0.16
Total Kjeldahl Nitrogen (as N)	mg/L	1.87	0.93	0.84
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	1.00	0.27	0.44
Total Nitrogen	mg/L	2.96	3.45	1.34
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 (as 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	0.02	0.01	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	0.042	BLQ	BLQ
Total Arsenic (as As)	mg/L	BLQ	BLQ	BLQ
Lead (as Pb)	mg/L	0.008	BLQ	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	0.11	0.15	0.03
Iron (as Fe)	mg/L	0.43	0.22	0.31

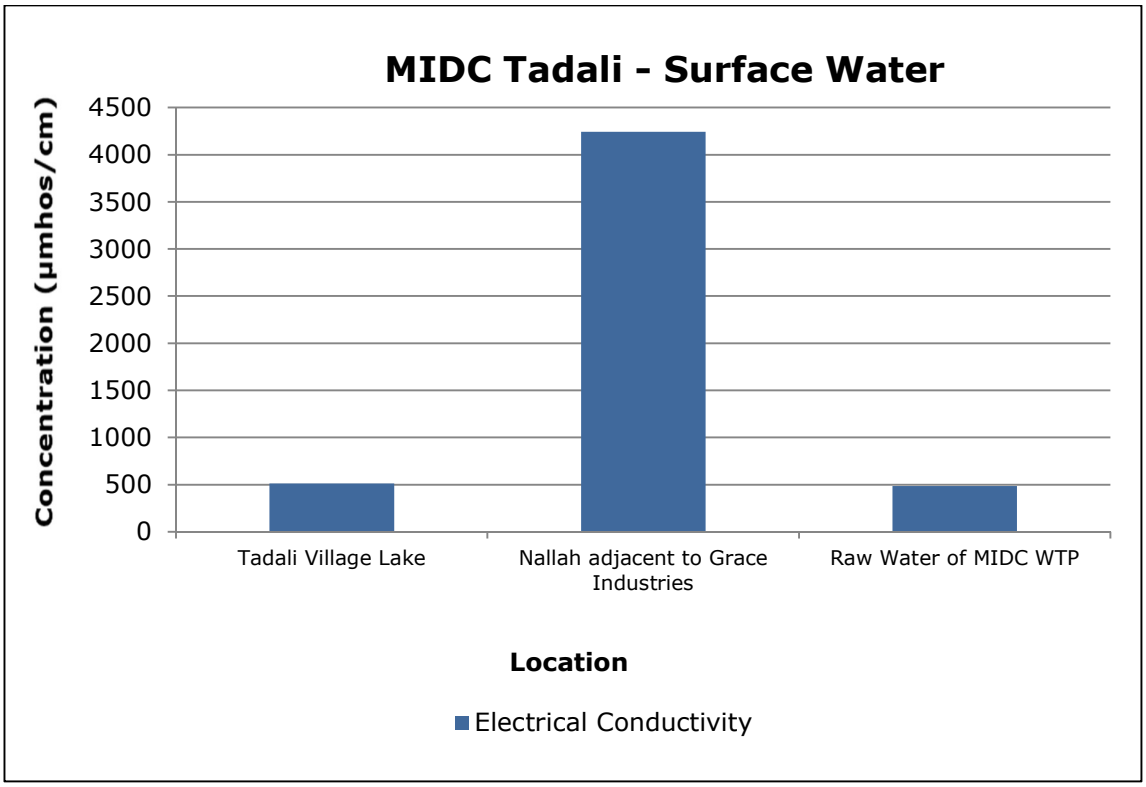
Parameters	Unit	Results		
		Tadali Village Lake	Nallah adjacent to Grace Industries	Raw Water of MIDC WTP
Vanadium (as V)	mg/L	0.03	BLQ	0.03
Selenium (as Se)	mg/L	0.01	0.01	0.01
Boron (as B)	mg/L	BLQ	0.12	BLQ
Bioassay Test on fish	% survival	100	97	100

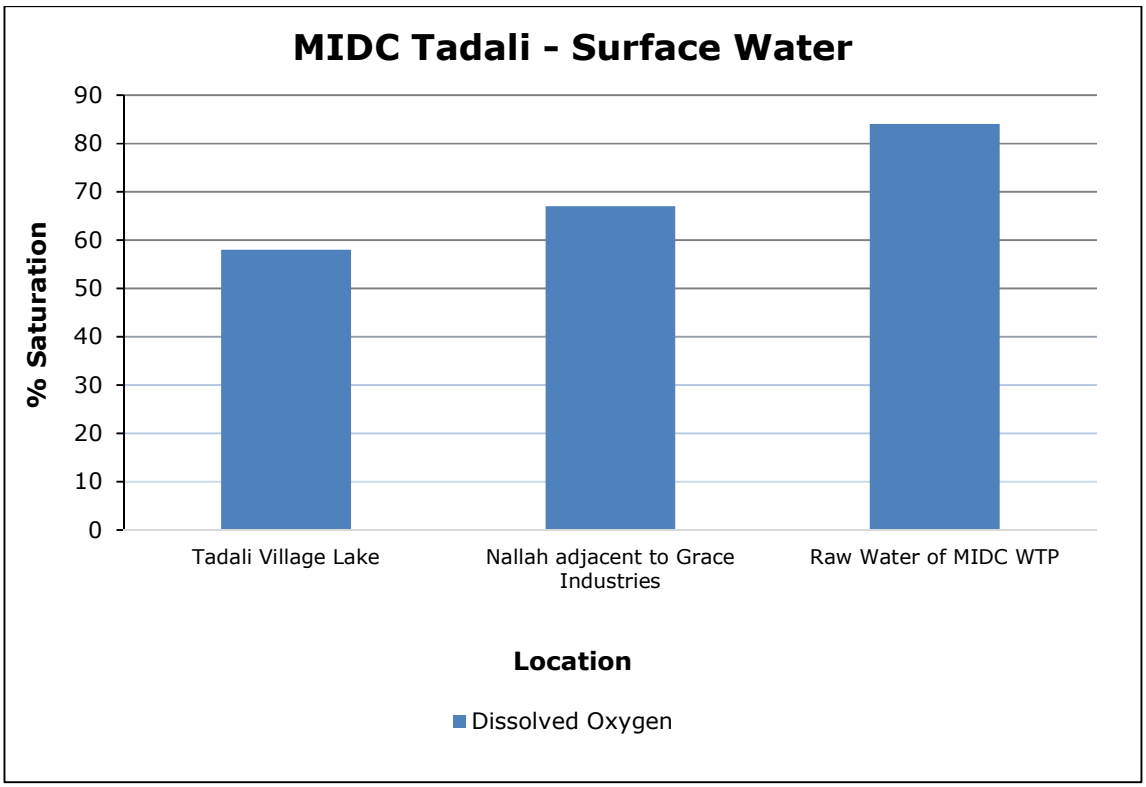
Graphs - Surface Water Quality of MIDC Tadali

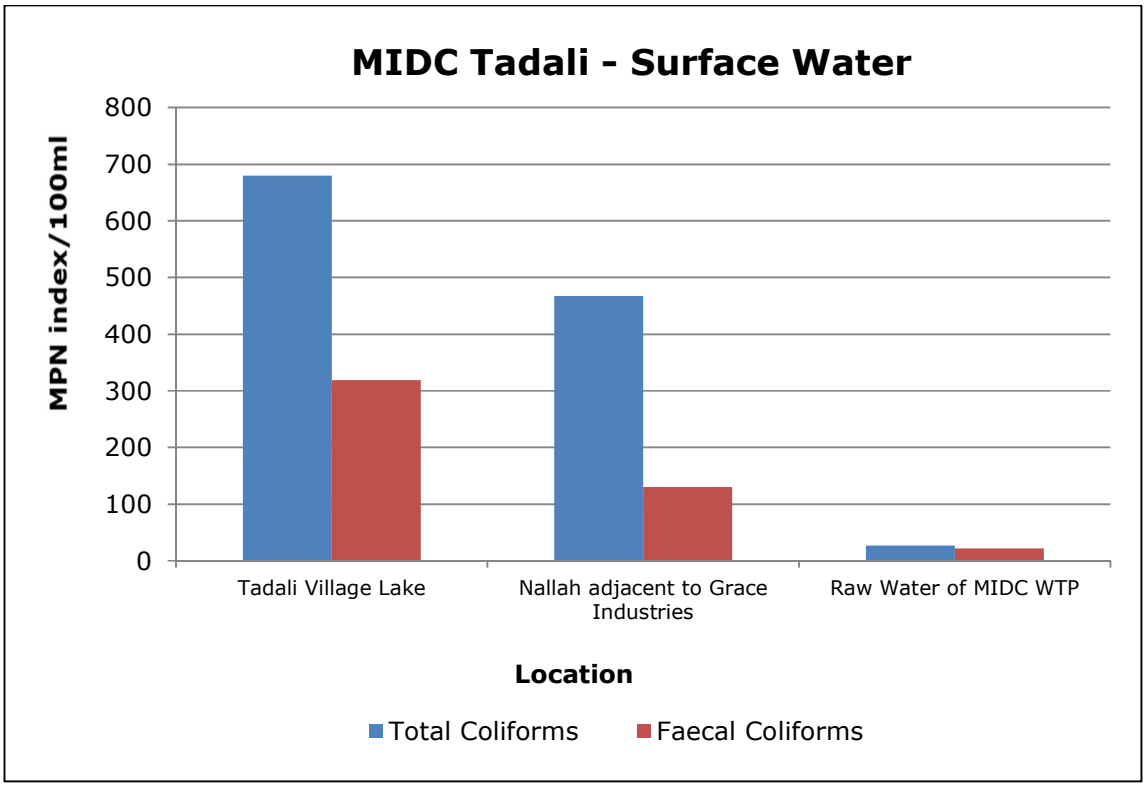


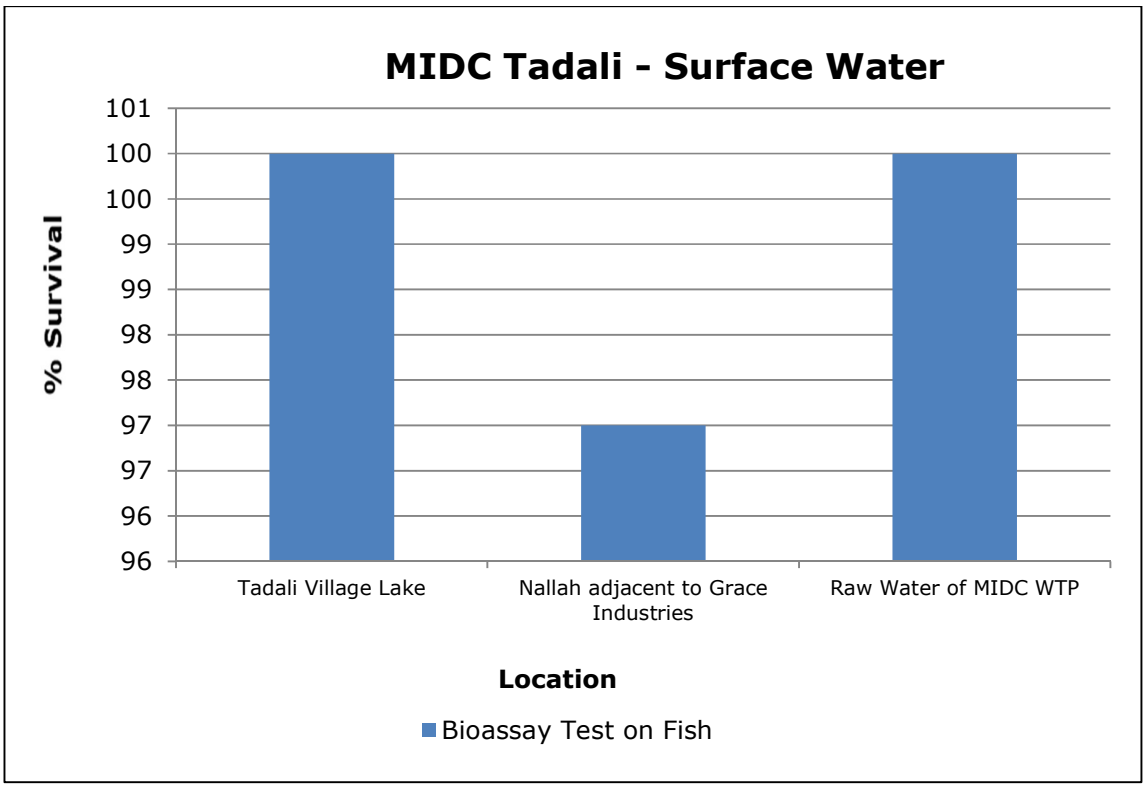

MIDC Tadali - Surface Water
Concentration (mg/L)
3000
2500
2000
1500
1000
500
0
Tadali Village Lake
Nallah adjacent to Grace Industries
Raw Water of MIDC WTP
Location
TDS


MIDC Tadali - Surface Water
9
8
7
6
5
4
3
2
1
0
Tadali Village Lake
Nallah adjacent to Grace Industries
Raw Water of MIDC WTP
Location
Sodium Adsorption Ratio
pH


MIDC Tadali - Surface Water
Concentration (µmhos/cm)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Tadali Village Lake
Nallah adjacent to Grace Industries
Raw Water of MIDC WTP
Location
Electrical Conductivity


MIDC Tadali - Surface Water
% Saturation
90
80
70
60
50
40
30
20
10
0
Tadali Village Lake
Nallah adjacent to Grace Industries
Raw Water of MIDC WTP
Location
Dissolved Oxygen


MIDC Tadali - Surface Water
MPN index/100ml
800
700
600
500
400
300
200
100
0
Tadali Village Lake
Nallah adjacent to Grace Industries
Raw Water of MIDC WTP
Location
Total Coliforms
Faecal Coliforms


MIDC Tadali - Surface Water
% Survival
101
100
100
99
99
98
98
97
97
96
96
Tadali Village Lake
Nallah adjacent to Grace Industries
Raw Water of MIDC WTP
Location
Bioassay Test on Fish

2. **MIDC Chandrapur:** Three surface water samples are collected from MIDC Chandrapur region.

- All three water samples collected are acceptable in general appearance, colour, smell and transparency.
- pH, Electrical conductivity, suspended solids and COD are also well within the limits at all three samples collected.
- 100% survival was achieved in Fish Bioassay in all samples.
- Metals like Zinc, Hexavalent Chromium (Cr^{6+}), Total Chromium, Total Arsenic, Cadmium, Nickel, Copper, Lead, etc. are observed either below the limit of quantification or below their standard limits.
- Parameters like Total Residual Chlorine, Cyanide, Sulphide, Dissolved Phosphate, Total Ammonical Nitrogen and Phenolic compounds, also meet the criteria as prescribed by CPCB.
- Total Phosphate and Iron exceeded in all three samples collected from MIDC Chandrapur.
- Polynuclear aromatic hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB) are below the limit of quantification in all three samples collected.
- Organo Chlorine Pesticides are also below the limit of quantification in all three samples collected.

Table 6.3 MIDC Chandrapur – 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.	Nallah Opposite Manidhari Industry	19°58’46.5”N	79°13’57.7”E	30.05.2023	01.06.2023	03.06.2023
2.	Nallah Near Gagangiri Village	19°58’03.5”N	79°14’50.5”E	30.05.2023	01.06.2023	03.06.2023
3.	Nallah at Dhanora Bridge	19°57’37.1”N	79°15’40.5”E	30.05.2023	01.06.2023	03.06.2023

Fig. Geographical Locations of Surface Water Sampling MIDC Chandrapur

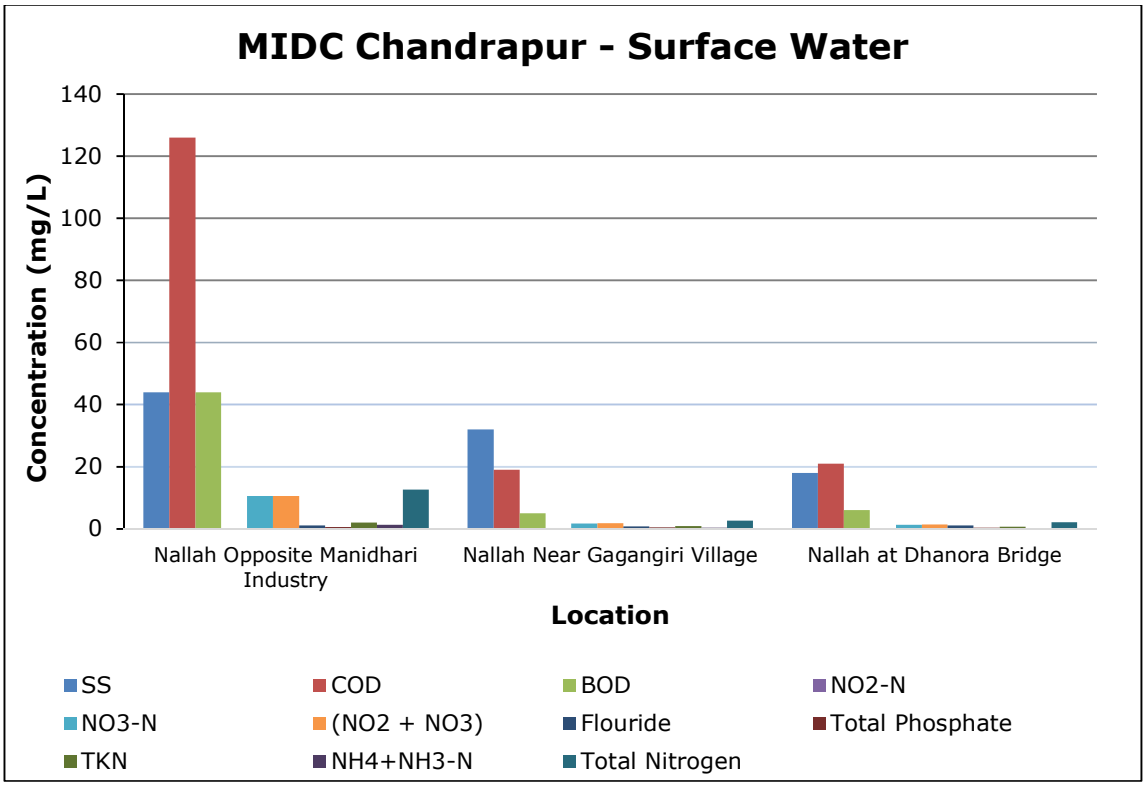
Table 6.4 MIDC Chandrapur – Results of Surface Water

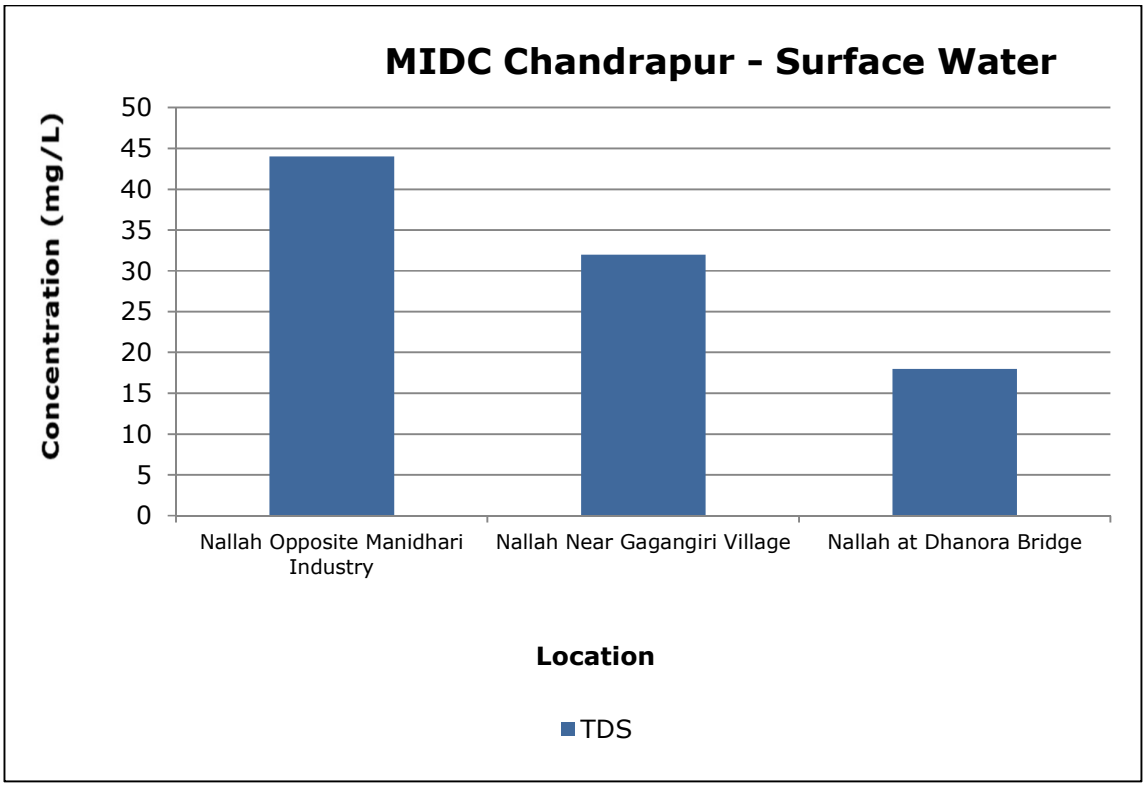
Parameters	Unit	Results		
		Nallah Opposite Manidhari Industry	Nallah Near Gagangiri Village	Nallah at Dhanora Bridge
Sanitary Survey	-	Generally Clean Neighbourhood	Generally Clean Neighbourhood	Generally Clean Neighbourhood
General Appearance	-	Floating Matter Evident	Floating Matter Evident	Floating Matter Evident
Transparency	m	0.1	0.1	0.2
Temperature	°C	27	27	28
Colour	Hazen	3	2	2
Odour	-	Agreeable	Agreeable	Agreeable
pH	-	7.04	7.18	7.18
Oil & Grease	mg/L	BLQ	BLQ	BLQ
Total Suspended Solids	mg/L	44	32	18
Total Dissolved Solids	mg/L	793	516	818
Dissolved Oxygen (% Saturation)	%	52	57	60
Chemical Oxygen Demand	mg/L	126	19	21
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	44	5	6
Electrical Conductivity (at 25°C)	µmhos/cm	1414	920	1458
Nitrite Nitrogen	mg/L	0.02	0.24	0.06

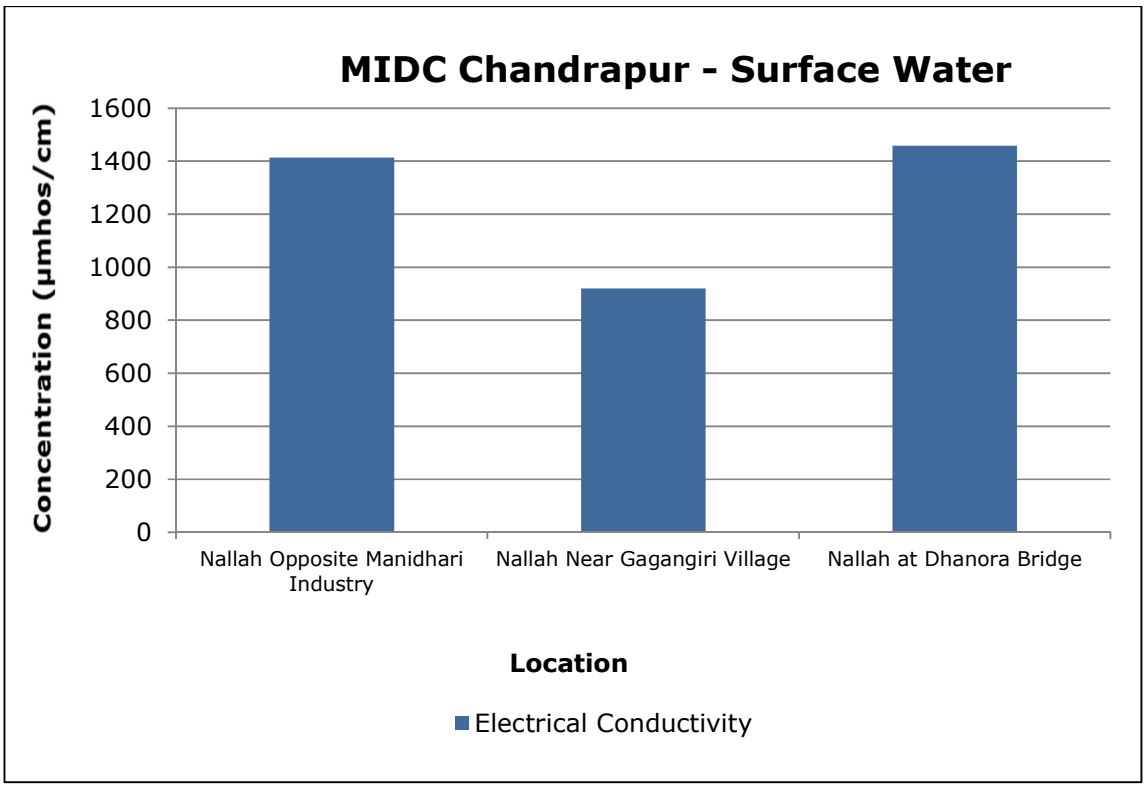
Parameters	Unit	Results		
		Nallah Opposite Manidhari Industry	Nallah Near Gagangiri Village	Nallah at Dhanora Bridge
Nitrate Nitrogen	mg/L	10.57	1.66	1.33
(NO_2+ NO_3)-Nitrogen	mg/L	10.57	1.74	1.37
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ
Free Residual Chlorine	mg/L	0.27	0.24	0.28
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	1.07	0.80	1.13
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.54	0.38	0.33
Sodium Adsorption Ratio	-	3.46	2.20	2.79
Total Coliforms	MPN Index/ 100 ml	517	1147	263
Faecal Coliforms	MPN Index/ 100 ml	250	373	217
Total Phosphate (as P)	mg/L	0.66	0.48	0.43
Total Kjeldahl Nitrogen (as N)	mg/L	2.05	0.93	0.75
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	1.28	0.42	0.22
Total Nitrogen	mg/L	12.61	2.68	2.12
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 (as PAH)	mg/L	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	BLQ	0.06	0.06
Nickel (as Ni)	mg/L	BLQ	0.01	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	0.10	0.06	0.08
Iron (as Fe)	mg/L	0.38	0.48	0.57
Vanadium (as V)	mg/L	0.04	0.02	0.02
Selenium (as Se)	mg/L	0.01	0.01	0.01

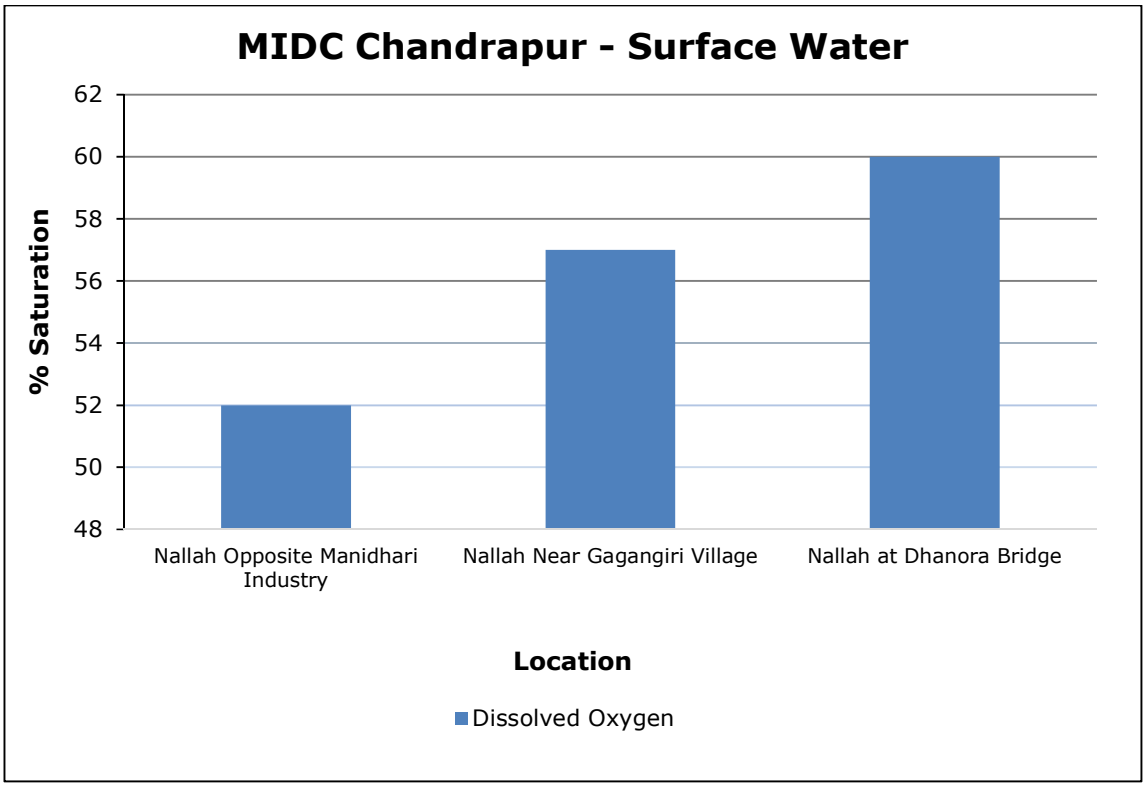
Parameters	Unit	Results		
		Nallah Opposite Manidhari Industry	Nallah Near Gagangiri Village	Nallah at Dhanora Bridge
Boron (as B)	mg/L	BLQ	0.18	BLQ
Bioassay Test on fish	% survival	100	100	100

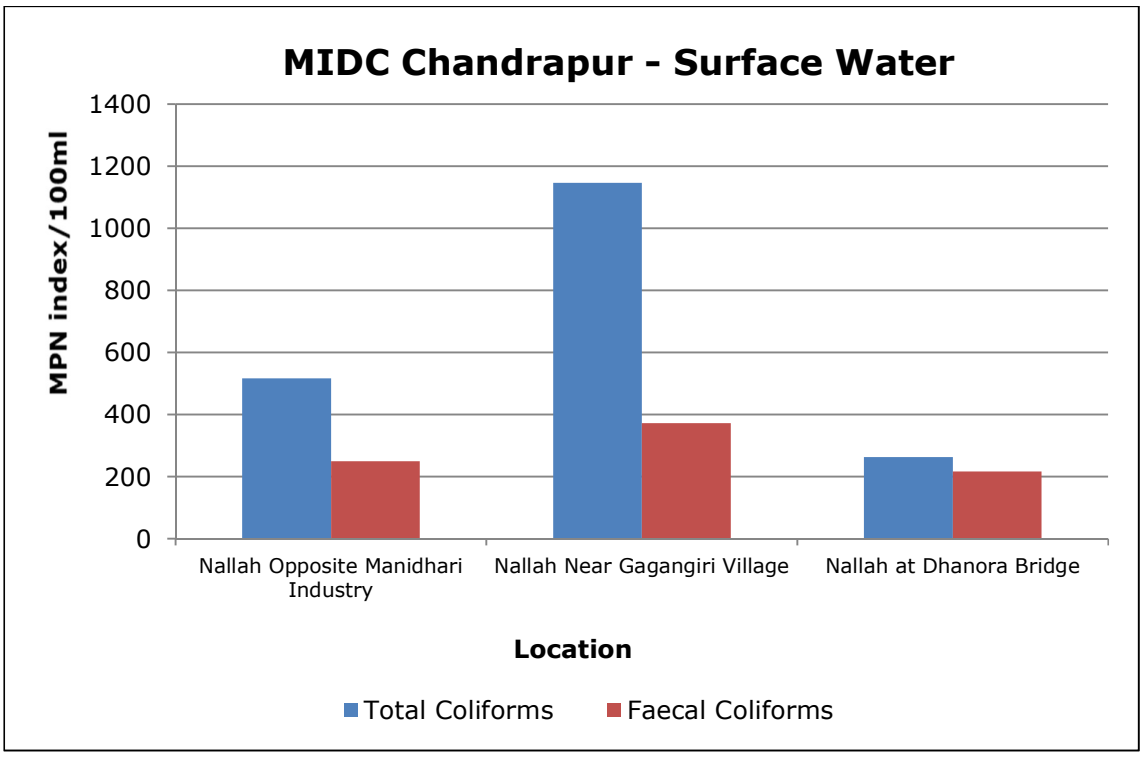
Graphs - Surface Water Quality of MIDC Chandrapur

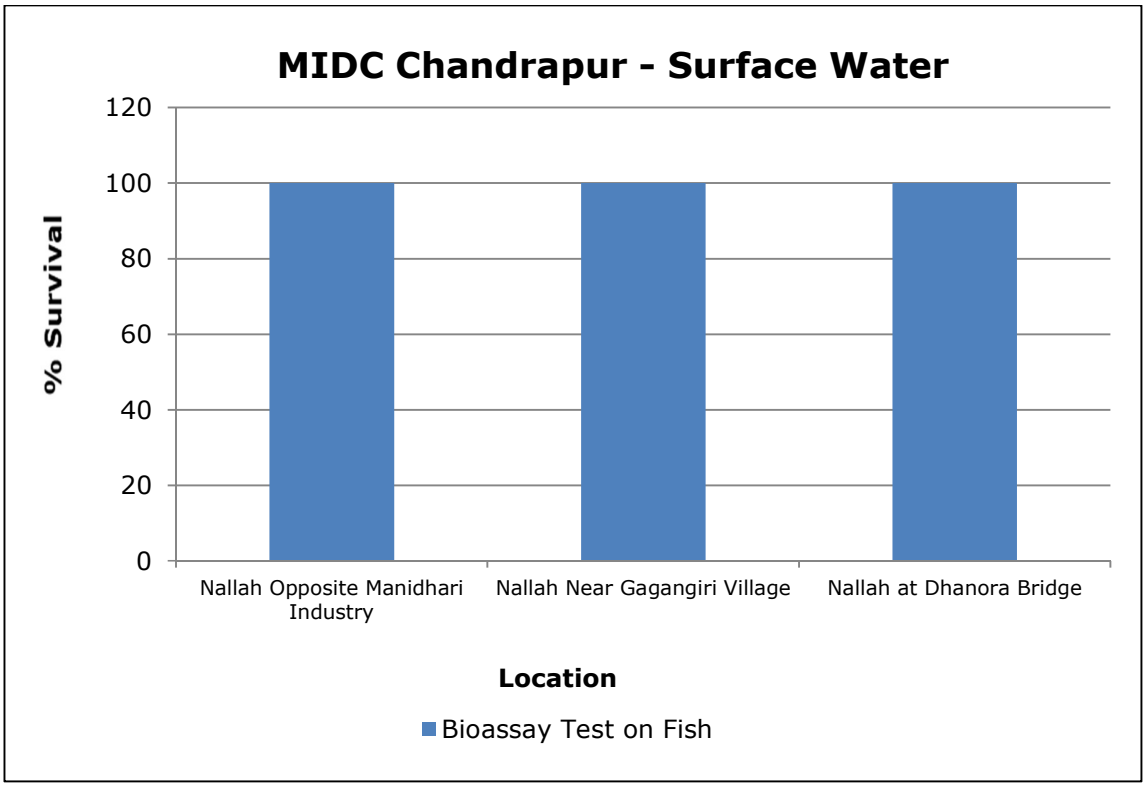



MIDC Chandrapur - Surface Water
Concentration (mg/L)
50
45
40
35
30
25
20
15
10
5
0
Nallah Opposite Manidhari Industry
Nallah Near Gagangiri Village
Nallah at Dhanora Bridge
Location
TDS


MIDC Chandrapur - Surface Water
Concentration (µmhos/cm)
1600
1400
1200
1000
800
600
400
200
0
Nallah Opposite Manidhari Industry
Nallah Near Gagangiri Village
Nallah at Dhanora Bridge
Location
Electrical Conductivity


MIDC Chandrapur - Surface Water
% Saturation
62
60
58
56
54
52
50
48
Nallah Opposite Manidhari Industry
Nallah Near Gagangiri Village
Nallah at Dhanora Bridge
Location
Dissolved Oxygen


MIDC Chandrapur - Surface Water
MPN index/100ml
1400
1200
1000
800
600
400
200
0
Nallah Opposite Manidhari Industry
Nallah Near Gagangiri Village
Nallah at Dhanora Bridge
Location
Total Coliforms
Faecal Coliforms


MIDC Chandrapur - Surface Water
120
100
80
60
40
20
0
% Survival
Nallah Opposite Manidhari Industry
Nallah Near Gagangiri Village
Nallah at Dhanora Bridge
Location
Bioassay Test on Fish

3. **MIDC Ghugus:** Five Surface water samples are collected from MIDC Ghugus.

- All five water samples collected are acceptable in general appearance, colour and smell.
- pH, Electrical conductivity, suspended solids and COD are also well within the limits at all five samples collected.
- 100% survival was achieved in Fish Bioassay test in two samples out of five samples collected.
- Metals like Zinc, Arsenic, Nickel, Copper, Hexavalent Chromium (Cr^{6+}) etc. are observed either below the limit of quantification or below their standard limits.
- Metals like Iron, Manganese etc. are observed above their standard limits.
- Parameters like Total Residual Chlorine, Cyanide, Sulphide, Dissolved Phosphate, Total Ammonical Nitrogen and Phenolic compounds, also meet the criteria as prescribed by CPCB.
- BOD exceeded in one sample out of five Surface water samples collected.
- Total Phosphate exceeded in four surface water samples out of five samples collected.
- Fluoride in all five Surface water samples collected.
- Polynuclear aromatic hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB) are below the limit of quantification in all five samples collected.
- Organo Chlorine Pesticides are also below the limit of quantification in all five samples collected.

Table 6.5 MIDC Ghugus – 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.	Wardha river Near WCL WTP Ghugus OCM	19°57'25.8"N	79°06'11.4"E	30.05.2023	01.06.2023	03.06.2023
2.	Domestic Effluent Nallah Near lokhandi bridge at WTP of Ghugus OCM	19°57'23.3"N	79°06'14.5"E	30.05.2023	01.06.2023	03.06.2023
3.	(NWMP) Wardha River behind ACC plant	19°54'16.7"N	79°06'54.9"E	30.05.2023	01.06.2023	03.06.2023
4.	Nallah at Usgaon, Shengaon road	19°55'18.5"N	79°07'57.5"E	30.05.2023	01.06.2023	03.06.2023
5.	Nallah Water down site of ACC Colony.	19°55'42.3"N	79°06'54.7"E	30.05.2023	01.06.2023	03.06.2023

Fig. Geographical Locations of Surface Water Sampling MIDC Ghugus

Table 6.6 MIDC Ghugus – Results of Surface Water

Parameters	Unit	Results		
		Wardha river Near WCL WTP Ghugus OCM	**Domestic Effluent Nallah Near lokhandi bridge at WTP of Ghugus OCM**	**(NWMP) Wardha River behind ACC plant**
Sanitary Survey	-	Generally Clean Neighbourhood	Reasonably Clean Neighbourhood	Generally Clean Neighbourhood
General Appearance	-	No Floating Matter	Floating matter Evident	Floating Matter Evident
Transparency	m	0.5	0.1	0.4
Temperature	^{o}C	29	27	30
Colour	Hazen	1	1	1
Odour	-	Agreeable	Agreeable	Agreeable
pH	-	7.13	6.96	7.34
Oil & Grease	mg/L	BLQ	BLQ	BLQ
Total Suspended Solids	mg/L	23	37	21
Total Dissolved Solids	mg/L	469	604	501
Dissolved Oxygen (% Saturation)	%	69	55	69
Chemical Oxygen Demand	mg/L	10	23	10

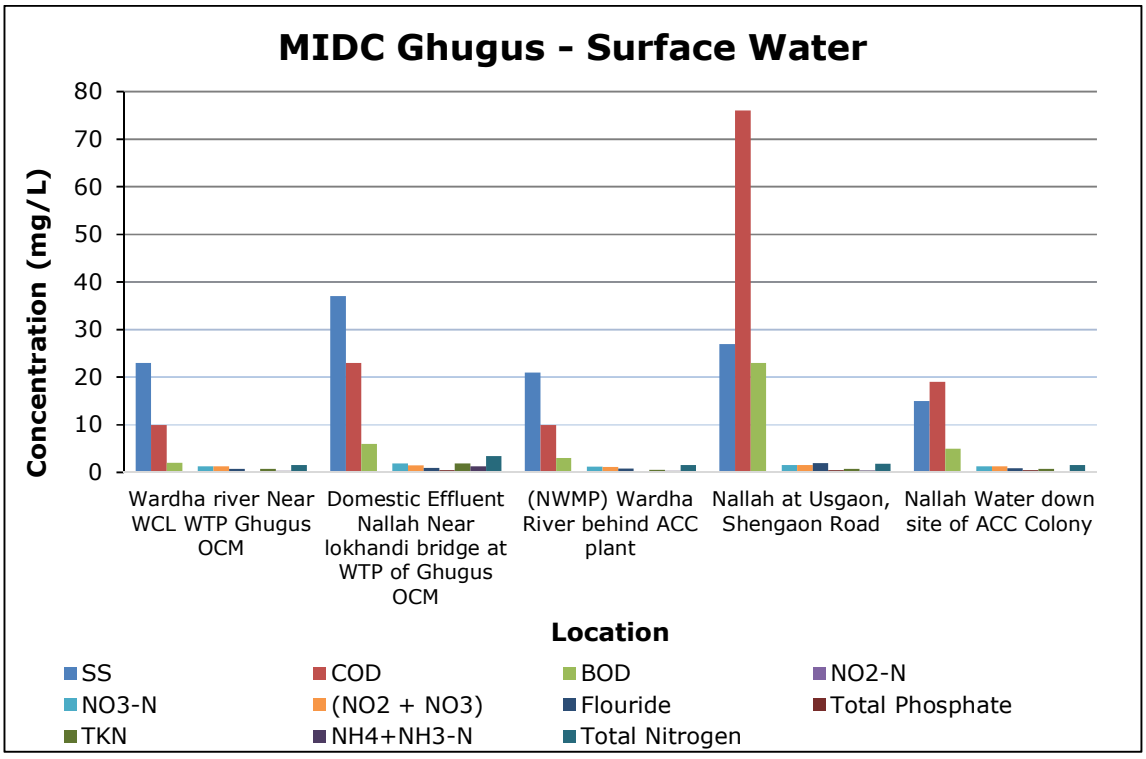
Parameters	Unit	Results		
		Wardha river Near WCL WTP Ghugus OCM	Domestic Effluent Nallah Near lokhandi bridge at WTP of Ghugus OCM	(NWMP) Wardha River behind ACC plant
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	2	6	3
Electrical Conductivity (at 25°C)	µmhos/cm	836	1077	892
Nitrite Nitrogen	mg/L	0.03	0.04	0.07
Nitrate Nitrogen	mg/L	1.23	1.89	1.21
(NO_2+ NO_3)-Nitrogen	mg/L	1.26	1.43	1.11
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ
Free Residual Chlorine	mg/L	0.35	0.32	0.30
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	0.77	0.97	0.83
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.16	0.40	0.18
Sodium Adsorption Ratio	-	1.34	2.26	1.61
Total Coliforms	MPN Index/ 100 ml	144	1373	760
Faecal Coliforms	MPN Index/ 100 ml	103	1020	260
Total Phosphate (as P)	mg/L	0.15	0.52	0.26
Total Kjeldahl Nitrogen (as N)	mg/L	0.75	1.87	0.56
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.31	1.28	0.32
Total Nitrogen	mg/L	1.55	3.39	1.56
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 (as 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	0.05	0.01	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	0.035	0.024	0.024
Total Arsenic (as As)	mg/L	BLQ	BLQ	BLQ
Lead (as Pb)	mg/L	BLQ	BLQ	BLQ

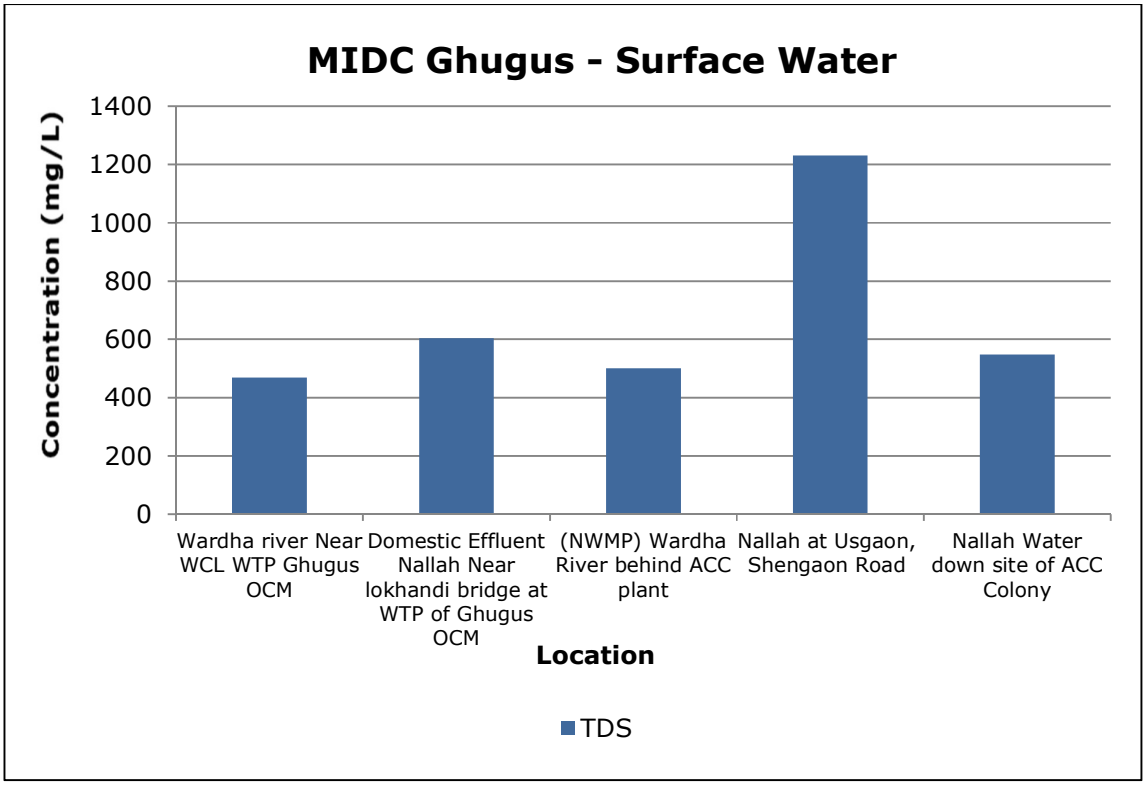
Parameters	Unit	Results		
		Wardha river Near WCL WTP Ghugus OCM	Domestic Effluent Nallah Near lokhandi bridge at WTP of Ghugus OCM	(NWMP) Wardha River behind ACC plant
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	0.14	0.14	BLQ
Iron (as Fe)	mg/L	0.26	0.27	0.15
Vanadium (as V)	mg/L	0.04	0.04	BLQ
Selenium (as Se)	mg/L	0.01	0.01	0.01
Boron (as B)	mg/L	BLQ	BLQ	0.16
Bioassay Test on fish	% survival	100	87	93

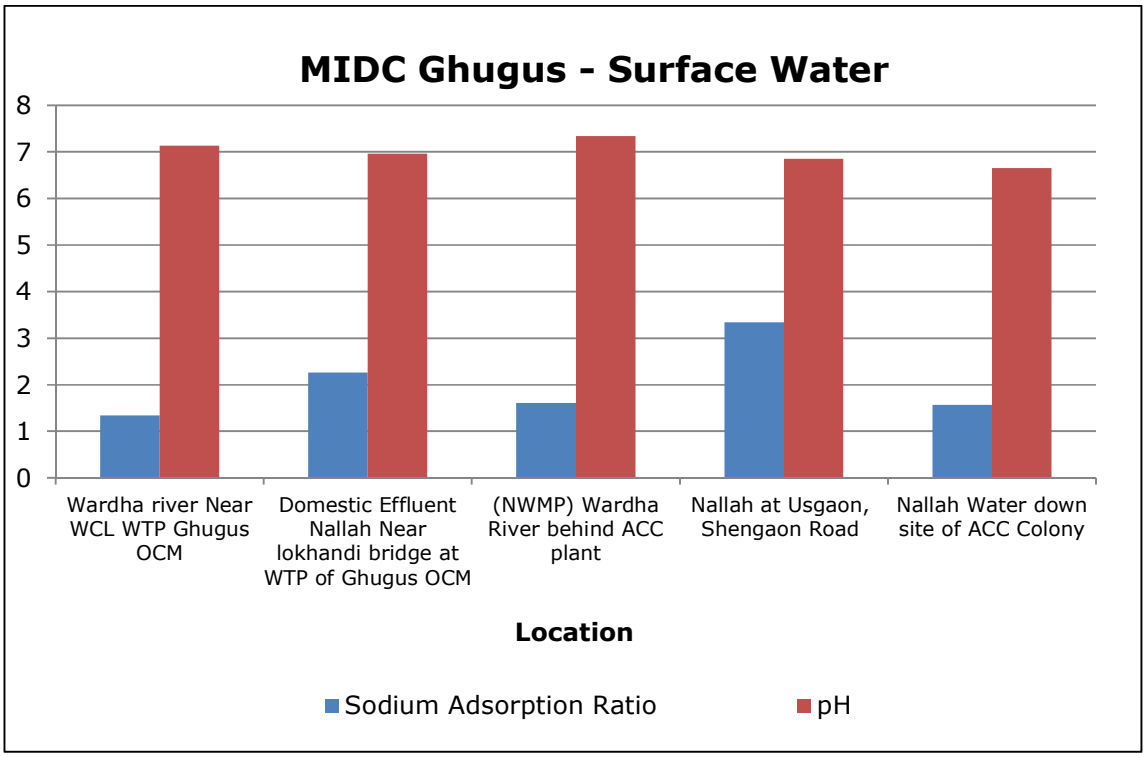
Parameters	Unit	Result	
		Nallah at Usgaon, Shengaon Road	Nallah Water down site of ACC Colony
Sanitary Survey	-	Reasonably Clean Neighbourhood	Reasonably Clean Neighbourhood
General Appearance	-	Floating Matter Evident	Floating Matter Evident
Transparency	m	0.3	0.1
Temperature	^{o}C	28	29
Colour	Hazen	1	1
Odour	-	Agreeable	Agreeable
pH	-	6.85	6.65
Oil & Grease	mg/L	BLQ	BLQ
Total Suspended Solids	mg/L	27	15
Total Dissolved Solids	mg/L	1231	548
Dissolved Oxygen (% Saturation)	%	47	58
Chemical Oxygen Demand	mg/L	76	19
Biochemical Oxygen Demand (3 days, 27^{o}C)	mg/L	23	5
Electrical Conductivity (at 25^{o}C)	µmhos/cm	2197	977
Nitrite Nitrogen	mg/L	BLQ	0.02
Nitrate Nitrogen	mg/L	1.55	1.28
(NO_2+ NO_3)-Nitrogen	mg/L	1.55	1.28
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ
Free Residual Chlorine	mg/L	0.57	0.58
Cyanide (as CN)	mg/L	BLQ	BLQ

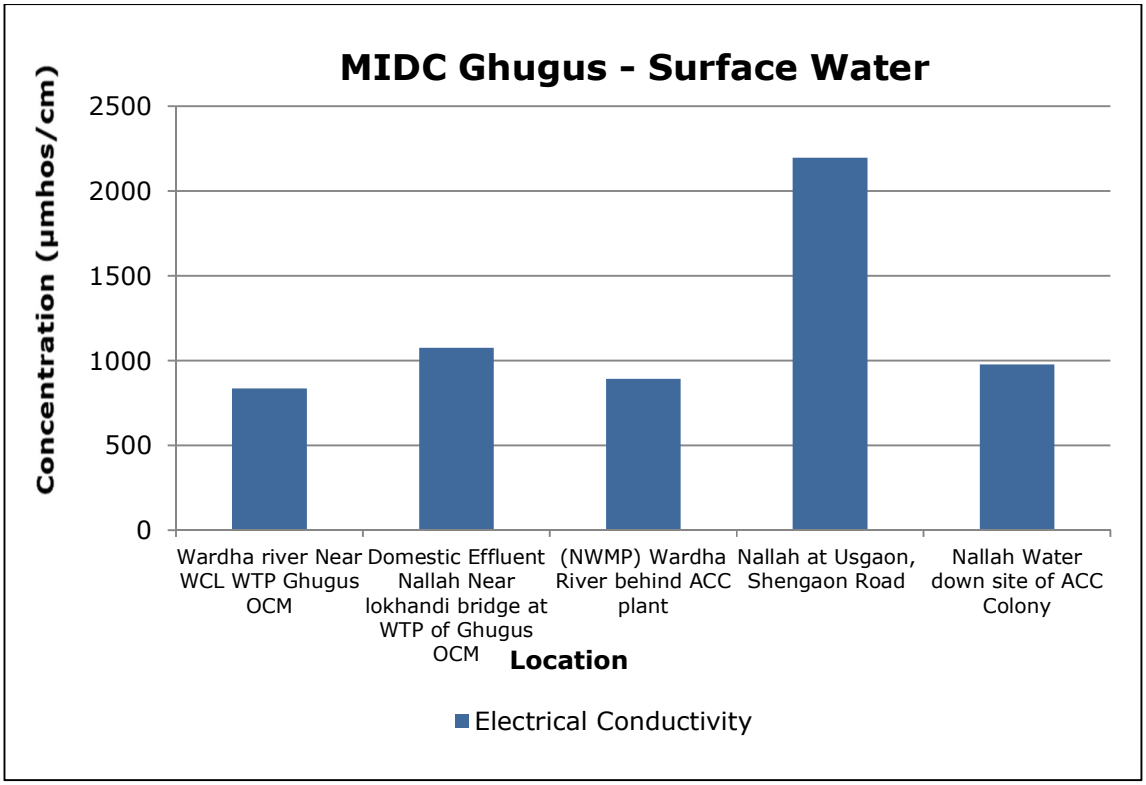
Parameters	Unit	Result	
		Nallah at Usgaon, Shengaon Road	Nallah Water down site of ACC Colony
Fluoride (as F)	mg/L	1.93	0.90
Sulphide (as H_2S)	mg/L	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.36	0.42
Sodium Adsorption Ratio	-	3.34	1.57
Total Coliforms	MPN Index/ 100 ml	730	1247
Faecal Coliforms	MPN Index/ 100 ml	707	723
Total Phosphate (as P)	mg/L	0.44	0.52
Total Kjeldahl Nitrogen (as N)	mg/L	0.75	0.75
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.37	0.18
Total Nitrogen	mg/L	1.85	1.54
Phenols (as C_6H_5OH)	mg/L	BLQ	BLQ
Anionic Detergents (as MBAS)	mg/L	BLQ	BLQ
Organo Chlorine Pesticides	µg/L	BLQ	BLQ
Polynuclear aromatic hydrocarbons (as PAH)	mg/L	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ
Zinc (as Zn)	mg/L	0.73	BLQ
Nickel (as Ni)	mg/L	0.01	0.01
Copper (as Cu)	mg/L	0.022	BLQ
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	0.041
Total Arsenic (as As)	mg/L	0.011	0.005
Lead (as Pb)	mg/L	BLQ	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ
Manganese (as Mn)	mg/L	0.08	0.12
Iron (as Fe)	mg/L	0.33	0.24
Vanadium (as V)	mg/L	0.04	0.02
Selenium (as Se)	mg/L	0.01	0.01
Boron (as B)	mg/L	0.20	BLQ
Bioassay Test on fish	% survival	97	100

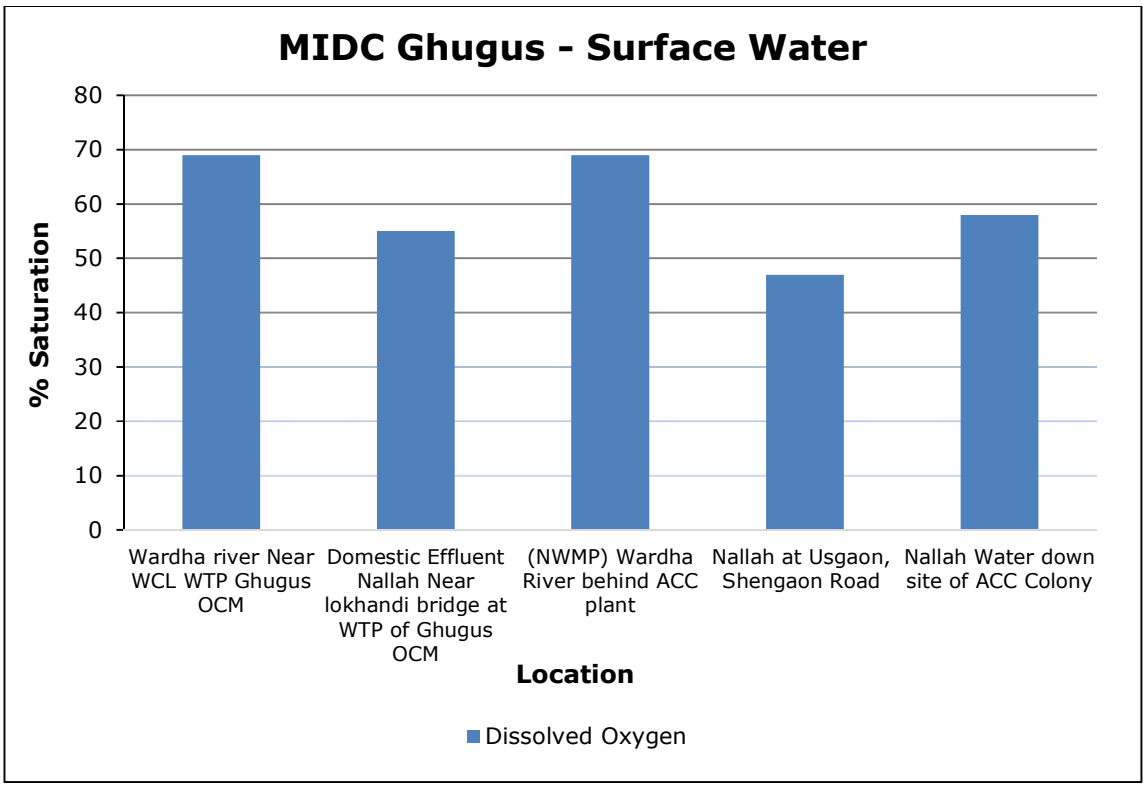
Graphs - Surface Water Quality of MIDC Ghugus

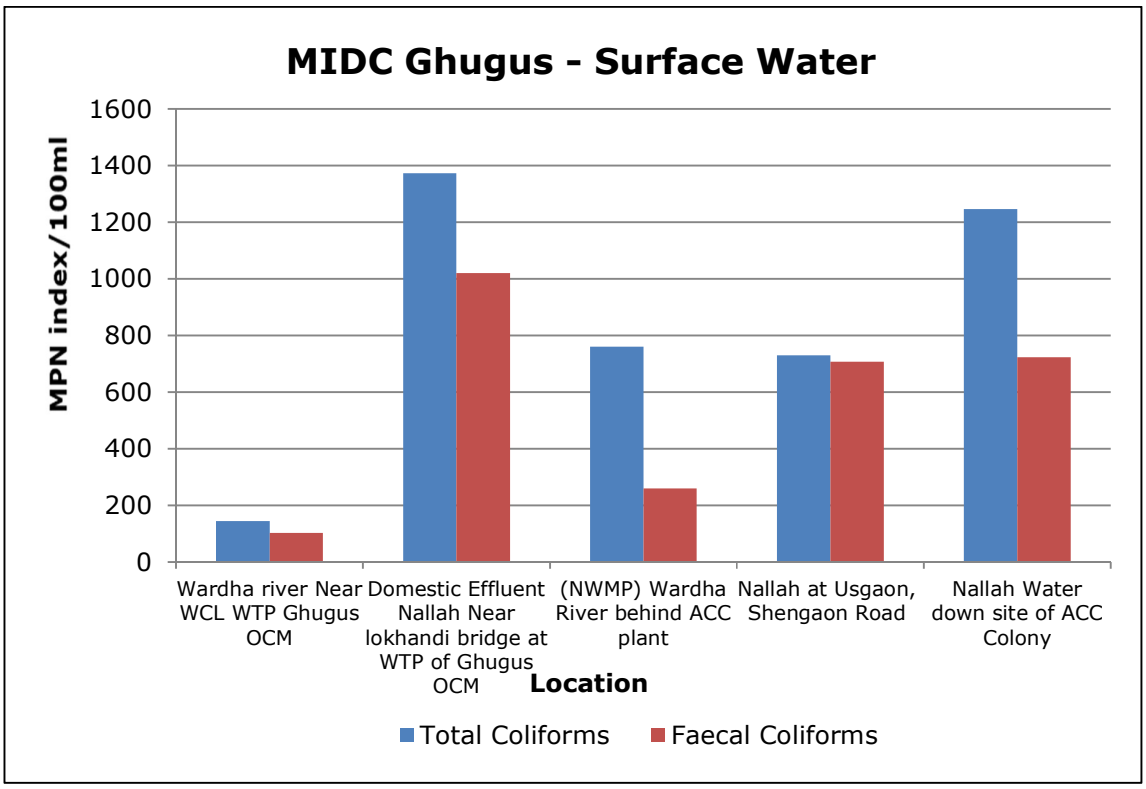


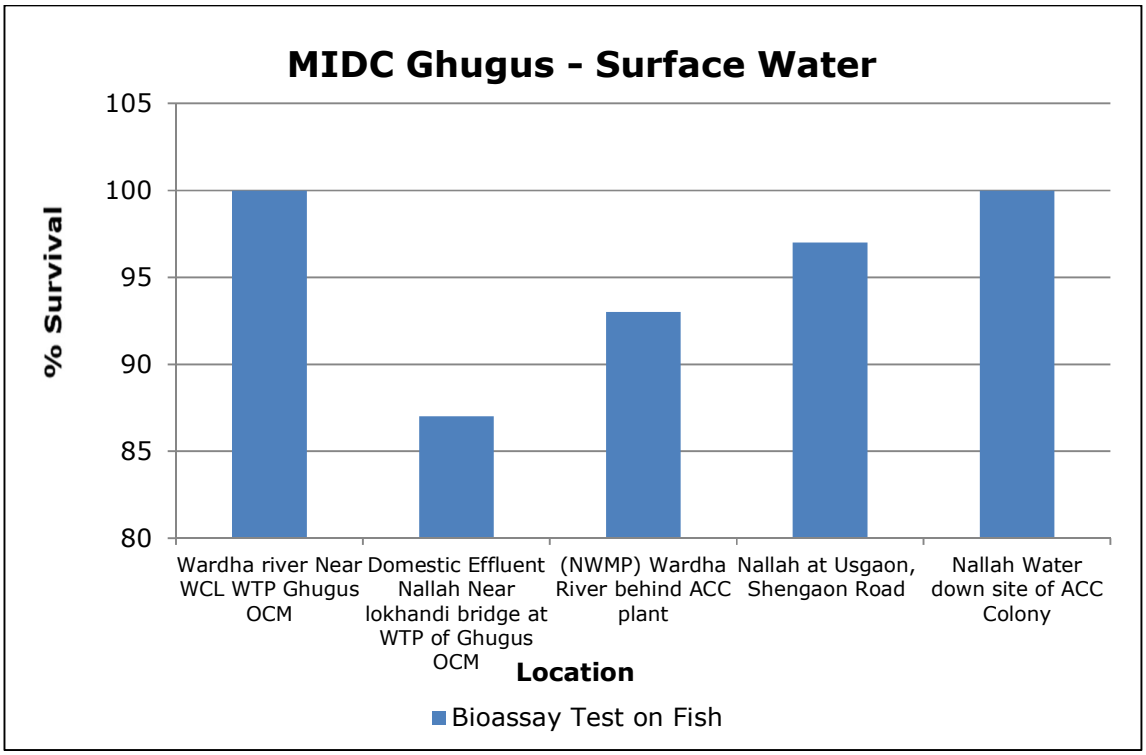



MIDC Ghugus - Surface Water
8
7
6
5
4
3
2
1
0
Wardha river Near WCL WTP Ghugus OCM
Domestic Effluent Nallah Near lokhandi bridge at WTP of Ghugus OCM
(NWMP) Wardha River behind ACC plant
Nallah at Usgaon, Shengaon Road
Nallah Water down site of ACC Colony
Location
Sodium Adsorption Ratio
pH


MIDC Ghugus - Surface Water
Concentration (µmhos/cm)
2500
2000
1500
1000
500
0
Wardha river Near WCL WTP Ghugus OCM
Domestic Effluent Nallah Near lokhandi bridge at WTP of Ghugus OCM
(NWMP) Wardha River behind ACC plant
Nallah at Usgaon, Shengaon Road
Nallah Water down site of ACC Colony
Location
Electrical Conductivity


MIDC Ghugus - Surface Water
% Saturation
80
70
60
50
40
30
20
10
0
Wardha river Near WCL WTP Ghugus OCM
Domestic Effluent Nallah Near lokhandi bridge at WTP of Ghugus OCM
(NWMP) Wardha River behind ACC plant
Nallah at Usgaon, Shengaon Road
Nallah Water down site of ACC Colony
Location
Dissolved Oxygen


MIDC Ghugus - Surface Water
MPN index/100ml
1600
1400
1200
1000
800
600
400
200
0
Wardha river Near WCL WTP Ghugus OCM
Domestic Effluent Nallah Near lokhandi bridge at WTP of Ghugus OCM
(NWMP) Wardha River behind ACC plant
Nallah at Usgaon, Shengaon Road
Nallah Water down site of ACC Colony
Location
Total Coliforms
Faecal Coliforms


MIDC Ghugus - Surface Water
105
100
95
90
85
80
% Survival
Wardha river Near WCL WTP Ghugus OCM
Domestic Effluent Nallah Near lokhandi bridge at WTP of Ghugus OCM
(NWMP) Wardha River behind ACC plant
Nallah at Usgaon, Shengaon Road
Nallah Water down site of ACC Colony
Location
Bioassay Test on Fish

4. **MIDC Ballarpur:** Six Surface water samples are collected from MIDC Ballarpur.

- All six water samples collected are acceptable in general appearance, colour, smell and transparency.
- pH, Electrical conductivity and COD are also well within the limits at all six samples collected.
- Metals like Zinc, Copper, Iron, Hexavalent Chromium (Cr^{6+}), Total Arsenic, etc. are observed either below the limit of quantification or below their standard limits.
- Parameters like Total Residual Chlorine, Cyanide, Sulphide, Dissolved Phosphate, Total Ammonical Nitrogen and Phenolic compounds also meet the criteria as prescribed by CPCB.
- Total Kjeldahl Nitrogen exceeded in 3 water samples out of 6 samples collected.
- The concentration of Total Phosphate 4 water samples out of 6 samples collected.
- Fluoride exceeds in all surface water collected.
- Polynuclear aromatic hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB) are below the limit of quantification in all six samples collected.
- Organo Chlorine Pesticides are also below the limit of quantification in all six samples collected.

Table 6.7 MIDC Ballarpur – 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.	Nallah Near Petrol Pump at Ballarpur Bamni Road	19°50'41.4''N	79°21'29.1''E	23.05.2023	25.05.2023	27.05.2023
2.	Bagirathi Nallah Bridge, Gondpipari Road, Near Bamni Proteins	19°51'11.8''N	79°20'45.8''E	23.05.2023	25.05.2023	27.05.2023
3.	Wardha River upstream at Ballarpur	19°51'10.5''N	79°20'20.3''E	23.05.2023	25.05.2023	27.05.2023
4.	(NWMP) Wardha River downstream, Near Rajura Bridge	19°48'52.8''N	79°22'39.2''E	23.05.2023	25.05.2023	27.05.2023
5.	Nallah Near MSW Municipal Corporation, Near Railway line	19°50'23.5''N	79°21'23.9''E	23.05.2023	25.05.2023	27.05.2023
6.	Nallah of Municipal Council Ballarpur, Beside of HP Petrol Pump	19°51'26.5''N	79°20'45.1''E	23.05.2023	25.05.2023	27.05.2023

Fig. Geographical Locations of Surface Water Sampling MIDC Ballarpur

Table 6.8 MIDC Ballarpur – Results of Surface Water

Parameters	Unit	Results		
		Nallah Near Petrol Pump at Ballarpur Bamni Road	**Bagirathi Nallah Bridge, Gondpipari Road, Near Bamni Proteins**	**Wardha River upstream at Ballarpur**
Sanitary Survey	-	Generally Clean Neighbourhood	Generally Clean Neighbourhood	Generally Clean Neighbourhood
General Appearance	-	Floating Matter Evident	Floating Matter Evident	Floating Matter Evident
Transparency	m	0.2	0.2	0.6
Temperature	^{o}C	31	25	25
Colour	Hazen	2	2	1
Odour	-	Agreeable	Agreeable	Agreeable
pH	-	7.02	6.80	7.96
Oil & Grease	mg/L	BLQ	BLQ	BLQ
Total Suspended Solids	mg/L	29	31	17
Total Dissolved Solids	mg/L	1916	1933	304
Dissolved Oxygen (% Saturation)	%	56	47	74
Chemical Oxygen Demand	mg/L	57	50	6

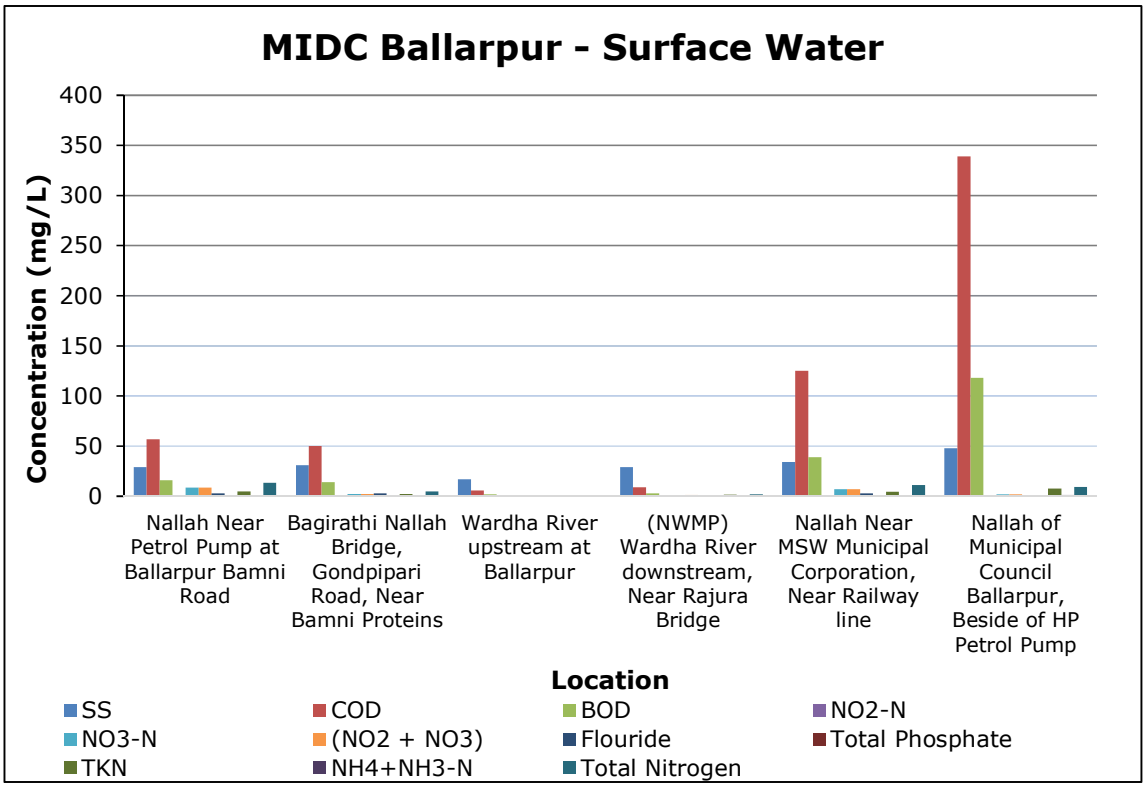
Parameters	Unit	Results		
		Nallah Near Petrol Pump at Ballarpur Bamni Road	Bagirathi Nallah Bridge, Gondpipari Road, Near Bamni Proteins	Wardha River upstream at Ballarpur
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	16	14	2
Electrical Conductivity (at 25°C)	µmhos/cm	3420	3450	542
Nitrite Nitrogen	mg/L	0.05	0.16	0.06
Nitrate Nitrogen	mg/L	8.69	2.22	1.00
(NO_2+ NO_3)-Nitrogen	mg/L	8.69	2.33	1.00
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	BLQ	BLQ	0.48
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	2.87	2.93	0.43
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	1.00	0.71	0.14
Sodium Adsorption Ratio	-	7.17	2.55	1.52
Total Coliforms	MPN Index/ 100 ml	525	640	620
Faecal Coliforms	MPN Index/ 100 ml	157	323	312
Total Phosphate (as P)	mg/L	0.64	0.81	0.25
Total Kjeldahl Nitrogen (as N)	mg/L	4.65	2.43	0.56
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.36	0.47	0.29
Total Nitrogen	mg/L	13.37	4.75	1.22
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 (as PAH)	mg/L	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	0.07	0.068	0.076
Nickel (as Ni)	mg/L	0.011	0.013	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	0.002	0.003	BLQ

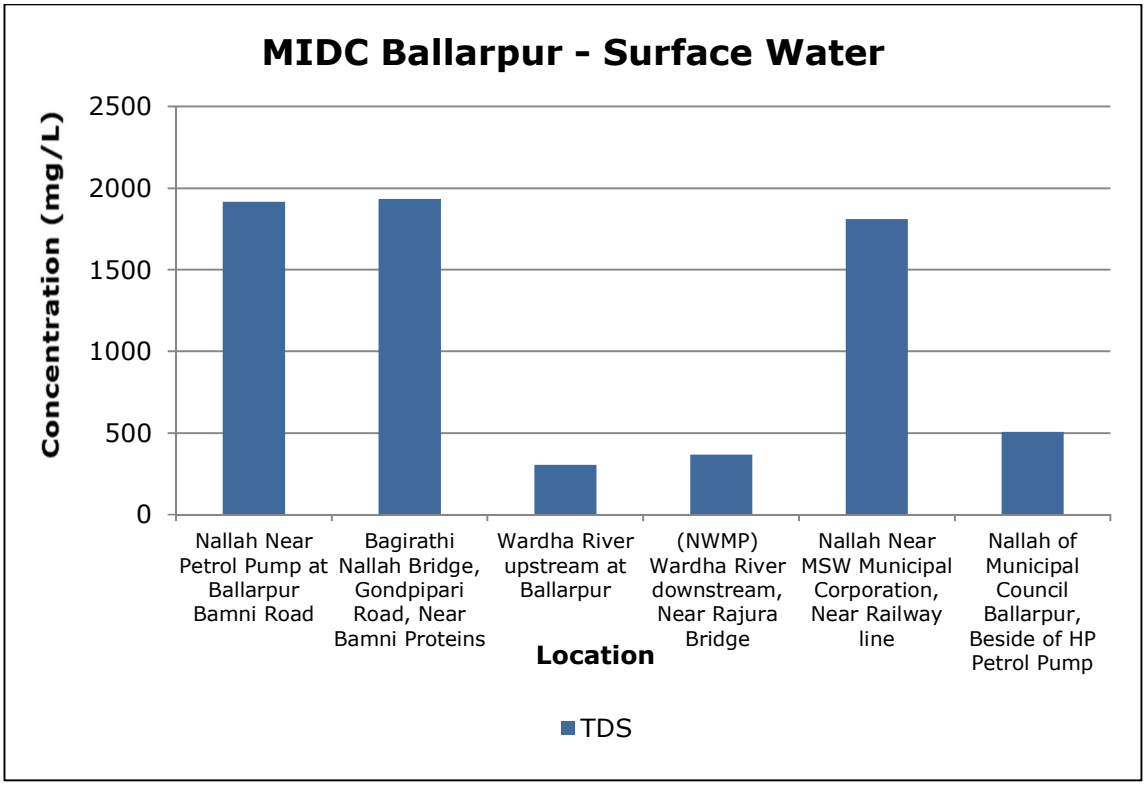
Parameters	Unit	Results		
		Nallah Near Petrol Pump at Ballarpur Bamni Road	Bagirathi Nallah Bridge, Gondpipari Road, Near Bamni Proteins	Wardha River upstream at Ballarpur
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	0.37	0.10	0.07
Iron (as Fe)	mg/L	0.36	0.68	0.39
Vanadium (as V)	mg/L	0.03	BLQ	0.032
Selenium (as Se)	mg/L	0.016	0.016	0.007
Boron (as B)	mg/L	BLQ	BLQ	BLQ
Bioassay Test on fish	% survival	93	100	87

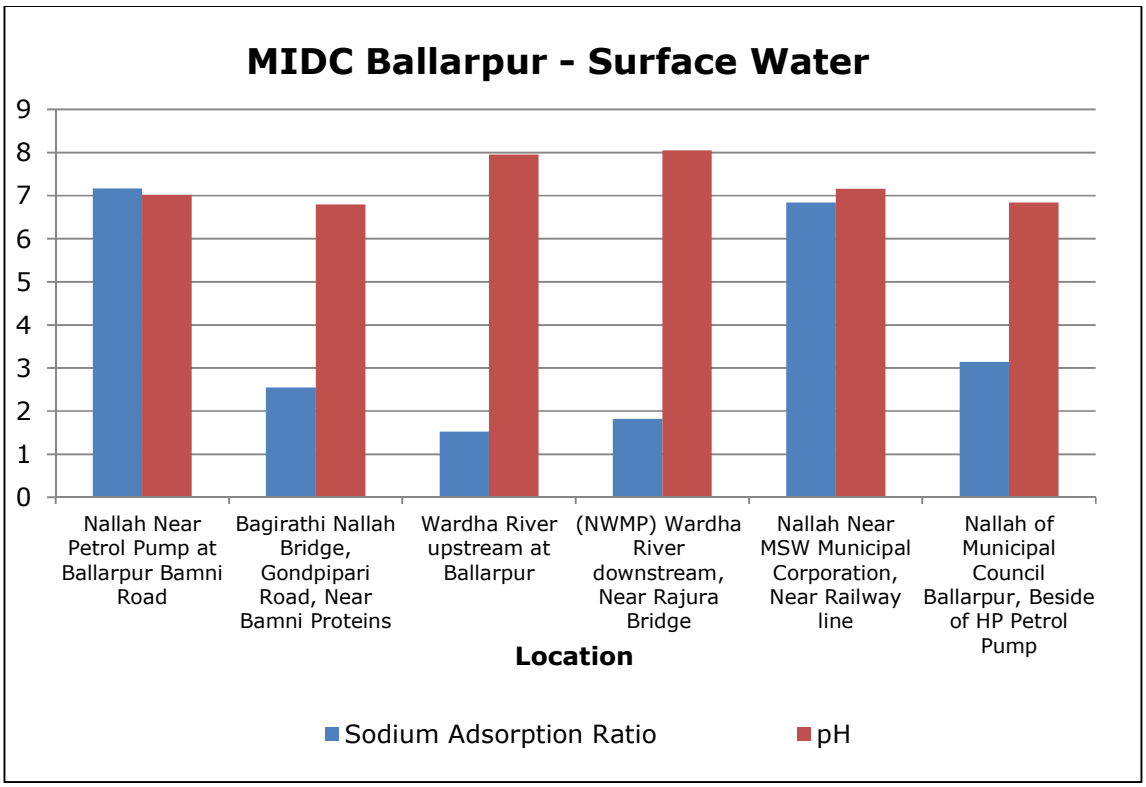
Parameters	Unit	Results		
		(NWMP) Wardha River downstream, Near Rajura Bridge	Nallah Near MSW Municipal Corporation, Near Railway line	Nallah of Municipal Council Ballarpur, Beside of HP Petrol Pump
Sanitary Survey	-	Generally Clean Neighbourhood	Generally Clean Neighbourhood	Generally Clean Neighbourhood
General Appearance	-	Floating Matter Evident	Floating Matter Evident	Floating Matter Evident
Transparency	m	0.5	0.2	0.2
Temperature	^{o}C	25	31	25
Colour	Hazen	1	2	6
Odour	-	Agreeable	Agreeable	Not Agreeable
pH	-	8.05	7.16	6.84
Oil & Grease	mg/L	BLQ	BLQ	BLQ
Total Suspended Solids	mg/L	29	34	48
Total Dissolved Solids	mg/L	366	1812	506
Dissolved Oxygen (% Saturation)	%	67	47	35
Chemical Oxygen Demand	mg/L	9	125	339
Biochemical Oxygen Demand (3 days, $27^{o}C$)	mg/L	3	39	118
Electrical Conductivity (at $25^{o}C$)	µmhos/cm	653	3233	905
Nitrite Nitrogen	mg/L	0.04	BLQ	BLQ
Nitrate Nitrogen	mg/L	1.21	7.07	1.95
(NO_2+ NO_3)-Nitrogen	mg/L	1.26	7.07	1.96
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	0.23	BLQ	BLQ

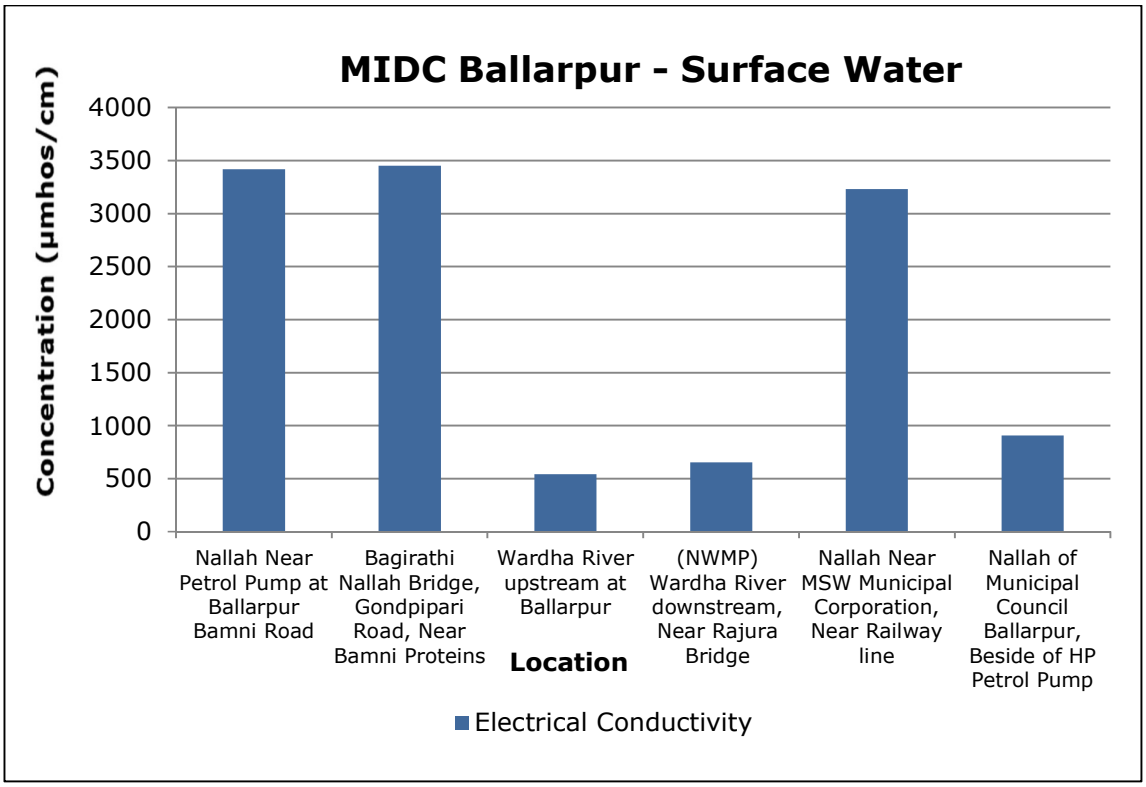
Parameters	Unit	Results		
		(NWMP) Wardha River downstream, Near Rajura Bridge	Nallah Near MSW Municipal Corporation, Near Railway line	Nallah of Municipal Council Ballarpur, Beside of HP Petrol Pump
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	0.57	2.80	0.77
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.17	0.82	0.46
Sodium Adsorption Ratio	-	1.82	6.84	3.14
Total Coliforms	MPN Index/ 100 ml	957	567	366
Faecal Coliforms	MPN Index/ 100 ml	57	462	500
Total Phosphate (as P)	mg/L	0.23	0.99	0.56
Total Kjeldahl Nitrogen (as N)	mg/L	1.68	4.29	7.65
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.70	0.48	1.43
Total Nitrogen	mg/L	2.11	11.35	9.13
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 (as 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	0.02	0.01	0.01
Copper (as Cu)	mg/L	BLQ	BLQ	BLQ
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	0.083	0.046	BLQ
Total Arsenic (as As)	mg/L	BLQ	BLQ	BLQ
Lead (as Pb)	mg/L	0.018	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	0.07	0.38
Iron (as Fe)	mg/L	0.38	0.42	0.47
Vanadium (as V)	mg/L	0.03	0.02	0.02
Selenium (as Se)	mg/L	0.01	0.01	0.01
Boron (as B)	mg/L	BLQ	0.11	0.12
Bioassay Test on fish	% survival	100	100	100

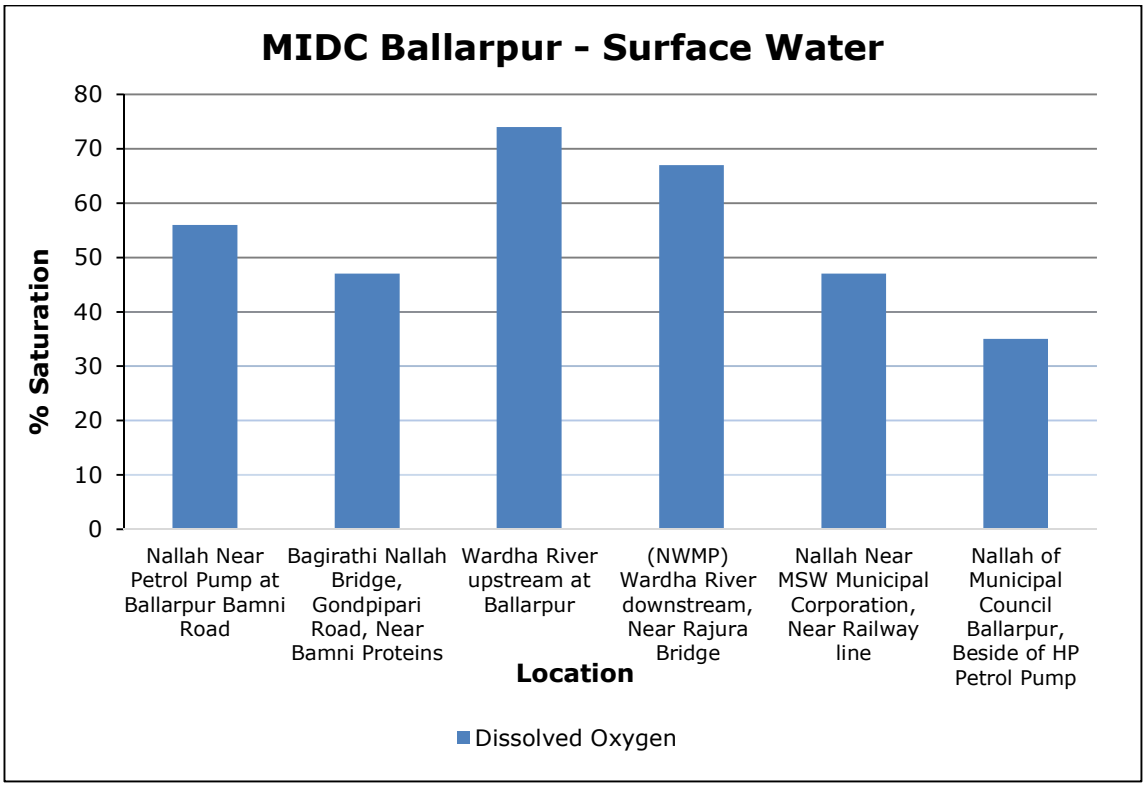
Graphs - Surface water Quality of MIDC Ballarpur

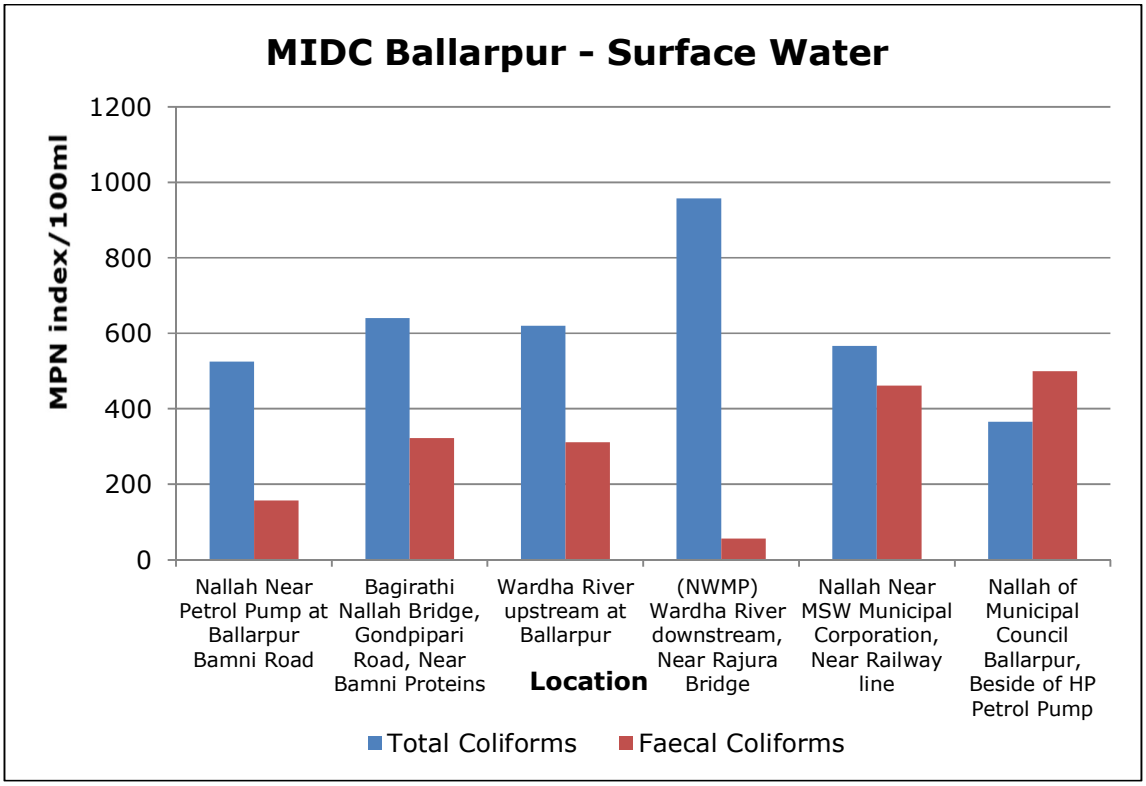


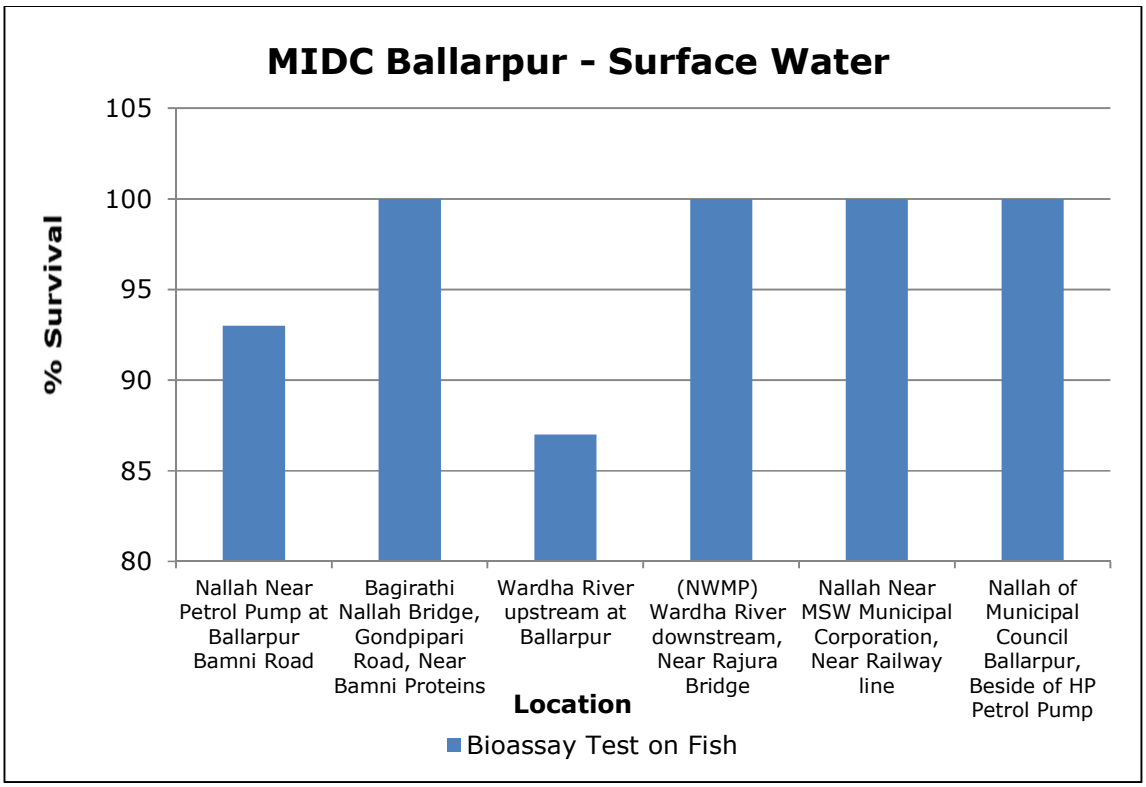



MIDC Ballarpur - Surface Water
9
8
7
6
5
4
3
2
1
0
Nallah Near Petrol Pump at Ballarpur Bamni Road
Bagirathi Nallah Bridge, Gondpipari Road, Near Bamni Proteins
Wardha River upstream at Ballarpur
(NWMP) Wardha River downstream, Near Rajura Bridge
Nallah Near MSW Municipal Corporation, Near Railway line
Nallah of Municipal Council Ballarpur, Beside of HP Petrol Pump
Location
Sodium Adsorption Ratio
pH


MIDC Ballarpur - Surface Water
Concentration (µmhos/cm)
4000
3500
3000
2500
2000
1500
1000
500
0
Nallah Near Petrol Pump at Ballarpur Bamni Road
Bagirathi Nallah Bridge, Gondpipari Road, Near Bamni Proteins
Wardha River upstream at Ballarpur
(NWMP) Wardha River downstream, Near Rajura Bridge
Nallah Near MSW Municipal Corporation, Near Railway line
Nallah of Municipal Council Ballarpur, Beside of HP Petrol Pump
Location
Electrical Conductivity


MIDC Ballarpur - Surface Water
% Saturation
80
70
60
50
40
30
20
10
0
Nallah Near Petrol Pump at Ballarpur Bamni Road
Bagirathi Nallah Bridge, Gondpipari Road, Near Bamni Proteins
Wardha River upstream at Ballarpur
(NWMP) Wardha River downstream, Near Rajura Bridge
Nallah Near MSW Municipal Corporation, Near Railway line
Nallah of Municipal Council Ballarpur, Beside of HP Petrol Pump
Location
Dissolved Oxygen


MIDC Ballarpur - Surface Water
MPN index/100ml
1200
1000
800
600
400
200
0
Nallah Near Petrol Pump at Ballarpur Bamni Road
Bagirathi Nallah Bridge, Gondpipari Road, Near Bamni Proteins
Wardha River upstream at Ballarpur
(NWMP) Wardha River downstream, Near Rajura Bridge
Nallah Near MSW Municipal Corporation, Near Railway line
Nallah of Municipal Council Ballarpur, Beside of HP Petrol Pump
Location
Total Coliforms
Faecal Coliforms


MIDC Ballarpur - Surface Water
% Survival
105
100
95
90
85
80
Nallah Near Petrol Pump at Ballarpur Bamni Road
Bagirathi Nallah Bridge, Gondpipari Road, Near Bamni Proteins
Wardha River upstream at Ballarpur
(NWMP) Wardha River downstream, Near Rajura Bridge
Nallah Near MSW Municipal Corporation, Near Railway line
Nallah of Municipal Council Ballarpur, Beside of HP Petrol Pump
Location
Bioassay Test on Fish

LAND ENVIRONMENT

7. Land Environment

For studying the land Environment of Chandrapur area, ground water was collected from Bore well. Dug well, and Hand Pump. A total of 12 samples were collected from MIDC Chandrapur, MIDC Tadali, MIDC Ballarpur and MIDC Ghugus.

1. **MIDC Tadali:** From MIDC Tadali also three ground water samples are collected.

- All three water samples collected are acceptable in general appearance, colour, smell and transparency.
- pH, suspended solids, COD and BOD are also well within the limits at all three samples collected.
- 100% survival was achieved in Fish Bioassay in all samples collected.
- Metals like Zinc, Nickel, Copper, Hexavalent Chromium (Cr^{6+}), Total Chromium, Total Arsenic, etc. are observed either below the limit of quantification or below their standard limits.
- Parameters like Total Residual Chlorine, Cyanide, Sulphide, Dissolved Phosphate, Total Ammonical Nitrogen and Phenolic compounds, also meet the criteria as prescribed by CPCB.
- Total Phosphate exceeded in two samples out of three samples collected.
- Fluoride exceeds in all three samples.
- Polynuclear aromatic hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB) are below the limit of quantification in all three samples collected.
- Organo Chlorine Pesticides are also below the limit of quantification in all three samples collected.

Table 7.1 MIDC Tadali – 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.	Yerur village (Bore well water)	19°59'46.1"N	79°11'28.7"E	23.05.2023	25.05.2023	27.05.2023
2.	Near Tadali Lake Janata School (Dug well water)	20°01'48.4"N	79°11'22.1"E	23.05.2023	25.05.2023	27.05.2023
3.	Yerur Village (Dug well Water)	19°59'46.9"N	79°11'28.0"E	23.05.2023	25.05.2023	27.05.2023

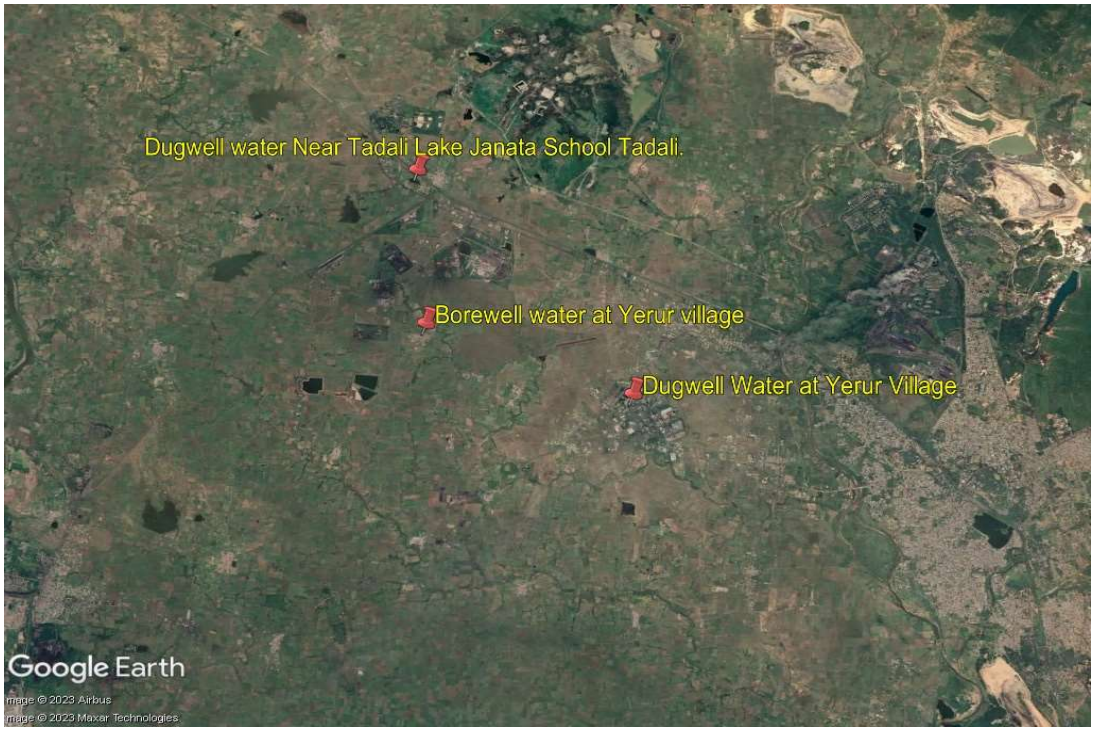


Fig. Geographical Locations of Ground Water Sampling MIDC Tadali

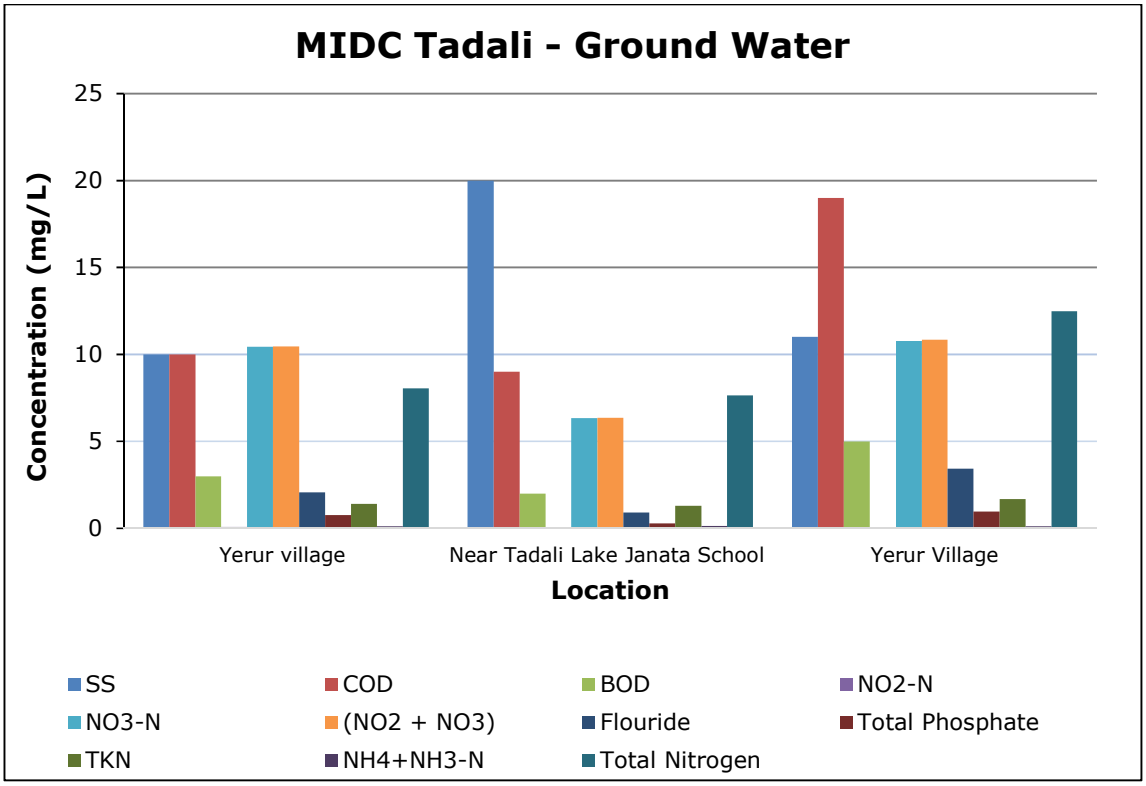
Table 7.2 MIDC Tadali – Details of Sampling Location of Ground Water

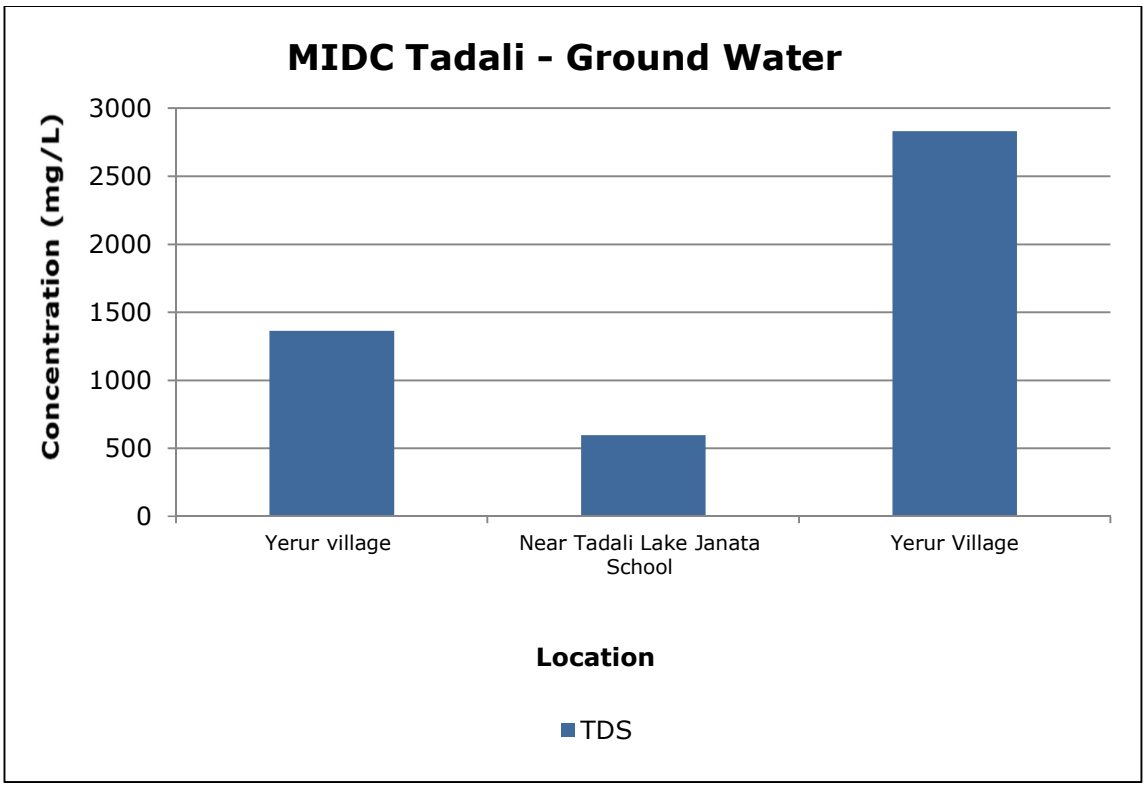
Parameters	Unit	Results		
		Yerur village (Bore well water)	Near Tadali Lake Janata School (Dug well water)	Yerur Village (Dug well Water)
Sanitary Survey	-	Generally Clean Neighbourhood	Generally Clean neighbourhood	Generally Clean neighbourhood
General Appearance	-	No Floating Matter	No floating matter	No floating matter
Transparency	m	Not Applicable	0.2	0.3
Temperature	^{o}C	29	30	28
Colour	Hazen	1	1	1
Odour	-	Agreeable	Agreeable	Agreeable
pH	-	6.90	7.52	6.94
Oil & Grease	mg/L	BLQ	BLQ	BLQ
Total Suspended Solids	mg/L	10	20	11
Total Dissolved Solids	mg/L	1363	598	2830
Chemical Oxygen Demand	mg/L	10	9	19
Biochemical Oxygen Demand (3 days, 27^{o}C)	mg/L	3	2	5
Electrical Conductivity (at 25^{o}C)	µmhos/cm	2437	1067	5053
Nitrite Nitrogen	mg/L	0.07	0.02	0.06
Nitrate Nitrogen	mg/L	10.44	6.34	10.78

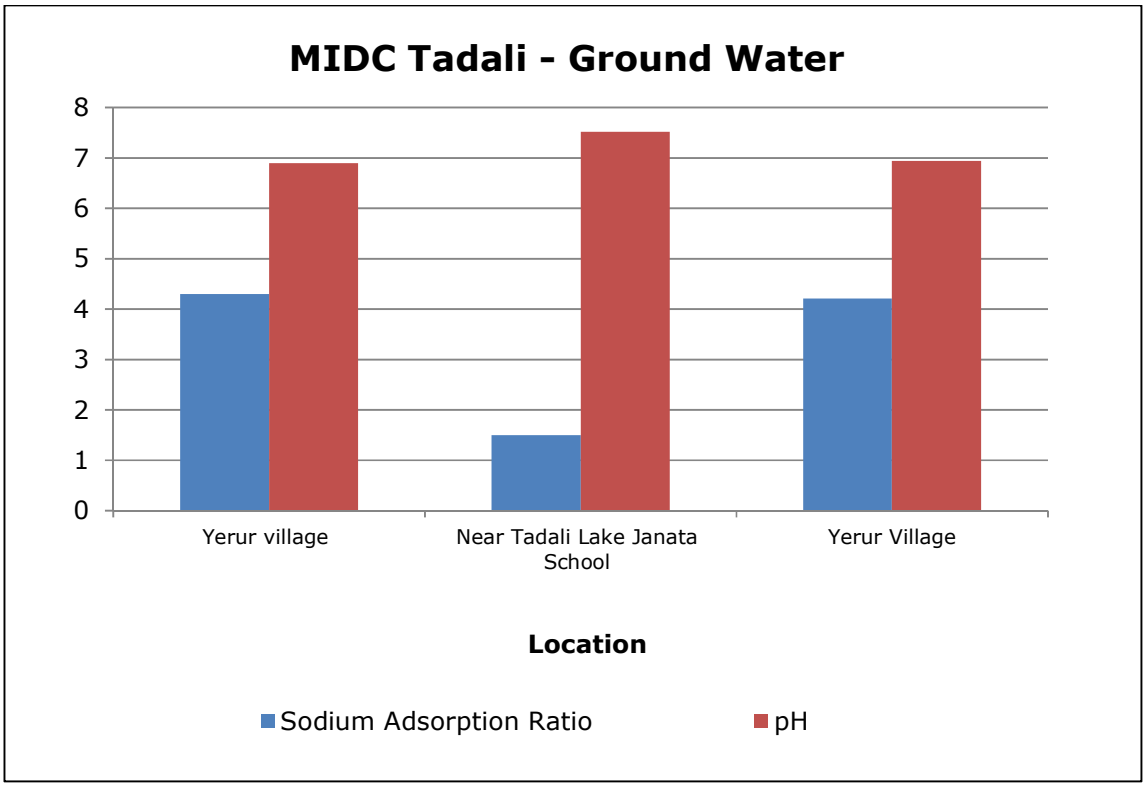
Parameters	Unit	Results		
		Yerur village (Bore well water)	Near Tadali Lake Janata School (Dug well water)	Yerur Village (Dug well Water)
(NO_2+ NO_3)-Nitrogen	mg/L	10.45	6.35	10.86
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	0.24	0.57	0.57
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	2.07	0.90	3.43
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.69	0.21	0.80
Sodium Adsorption Ratio	-	4.30	1.50	4.21
Total Coliforms	MPN Index/ 100 ml	151	1070	1123
Faecal Coliforms	MPN Index/ 100 ml	29	484	657
Total Phosphate (as P)	mg/L	0.76	0.28	0.97
Total Kjeldahl Nitrogen (as N)	mg/L	1.4	1.31	1.68
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.13	0.15	0.13
Total Nitrogen	mg/L	8.05	7.66	12.50
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 (as PAH)	mg/L	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	0.078	0.046	BLQ
Nickel (as Ni)	mg/L	BLQ	0.018	0.032
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	0.03	0.06
Total Arsenic (as As)	mg/L	BLQ	0.006	0.005
Lead (as Pb)	mg/L	BLQ	0.01	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	0.04	0.07	0.12
Iron (as Fe)	mg/L	0.15	0.54	0.37
Vanadium (as V)	mg/L	BLQ	BLQ	0.01
Selenium (as Se)	mg/L	0.01	0.01	0.02
Boron (as B)	mg/L	0.40	BLQ	0.15

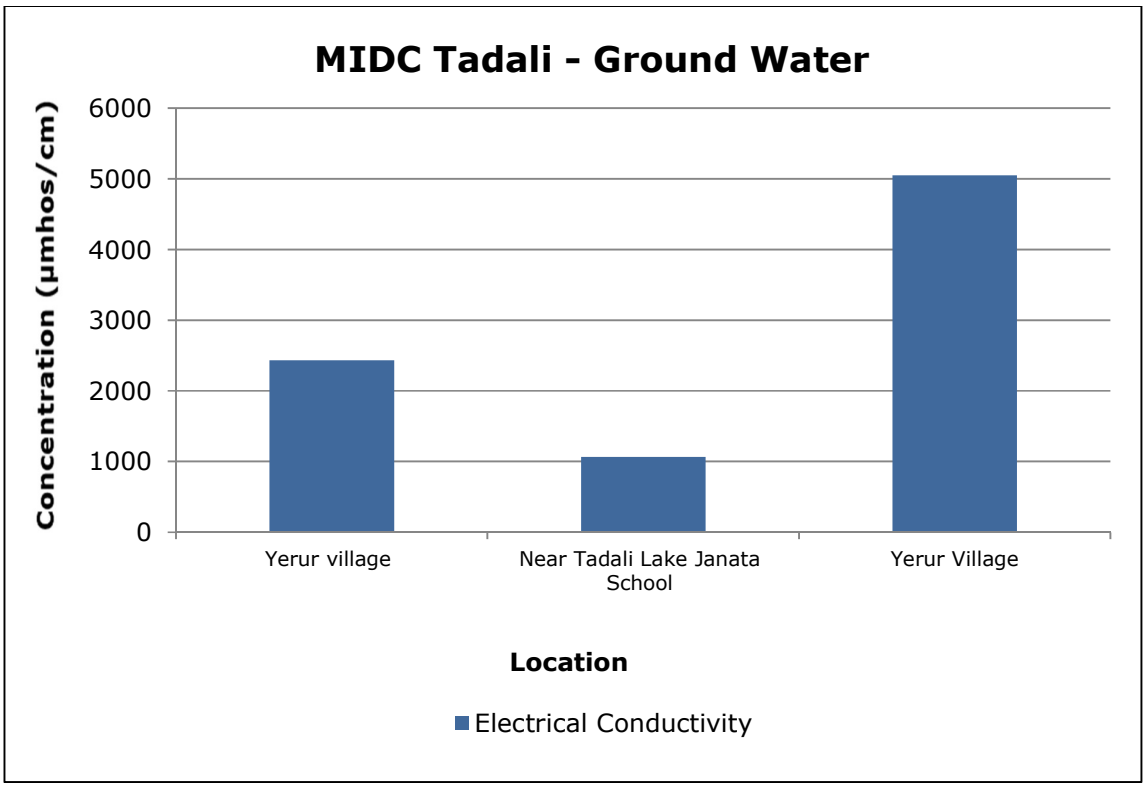
Parameters	Unit	Results		
		Yerur village (Bore well water)	Near Tadali Lake Janata School (Dug well water)	Yerur Village (Dug well Water)
Bioassay Test on fish	% survival	100	100	100

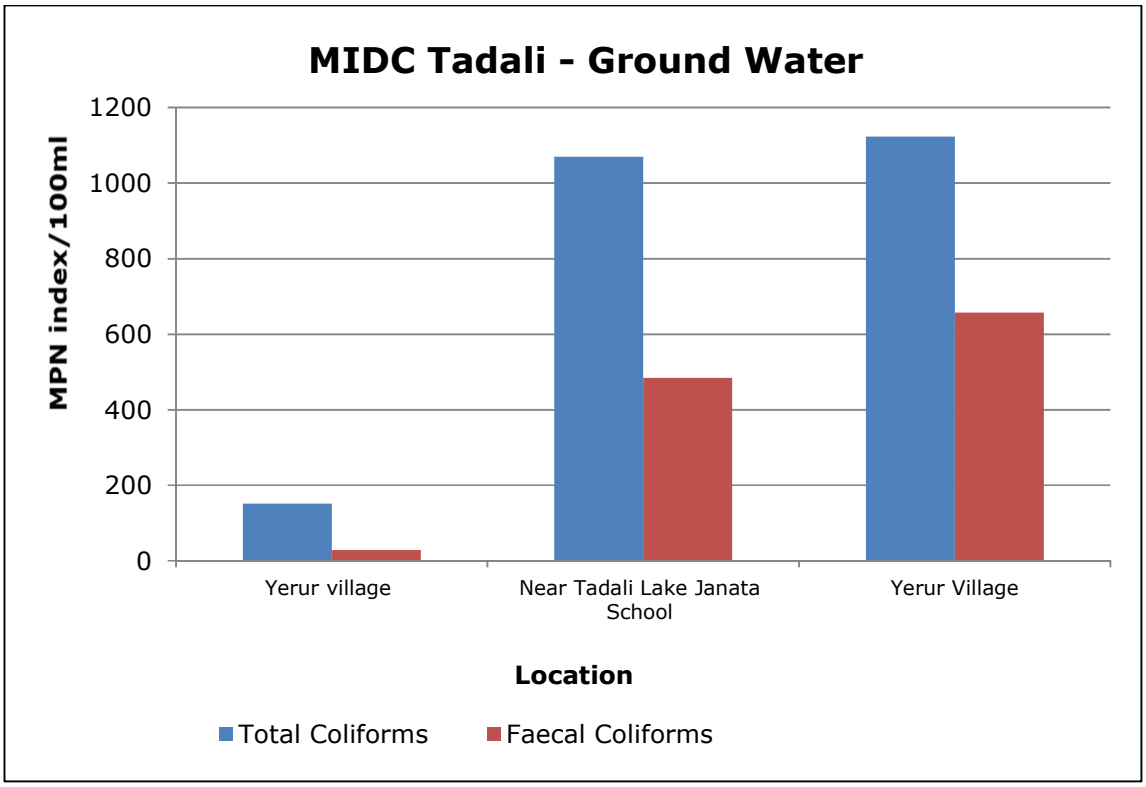
Graphs - Ground Water Quality of MIDC Tadali

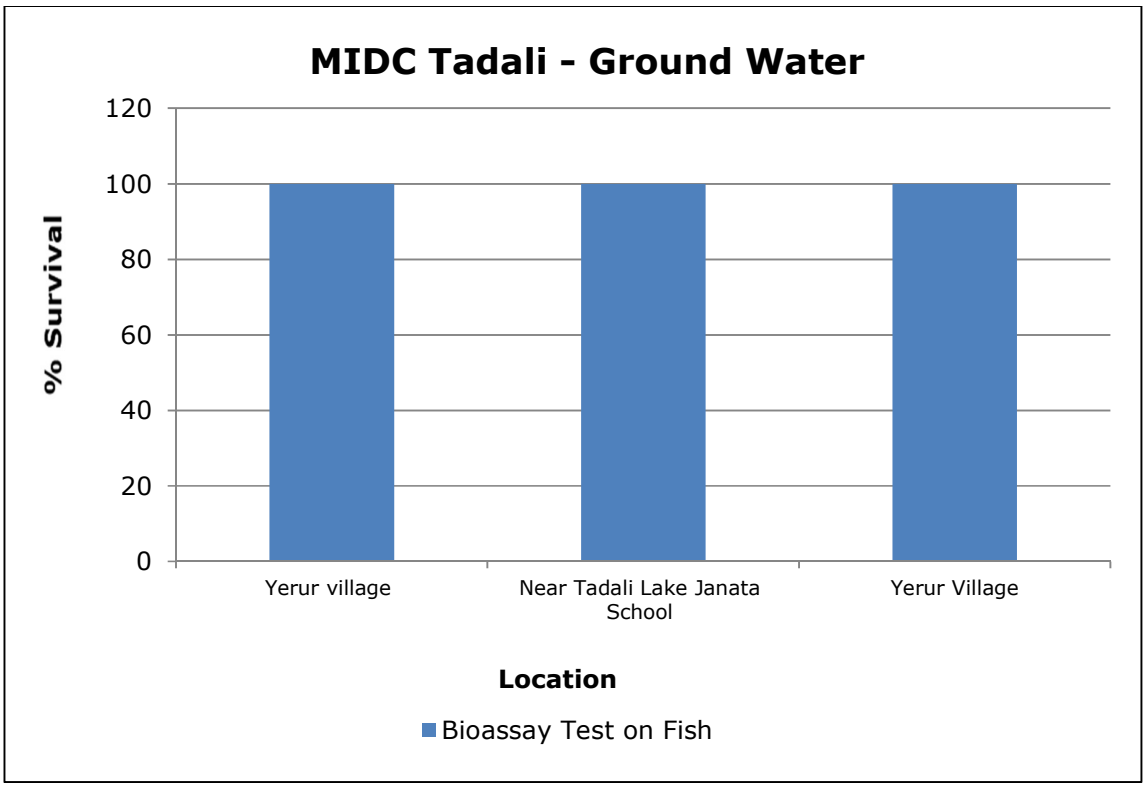



MIDC Tadali - Ground Water
Concentration (mg/L)
3000
2500
2000
1500
1000
500
0
Yerur village
Near Tadali Lake Janata School
Yerur Village
Location
TDS


MIDC Tadali - Ground Water
8
7
6
5
4
3
2
1
0
Yerur village
Near Tadali Lake Janata School
Yerur Village
Location
Sodium Adsorption Ratio
pH


MIDC Tadali - Ground Water
Concentration (µmhos/cm)
6000
5000
4000
3000
2000
1000
0
Yerur village
Near Tadali Lake Janata School
Yerur Village
Location
Electrical Conductivity


MIDC Tadali - Ground Water
MPN index/100ml
1200
1000
800
600
400
200
0
Yerur village
Near Tadali Lake Janata School
Yerur Village
Location
Total Coliforms
Faecal Coliforms


MIDC Tadali - Ground Water
120
100
80
60
40
20
0
% Survival
Yerur village
Near Tadali Lake Janata School
Yerur Village
Location
Bioassay Test on Fish

2. **MIDC Chandrapur:** Three ground water samples are collected from MIDC Chandrapur region.

- All three water samples collected are acceptable in general appearance, colour, smell and transparency.
- pH, suspended solids, Electrical conductivity, BOD, and COD are also well within the limits at all three samples collected.
- 100% survival was achieved in Fish Bioassay in one sample out of three samples collected.
- Metals like Arsenic, Nickel, Copper, Iron, Hexavalent Chromium (Cr^{6+}) etc. are observed either below detection limit or below their standard limits.
- Parameters like Total Residual Chlorine, Cyanide, Sulphide, Dissolved Phosphate, Total Ammonical Nitrogen and Phenolic compounds also meet the criteria as prescribed by CPCB.
- Total Phosphate and Fluoride concentration found above the in all three locations.
- Iron exceeds in two locations out of three location.
- Polynuclear aromatic hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB) are below the limit of quantification in all three samples collected.
- Organo Chlorine Pesticides are also below the limit of quantification in all three samples collected.

Table 7.3 MIDC Chandrapur – 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.	Gagangiri Village (Dug well Water)	19°58′07.8″N	79°14′53.8″E	30.05.2023	01.06.2023	03.06.2023
2.	Mahada Colony (Hand Pump water)	19°58′13.4″N	79°15′02.7″E	30.05.2023	01.06.2023	03.06.2023
3.	Near Datala Grampanchayat (Hand Pump water)	19°58′8.8″N	79°5′40.6″E	30.05.2023	01.06.2023	03.06.2023

Fig. Geographical Locations of Ground Water Sampling MIDC Chandrapur

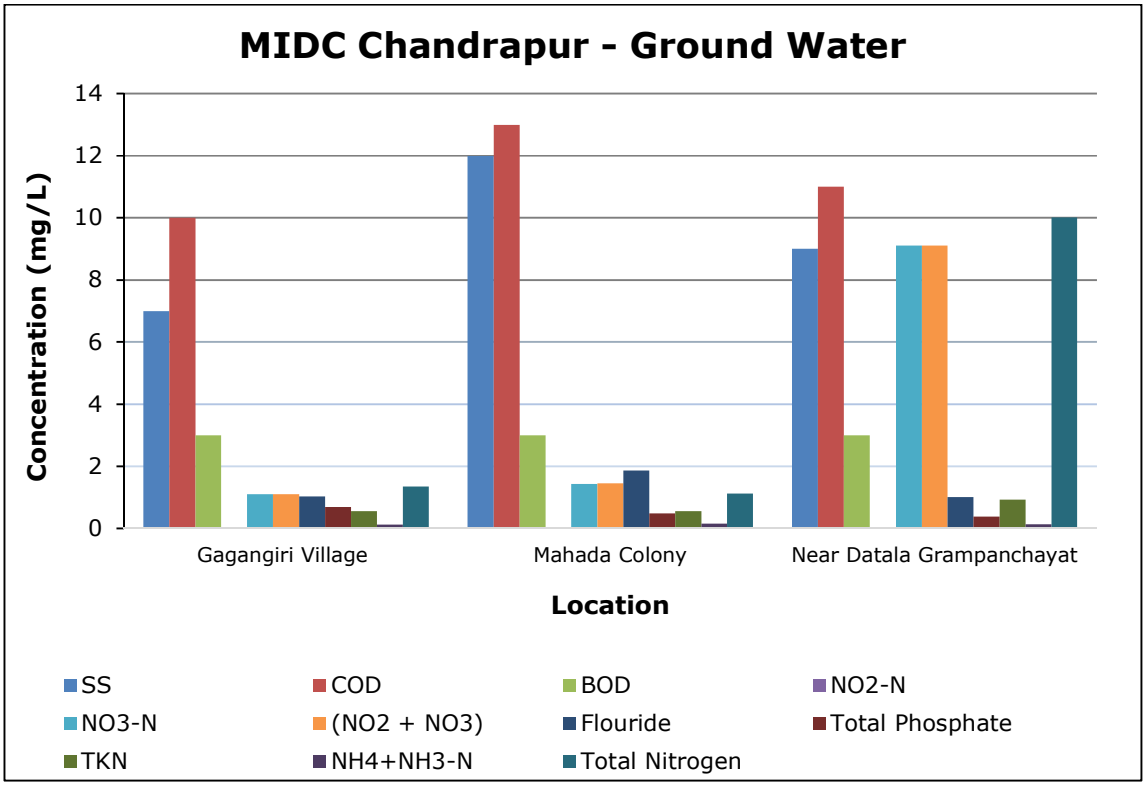
Table 7.4 MIDC Chandrapur – Details of Sampling Location of Ground Water

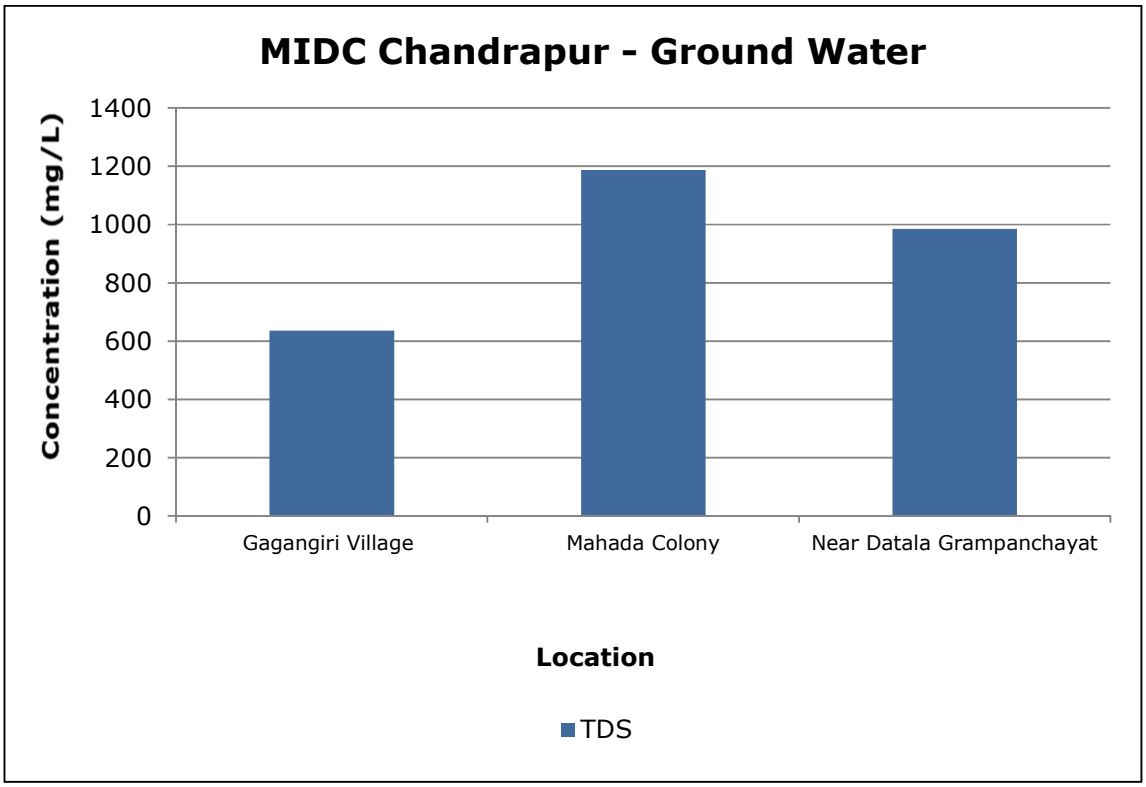
Parameters	Unit	Results		
		Gagangiri Village (Dug well Water)	Mahada Colony (Hand Pump water)	Near Datala Grampanchayat (Hand Pump water)
Sanitary Survey	-	Very Clean neighbourhood and catchment	Very Clean neighbourhood and catchment	Very Clean neighbourhood and catchment
General Appearance	-	No floating matter	Not Applicable	Not Applicable
Transparency	m	0.2	Not Applicable	Not Applicable
Temperature	°C	26	29	29
Colour	Hazen	1	1	1
Odour	-	Agreeable	Agreeable	Agreeable
pH	-	7.21	7.88	7.02
Oil & Grease	mg/L	BLQ	BLQ	BLQ
Total Suspended Solids	mg/L	7	12	9
Total Dissolved Solids	mg/L	636	1187	986
Chemical Oxygen Demand	mg/L	10	13	11
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	3	3	3
Electrical Conductivity (at 25°C)	µmhos/cm	1134	2120	1758
Nitrite Nitrogen	mg/L	BLQ	0.02	BLQ

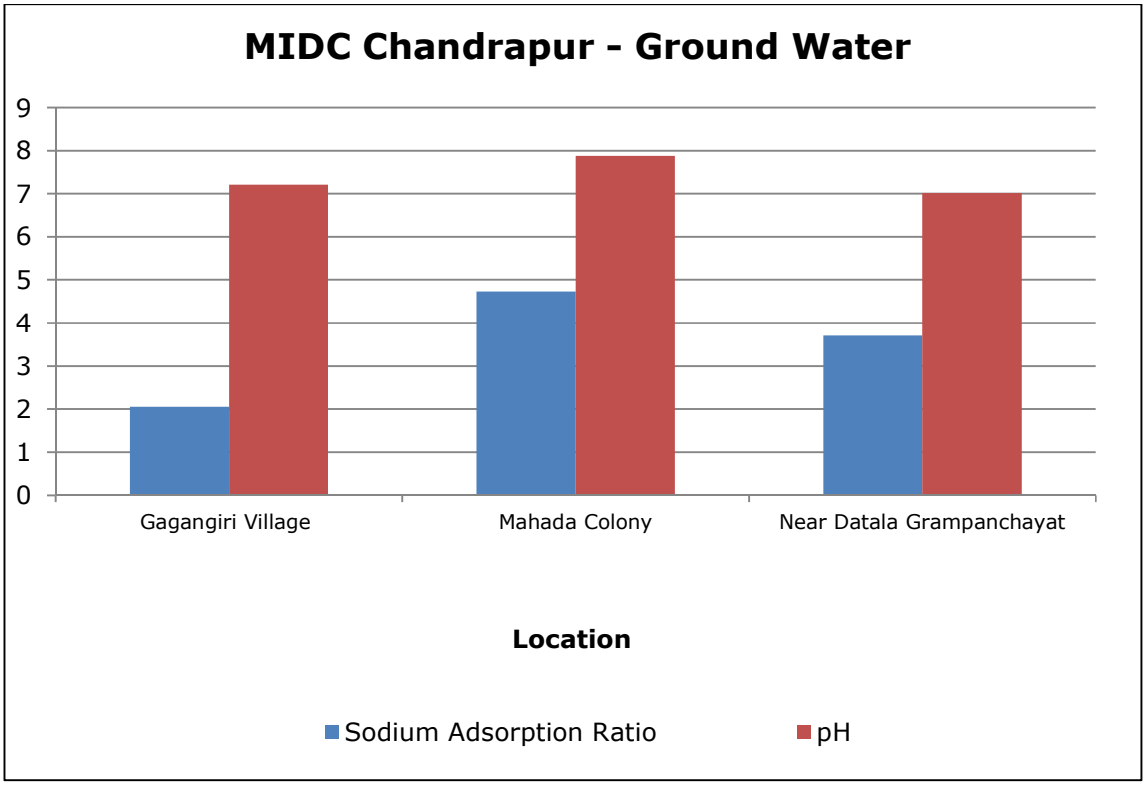
Parameters	Unit	Results		
		Gagangiri Village (Dug well Water)	Mahada Colony (Hand Pump water)	Near Datala Grampanchayat (Hand Pump water)
Nitrate Nitrogen	mg/L	1.10	1.43	9.11
(NO_2+ NO_3)-Nitrogen	mg/L	1.10	1.45	9.11
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	0.22	0.32	0.25
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	1.03	1.87	1.00
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.45	0.38	0.30
Sodium Adsorption Ratio	-	2.06	4.73	3.71
Total Coliforms	MPN Index/ 100 ml	1080	124	28
Faecal Coliforms	MPN Index/ 100 ml	259	51	23
Total Phosphate (as P)	mg/L	0.68	0.48	0.38
Total Kjeldahl Nitrogen (as N)	mg/L	0.56	0.56	0.93
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.12	0.15	0.13
Total Nitrogen	mg/L	1.35	1.12	10.01
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 (as PAH)	mg/L	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	0.056	0.055	BLQ
Nickel (as Ni)	mg/L	0.0105	0.019	0.021
Copper (as Cu)	mg/L	BLQ	0.265	BLQ
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	BLQ	0.104
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	0.07	0.07	0.07
Iron (as Fe)	mg/L	0.61	0.33	0.28
Vanadium (as V)	mg/L	0.02	0.02	0.01
Selenium (as Se)	mg/L	0.01	0.01	0.01

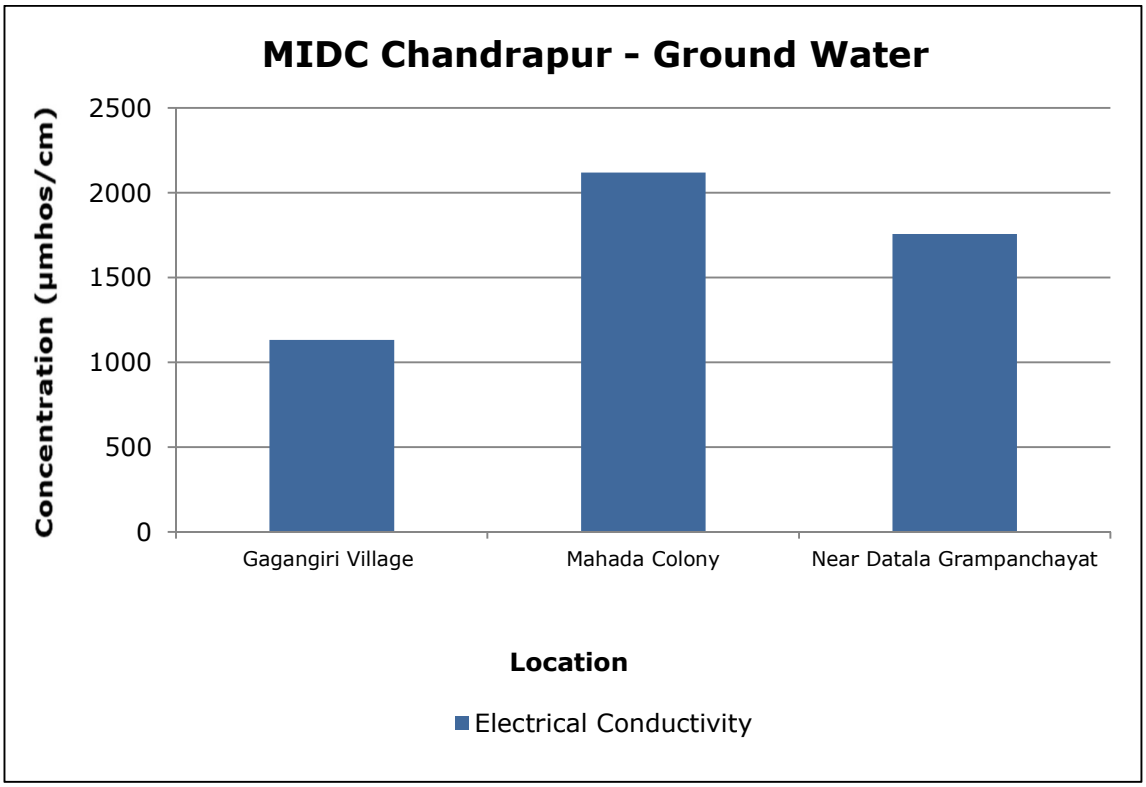
Parameters	Unit	Results		
		Gagangiri Village (Dug well Water)	Mahada Colony (Hand Pump water)	Near Datala Grampanchayat (Hand Pump water)
Boron (as B)	mg/L	BLQ	0.35	BLQ
Bioassay Test on fish	% survival	97	100	93

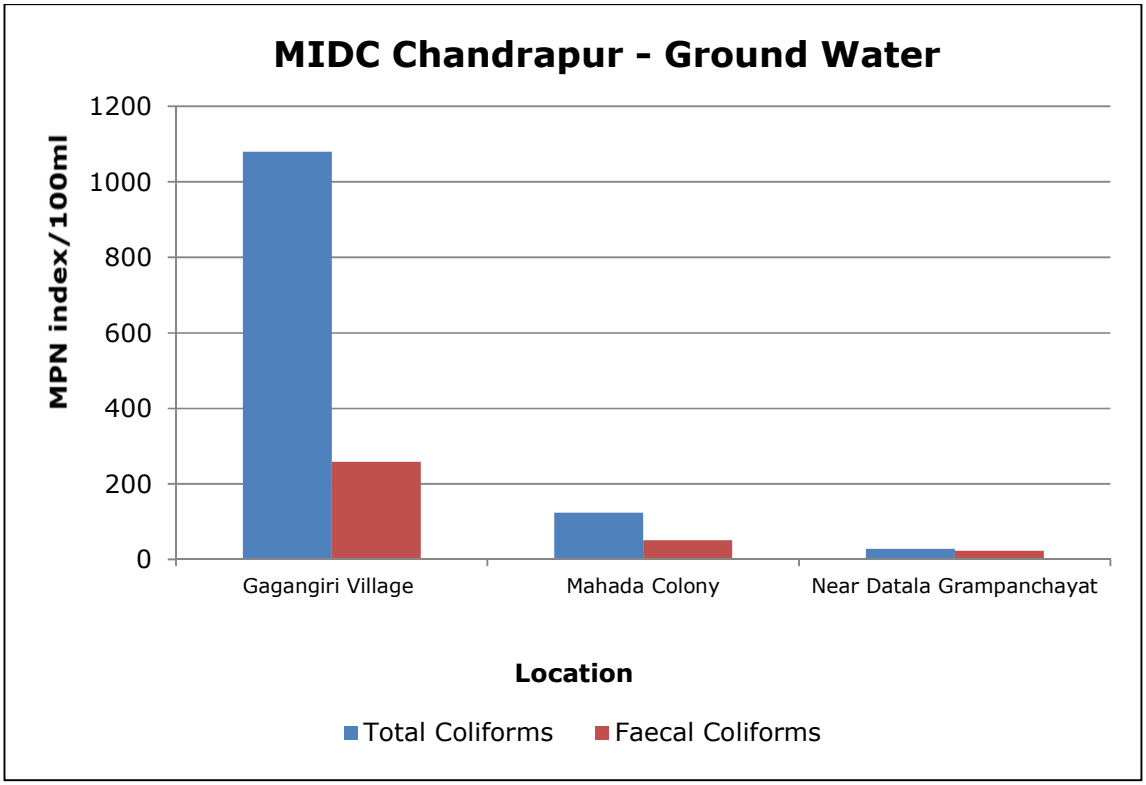
Graphs - Ground water Quality of MIDC Chandrapur

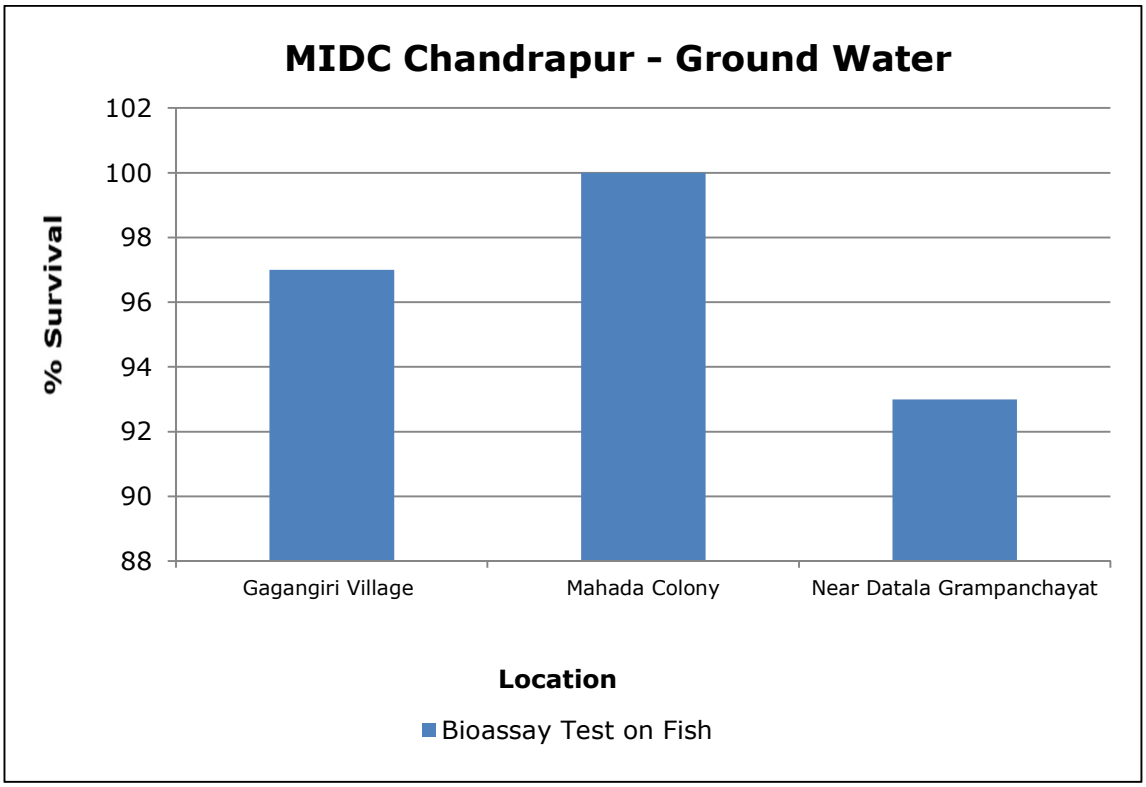



MIDC Chandrapur - Ground Water
Concentration (mg/L)
1400
1200
1000
800
600
400
200
0
Gagangiri Village
Mahada Colony
Near Datala Grampanchayat
Location
TDS


MIDC Chandrapur - Ground Water
9
8
7
6
5
4
3
2
1
0
Gagangiri Village
Mahada Colony
Near Datala Grampanchayat
Location
Sodium Adsorption Ratio
pH


MIDC Chandrapur - Ground Water
Concentration (µmhos/cm)
2500
2000
1500
1000
500
0
Gagangiri Village
Mahada Colony
Near Datala Grampanchayat
Location
Electrical Conductivity


MIDC Chandrapur - Ground Water
MPN index/100ml
1200
1000
800
600
400
200
0
Gagangiri Village
Mahada Colony
Near Datala Grampanchayat
Location
Total Coliforms
Faecal Coliforms


MIDC Chandrapur - Ground Water
% Survival
102
100
98
96
94
92
90
88
Gagangiri Village
Mahada Colony
Near Datala Grampanchayat
Location
Bioassay Test on Fish

3. **MIDC Ghugus:** Three ground water samples are collected from MIDC Ghugus.

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

Table 7.5 MIDC Ghugus – 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.	Tukdoji Nagar Ghugus Village (Hand Pump Water)	19°56'20.6''N	79°07'11.3''E	30.05.2023	01.06.2023	03.06.2023
2.	Nakoda Village (Bore Well Water)	19° 54'57.9''N	79°06'42.1''E	30.05.2023	01.06.2023	03.06.2023
3.	Usgaon Village (Dug Well Water)	19°54'45.3'N	79°07'36.4''E	30.05.2023	01.06.2023	03.06.2023

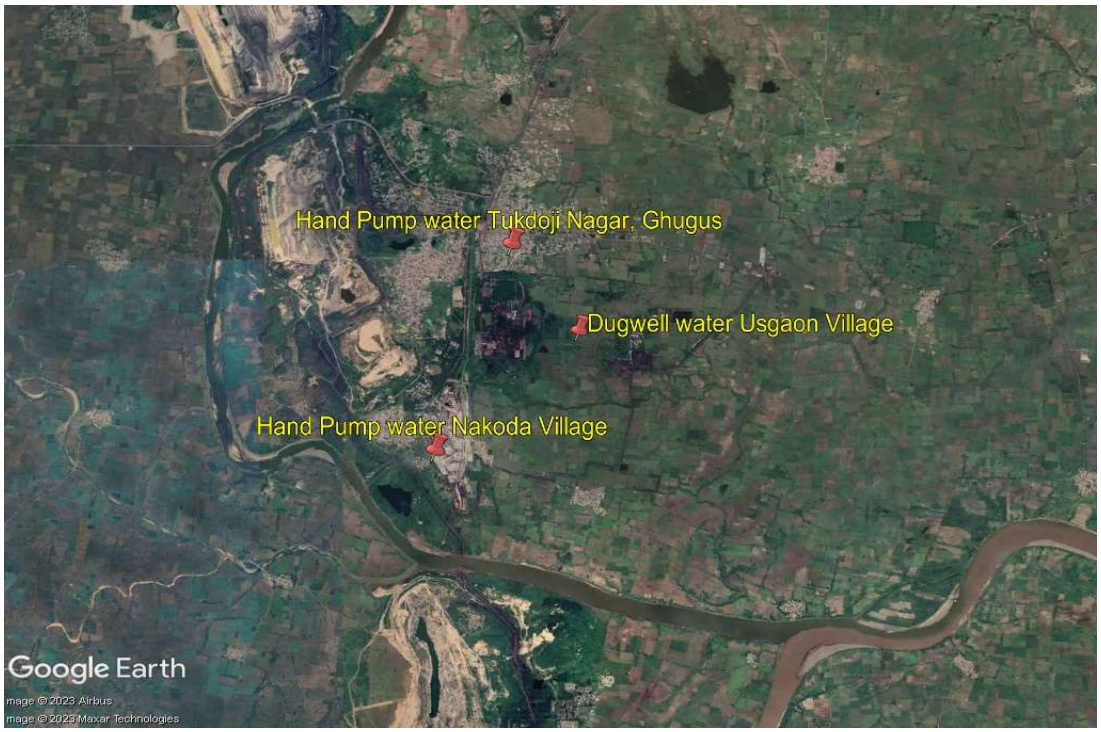


Fig. Geographical Locations of Ground Water Sampling MIDC Ghugus

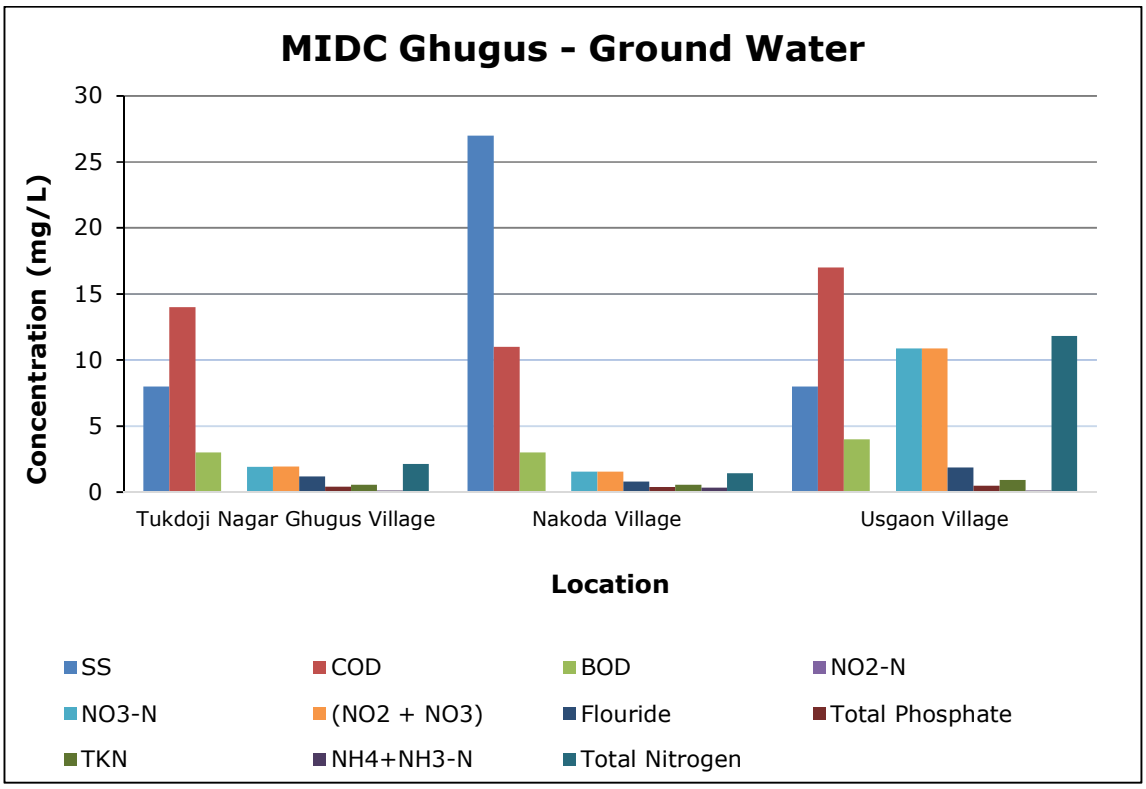
Table 7.6 MIDC Ghugus – Details of Sampling Location of Ground Water

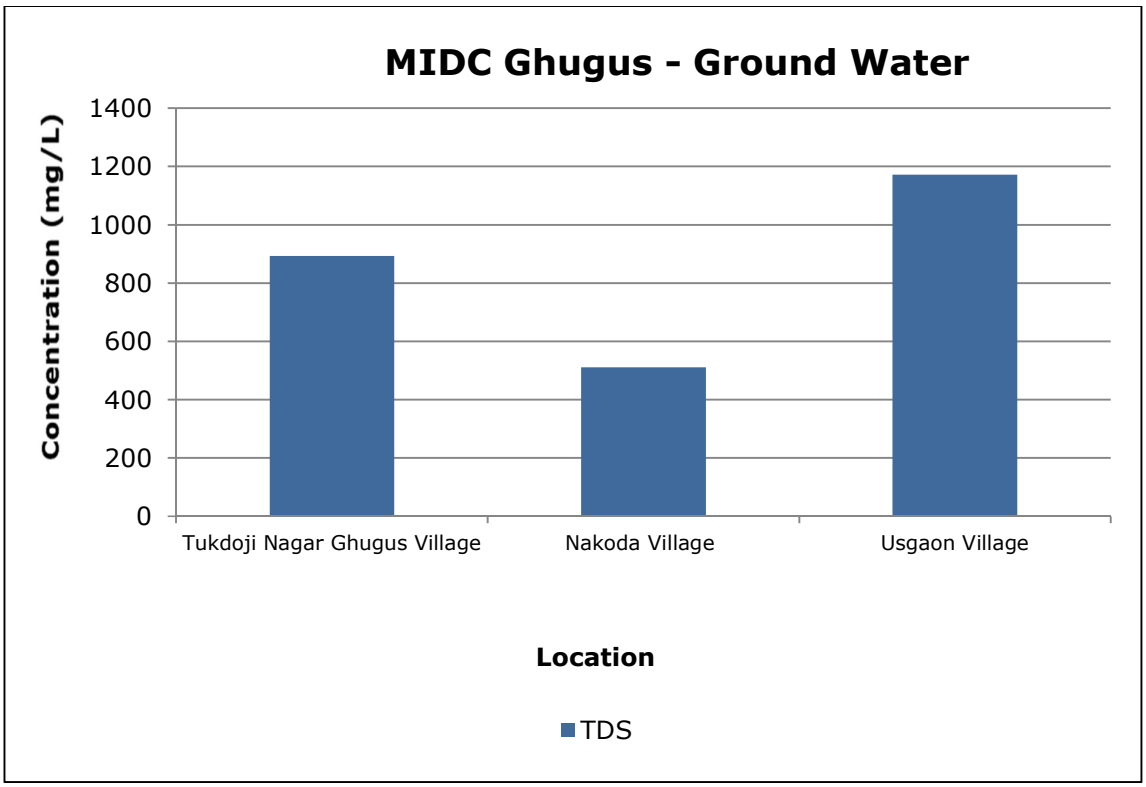
Parameters	Unit	Results		
		Tukdoji Nagar Ghugus Village (Hand Pump Water)	Nakoda Village (Bore Well Water)	Usgaon Village (Dug Well Water)
Sanitary Survey	-	Generally Clean neighbourhood	Generally Clean neighbourhood	Generally Clean neighbourhood
General Appearance	-	No floating matter	No floating matter	No floating matter
Transparency	m	Not Applicable	Not Applicable	0.3
Temperature	°C	29	29	28
Colour	Hazen	1	1	1
Odour	-	Agreeable	Agreeable	Agreeable
pH	-	7.48	7.30	6.94
Oil & Grease	mg/L	BLQ	BLQ	BLQ
Total Suspended Solids	mg/L	8	27	8
Total Dissolved Solids	mg/L	893	511	1172
Chemical Oxygen Demand	mg/L	14	11	17
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	3	3	4
Electrical Conductivity (at 25°C)	µmhos/cm	1593	876	2090
Nitrite Nitrogen	mg/L	BLQ	BLQ	0.02
Nitrate Nitrogen	mg/L	1.93	1.57	10.87

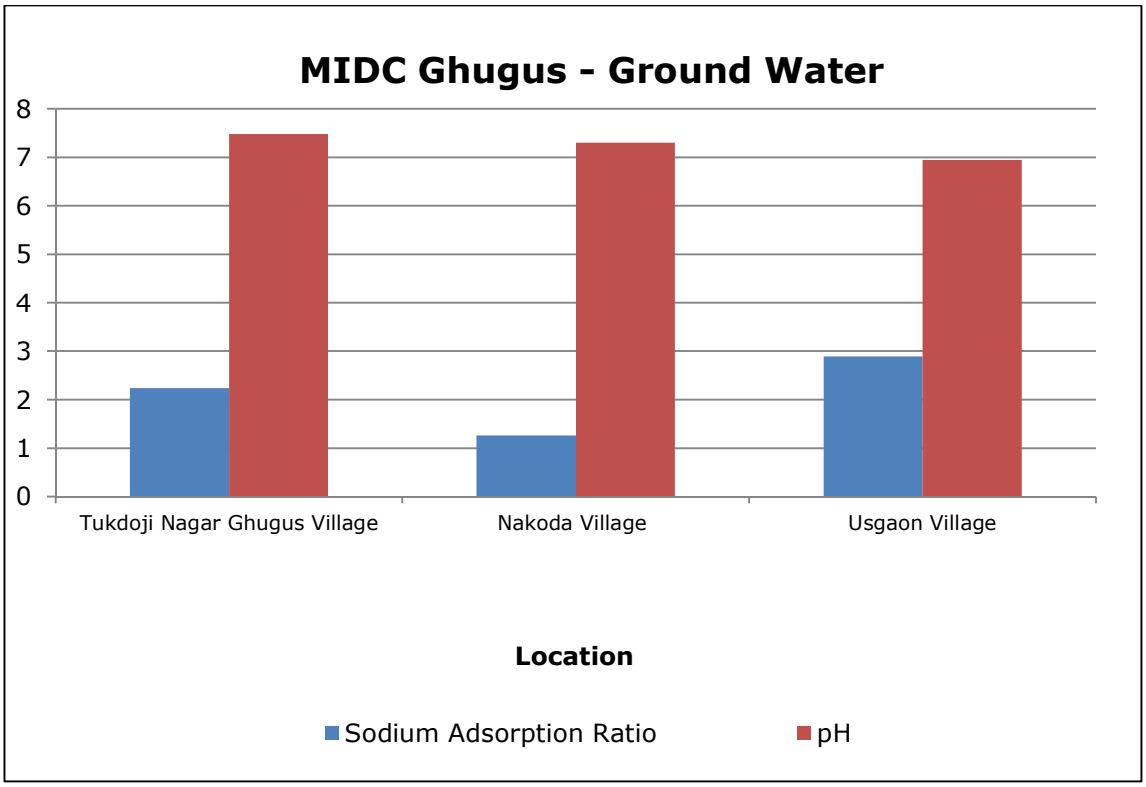
Parameters	Unit	Results		
		Tukdoji Nagar Ghugus Village (Hand Pump Water)	Nakoda Village (Bore Well Water)	Usgaon Village (Dug Well Water)
(NO_2+ NO_3)-Nitrogen	mg/L	1.94	1.57	10.88
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	0.26	0.25	0.36
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	1.20	0.80	1.87
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.49	0.30	0.44
Sodium Adsorption Ratio	-	2.24	1.26	2.89
Total Coliforms	MPN Index/ 100 ml	49	<1.8	1183
Faecal Coliforms	MPN Index/ 100 ml	<1.8	<1.8	743
Total Phosphate (as P)	mg/L	0.41	0.39	0.50
Total Kjeldahl Nitrogen (as N)	mg/L	0.56	0.56	0.93
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.13	0.36	0.13
Total Nitrogen	mg/L	2.14	1.42	11.83
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 (as 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	0.031	0.028	0.022
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	0.17	0.21
Iron (as Fe)	mg/L	0.49	0.23	0.17
Vanadium (as V)	mg/L	BLQ	BLQ	0.01
Selenium (as Se)	mg/L	0.01	0.01	0.01
Boron (as B)	mg/L	BLQ	BLQ	BLQ

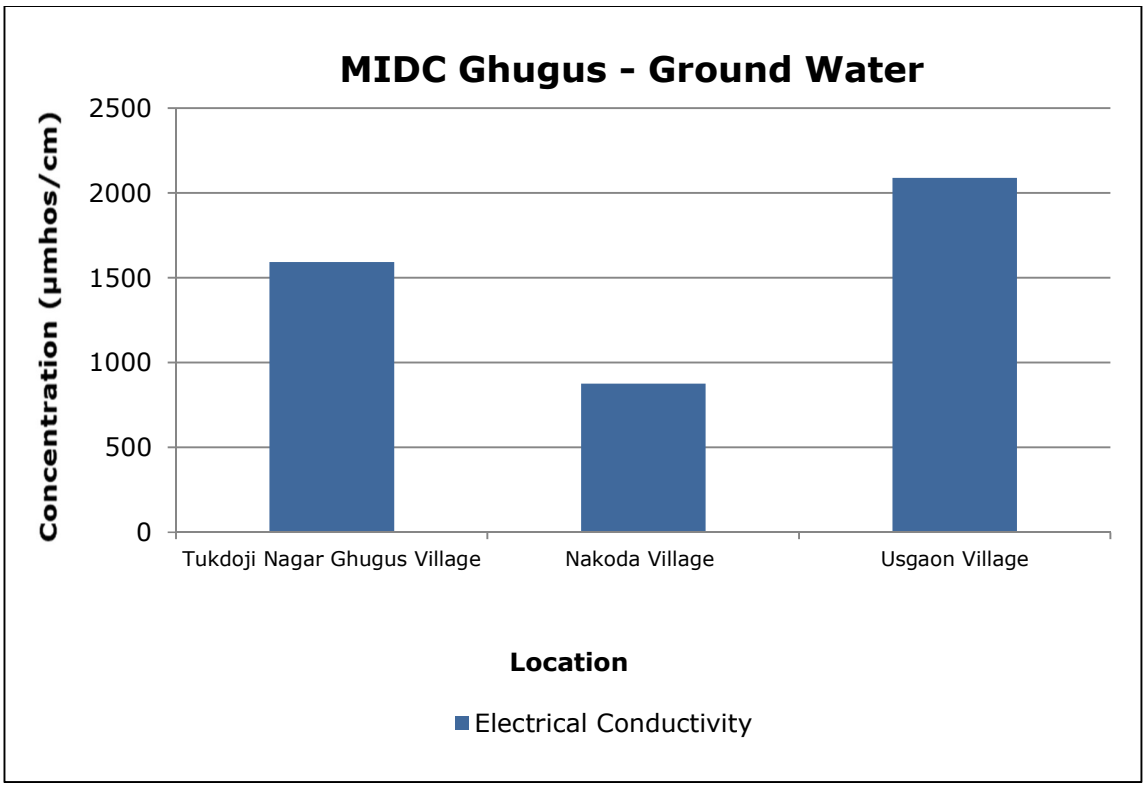
Parameters	Unit	Results		
		Tukdoji Nagar Ghugus Village (Hand Pump Water)	Nakoda Village (Bore Well Water)	Usgaon Village (Dug Well Water)
Bioassay Test on fish	% survival	100	100	100

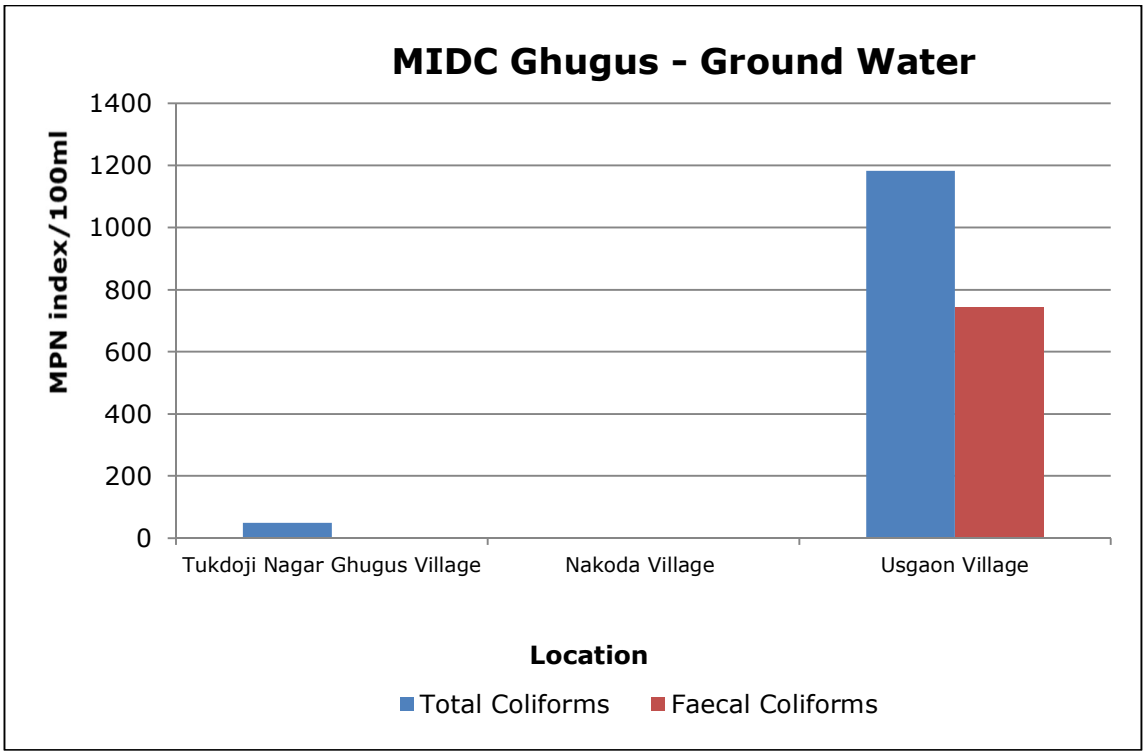
Graphs - Ground water Quality of MIDC Ghugus

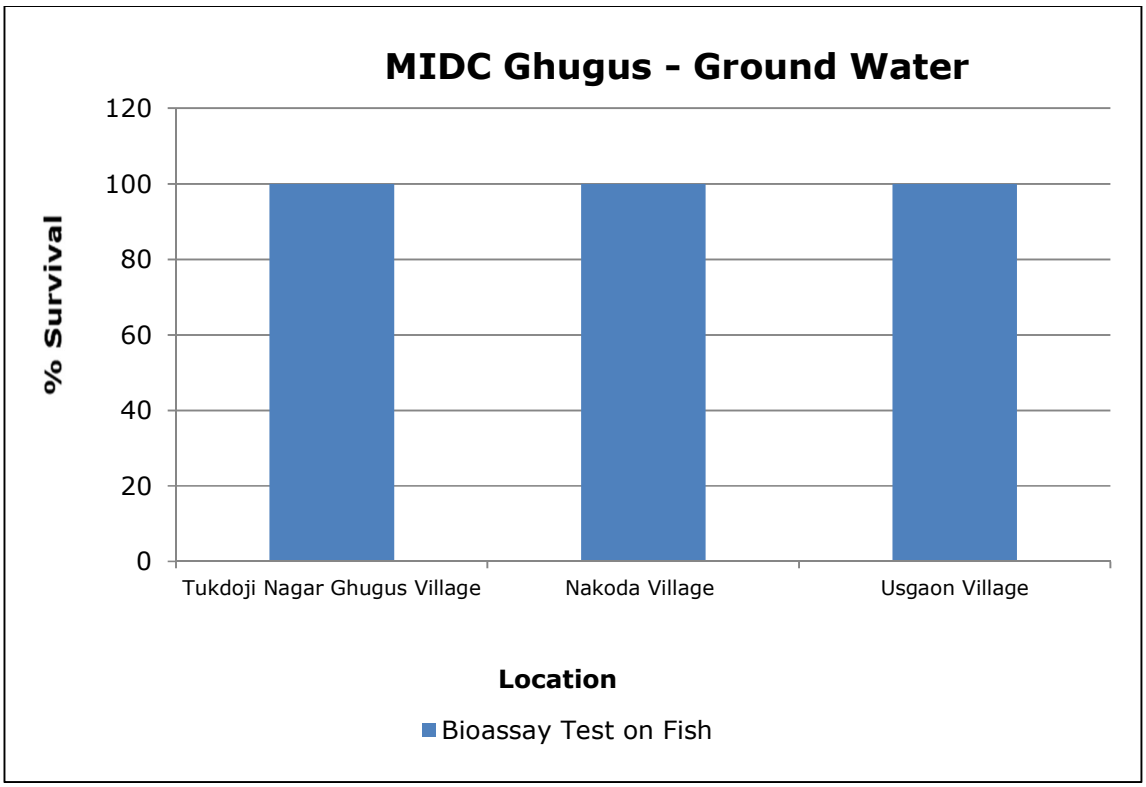



MIDC Ghugus - Ground Water
Concentration (mg/L)
1400
1200
1000
800
600
400
200
0
Tukdoji Nagar Ghugus Village
Nakoda Village
Usgaon Village
Location
TDS


MIDC Ghugus - Ground Water
8
7
6
5
4
3
2
1
0
Tukdoji Nagar Ghugus Village
Nakoda Village
Usgaon Village
Location
Sodium Adsorption Ratio
pH


MIDC Ghugus - Ground Water
Concentration (µmhos/cm)
2500
2000
1500
1000
500
0
Tukdoji Nagar Ghugus Village
Nakoda Village
Usgaon Village
Location
Electrical Conductivity


MIDC Ghugus - Ground Water
MPN index/100ml
1400
1200
1000
800
600
400
200
0
Tukdoji Nagar Ghugus Village
Nakoda Village
Usgaon Village
Location
Total Coliforms
Faecal Coliforms


MIDC Ghugus - Ground Water
120
100
80
60
40
20
0
% Survival
Tukdoji Nagar Ghugus Village
Nakoda Village
Usgaon Village
Location
Bioassay Test on Fish

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

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

Table 7.7 MIDC Ballarpur – 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.	Gramin Rugnalaya (Bore Well Water)	19°51'11.6"N	79°20'58.0"E	23.05.2023	25.05.2023	27.05.2023
2.	Near Fire Station (Bore Well Water)	19°51'11.8"N	79°20'45.8"E	23.05.2023	25.05.2023	27.05.2023
3.	Visapur Village (Bore well Water)	19°53'13.7"N	79°19'49.7"E	23.05.2023	25.05.2023	27.05.2023

Fig. Geographical Locations of Ground Water Sampling MIDC Ballarpur

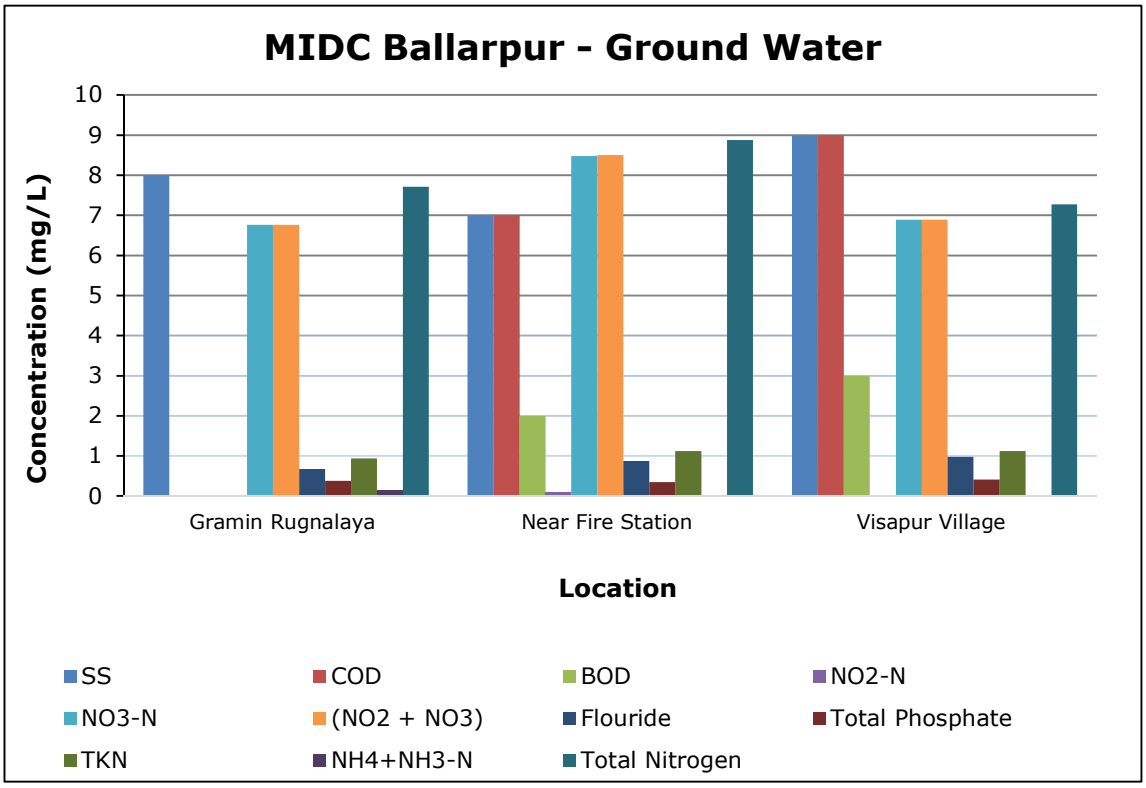
Table 7.8 MIDC Ballarpur – Details of Sampling Location of Ground Water

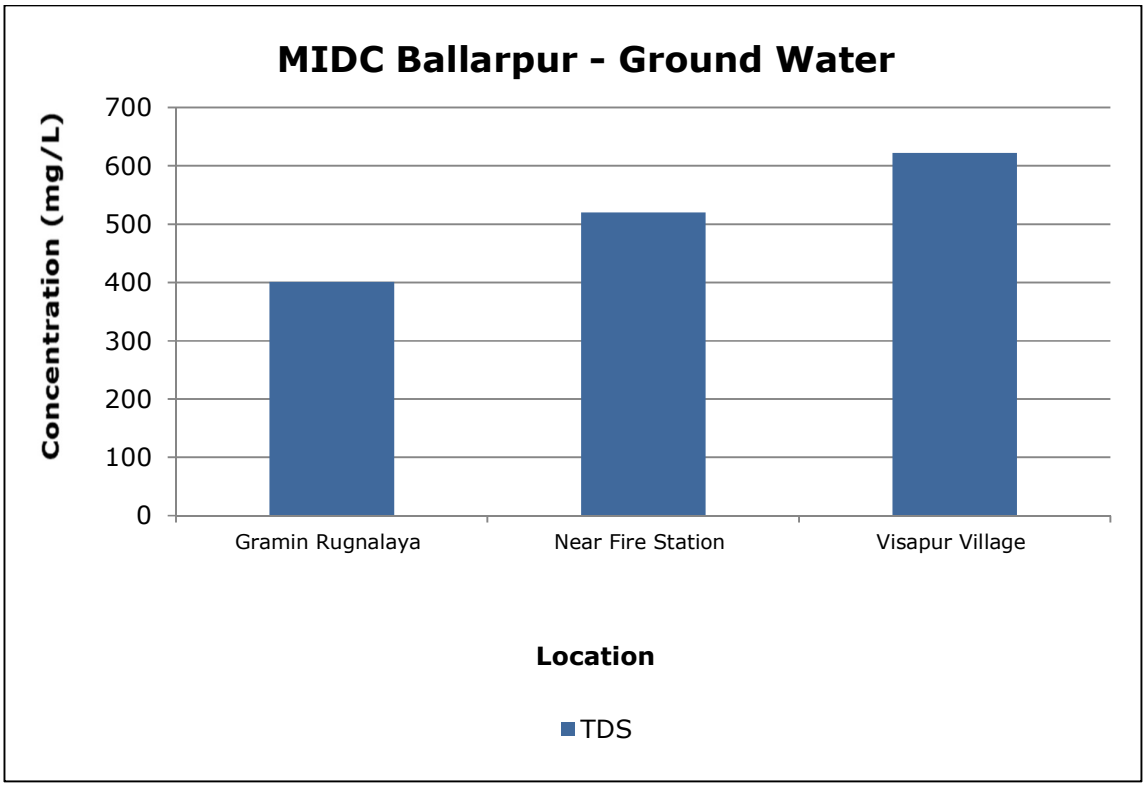
Parameters	Unit	Results		
		Gramin Rugnalaya (Bore Well Water)	Near Fire Station (Bore Well Water)	Visapur Village (Bore well Water)
Sanitary Survey	-	Very Clean neighbourhood and catchment	Very Clean neighbourhood and catchment	Very Clean neighbourhood and catchment
General Appearance	-	No floating matter	No floating matter	No floating matter
Transparency	m	Not Applicable	Not Applicable	Not Applicable
Temperature	^{o}C	26	27	26
Colour	Hazen	1	1	1
Odour	-	Agreeable	Agreeable	Agreeable
pH	-	7.07	7.27	6.93
Oil & Grease	mg/L	BLQ	BLQ	BLQ
Total Suspended Solids	mg/L	8	7	9
Total Dissolved Solids	mg/L	401	520	622
Chemical Oxygen Demand	mg/L	BLQ	7	9
Biochemical Oxygen Demand (3 days, 27^{o}C)	mg/L	BLQ	2	3
Electrical Conductivity (at 25^{o}C)	µmhos/cm	715	928	1110
Nitrite Nitrogen	mg/L	BLQ	0.08	BLQ
Nitrate Nitrogen	mg/L	6.76	8.47	6.89

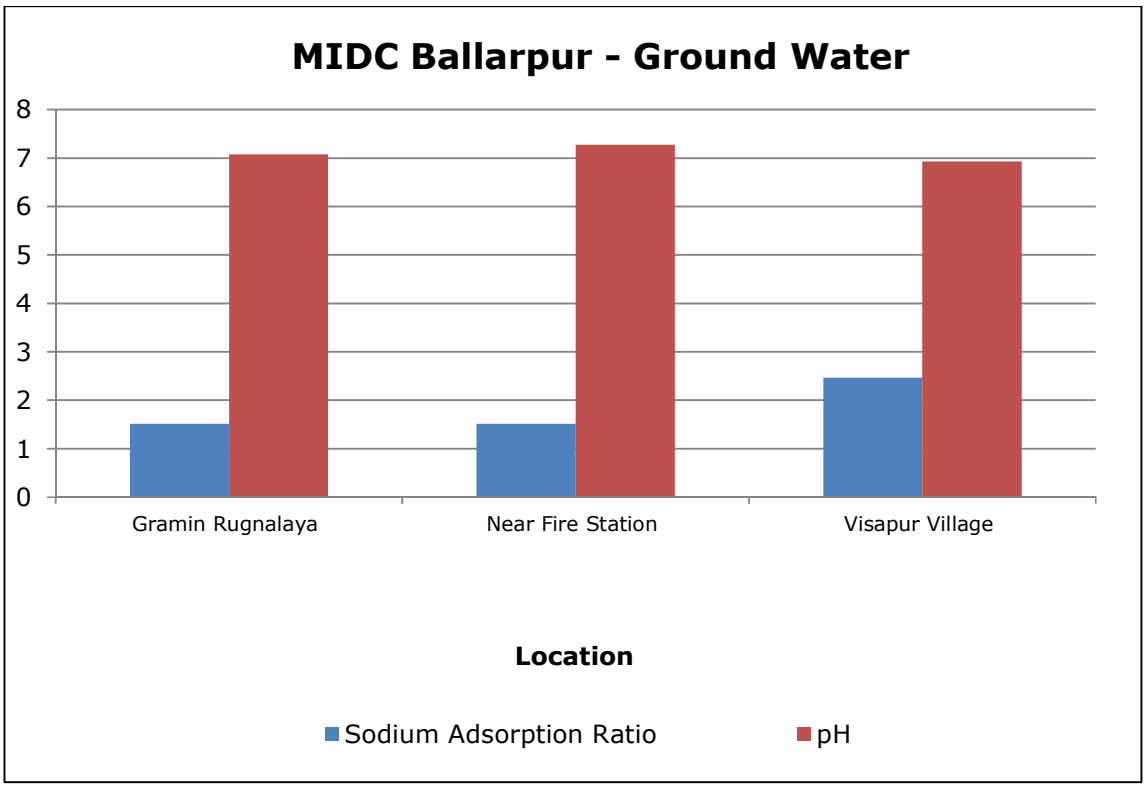
Parameters	Unit	Results		
		Gramin Rugnalaya (Bore Well Water)	Near Fire Station (Bore Well Water)	Visapur Village (Bore well Water)
(NO_2+ NO_3)-Nitrogen	mg/L	6.76	8.50	6.89
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	0.35	0.25	0.23
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	0.67	0.87	0.97
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	0.18	0.27	0.35
Sodium Adsorption Ratio	-	1.52	1.52	2.47
Total Coliforms	MPN Index/ 100 ml	211	920	376
Faecal Coliforms	MPN Index/ 100 ml	179	191	18
Total Phosphate (as P)	mg/L	0.38	0.34	0.41
Total Kjeldahl Nitrogen (as N)	mg/L	0.93	1.12	1.12
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.135	BLQ	BLQ
Total Nitrogen	mg/L	7.71	8.88	7.27
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 (as 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	0.01	0.034	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	0.16	0.43	0.04
Iron (as Fe)	mg/L	0.48	1.13	0.27
Vanadium (as V)	mg/L	0.02	0.02	0.02
Selenium (as Se)	mg/L	0.01	BLQ	0.01
Boron (as B)	mg/L	BLQ	BLQ	0.11

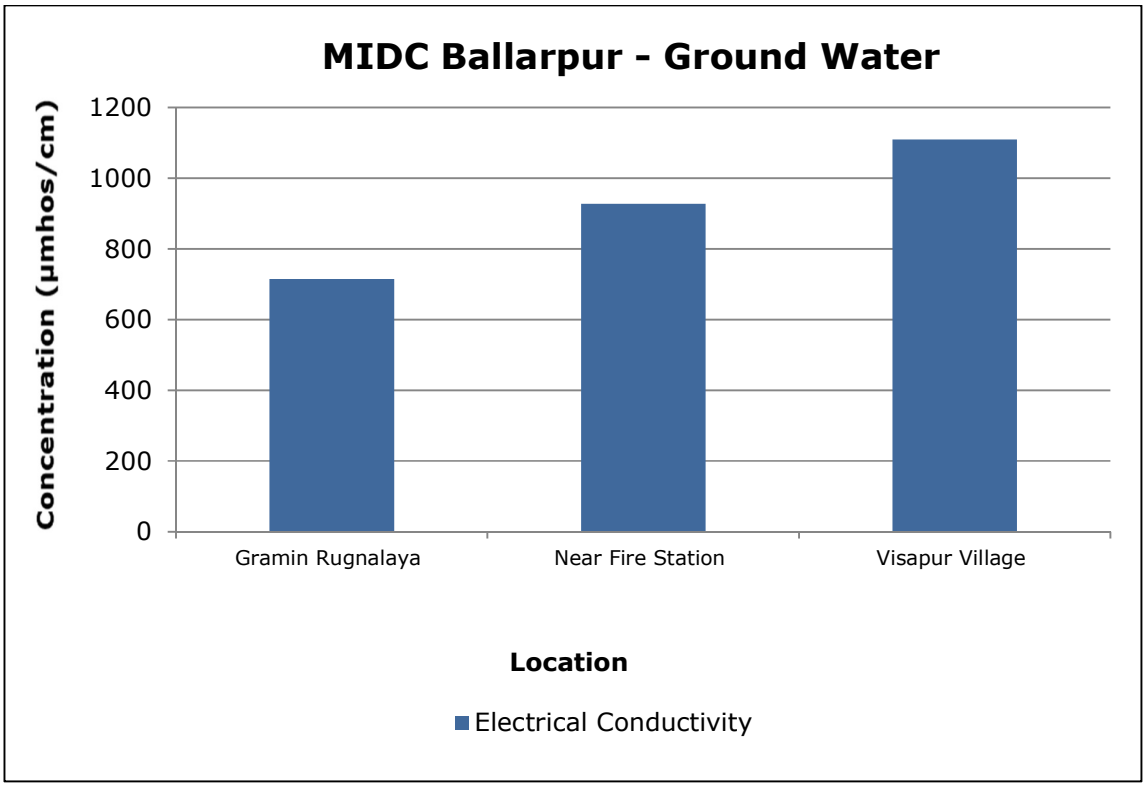
Parameters	Unit	Results		
		Gramin Rugnalaya (Bore Well Water)	Near Fire Station (Bore Well Water)	Visapur Village (Bore well Water)
Bioassay Test on fish	% survival	100	100	100

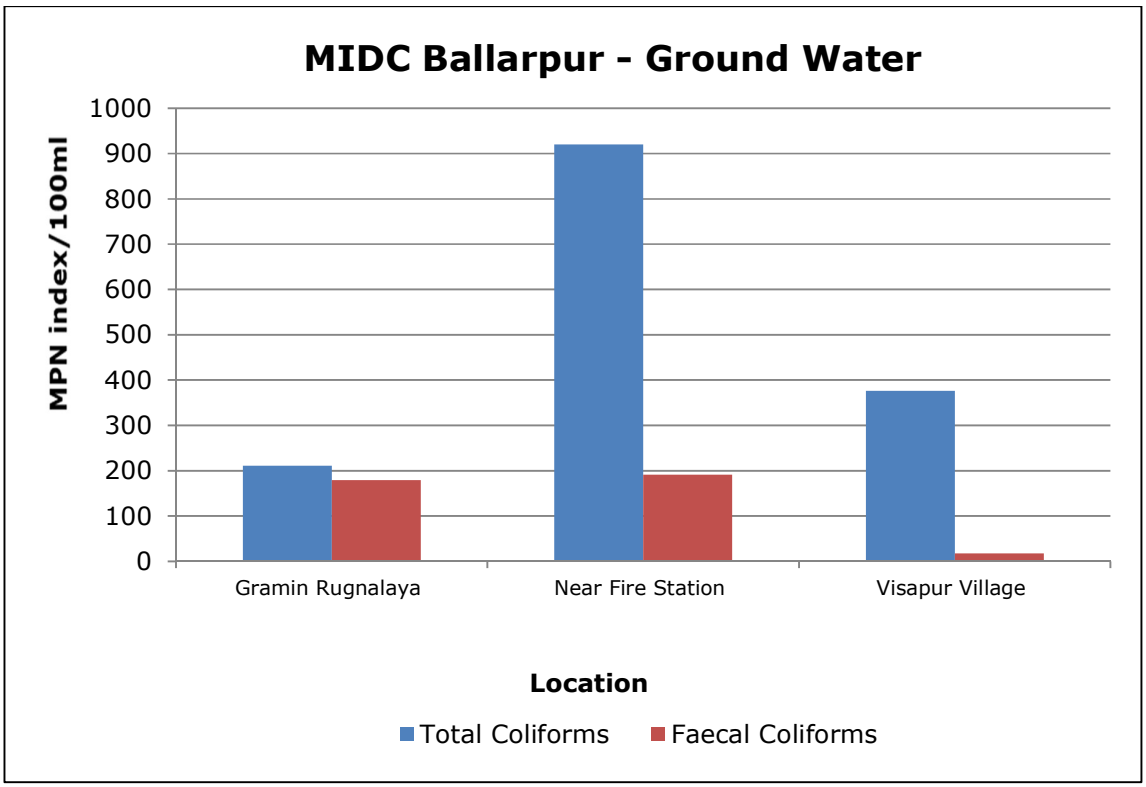
Graphs - Ground water Quality of MIDC Ballarpur

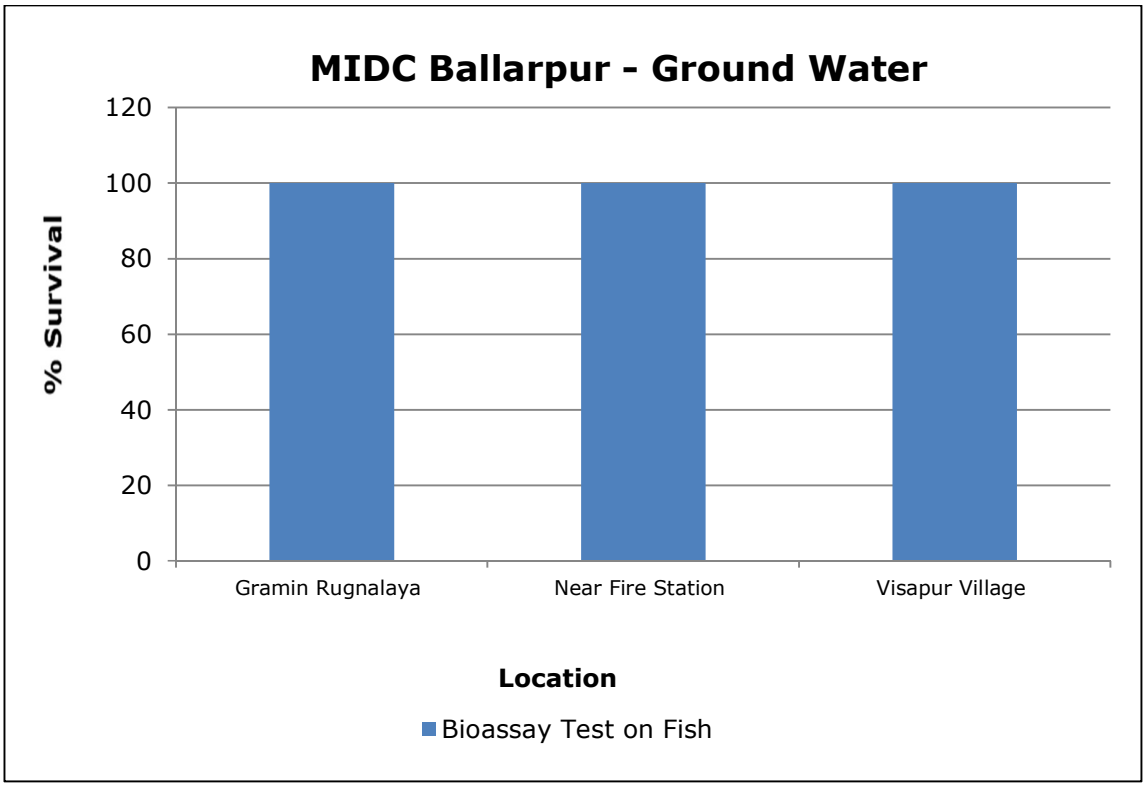



MIDC Ballarpur - Ground Water
Concentration (mg/L)
700
600
500
400
300
200
100
0
Gramin Rugnalaya
Near Fire Station
Visapur Village
Location
TDS


MIDC Ballarpur - Ground Water
8
7
6
5
4
3
2
1
0
Gramin Rugnalaya
Near Fire Station
Visapur Village
Location
Sodium Adsorption Ratio
pH


MIDC Ballarpur - Ground Water
Concentration (µmhos/cm)
1200
1000
800
600
400
200
0
Gramin Rugnalaya
Near Fire Station
Visapur Village
Location
Electrical Conductivity


MIDC Ballarpur - Ground Water
MPN index/100ml
1000
900
800
700
600
500
400
300
200
100
0
Gramin Rugnalaya
Near Fire Station
Visapur Village
Location
Total Coliforms
Faecal Coliforms


MIDC Ballarpur - Ground Water
120
100
80
60
40
20
0
% Survival
Gramin Rugnalaya
Near Fire Station
Visapur Village
Location
Bioassay Test on Fish

C: Receptor

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

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

Annexure – I Health Related Data enclosed.

9. CEPI Score

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

Table 8.1 CEPI score of the Pre monsoon season 2023

	A1	A2	A	B	C	D	CEPI
Air Index	2.75	2.5	6.875	0	10	10	**26.88**
Water Index	1.5	2.5	3.75	28	10	10	**51.75**
Land Index	3.25	2.5	8.125	32.75	10	10	**60.88**
						Aggregated CEPI	**66.32**

Water Index is highest with 51.75. The reason for increase in Water index is due to the exceedance of concentration of Total Phosphate which has exceeded at 11 samples out of 17 samples collected. The Land EPI is 60.88 and the concentration of and Air EPI is 26.88 and the concentration of Total Phosphate is high.

Table 8.2 Comparison of CEPI Scores

	Air Index	Water Index	Land Index	CEPI
CEPI score June 2023	26.88	51.75	60.88	**66.32**
CEPI score March 2023	38.10	59.30	41.90	**65.76**
CEPI score June 2021	22.00	57.30	59.00	**64.20**
CEPI Score March 2021	54.30	43.50	42.30	**62.70**
CEPI score March 2020	65.00	22.00	21.00	**66.60**
CEPI score June 2019	37.07	51.10	54.40	**54.56**
CEPI score March 2019	44.50	48.90	47.10	**57.28**
CEPI score June 2018	41.32	40.58	44.36	**51.88**
CEPI score March 2018	46.80	49.20	56.90	**61.69**

CPCB CEPI score March 2018	75.00	23.75	23.75	**76.41**

The result shows that CEPI score of the present report is 66.32. The present study is the compilation of pre monsoon season, which also affects the score value. This time CEPI is observed lower than the CPCB CEPI score March 2018 which was 76.41.

CEPI score calculation:

Ambient Air Analysis Report

Pollutant	Group	A1	A2	A (A1 X A2)
PM10	B	2	Moderate	
PM2.5	B	0.5		
SO_2	A	0.25		
		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}	66.00	100	0.66	0	16	0.00	L	0
$PM_{2.5}$	17.44	60	0.29	0	16	0.00	L	0
SO_2	11.96	80	0.15	0	16	0.00	L	0
B score = (B1+B2+B3)							**B**	**0**

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

Air CEPI Score	**(A+B+C+D)**	**36.88**

Water Quality Analysis Report

Pollutant	Group	A1	A2	A (A1 X A2)
TP	A	1	Moderate	
TDS	A	0.25		
Zn	A	0.25		
		1.5	**2.5**	**6.25**

Pollutant	Avg (1)	Std (2)	EF (3) [(3)=(1)/(2)]	No. of samples Exceeding (4)	Total no. of samples (5)	SNLF Value (6) [(6)=(4)/(5) x(3)]	SNLF score (B)	
TP	0.45	0.3	1.50	11	17	0.97	C	22.5
TDS	778.00	2000	0.39	1	17	0.02	H	2.75
Zn	0.06	0.3	0.20	1	17	0.01	M	2.75
B score = (B1+B2+B3)							**B**	**28**

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

Water CEPI Score	**(A+B+C+D)**	**51.75**

Ground Water Quality Analysis Report

Pollutant	Group	A1	A2	A (A1 X A2)
TP	B	2	Moderate	
Hg	C	1		
TDS	A	0.25		
		3.25	**2.5**	**8.175**

Pollutant	Avg (1)	Std (2)	EF (3) [(3)=(1)/(2)]	No. of samples Exceeding (4)	Total no. of samples (5)	SNLF Value (6) [(6)=(4)/(5) x(3)]	SNLF score (B)	
TP	0.50	0.3	1.67	11	12	1.53	C	30
Hg	0.00	0.001	0.00	0	12	0.00	L	0
TDS	976.58	2000	0.49	1	12	0.04	M	2.75
B score = (B1+B2+B3)							**B**	**32.75**

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

Land CEPI Score	**(A+B+C+D)**	**60.88**

Land CEPI Score (im) **60.88**

Water CEPI Score (i2) **51.75**

Air CEPI Score (i3) **26.88**

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 = **66.32**

10. Conclusion

Ambient Air Quality

- The AAQ stations were identified in the CEPI impact area to cover both upwind and cross wind directions and AAQ survey was conducted.
- All 12 parameters are well within the limits as per NAAQS at all locations.
- In the CEPI score calculated for Air Environment by CPCB in March 2018 also PM_{10}, $PM_{2.5}$ and Benzene have exceeded which may also be due to the vehicular emissions.

Surface Water Quality

- Higher concentration of Total phosphates was observed in the surface water samples collected which may be due to domestic wastewater, sewerage, other localized activities.
- All the industries in Chandrapur region are either reusing the treated trade effluent as sewage in their process or gardening or are disposed into Sea.

Ground Water Quality

- Ground water samples were collected from different Dug well, well and Bore well in the region.
- Higher concentration of Total phosphates was observed in the ground water samples collected.
- Mainly through agricultural processes the ground water contamination is happening.
- In the CEPI score calculated for Land Environment by CPCB in March 2018 also there is no critical pollutant exceeding in any water sample collected.

CEPI Score

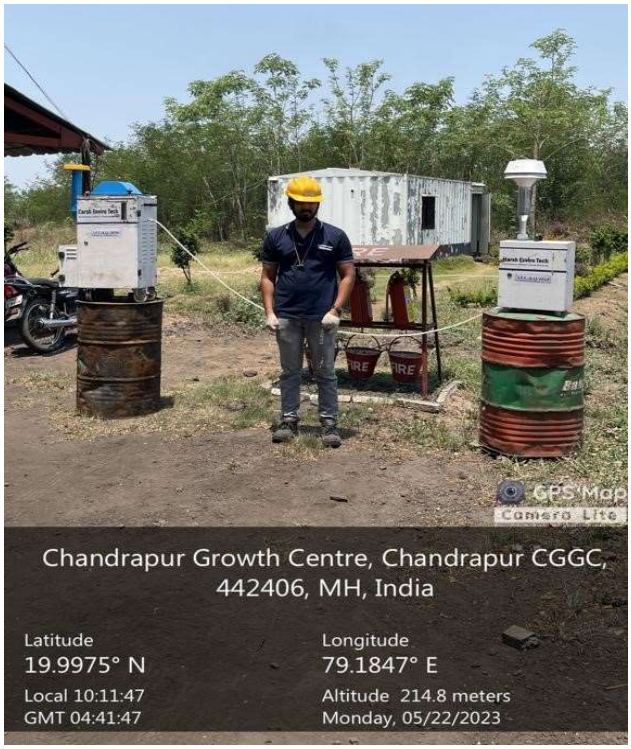
- The CEPI Score pre monsoon season is 66.32.
- When CEPI Score is 65.76 of March 2023 is compared, a decrease in the Air Index and Water Index an increase in the Land index are found to get increased in June 2023.
- Collective efforts of MPCB, administration and environmental organizations have finally paid off and pollution levels in Chandrapur are on the decline.
- An effort taken to reduce the pollution level is represented in factor D in CEPI Calculation, which also affects the overall CEPI score.
- The present study is the compilation of pre monsoon season, which results in dilution of environmental samples resulting in lower pollution load, hence also affects the total score.

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

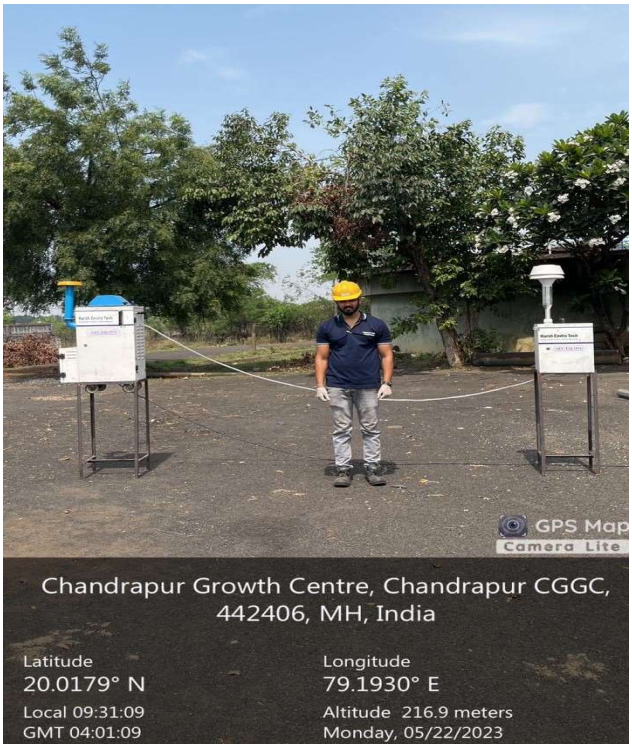
- Drive against open burning of bio-mass, crop residue, garbage, leaves, etc. Awareness programme/campaign conducted regularly during World Environment Day.
- **Waste collection and segregation centres**:
  - ✓ **Domestic Solid Waste**: CCMC has provided waste collection and segregation facility at source for residential areas.
  - ✓ **Industrial Non-Hazardous Waste:** Recyclable waste is sent to authorized waste recycler and other waste collected by corporation.
  - ✓ **Hazardous waste:** Industrial hazardous waste is sent to common hazardous treatment and disposal facility by industries.
- **Installation of CEMS installed for Air and Water in Large and Medium scale RED category industries**: All large and medium scale 10 nos. of red category industries of CEPI Area have installed CEMS for air monitoring.
- Arrangement of scientific collection and treatment of sewage generated: CCMC has constructed sewer line of 141 km in Chandrapur city for collection of entire sewage generated in Chandrapur city. Remaining work of 36 km is under progress.
- Installation of CAAQMS station: CAAQMS is installed at 02 locations namely at Udyog Bhavan and at MIDC Chandrapur.
- Establishment of monitoring stations under National Water Quality Monitoring Programme (NWMP): There are 5 NWMP stations in critically polluted area of Chandrapur namely at Wardha River upstream of AAC Ghuggus, Wardha river downstream of ACC Ghuggus, Wardha river at Rajura bridge, upstream of Erai river and downstream of Erai river.
- Steps are taken for industrial area/other units to recycle 100% treated effluent to achieve zero liquid discharge (ZLD): M/s Multi Organics Pvt.Ltd. has provided ZLD system for recycling of entire treated effluent into the process.
- Steps taken to reduce dust emission: All the industries in Chandrapur CEPI area has installed adequate air pollution control systems for dust suppression inside the plant periphery. WCL mines have installed water sprinklers and mist type fogging systems for dust suppression in mine areas.
- Tree plantation in last one year (2021-2022): 20000 approximately.
- Other initiatives taken to control and reduce pollution in air, surface water and groundwater in last one year (2021-2022):
  a) Regular cleaning of roads, traffic diversion and signals shall be installed by corporation.
  b) Road sweeping machine provided.
  c) Tree plantation drive in nearby MIDC areas.
  d) Continuous Ambient Air Monitoring Mobile Van provided for monitoring of air quality in around Chandrapur industrial areas.
  e) Cleaning and deepening of Ramala Lake & Erai River.
  f) Installation of display boards at prominent locations for creating awareness regarding air pollution in the city.

	
Continuous Ambient Air Quality Monitoring Station	**Ambient Air Quality Monitoring Van**

12. Photographs



MIDC Tadali-Ambient Air Sampling at Near Chaman Metallic Boundary Wall

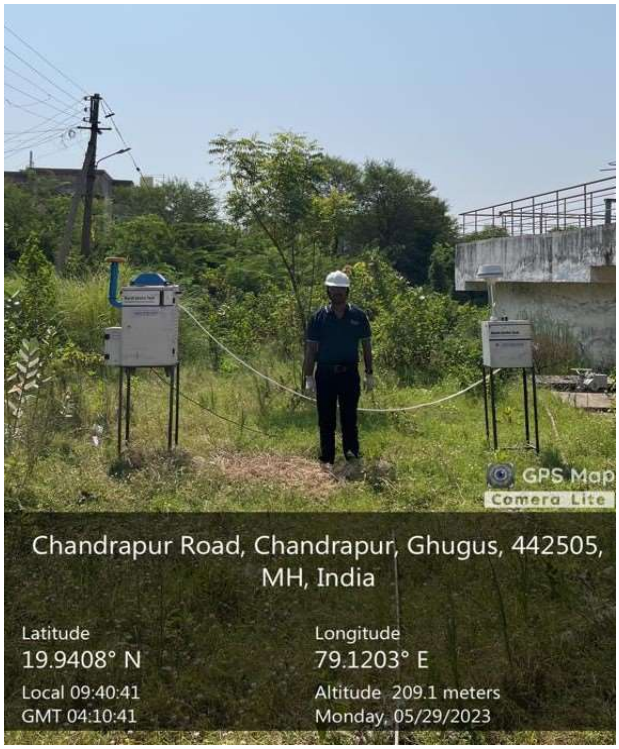


MIDC Tadali-Ambient Air Sampling at MIDC WTP Building

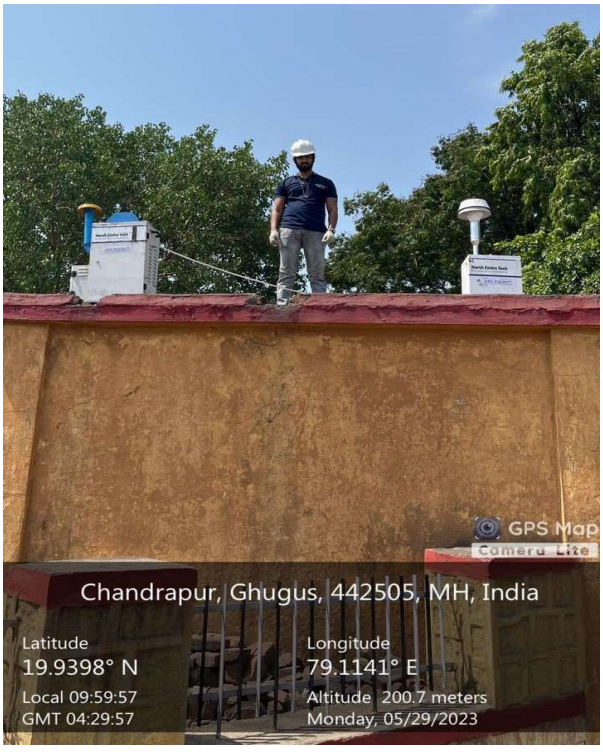
MIDC Chandrapur - Ambient Air Sampling at Opposite Super Hygienic CBMW Site

MIDC Chandrapur - Ambient Air Sampling at Multi Organics

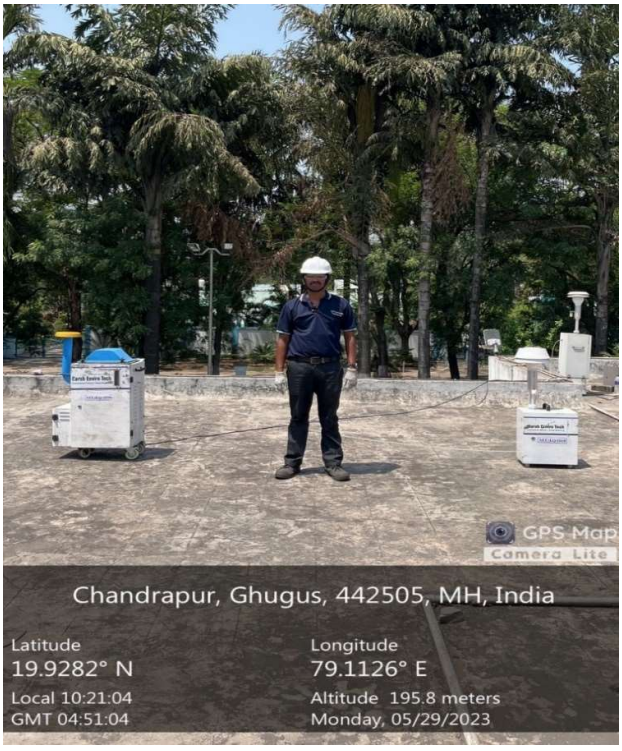
MIDC Ghugus - Ambient Air Sampling at Terrace of Transit Hostel Rajiv Colony WCL



MIDC Ghugus - Ambient Air Sampling at WTP Water Supply Tank



MIDC Ghugus - Ambient Air Sampling at (NAMP) Near Gram Panchayat

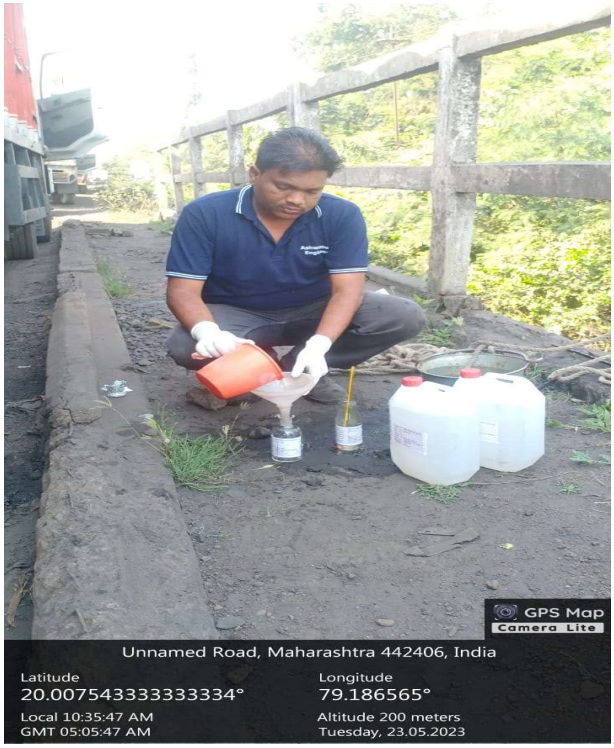


MIDC Ghugus - Ambient Air Sampling at Guest House of ACC Cement

MIDC Ballarpur - Ambient Air Sampling at WCL Office, Ballarpur on Sasti Road

MIDC Ballarpur - Ambient Air Sampling at Estate Office, BILT Colony

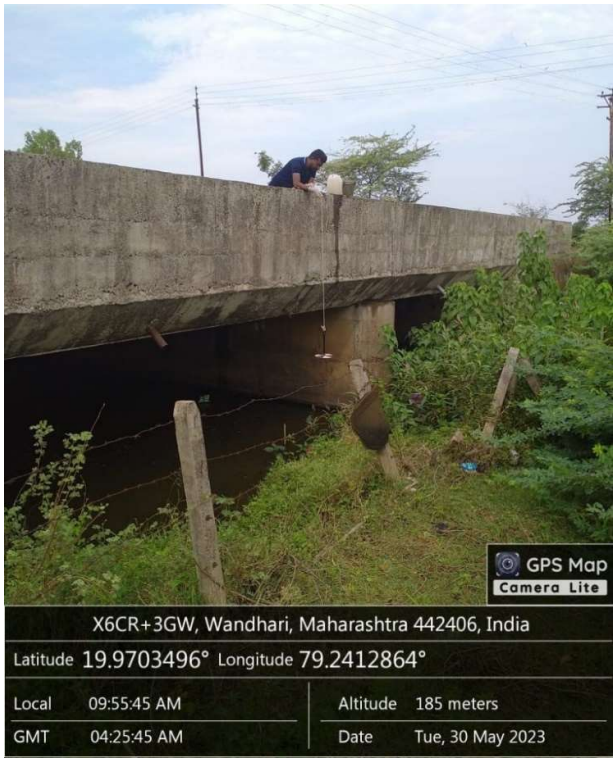
MIDC Tadali – Surface Water Sampling at Tadali Village Lake



MIDC Tadali – Surface Water Sampling at Nallah adjacent to Grace Industries

MIDC Tadali – Surface Water Sampling at Raw Water of MIDC WTP

MIDC Chadrapur – Surface Water Sampling at Nallah Opposite Manidhari Industry



MIDC Chadrapur – Surface Water Sampling at Nallah Near Gagangiri Village

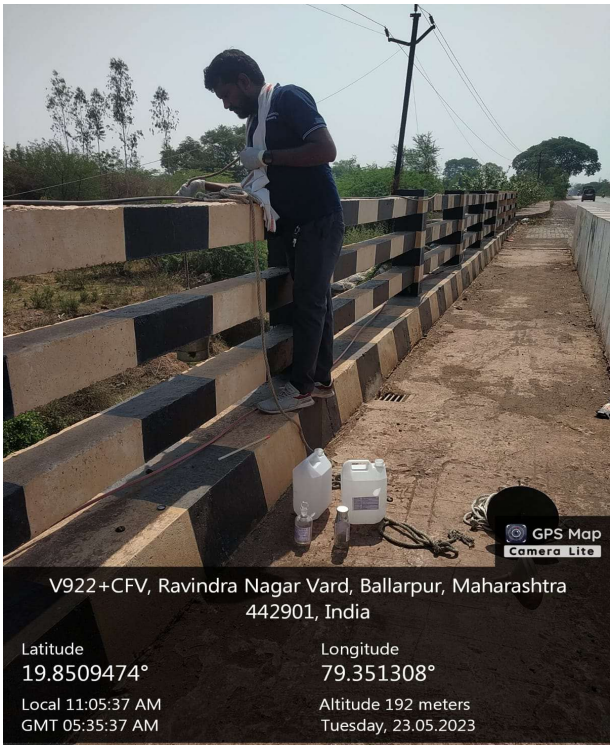
MIDC Chadrapur – Surface Water Sampling at Nallah at Dhanora Bridge

MIDC Ghugus – Surface Water Sampling at Wardha river Near WCL WTP Ghugus OCM

MIDC Ghugus – Surface Water Sampling at Domestic Effluent Nallah Near lokhandi bridge at WTP of Ghugus OCM

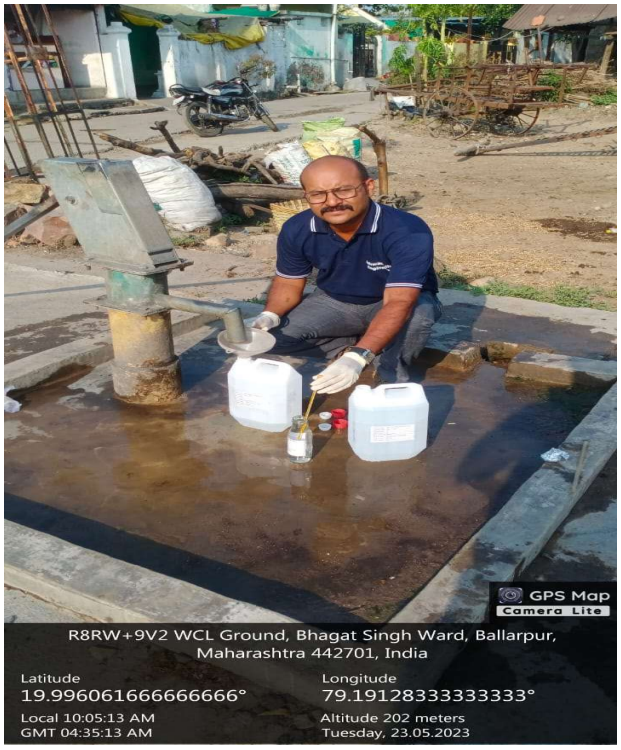
MIDC Ghugus – Surface Water Sampling at (NWMP) Wardha River behind ACC plant

MIDC Ballarpur – Surface Water Sampling at Nallah Near Petrol Pump at Ballarpur Bamni Road

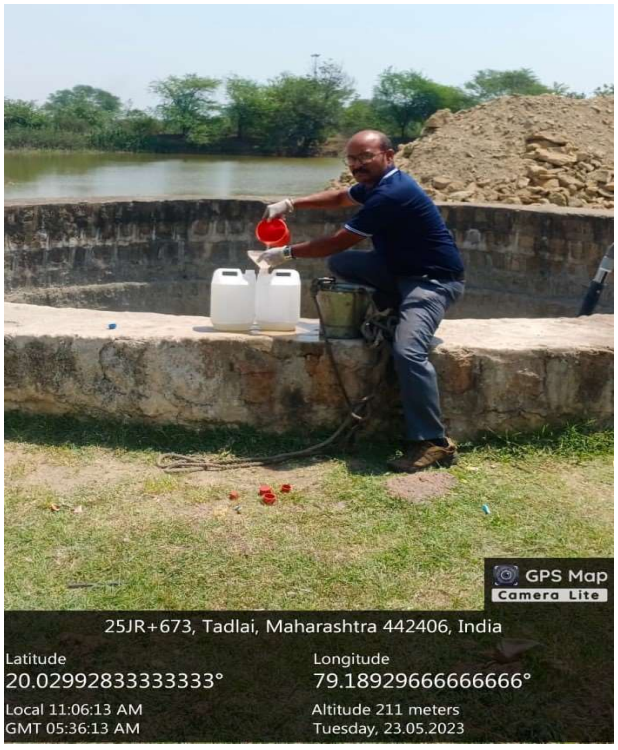


MIDC Ballarpur – Surface Water Sampling at Bagirathi Nallah Bridge, Gondpipari Road, Near Bamni Proteins

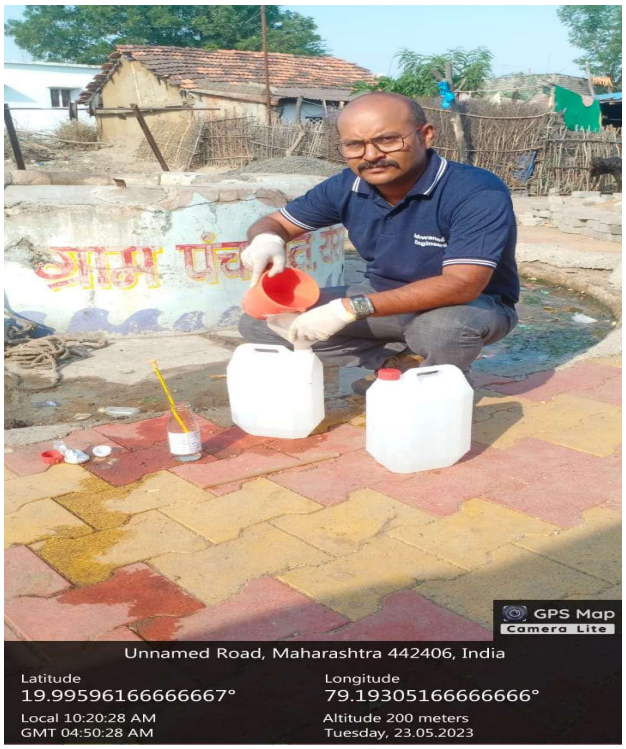
MIDC Ballarpur – Surface Water Sampling at Wardha River upstream



MIDC Tadali – Ground Water Sampling at Yerur village (Bore well water)

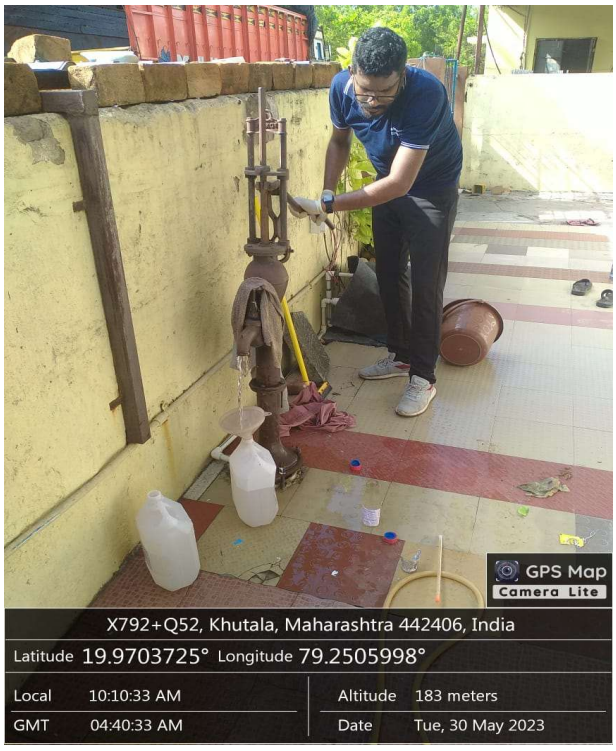


MIDC Tadali – Ground Water Sampling at Near Tadali Lake Janata School (Dug well water)



MIDC Tadali – Ground Water Sampling at Yerur Village (Dug well Water)

MIDC Chandrapur – Ground Water Sampling at Gagangiri Village (Dug well Water)



MIDC Chandrapur – Ground Water Sampling at Mahada Colony (Hand Pump water)

MIDC Chandrapur – Ground Water Sampling at Near Datala Grampanchayat (Hand Pump water)

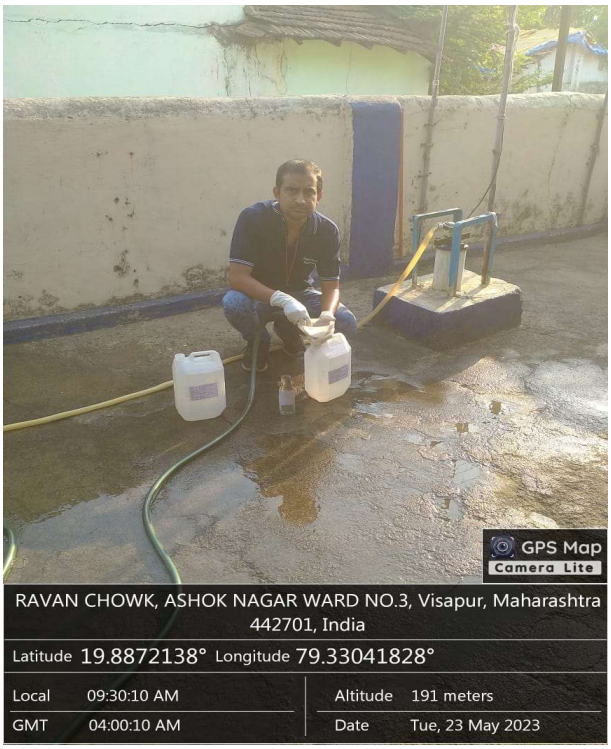
MIDC Ghugus – Ground Water Sampling at Tukdoji Nagar Ghugus Village (Hand Pump Water)

MIDC Ghugus – Ground Water Sampling at Nakoda Village (Bore Well Water)

MIDC Ghugus – Ground Water Sampling at Usgaon Village (Dug Well Water)

MIDC Ballarpur – Ground Water Sampling at Gramin Rugnalaya (Bore Well Water)

MIDC Ballarpur – Ground Water Sampling at Near Fire Station (Bore Well Water)



MIDC Ballarpur – Ground Water Sampling at Visapur Village (Bore well Water)

HEALTH STATISTICS

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

Name of the Polluted Industrial Area (PIA)	CHANDRAPUR
Name of the major health center/ organization	BILT Hospital
Name and designation of the Contact person	
Address	Ballarpur, Tal. Ballarpur, Dist. Chandrapur

S No.	Diseases	No. of Patients Reported	
		2022 (Jan-Dec)	2021 (Jan-Dec)
AIRBORNE DISEASES			
1.	Asthma	1	2
2.	Acute Respiratory Infection	55	63
3.	Bronchitis	8	6
4.	Cancer	Nil	Nil
WATERBORNE DISEASES			
1.	Gastroenteritis	26	30
2.	Diarrhea	45	60
3.	Renal diseases	Nil	Nil
4.	Cancer	Nil	Nil

Date: 11/1/2023

Signature

Dr. Rupali R. Yadav
MBBS (Mum.), MD (Anatomy)
R. No. 2001020497
AFIH (Industrial Health)
Lady Medical Officer
BGPPL Hospital, Ballarpur

HEALTH STATISTICS

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

Name of the Polluted Industrial Area (PIA)	CHANDRAPUR
Name of the major health center/ organization	CHL Multi-Specialty Hospital & Research Center
Name and designation of the Contact person	Dr. Rohan V. Ainchwar.
Address	Opposite Adarsh Petrol Pump, Sarkar Nagar, Mul Road, Chandrapur, Tal. Dist. Chandrapur

S No.	Diseases	No. of Patients Reported	
		2022 (Jan-Dec)	2021 (Jan-Dec)
AIRBORNE DISEASES			
1.	Asthma	124	122
2.	Acute Respiratory Infection	1080	1070
3.	Bronchitis	150	130
4.	Cancer	30	20
WATERBORNE DISEASES			
1.	Gastroenteritis	90	80
2.	Diarrhea	95	82
3.	Renal diseases	40	30
4.	Cancer	20	15

Date: 24/01/2023

Signature

CHL MULTISPECIALITY HOSPITAL & RESEARCH CENTRE Reg. 132

HEALTH STATISTICS

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

Name of the Polluted Industrial Area (PIA)	CHANDRAPUR
Name of the major health center/ organization	Government Medical College
Name and designation of the Contact person	
Address	Ramnagar, T. B. Hospital Premises, In front of Dr. Ambedkar College, Tal. Dist. Chandrapur-442401

S No.	Diseases	No. of Patients Reported	
		2022 (Jan-Dec)	2021 (Jan-Dec)
AIRBORNE DISEASES			
1.	Asthma	521	236
2.	Acute Respiratory Infection	5371	1255
3.	Bronchitis	534	202
4.	Cancer	133	79
WATERBORNE DISEASES			
1.	Gastroenteritis	1500	1041
2.	Diarrhea	573	421
3.	Renal diseases	5567	3354
4.	Cancer (double entry)	133	79

Date:

Signature

Medical Superintendent
Govt. Medical College & Hospital
Chandrapur.

Dhadaskar
25/11/23

अधिसेविका
शासकीय वैद्यकीय महाविद्यालय व रुग्णालय
चंद्रपूर

HEALTH STATISTICS

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

Name of the Polluted Industrial Area (PIA)	CHANDRAPUR
Name of the major health center/ organization	Rural Hospital Ballarpur
Name and designation of the Contact person	
Address	Ballarpur, Tal. Ballarpur, Dist. Chandrapur

S No.	Diseases	No. of Patients Reported	
		2022 (Jan-Dec)	2021 (Jan-Dec)
AIRBORNE DISEASES			
1.	Asthma	35	32
2.	Acute Respiratory Infection	44	40
3.	Bronchitis	23	19
4.	Cancer	0	0
WATERBORNE DISEASES			
1.	Gastroenteritis	147	219
2.	Diarrhea	41	30
3.	Renal diseases	0	0
4.	Cancer	0	0

Date: 16/1/2023

Signature

Medical Officer
Rural Hospital, Ballarpur

HEALTH STATISTICS

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

Name Of the Polluted Industrial Area (PIA)	CHANDRAPUR
Name of the Major health Center / Organization	Rajiv Ratan Hospital
Name and Designation of the contact Person	Dr. D.C. Anand (CMO)
Address	WCL, Wani Area , Po.Ghugus Tal . Dist Chandrapur

S.No.	Diseases	No. of Patients Reported	
		2022 (Jan-Dec)	2021 (Jan-Dec)
AIRBORNE DISEASES			
1.	Asthma	25	20
2.	Acute Respiratory Infection	63	72
3.	Bronchitis	980	755
4.	Cancer	0	0
WATERBORNE DISEASES			
1.	Gastroenteritis	45	32
2.	Diarrhea	80	154
3.	Renal Diseases	16	14
4.	Cancer	0	0

Date :

राजीव रतन केंद्रीय चिकित्सालय, घुग्घुस
Rajiv Ratan Central Hospital, Ghugus
03
22/1/23

Signature

क्षेत्रीय चिकित्सा अधिकारी
Area Medical Officer
राजीव रतन केंद्रीय चिकित्सालय वणी क्षेत्र
Rajiv Ratan Central Hospital Wani Area