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

Tarapur

Post-Monsoon (December 2023 to February 2024)

Maharashtra Pollution Control Board

Kalptaru Point, Sion East, Mumbai – 400 022

Index

ABBREVIATIONS

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

1. Executive Summary

Tarapur was monitored for Ambient Air Quality, Ground and Surface Water quality. Based on the data collected by monitoring, a Comprehensive Environmental Pollution Index (CEPI) Score [as per latest directions 120 of Letter No. B-29012/ESS (CPA)/2015-16 dated 26th April 2016 of Central Pollution Control Board (CPCB)] was calculated. Maharashtra Pollution Control Board (MPCB) has carried out monitoring at CPCB location with the additional locations of sampling for ambient air, surface and ground water in consideration with the previous CEPI monitoring and covering the entire CEPI Impact Zone. The post monsoon monitoring was carried out during the period of December 2022 to February 2023 to assess the ambient air quality, surface water quality and ground water quality.

The Ambient Air Quality stations were identified considering the upwind and cross wind direction in the CEPI impact area. Ambient Air Quality was monitored at eight locations. The concentration of all the ambient air parameters was found well within the limits prescribed by NAAQS. Six locations each for surface water and ground water were monitored for the study. Concentration values of BOD were found above the standard limits in the surface water monitoring. Land index is represented by ground water in the CEPI. Except Selenium and Flouride, all other parameters of the ground water parameters were observed within the permissible limits when compared with IS10500:2012 drinking water standards.

Based on the study conducted by CPCB during the period January 2018, the CEPI score of Tarapur region as per the revised guidelines of CEPI (2016) was 93.69 (Air Index–72, Water Index-89 and Land Index–59.25). However, in the present study, the aggregated CEPI score of Tarapur region of post-monsoon season (March, 2024) calculated as 59.8. Based on the study, present CEPI score is calculated on the basis of sub index of Air-21.00, Water Index-53.00 and Land Index–54.80. The CEPI score is the combination of A, B, C and D factors. Here, C factor represents the health data, is also observed to decrease as compared to last time study. This has also decreased to Zero as indicated by the health data collected from 3 major hospitals of the studied region.

The analysis of the aggregated CEPI score indicates a transition for the Tarapur industrial clusters from a critical level of pollution to a severe level of pollution concerning the respective environmental components. A significant decrease of approximately 36% in the CEPI score is noted, declining from 93.69 in 2018 to 59.8 in this post-monsoon season study.

2. Introduction

In the vibrant tapestry of India's industrial landscape, the state of Maharashtra stands as a testament to both the promise and perils of rapid economic development. With countless number of industrial clusters, Maharashtra has witnessed unprecedented growth and prosperity in recent decades. However, this surge in industrial activity has come at a significant environmental cost, with pollution emerging as a pressing concern in many regions across the state.

Simultaneously, the Comprehensive Environmental Pollution Index (CEPI) has emerged as a beacon of assessment and action in India's environmental landscape. Introduced as a standardized methodology for evaluating and addressing pollution in industrial clusters across the nation, the CEPI represents a significant step towards achieving the delicate balance between economic growth and environmental sustainability. Developed through collaborative efforts between environmental scientists, regulatory authorities, and community stakeholders, the CEPI serves as a vital instrument for identifying, prioritizing, and mitigating pollution in industrial areas. By systematically monitoring, sampling, and analyzing pollution parameters such as ambient air quality, surface water quality, and groundwater quality, the CEPI empowers policymakers and regulators to make informed decisions and allocate resources effectively.

In Maharashtra, where industrial activities drive economic growth and employment opportunities, the importance of the CEPI cannot be overstated. Through strategic monitoring, sampling, and analysis efforts, the CEPI aims to provide a comprehensive assessment of pollution levels and their impacts on environmental health in critically, severely, and other polluted industrial areas across the state.

Moreover, the application of the CEPI extends beyond mere assessment, serving as a catalyst for targeted interventions and regulatory enforcement in polluted industrial areas. By identifying pollution hotspots and vulnerable communities, the CEPI enables authorities to implement remedial measures, enforce pollution control norms, and monitor progress towards environmental sustainability.

In the following sections, we delve into the methodology, findings, and implications of both the CEPI assessment and the Monitoring, Sampling, and Analysis for Ambient Air Quality, Surface Water Quality, and Groundwater Quality in Polluted Industrial Areas of Tarapur in Mumbai, Maharashtra. The present CEPI study includes Tarapur region, which is an industrial town located some 45 km north of Virar, on the Western Railway line of Mumbai Suburban Division (Mumbai Suburban Railway). The important river flowing through the region are Surya. This river is important drinking water resources of the region. Unlike other industrial estates, this industrial estate has a pleasant look due to the roads crossing at right angles and lots of small gardens adjacent to the boundary walls of the industrial units. Tarapur accounts for about 23 highly polluting 17 category industries and 59 red category industries, 53 orange category industries and 66 green category industries of various category engaged in the manufacturing of chemicals, dyes, dye-intermediates, Bulk drugs, pharmaceuticals, Textile auxiliaries, Pesticides, Petrochemicals, Iron and steel, Textile

processors, Engineering units etc. Besides the industries, there are other sources which are major contributors of pollution like emissions by transport and construction activities etc.

The present report is also based on the revised CEPI version 2016. The index captures the various dimensions of environment including air, water and land. Comprehensive Environmental Pollution Index (CEPI), which is a rational number to characterize the environmental quality at a given location following the algorithm of source, pathway and receptor have been developed. The CEPI reports serve as a roadmap for targeted interventions, regulatory enforcement, and community engagement aimed at mitigating pollution and safeguarding public health in the area. Despite the persistent challenges, ongoing initiatives guided by the CEPI reports offer hope for addressing environmental concerns and fostering sustainable development in Tarapur.

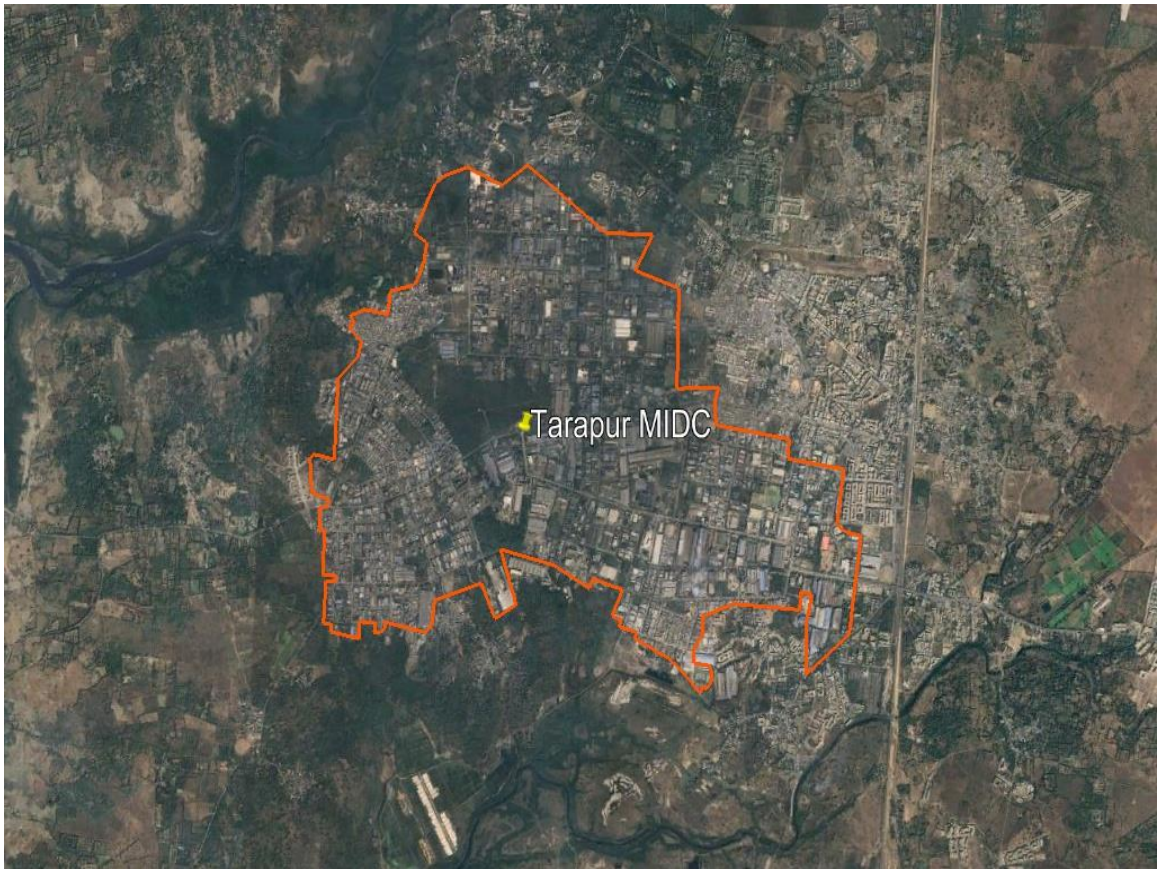


Fig. Tarapur Region CEPI Monitoring Zone

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 Tarapur, 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 Tarapur

Sampling Criteria	Total Sites	Monitoring Parameters
Ambient Air Quality	**08**	PM_{10}, $PM_{2.5}$, SO_2, NO_2, NH_3, O_3, C_6H_6, CO, BaP, Pb, Ni, As
Volatile Organic Compounds (VOCs)	**02**	Dichloromethane, Chloroform, Carbon Tetrachloride, Trichloroethylene, Bromodichloromethane, 1,3-Dichloropropane, 1,4-Dichlorobenzene, 1,3-Dichlorobenzene, 1,2-Dichlorobenzene, 1,2-Dibromo-3-Chloropropane, Napthalene, Bromobenzene,1,2,4-Trimethylbenzene, 2-Chlorotoluene, Tert-Butylbenzene, SEC-Butylbenzene, P-Isopropyl toluene, M-Xylene, P-Xylene, Styrene, Cumene 1,2,3-Trichloropropane, N-Propyl benzene, Dibromochloromethane, 1,2-Dibromoethane, Chlorobenzene, 1,1,1,2-Tetrachloroethane, Ethylbenzene, 1,1-Dichloropropylene, 1,2-Dichloroethane, 1,2-Dichloropropane, Trans-1,3-Dichloropropene, CIS 1,3-Dichloropropene, 1,1,2-Trichloroethane, Tetrachloroethylene, 1,3,5-Trimethylbenzene, N-Butylbenzene, 1,2,3-Trichlorobenzene, Hexachlorobutadiene, 1,2,4-Trichlorobenzene, 2,2-Dichloropropane, Dibromo methane, Toluene, O-Xylene, Bromoform, 1,1,2,2-Tetrachloroethane, 4-Chlorotoluene, 1,1-Dichloroethylene, Trans-1,2-Dichloroethylene, 1,1-Dichloroethane, CIS-1,2-

Sampling Criteria	Total Sites	Monitoring Parameters
		Dichloroethylene, Bromochloromethane, 1,1,1-Trichloroethane
Water Quality Monitoring	**Surface water - 06**	**(i) Simple Parameters** Sanitary Survey, General Appearance, Colour, Smell, Transparency and Ecological **(ii) Regular Monitoring Parameters** pH, O & G, Suspended Solids, DO, COD, BOD, TDS, Electrical Conductivity, Total Dissolved Solids, Nitrite–Nitrogen, Nitrate-Nitrogen, (NO_2+NO_3) total nitrogen, Free Ammonia, Total Residual Chlorine, Cyanide, Fluoride, Chloride, Sulphate, Sulphides, Total Hardness, Dissolved Phosphates, SAR, Total Coliforms, Faecal Coliform **(iii) Special Parameters** Total Phosphorous, TKN, Total Ammonia (NH_4+NH_3)-Nitrogen, Phenols, Surface Active Agents, Anionic detergents, Organo-Chlorine Pesticides, PAH, PCB and PCT, Zinc, Nickel, Copper, Hexa-valent Chromium, Chromium (Total), Arsenic (Total), Lead, Cadmium, Mercury, Manganese, Iron, Vanadium, Selenium, Boron **(iv) Bio-assay (zebra Fish)** Test – For specified samples only.
	Ground water - 06	

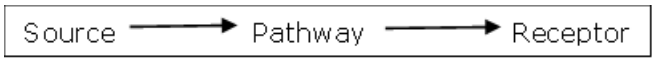
Table 3.2 Frequency of Sampling

	Parameter	Round of Sampling	Frequency in Each Round
A	**Ambient Air Quality Monitoring**		
1.	Particulate Matter (size less than 10 µm) or PM_{10}	03	3 Shifts of 8 hrs each
2.	Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	03	1 Shift of 24 hrs
3.	Sulphur Dioxide (SO_2)	03	6 Shifts of 4 hrs each

	Parameter	Round of Sampling	Frequency in Each Round
4.	Nitrogen Dioxide (NO_2)	03	6 Shifts of 4 hrs each
5.	Ammonia (NH_3)	03	6 Shifts of 4 hrs each
6.	Ozone (O_3)	03	24 Shifts of 1 hr each
7.	Benzene (C_6H_6)	03	1 Shifts of 24 hrs
8.	Carbon Monoxide (CO)	03	24 Shifts of 1 hr each
9.	Benzo (a) Pyrene (BaP) – particulate phase only	03	3 Shifts of 8 hrs each
10.	Lead (Pb)	03	3 Shifts of 8 hrs each
11.	Arsenic (As)	03	3 Shifts of 8 hrs each
12.	Nickel (Ni)	03	3 Shifts of 8 hrs each
B	**Volatile Organic Compounds (VOCs)**		
	As mentioned in Table 3.1	03	3 Shifts of 24 hrs each
C	**Ground Water**		
	As mentioned in Table 3.1	03	01 sample at each round
D	**Surface Water**		
	As mentioned in Table 3.1	03	01 sample at each round

4. Methodology

The present report is based on the revised Comprehensive Environmental Pollution Index (CEPI) version 2016. The index captures the various dimensions of the environment including air, water and land. Comprehensive Environmental Pollution Index (CEPI) is a rational number, which is used to characterize the environmental quality at a given location. It is three-step process based on the algorithm of Source, Pathway and Receptor.



Ambient air stations, Surface water locations and Ground water locations were decided by the respective regional officers. The sampling was done in 3 rounds with an interval of one or two days at each location. Sampling has been done at the potentially polluted areas so as to arrive at the CEPI. This will further help the authorities to monitor the areas in order to improve the current status of their environmental components such as air and water quality data, ecological damage and visual environmental conditions.

AIR ENVIRONMENT

5. Air Environment

For studying the Air Environment of Tarapur area, monitoring stations were identified considering the upwind and cross wind direction and all 12 parameters as per the notification of National Ambient Air Quality Standards (NAAQS) were carried out.

**Kindly note: Volatile Organic Compounds (VOCs) concentration is not detected in most of the Air samples collected; hence it is not shown in the graphs.*

In Tarapur eight locations have been monitored of checking the Ambient Air Quality (AAQ) in triplicate from 02nd Jan., 2024 to 06th Jan., 2024. The concentration of all the parameters at all studied locations is observed well within the limits. Volatile Organic Compounds (VOCs) were monitored at 2 locations namely Kokuyo Camlin Ltd. and Lupin Ltd.

Table 5.1 Details of Sampling Location of Ambient Air Quality Monitoring

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Kokuyo Camlin Ltd.	19.798036°N	72.737654°E	02.01.2024	04.01.2024	06.01.2024
2.	D Docor Export Pvt. Ltd.	19.789417°N	72.752577°E	02.01.2024	04.01.2024	06.01.2024
3.	Sumitomo Chemical India Pvt. Ltd.	19.790828°N	72.718491°E	02.01.2024	04.01.2024	06.01.2024
4.	MPCB SRO Office	19.8098767°N	72.7435753°E	02.01.2024	04.01.2024	06.01.2024
5.	Loba Chemical Pvt Ltd	19.809545°N	72.734732°E	02.01.2024	04.01.2024	06.01.2024
6.	Unitec Fibres Pvt Ltd	19.804582°N	72.729414°E	02.01.2024	04.01.2024	06.01.2024
7.	Lupin Ltd	19.79615°N	72.720105°E	02.01.2024	04.01.2024	06.01.2024
8.	MPIL Steel Structure Ltd	19.797829°N	72.746503°E	02.01.2024	04.01.2024	06.01.2024

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

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Kokuyo Camlin Ltd.	19.798036°N	72.737654°E	02.01.2024	04.01.2024	06.01.2024

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
2.	Lupin Ltd	19.79615°N	72.720105°E	02.01.2024	04.01.2024	06.01.2024

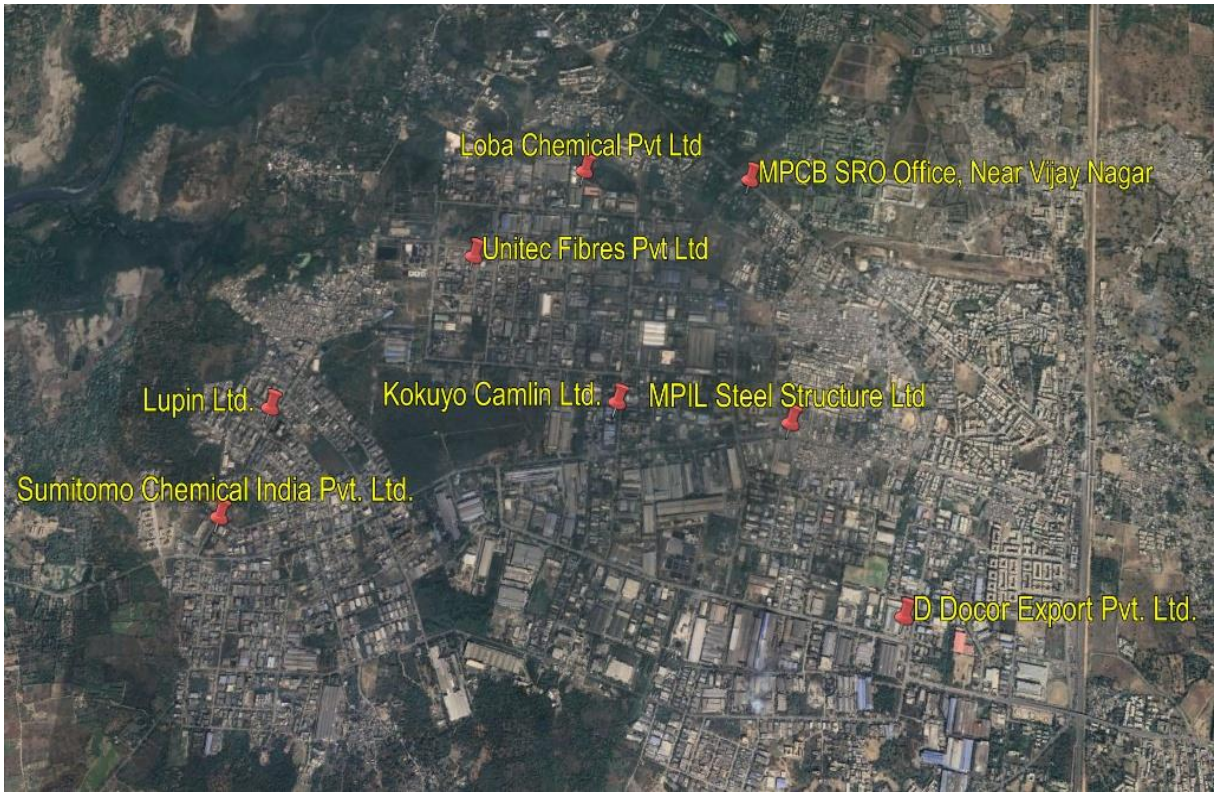


Fig: Geographical Locations of Ambient Air Quality Sampling

Fig: Geographical Locations of VOCs Monitoring

Table 5.3 Ambient Air Quality Monitoring Results

Parameters	Unit	Results			
		Kokuyo Camlin Ltd.	D Docor Export Pvt. Ltd.	Sumitomo Chemical India Pvt. Ltd	MPCB SRO Office
Sulphur Dioxide (SO_2)	$\mu g/m^3$	BLQ	BLQ	BLQ	BLQ
Nitrogen Dioxide (NO_2)	$\mu g/m^3$	15.30	11.70	BLQ	6.69
Particulate Matter (size less than 10 µm) or PM_{10}	$\mu g/m^3$	58	56	58	53
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	$\mu g/m^3$	16	16	16	14
Ozone (O_3)	$\mu g/m^3$	36.40	33.15	43.60	37.40
Lead (Pb)	$\mu g/m^3$	0.03	BLQ	BLQ	BLQ
Carbon Monoxide (CO) (1h)	mg/m^3	0.97	1.06	1.31	1.06
Carbon Monoxide (CO) (8 h)	mg/m^3	1.53	1.82	2.02	1.60
Ammonia (NH_3)	$\mu g/m^3$	50.65	52.87	83.60	49.25
Benzene (C_6H_6)	$\mu g/m^3$	2.26	2.19	2.32	2.11
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m^3	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m^3	1.21	BLQ	0.38	0.59
Nickel (Ni)	ng/m^3	BLQ	BLQ	5.17	BLQ

Parameters	Unit	Results			
		Loba Chemical Pvt Ltd.	Unitec Fibres Pvt Ltd.	Lupin Ltd.	MPIL Steel Structure Ltd.
Sulphur Dioxide (SO_2)	$\mu g/m^3$	BLQ	4.82	BLQ	BLQ
Nitrogen Dioxide (NO_2)	$\mu g/m^3$	6.72	10.80	8.91	10.20
Particulate Matter (size less than 10 µm) or PM_{10}	$\mu g/m^3$	56	62	51	57
Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	$\mu g/m^3$	15	16	16	15
Ozone (O_3)	$\mu g/m^3$	36.63	39.75	37.07	32.83

Parameters	Unit	Results			
		Loba Chemical Pvt Ltd.	Unitec Fibres Pvt Ltd.	Lupin Ltd.	MPIL Steel Structure Ltd.
Lead (Pb)	µg/m^3	BLQ	BLQ	BLQ	BLQ
Carbon Monoxide (CO) (1h)	mg/m^3	1.16	1.20	1.06	1.07
Carbon Monoxide (CO) (8 h)	mg/m^3	1.70	1.69	1.89	1.87
Ammonia (NH_3)	µg/m^3	62.85	46.65	83.15	48.70
Benzene (C_6H_6)	µg/m^3	2.69	1.94	2.73	2.66
Benzo (a) Pyrene (BaP) – particulate phase only	ng/m^3	BLQ	BLQ	BLQ	BLQ
Arsenic (As)	ng/m^3	0.67	1.02	0.36	0.56
Nickel (Ni)	ng/m^3	3.58	BLQ	5.54	4.67

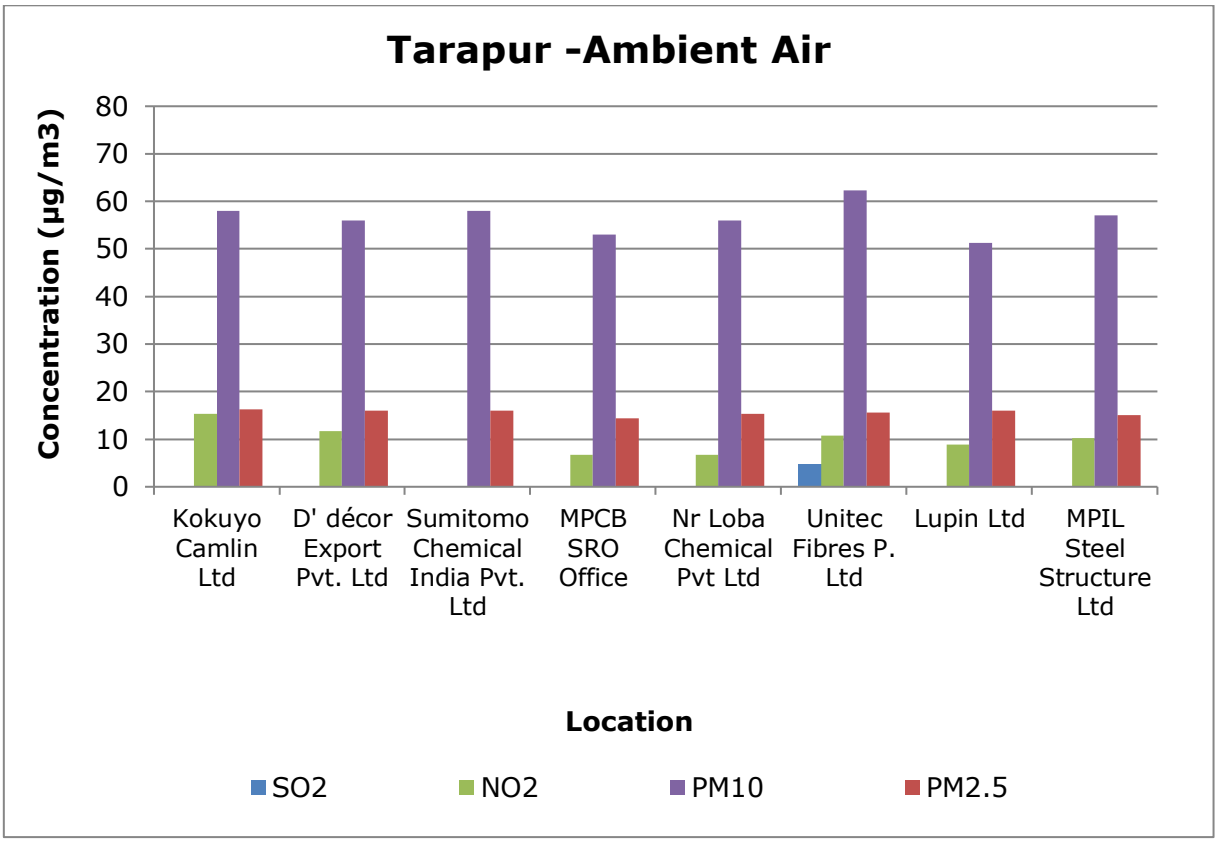
Table 5.4 Volatile Organic Compounds (VOCs) in Ambient Air Results

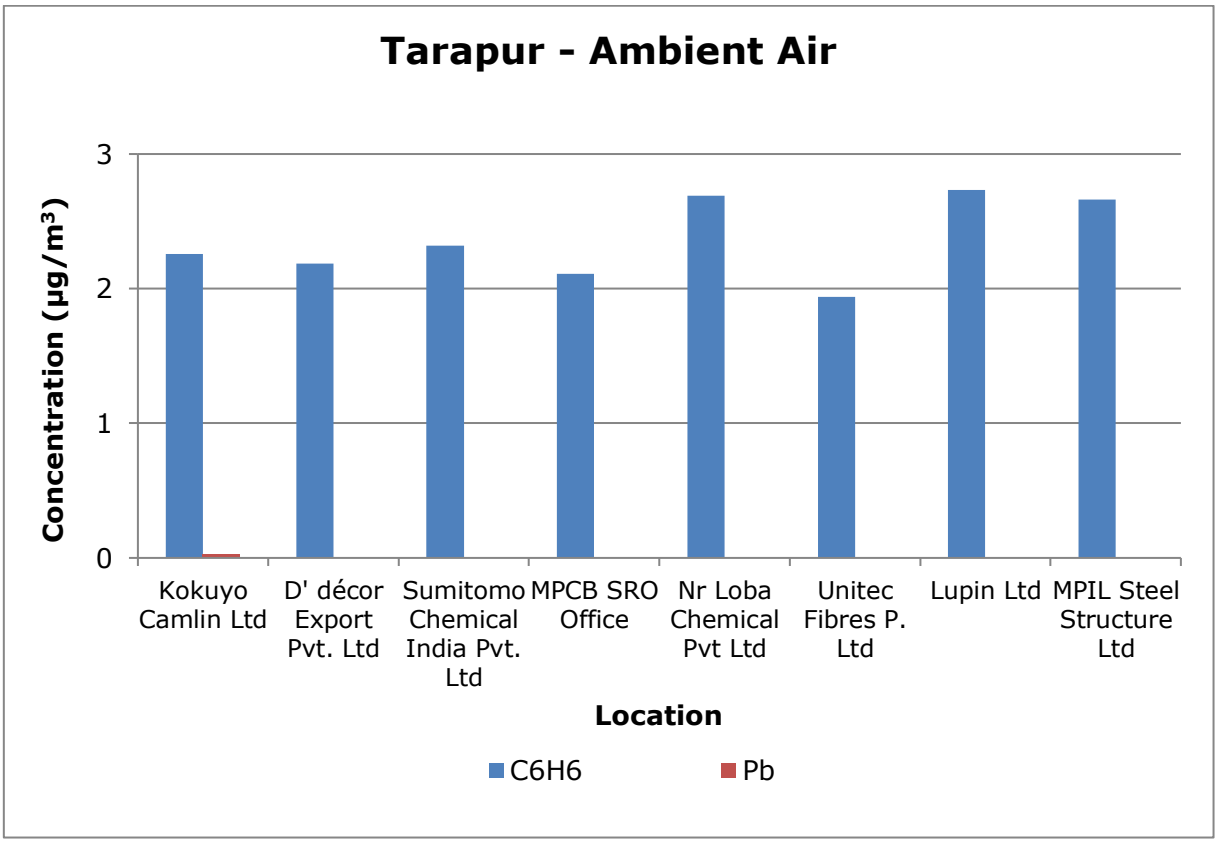
Parameters	Unit	Results	
		Kokuyo Camlin Ltd.	Lupin Ltd.
Dichloromethane	µg/m³	1.67	1.54
Chloroform	µg/m³	1.75	0.63
Carbon Tetrachloride	µg/m³	3.80	BLQ
Trichloroethylene	µg/m³	BLQ	BLQ
Bromodichloromethane	µg/m³	BLQ	BLQ
1,3-Dichloropropane	µg/m³	BLQ	BLQ
1,4-Dichlorobenzene	µg/m³	21.20	BLQ
1,3-Dichlorobenzene	µg/m³	12.98	BLQ
1,2-Dichlorobenzene	µg/m³	BLQ	BLQ
1,2-Dibromo-3-Chloropropane	µg/m³	BLQ	BLQ
Napthalene	µg/m³	BLQ	BLQ
Bromobenzene	µg/m³	BLQ	BLQ
1,2,4-Trimethylbenzene	µg/m³	BLQ	BLQ
2-Chlorotoluene	µg/m³	BLQ	BLQ
Tert-Butylbenzene	µg/m³	BLQ	BLQ
SEC-Butylbenzene	µg/m³	BLQ	BLQ

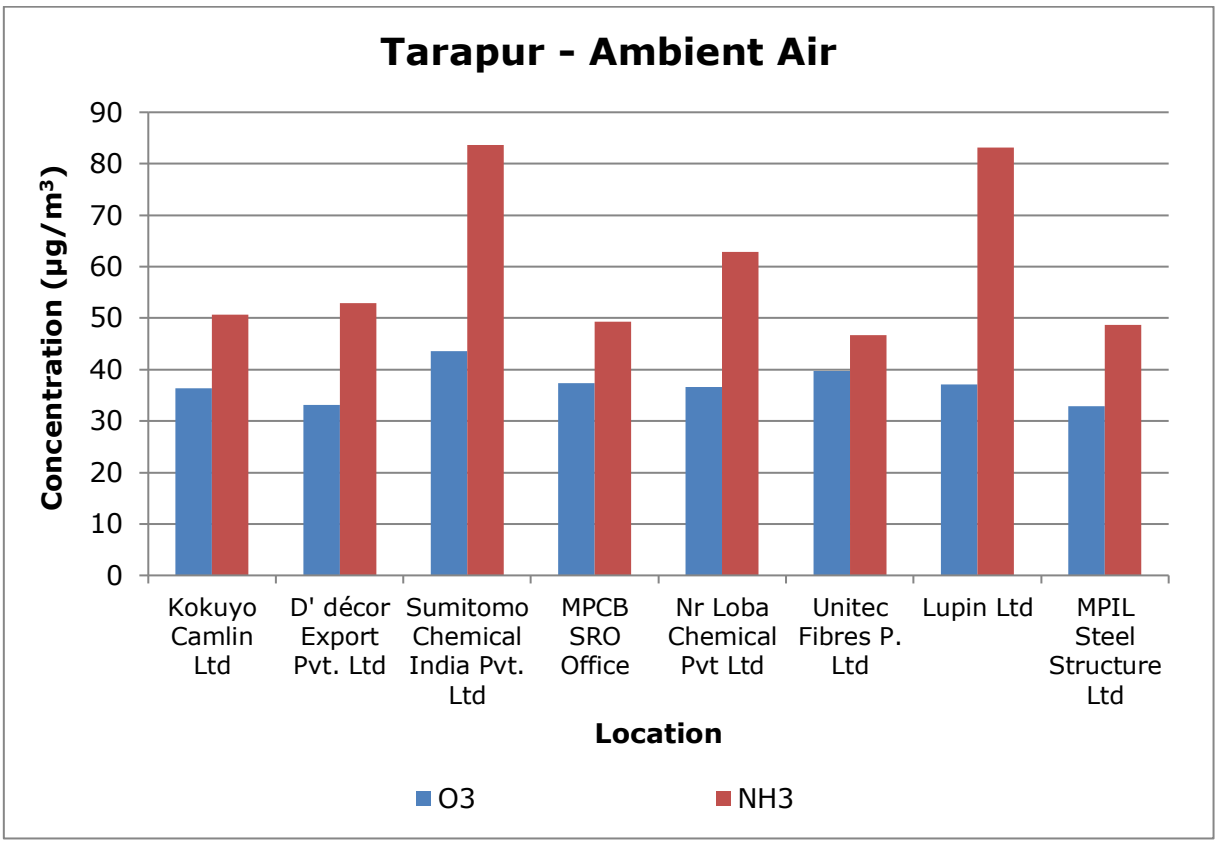
Parameters	Unit	Results	
		Kokuyo Camlin Ltd.	Lupin Ltd.
P-Isopropyltoluene	µg/m³	BLQ	BLQ
M-Xylene	µg/m³	BLQ	BLQ
P-Xylene	µg/m³	BLQ	1.48
Styrene	µg/m³	BLQ	BLQ
Cumene	µg/m³	BLQ	BLQ
1,2,3-Trichloropropane	µg/m³	BLQ	BLQ
N-Propylbenzene	µg/m³	BLQ	BLQ
Dibromochloromethane	µg/m³	BLQ	BLQ
1,2-Dibromoethane	µg/m³	BLQ	BLQ
Chlorobenzene	µg/m³	3.43	3.33
1,1,1,2-Tetrachloroethane	µg/m³	BLQ	BLQ
Ethylbenzene	µg/m³	BLQ	BLQ
1,1-Dichloropropylene	µg/m³	3.47	BLQ
1,2-Dichloroethane	µg/m³	0.82	0.75
1,2-Dichloropropane	µg/m³	BLQ	BLQ
Trans-1,3-Dichloropropene	µg/m³	BLQ	BLQ
CIS 1,3-Dichloropropene	µg/m³	BLQ	BLQ
1,1,2-Trichloroethane	µg/m³	BLQ	BLQ
Tetrachloroethylene	µg/m³	BLQ	BLQ
1,3,5-Trimethylbenzene	µg/m³	BLQ	BLQ
N-Butylbenzene	µg/m³	BLQ	BLQ
1,2,3-Trichlorobenzene	µg/m³	BLQ	BLQ
Hexachlorobutadiene	µg/m³	BLQ	BLQ
1,2,4-Trichlorobenzene	µg/m³	BLQ	BLQ
2,2-Dichloropropane	µg/m³	BLQ	BLQ
Dibromomethane	µg/m³	BLQ	BLQ
Toluene	µg/m³	2.10	2.44
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

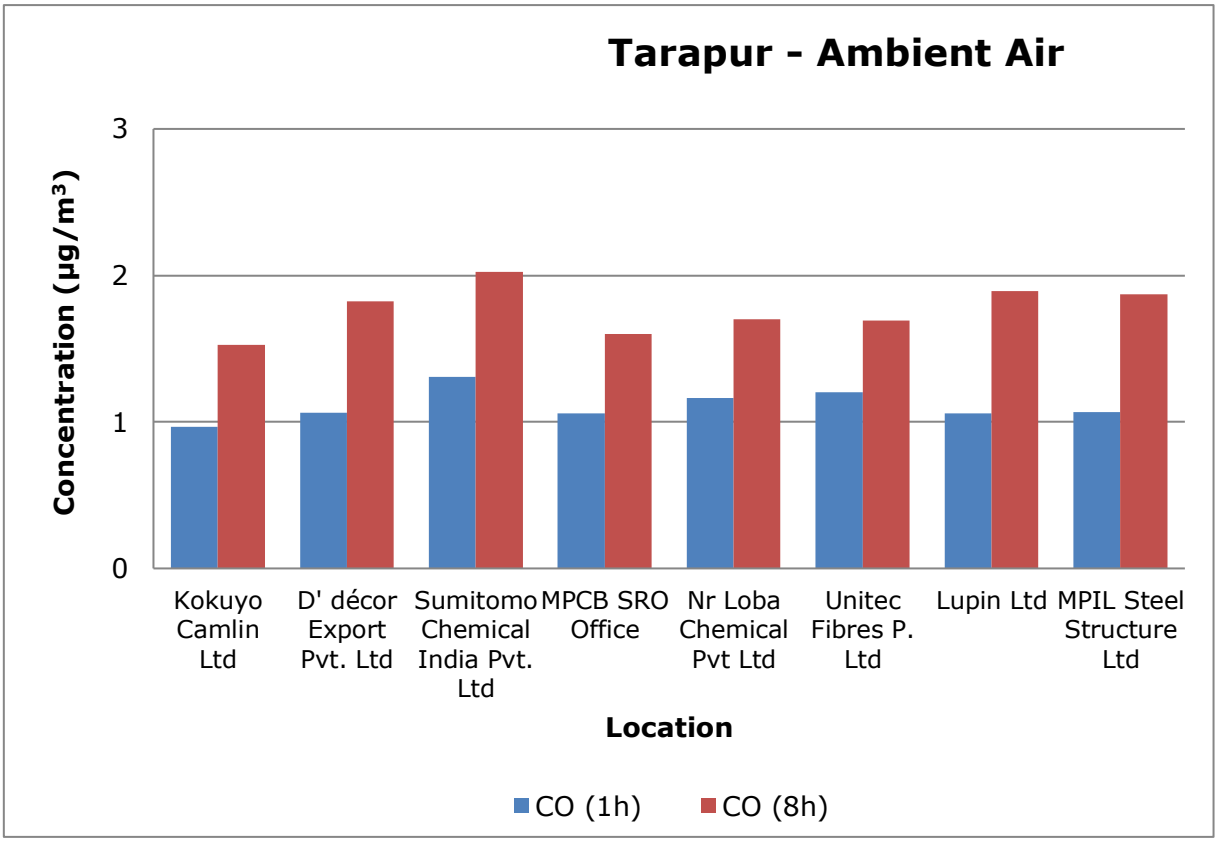
Parameters	Unit	Results	
		Kokuyo Camlin Ltd.	Lupin Ltd.
Trans-1,2-Dichloroethylene	µg/m³	BLQ	BLQ
1,1-Dichloroethane	µg/m³	BLQ	BLQ
CIS-1,2-Dichloroethylene	µg/m³	BLQ	BLQ
Bromochloromethane	µg/m³	1.15	BLQ
1,1,1-Trichloroethane	µg/m³	BLQ	BLQ

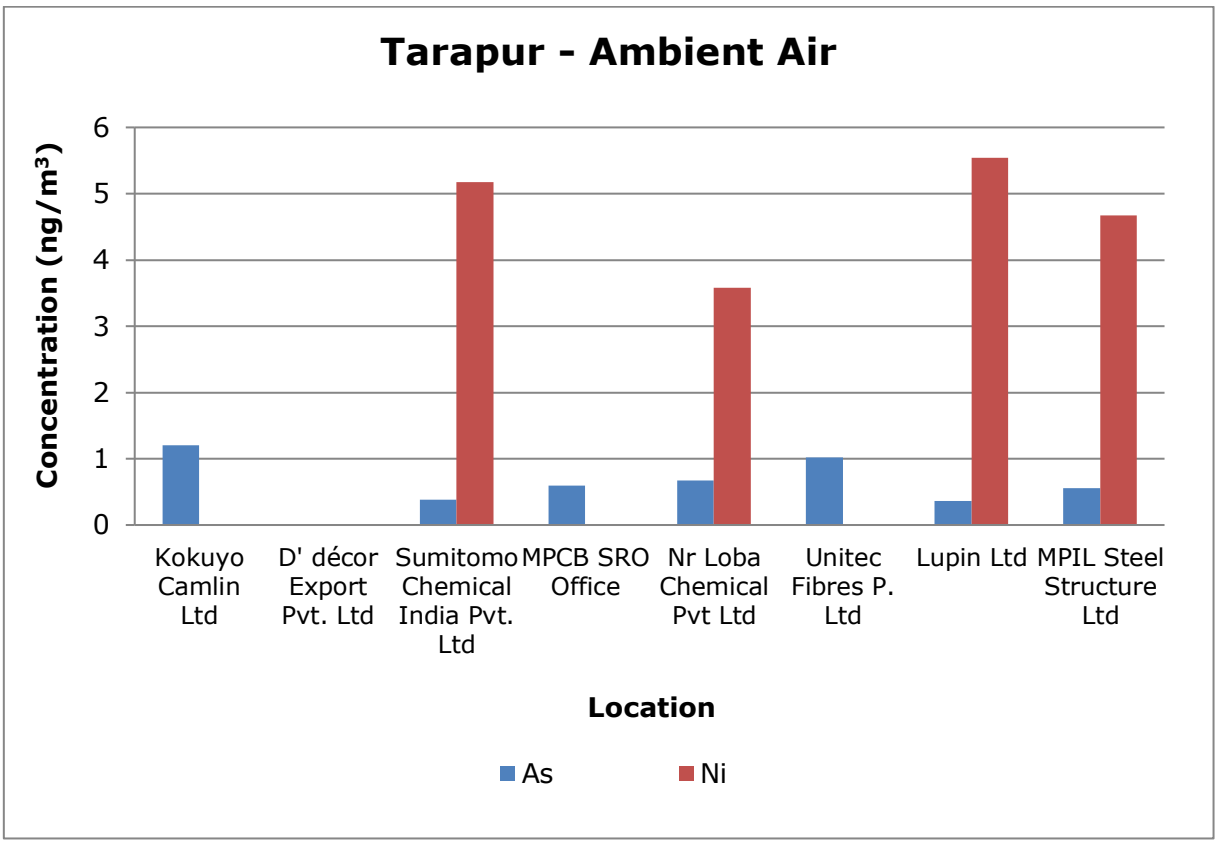
Graphs Ambient Air Quality Monitoring of Tarapur






Tarapur - Ambient Air
Concentration (µg/m³)
90
80
70
60
50
40
30
20
10
0
Kokuyo Camlin Ltd
D' décor Export Pvt. Ltd
Sumitomo Chemical India Pvt. Ltd
MPCB SRO Office
Nr Loba Chemical Pvt Ltd
Unitec Fibres P. Ltd
Lupin Ltd
MPIL Steel Structure Ltd
Location
O3
NH3


Tarapur - Ambient Air
Concentration (µg/m³)
3
2
1
0
Kokuyo Camlin Ltd
D' décor Export Pvt. Ltd
Sumitomo Chemical India Pvt. Ltd
MPCB SRO Office
Nr Loba Chemical Pvt Ltd
Unitec Fibres P. Ltd
Lupin Ltd
MPIL Steel Structure Ltd
Location
CO (1h)
CO (8h)


Tarapur - Ambient Air
Concentration (ng/m³)
6
5
4
3
2
1
0
Kokuyo Camlin Ltd
D' décor Export Pvt. Ltd
Sumitomo Chemical India Pvt. Ltd
MPCB SRO Office
Nr Loba Chemical Pvt Ltd
Unitec Fibres P. Ltd
Lupin Ltd
MPIL Steel Structure Ltd
Location
As
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WATER ENVIRONMENT

6. Water Environment

For studying the water environment of Tarapur area, surface water was collected from Nallah, Lake and River. To understand the quality of treated effluent, samples were collected from six locations.

- All six water samples collected were found acceptable in general appearance, colour, smell and transparency.
- General parameters like pH, electrical conductivity and suspended solids are also observed well within the limits in all the samples.
- Concentration of Biological Oxygen Demand (BOD) is found to exceed the acceptable limits at 5 of the studied locations.
- In fish bioassay, 47-100% survival of fishes was achieved.
- All metals like Arsenic, Nickel, Copper, Hexavalent Chromium (Cr^{6+}) etc. were also observed either below the limit of quantification.
- Parameters like Total Residual Chlorine, Cyanide, Sulphide, Dissolved Phosphate, Total Ammonical Nitrogen and Phenolic compounds, also met the criteria as prescribed by CPCB.
- Organo Chlorine Pesticides, Polynuclear aromatic hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB) are also observed below the limit of quantification (BLQ) in all the studied samples.

Table 6.1 Details of Sampling Location of Surface Water

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	BPT Navapur out Fall	19.790747°N	72.743416°E	03.01.2024	05.01.2024	07.01.2024
2.	Over Flow of Sump No-1	19.785157°N	72.738008°E	03.01.2024	05.01.2024	07.01.2024
3.	Nallah Near sump 2 Tarapur CETP	19.805635°N	72.724122°E	03.01.2024	05.01.2024	07.01.2024
4.	Open Drain Near Sump 3 Node	19.782267°N	72.721677°E	03.01.2024	05.01.2024	07.01.2024
5.	Nallah to Dandi	19.79258°N	72.690175°E	03.01.2024	05.01.2024	07.01.2024
6.	Nallah Carrying Domestic Sewage at Saravali	19.770204°N	72.751514°E	03.01.2024	05.01.2024	07.01.2024

Fig: Geographical Locations of Surface Water Sampling

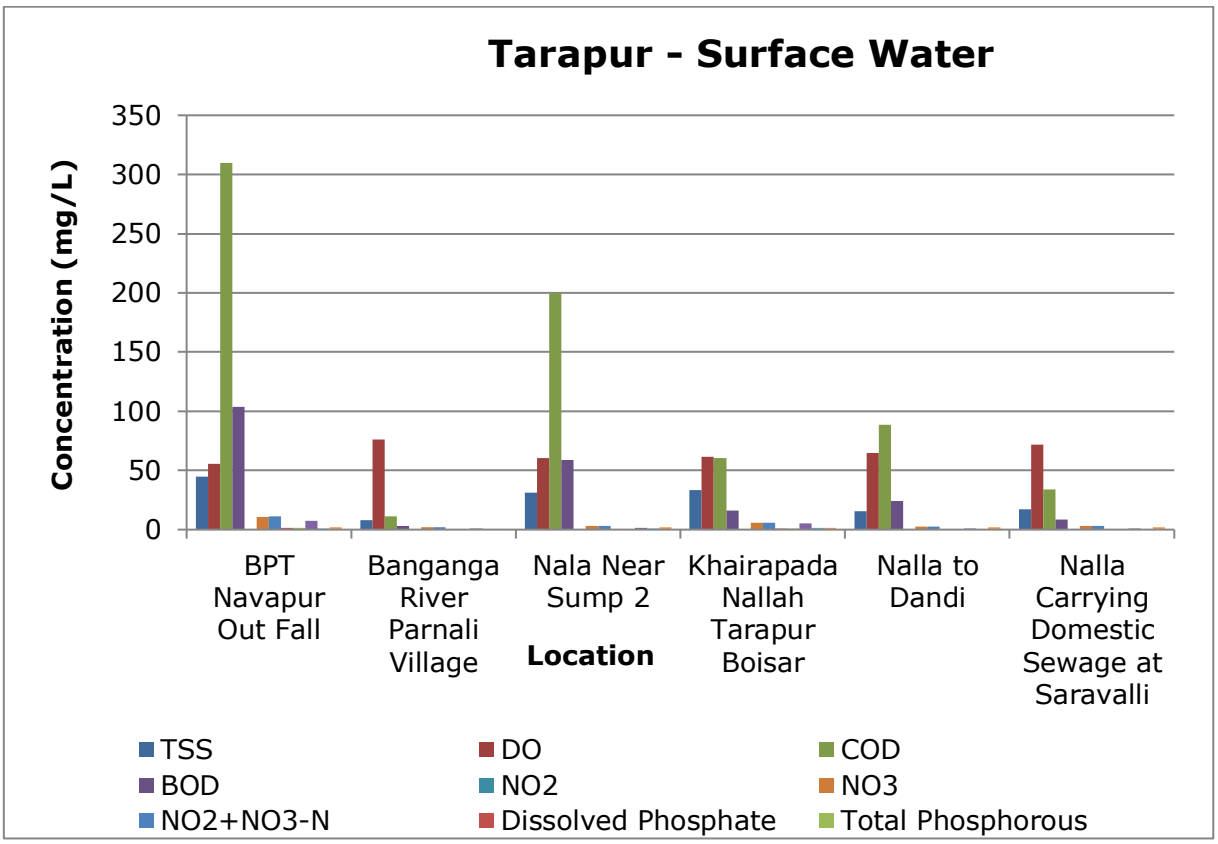
Table 6.2 Results of Surface Water

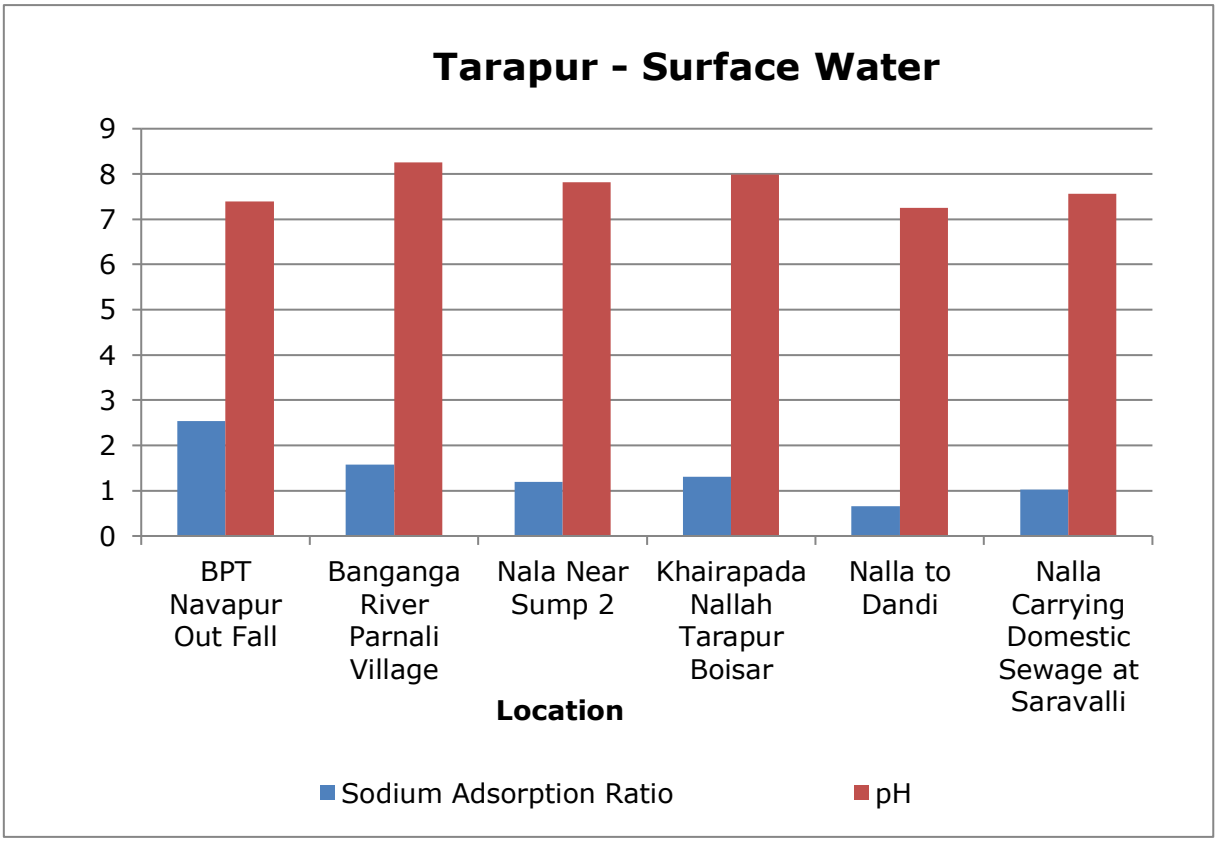
Parameters	Unit	Results					
		BPT Navapur Out Fall	**Overflow of Sump No-1**	**Nallah Near Sump- 2**	**Open drain near sump- 3**	**Nallah to Dandi**	**Nalla Carrying Domestic Sewage at Saravalli**
Sanitary Survey	-	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood
General Appearance	-	No floating matter	No floating matter	No floating matter	No floating matter	No floating matter	No floating matter
Transparency	M	0.20	0.30	0.50	0.40	0.50	0.20
Temperature	°C	28	29	28	29	29	30
Colour	Hazen	23	1	3	11	2	1
Smell	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH	-	7.39	8.26	7.81	7.99	7.25	7.57
Oil & Grease	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Suspended Solids	mg/L	45	8	31	33	15	17
Total Dissolved Solids	mg/L	4001	268	1121	576	26947	7576

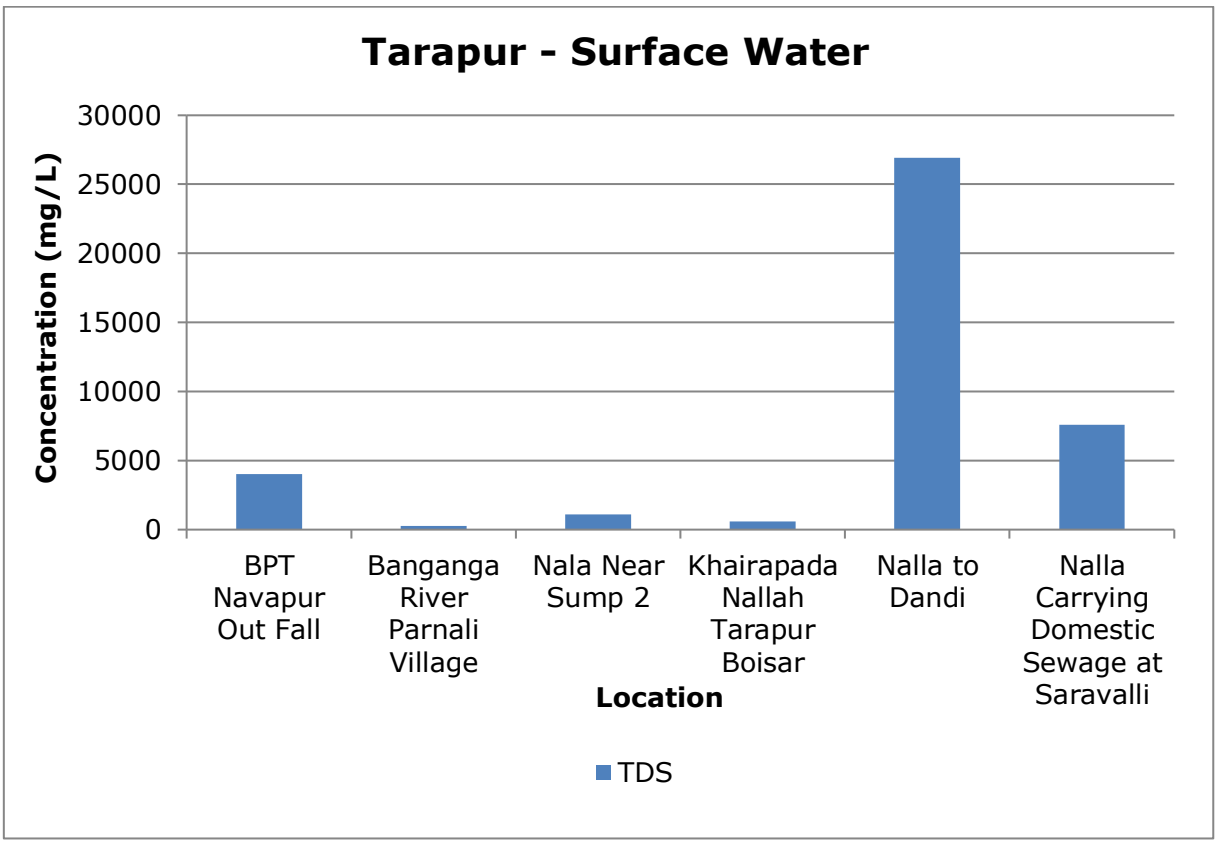
Parameters	Unit	Results					
		BPT Navapur Out Fall	Overflow of Sump No-1	Nallah Near Sump- 2	Open drain near sump- 3	Nallah to Dandi	Nalla Carrying Domestic Sewage at Saravalli
Dissolved Oxygen (% Saturation)	%	56	76	60	62	65	72
Chemical Oxygen Demand	mg/L	310	11	200	60	88	34
Biochemical Oxygen Demand (3 days,27°C)	mg/L	104	3	59	16	24	9
Electrical Conductivity (at 25 °C)	µmho/ cm	7140	477	1964	1493	46467	13027
Nitrite Nitrogen (as NO_2)	mg/L	0.60	BLQ	0.06	0.24	0.12	0.16
Nitrate Nitrogen (as NO_3)	mg/L	10.50	2.15	3.04	5.56	2.47	2.99
(NO_2 + NO_3)-Nitrogen	mg/L	11.07	2.15	3.08	5.80	2.59	3.15
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	0.07	BLQ	BLQ	0.07	0.08	0.08
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	1.90	0.40	1.77	1.43	1.90	1.87
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	1.41	BLQ	0.26	0.99	BLQ	BLQ
Sodium Adsorption Ratio	-	2.54	1.58	1.20	1.31	0.66	1.03
Total Coliforms	MPN Index/ 100 ml	933	1147	1600	920	204	730
Faecal Coliforms	MPN Index/ 100 ml	237	900	740	423	163	137
Total Phosphate (as P)	mg/L	1.47	BLQ	BLQ	1.07	BLQ	BLQ
Total Kjeldahl Nitrogen (as N)	mg/L	7.54	1.05	1.27	5.12	1.19	1.16
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	1.13	0.15	0.75	1.32	0.40	0.53

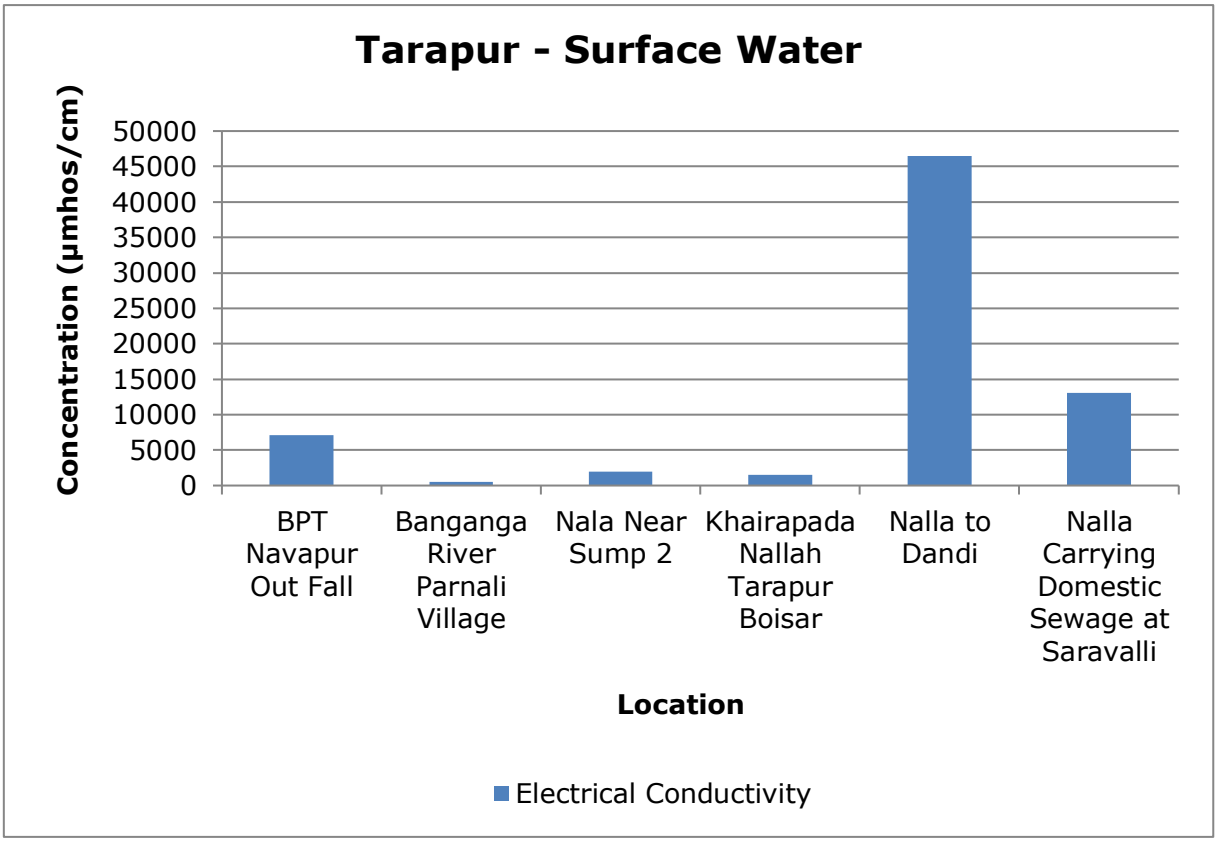
Parameters	Unit	Results					
		BPT Navapur Out Fall	Overflow of Sump No-1	Nallah Near Sump- 2	Open drain near sump- 3	Nallah to Dandi	Nalla Carrying Domestic Sewage at Saravalli
Phenols (as C_6H_5OH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Anionic Detergents (as MBAS Calculated as LAS, mol.wt.288.38)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Organo Chlorine Pesticides	µg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Polynuclear aromatic hydrocarbons (as PAH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	BLQ	BLQ	0.06	BLQ	BLQ	BLQ
Nickel (as Ni)	mg/L	0.09	BLQ	0.02	0.01	0.01	0.03
Copper (as Cu)	mg/L	0.08	BLQ	BLQ	BLQ	BLQ	BLQ
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Arsenic (as As)	mg/L	BLQ	BLQ	BLQ	BLQ	0.01	0.01
Lead (as Pb)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Cadmium (as Cd)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	0.14	BLQ	0.30	0.18	0.09	0.13
Iron (as Fe)	mg/L	0.23	0.09	0.51	0.31	0.14	0.08
Vanadium (as V)	mg/L	BLQ	0.02	BLQ	BLQ	BLQ	BLQ
Selenium (as Se)	mg/L	0.03	0.02	0.02	0.02	0.04	0.03
Boron (as B)	mg/L	0.60	0.16	0.17	BLQ	3.13	0.81
Total Nitrogen	mg/L	18.63	3.21	4.35	10.93	3.78	4.30
Bioassay Test on fish	% survival	47	97	67	100	100	100

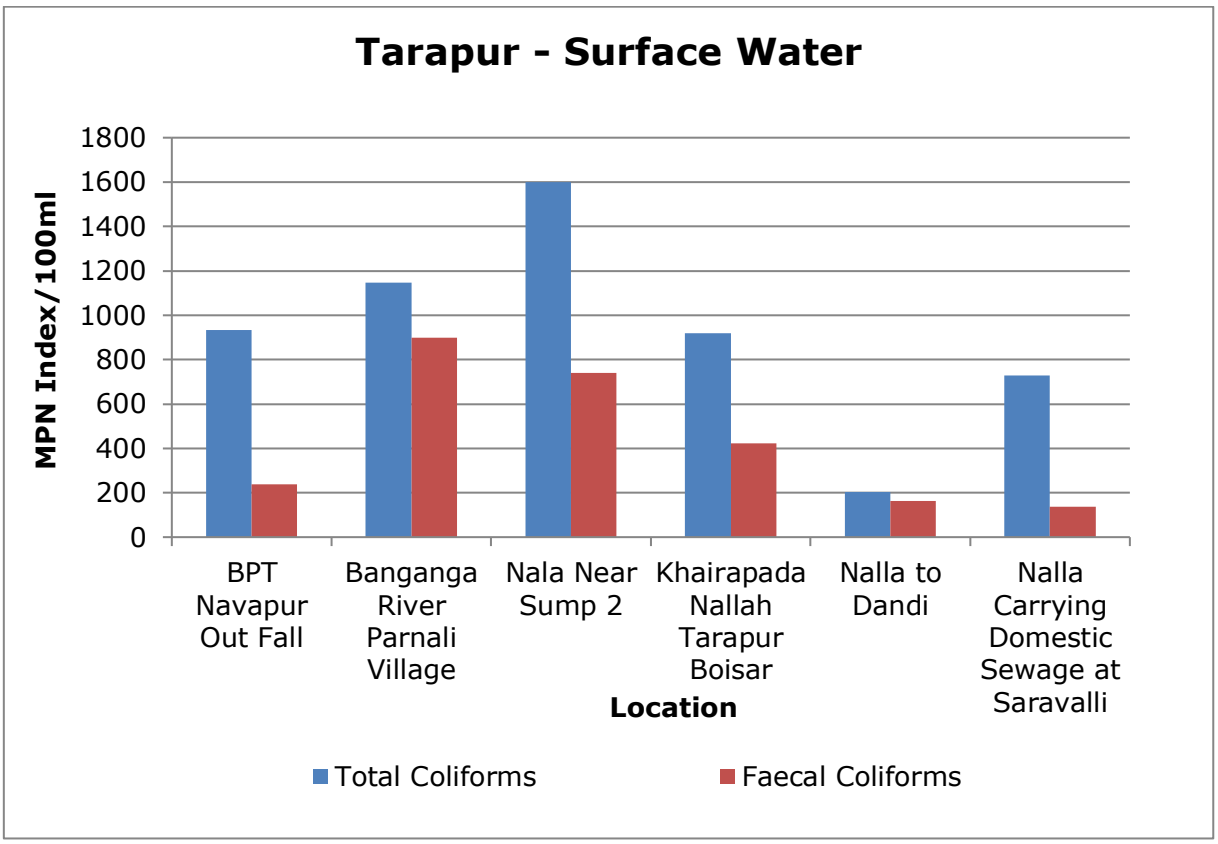
Graphs - Surface Water Quality of Tarapur

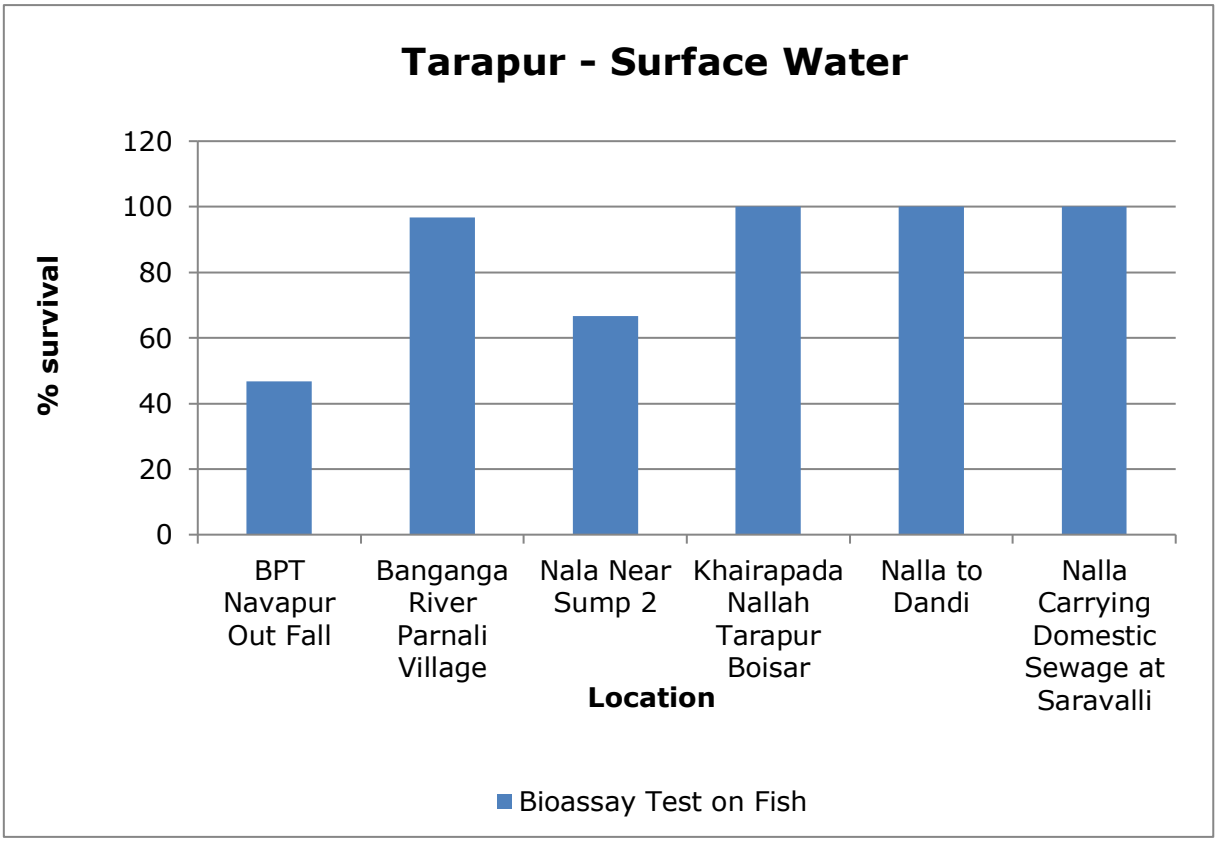





Tarapur - Surface Water
Concentration (mg/L)
30000
25000
20000
15000
10000
5000
0
BPT Navapur Out Fall
Banganga River Parnali Village
Nala Near Sump 2
Khairapada Nallah Tarapur Boisar
Nalla to Dandi
Nalla Carrying Domestic Sewage at Saravalli
Location
TDS


Tarapur - Surface Water
Concentration (µmhos/cm)
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
BPT Navapur Out Fall
Banganga River Parnali Village
Nala Near Sump 2
Khairapada Nallah Tarapur Boisar
Nalla to Dandi
Nalla Carrying Domestic Sewage at Saravalli
Location
Electrical Conductivity


Tarapur - Surface Water
MPN Index/100ml
1800
1600
1400
1200
1000
800
600
400
200
0
BPT Navapur Out Fall
Banganga River Parnali Village
Nala Near Sump 2
Khairapada Nallah Tarapur Boisar
Nalla to Dandi
Nalla Carrying Domestic Sewage at Saravalli
Location
Total Coliforms
Faecal Coliforms


Tarapur - Surface Water
% survival
120
100
80
60
40
20
0
BPT Navapur Out Fall
Banganga River Parnali Village
Nala Near Sump 2
Khairapada Nallah Tarapur Boisar
Nalla to Dandi
Nalla Carrying Domestic Sewage at Saravalli
Location
Bioassay Test on Fish

LAND ENVIRONMENT

7. Land Environment

For studying the land Environment of Tarapur area, ground water was collected from Bore well. Dug well, and Hand Pump. A total of 6 samples were collected and analysed to check the concentration of different parameters.

Six ground water samples were collected from Tarapur region.

- All the water samples collected were acceptable in general appearance, colour, and transparency and agreeable in smell/odour.
- General parameters like pH and suspended solids, were also well within the limits in all six samples collected.
- Three water samples out of six showed achieved 100% survival in Fish Bioassay.
- Metals like Arsenic, Nickel, Copper, Iron, Hexavalent Chromium (Cr^{6+}) etc. are also observed either below the limit of quantification or below their standard limits. However, Selenium is found to exceed the permissible limit in 5 water samples.
- Parameters like Total Residual Chlorine, Cyanide, Sulphide, Dissolved Phosphate, Total Ammonical Nitrogen and Phenolic compounds, also meet the criteria as prescribed by CPCB.
- Fluoride is found to exceed the permissible limit in 3 water samples.
- Organo Chlorine Pesticides, Polynuclear aromatic hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB) are below the limit of quantification in all studied samples.

Table 7.1 Details of Sampling Location of Ground Water

Sr. No.	Name of Monitoring Location	Latitude	Longitude	Date of Sampling		
				Round-1	Round-2	Round-3
1.	Handpump water, besides sai complex	19.80961°N	72.74466°E	03.01.2024	05.01.2024	07.01.2024
2.	Dhodi Pooja Borewell Water	19.79777°N	72.752702°E	03.01.2024	05.01.2024	07.01.2024
3.	Open well, near nalla Sump 1	19.785158°N	72.738027°E	03.01.2024	05.01.2024	07.01.2024
4.	Borewell at Shivaji Nagar, Boisar Tarapur	19.804566°N	72.753556°E	03.01.2024	05.01.2024	07.01.2024
5.	Gharat	19.811848°N	72.740713°E	03.01.2024	05.01.2024	07.01.2024
6.	Ramji Nagar, Tarapur	19.782236°N	72.723859°E	03.01.2024	05.01.2024	07.01.2024

Fig: Geographical Locations of Ground Water Sampling

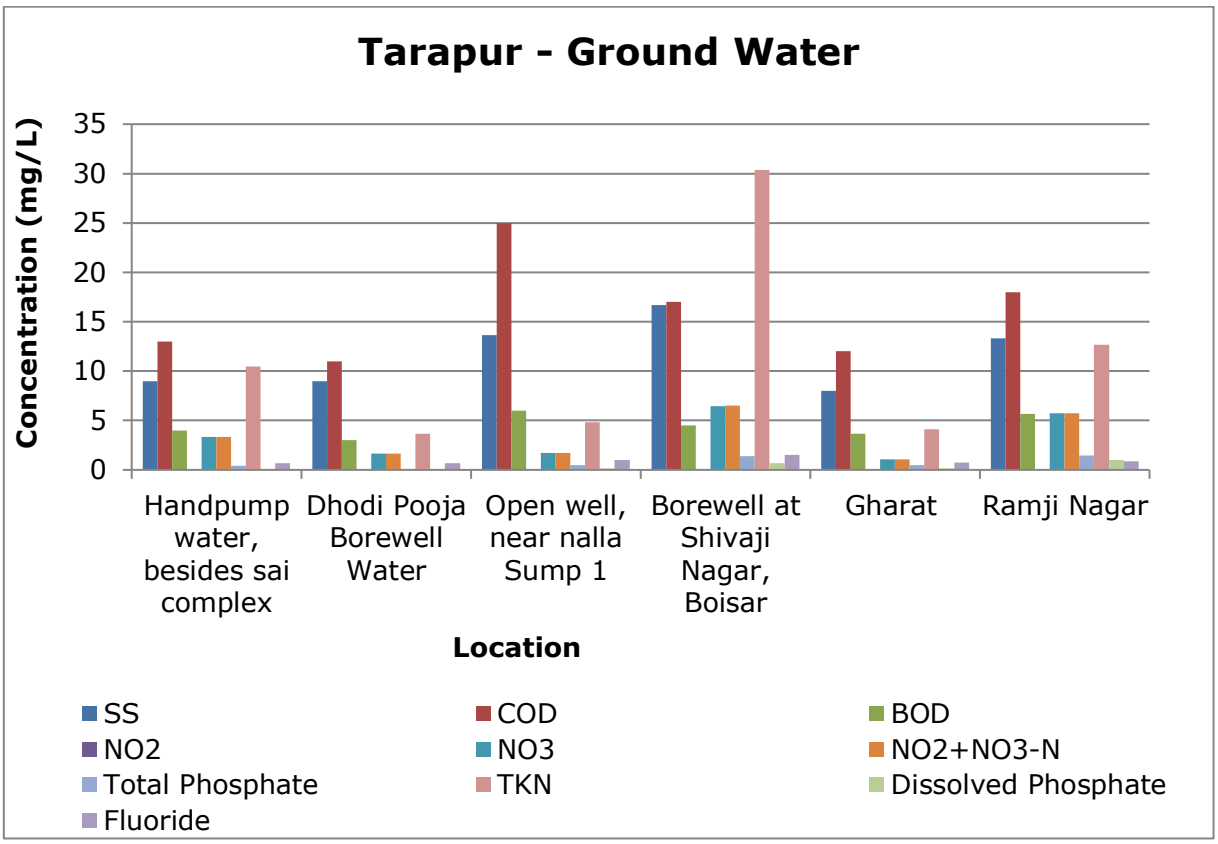
Table 7.2 Results of Ground Water

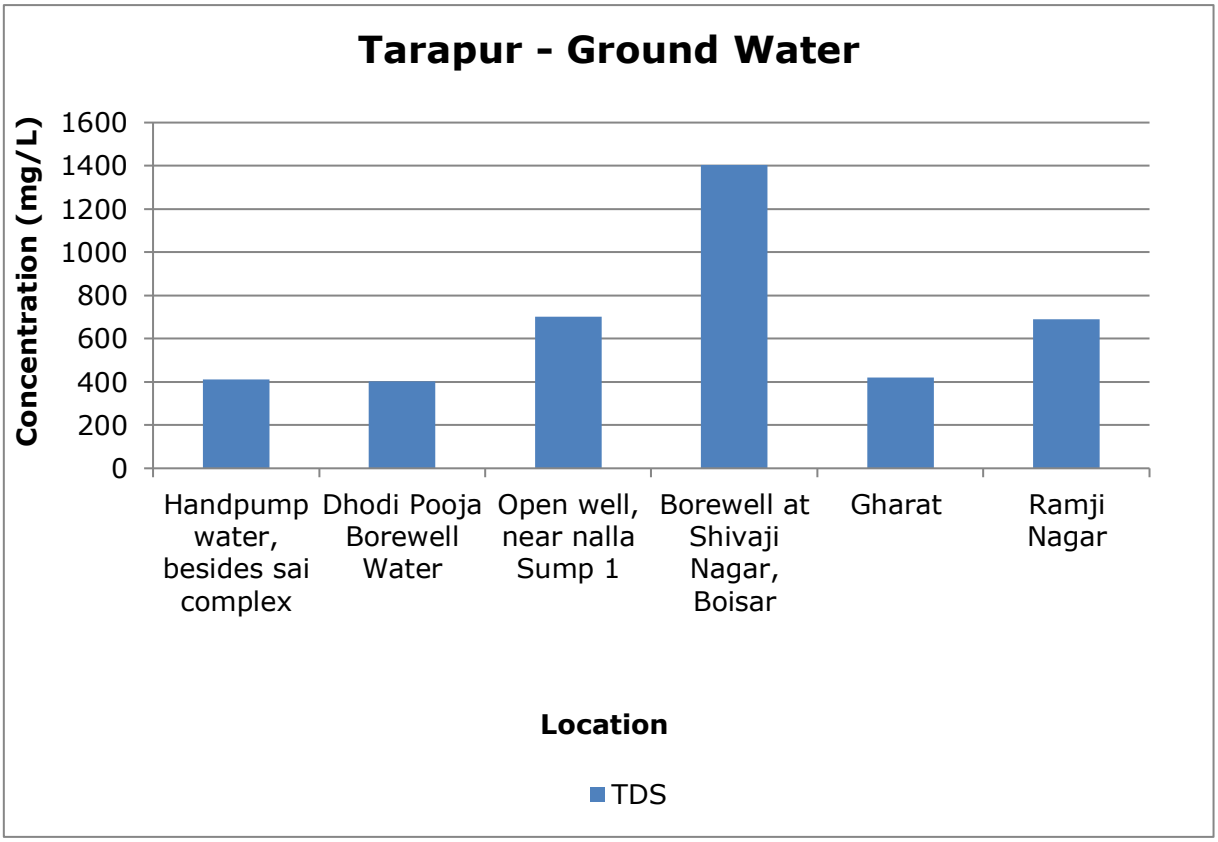
Parameters	Unit	Results					
		Handpump water, besides sai complex	**Dhodi Pooja Borewell Water**	**Open well, near nallah Sump 1**	**Borewell at Shivaji Nagar, Boisar**	**Gharat**	**Ramji Nagar**
Sanitary Survey	-	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood	Reasonably clean neighbourhood
General Appearance	-	No floating matter	No floating matter	No floating matter	No floating matter	No floating matter	No floating matter
Transparency	m						
Temperature	°C	28	27	29	29	27	29
Colour	Hazen	1	2	1	1	1	1
Smell	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH	-	8.35	7.84	8.18	7.77	8.16	7.75
Oil & Grease	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Suspended Solids	mg/L	11	20	15	13	14	16
Total Dissolved Solids	mg/L	368	1120	843	1143	538	1341

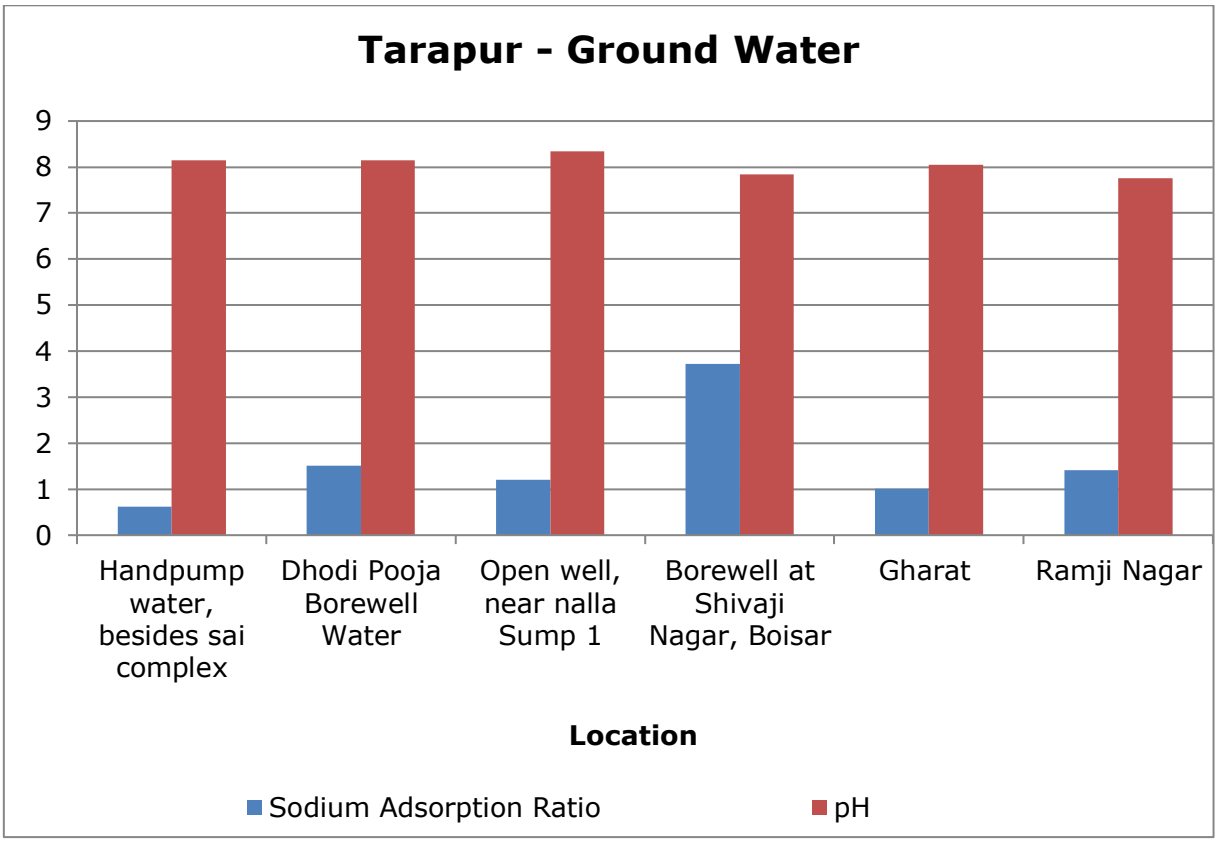
Parameters	Unit	Results					
		Handpump water, besides sai complex	Dhodi Pooja Borewell Water	Open well, near nallah Sump 1	Borewell at Shivaji Nagar, Boisar	Gharat	Ramji Nagar
Chemical Oxygen Demand	mg/L	7	22	10	13	BLQ	18
Biochemical Oxygen Demand (3 days,27°C)	mg/L	2	6	3	3	BLQ	4
Electrical Conductivity (at 25 °C)	µmho/cm	655	1998	1505	2039	959	2393
Nitrite Nitrogen (as NO_2)	mg/L	BLQ	0.05	0.03	0.04	BLQ	0.04
Nitrate Nitrogen (as NO_3)	mg/L	1.71	3.72	1.32	2.86	1.78	4.55
(NO_2 + NO_3)-Nitrogen	mg/L	1.30	3.76	1.34	2.89	1.78	4.59
Free Ammonia (as NH_3-N)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Residual Chlorine	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Cyanide (as CN)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Fluoride (as F)	mg/L	0.60	1.53	1.43	1.57	0.90	1.77
Sulphide (as H_2S)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Dissolved Phosphate (as P)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Sodium Adsorption Ratio	-	1.53	0.99	1.38	0.99	1.35	1.13
Total Coliforms	MPN Index/ 100 ml	787	920	494	1093	559	246
Faecal Coliforms	MPN Index/ 100 ml	687	467	194	591	23	95
Total Phosphate (as P)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Kjeldahl Nitrogen (as N)	mg/L	1.12	1.36	1.12	1.20	1.08	1.12
Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	0.39	0.31	0.27	0.24	0.39	0.36

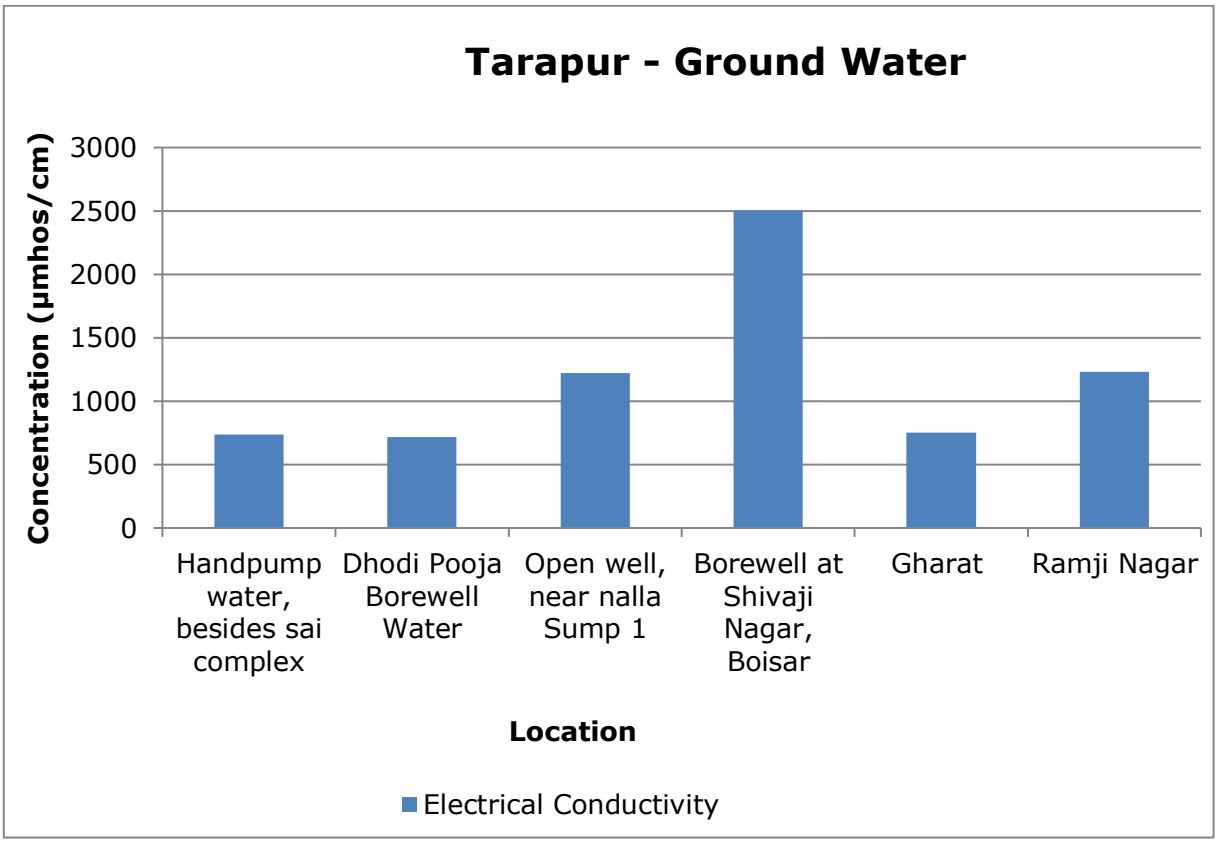
Parameters	Unit	Results					
		Handpump water, besides sai complex	Dhodi Pooja Borewell Water	Open well, near nallah Sump 1	Borewell at Shivaji Nagar, Boisar	Gharat	Ramji Nagar
Phenols (as C_6H_5OH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Anionic Detergents (as MBAS Calculated as LAS, mol.wt.288.38)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Organo Chlorine Pesticides	µg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Polynuclear aromatic hydrocarbons (as PAH)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Polychlorinated Biphenyls (PCB)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Zinc (as Zn)	mg/L	1.96	BLQ	BLQ	BLQ	BLQ	BLQ
Nickel (as Ni)	mg/L	0.01	0.01	0.01	BLQ	BLQ	0.01
Copper (as Cu)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Hexavalent Chromium (as Cr^{6+})	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Total Chromium (as Cr)	mg/L	BLQ	0.40	BLQ	BLQ	BLQ	BLQ
Total Arsenic (as As)	mg/L	0.01	BLQ	BLQ	BLQ	BLQ	BLQ
Lead (as Pb)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Cadmium (as Cd)	mg/L	0.01	BLQ	BLQ	BLQ	BLQ	BLQ
Mercury (as Hg)	mg/L	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
Manganese (as Mn)	mg/L	BLQ	0.24	0.02	0.11	BLQ	0.11
Iron (as Fe)	mg/L	0.06	4.94	0.09	BLQ	0.12	BLQ
Vanadium (as V)	mg/L	0.02	0.03	0.04	0.04	0.04	0.01
Selenium (as Se)	mg/L	0.01	0.04	0.02	0.02	0.02	0.03
Total Nitrogen	mg/L	BLQ	0.26	0.11	0.11	BLQ	0.19
Boron (as B)	mg/L	2.83	4.95	2.46	4.09	2.87	5.69
Bioassay Test on fish	% survival	93	100	97	97	100	100

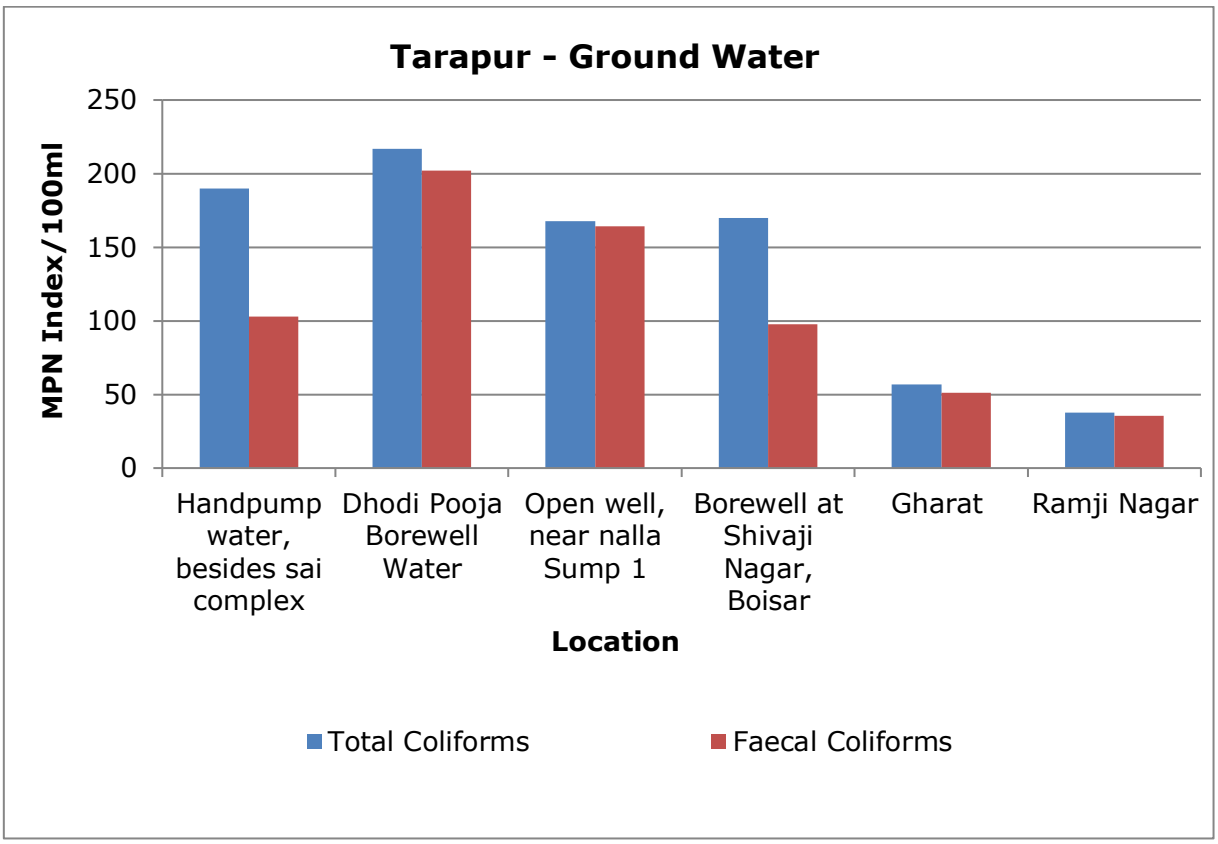
Graphs - Ground Water Quality of Tarapur

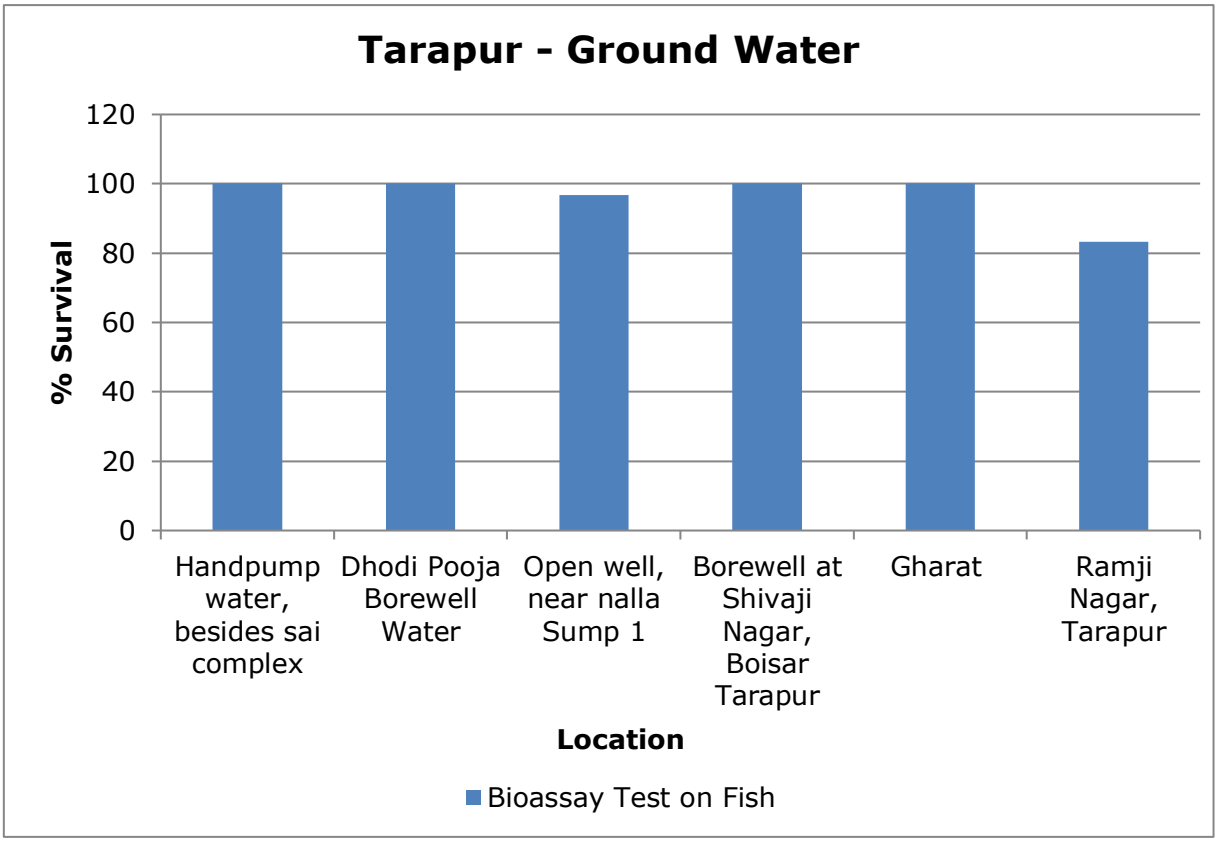





Tarapur - Ground Water
9
8
7
6
5
4
3
2
1
0
Handpump water, besides sai complex
Dhodi Pooja Borewell Water
Open well, near nalla Sump 1
Borewell at Shivaji Nagar, Boisar
Gharat
Ramji Nagar
Location
Sodium Adsorption Ratio
pH


Tarapur - Ground Water
Concentration (µmhos/cm)
3000
2500
2000
1500
1000
500
0
Handpump water, besides sai complex
Dhodi Pooja Borewell Water
Open well, near nalla Sump 1
Borewell at Shivaji Nagar, Boisar
Gharat
Ramji Nagar
Location
Electrical Conductivity


Tarapur - Ground Water
MPN Index/100ml
250
200
150
100
50
0
Handpump water, besides sai complex
Dhodi Pooja Borewell Water
Open well, near nalla Sump 1
Borewell at Shivaji Nagar, Boisar
Gharat
Ramji Nagar
Location
Total Coliforms
Faecal Coliforms


Tarapur - Ground Water
% Survival
120
100
80
60
40
20
0
Handpump water, besides sai complex
Dhodi Pooja Borewell Water
Open well, near nalla Sump 1
Borewell at Shivaji Nagar, Boisar Tarapur
Gharat
Ramji Nagar, Tarapur
Location
Bioassay Test on Fish

C: Receptor

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

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

Annexure – I Health Related Data enclosed.

9. CEPI Score

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

Table 8.1 CEPI score of the Post monsoon season (March, 2024)

	A1	A2	A	B	C	D	CEPI
Air Index	2.75	4	11	0	0	10	**21.00**
Water Index	2.5	4	10	33	0	10	**53.00**
Land Index	2.5	4	10	34.75	0	10	**54.80**
						Aggregated CEPI	**59.80**

Table 8.2 Comparison of CEPI Scores

	Air Index	Water Index	Land Index	CEPI
CEPI Score March 2024	21.00	53.00	54.80	**59.80**
CEPI score June 2023	24.00	56.50	56.00	**62.30**
CEPI Score March 2023	21.00	63.00	50.75	**66.94**
CEPI score June 2021	31.00	61.50	60.00	**68.66**
CEPI Score March 2021	31.00	65.00	30.75	**68.34**
CEPI score March 2020	47.00	65.30	36.50	**71.30**
CEPI score June 2019	37.07	51.10	54.40	**54.56**
CEPI score March 2019	34.75	45.00	45.00	**53.60**
CEPI score June 2018	26.00	39.25	45.00	**50.61**

	Air Index	Water Index	Land Index	CEPI
CEPI score March 2018	32.50	38.50	45.00	**51.88**
CPCB CEPI score March 2018	72.00	89.00	59.25	**93.69**

CEPI Score Calculation:

Tarapur, Maharashtra - CEPI - March 2024

Ambient Air Analysis report

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

Pollutant	Avg (1)	Std (2)	EF (3) [(3)=(1)/(2)]	No. of samples Exceeding (4)	Total no. of samples (5)	SNLF Value (6) [(6)=(4)/(5)x(3)]	SNLF score (B)	
PM_{10}	56.46	100	0.56	0	8	0.00	L	0.00
NO_2	10.05	80	0.13	0	8	0.00	L	0.00
$PM_{2.5}$	15.58	60	0.26	0	8	0.00	L	0.00
B score = (B1+B2+B3)							**B**	**0.00**

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

Air CEPI	**(A+B+C+D)**	**21.0**

Water Quality Analysis report

Pollutant	Group	A1	A2	A (A1 X A2)
BOD	B	2	Large	
Total Ammonia	A	0.25		
TN	A	0.25		
		2.5	**4**	**10**

Pollutant	Avg (1)	Std (2)	EF (3) [(3)=(1)/(2)]	No. of samples Exceeding (4)	Total no. of samples (5)	SNLF Value (6) [(6)=(4)/(5)x(3)]	SNLF score (B)

BOD	35.78	8	4.47	5	6	3.73	C	30.00
Total Ammonia	0.71	1.5	0.47	0	6	0.00	L	0.00
TN	7.53	15	0.50	1	6	0.08	M	3.00
B score = (B1+B2+B3)							**B**	**33.00**

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

Water CEPI	**(A+B+C+D)**	**53.0**

Ground Water Quality Analysis report

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

Pollutant	**Avg (1)**	**Std (2)**	**EF (3) [(3)=(1)/(2)]**	**No. of samples Exceeding (4)**	**Total no. of samples (5)**	**SNLF Value (6) [(6)=(4)/(5)x(3)]**	**SNLF score (B)**	
Se	0.02	0.01	2.21	5	6	1.84	C	30.00
TDS	892.22	2000	0.45	0	6	0.00	L	0.00
F	1.30	1.5	0.87	3	6	0.43	M	4.75
B score = (B1+B2+B3)							**B**	**34.75**

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

Land CEPI	**(A+B+C+D)**	**54.8**

Land CEPI Score (im)	**54.80**
Water CEPI Score (i2)	**53.00**
Air CEPI Score (i3)	**21.00**
Aggregated CEPI Score =	**im + {(100-im)*i2/100)*i3/100)}** where, im = maximum sub index; and i2 and i3 are sub indices for other media
CEPI Score	**59.8**

10. Conclusion

Ambient Air Quality

- In the present study, 08 AAQ stations were identified in the CEPI impact area to cover both upwind and cross wind directions and AAQ survey was conducted.
- All air quality parameters were observed well within the limits as per NAAQS.
- Concentration of PM10 was observed in the range of 53.0µg/m^3 to 62.0µg/m^3 and PM2.5 in the range of 14.0 to 16.0µg/m^3 at the studied locations.
- In the CEPI score calculated for Air Environment by CPCB in March 2018, the concentration of PM_{10} has exceeded at all the studied locations and $PM_{2.5}$ has exceeded at 10 locations out of 12, which contributed to higher air index (72.00). However, in the present report, concentration of both PM10 and PM2.5 are found below permissible levels resulted in less exceedance factor, hence lower air index (21.00).

Surface Water Quality

- To understand the quality of treated effluent, samples were collected from six industries
- In the present study, BOD is found to exceed the permissible limit in 5 water samples.
- All the industries in the Tarapur region are either reusing the treated trade effluent as sewage in their process or gardening.
- In the present CEPI score the concentration of Total Nitrogen was also observed to exceed at one of the studied locations.

Ground Water Quality

- Six ground water samples were collected from different Dug well, well and Bore well in the region.
- All the parameters of ground water analysis were found within the permissible limits, except selenium and flouride.
- Selenium is found to exceed the permissible limit in 5 water samples and Fluoride is found to exceed the permissible limit in 3 water samples. The expanding mining, refining, power generation and agricultural production are the main sources of selenium contamination in water bodies. High concentration of selenium in the body is too high, hair loss, body pain, muscle damage, liver and kidney failure, cancer.

CEPI Score

- The CEPI Score post monsoon season is 59.8.
- During calculation of CEPI score, Land Index is calculated highest with a score of 54.8, followed by the Water index as 53.0 and the Air Index 21.00. The parameters of air and ground water in

Tarapur region are observed well within the limits. Hence, aggregated CEPI score is calculated as 59.8, which is lower than the CPCB CEPI score February 2018 which was 93.69, which is 36.18% lower than the CPCB score of 2018.

- In CEPI score of CPCB 2018, all the indices i.e. Air index, water index and land index were higher as compared to the present (March, 2023) indices.
- In comparison with the CEPI Score of March 2023, a decrease in the water score is observed.
- As per the CPCB CEPI calculation revised in 2016, Health statistics represented by Receptor C in CEPI Calculation, also play an important role.
- For analysing the health data collected from hospitals, 38% decrease in air borne disease cases and 21% decrease in the water bornes diseases cases are observed in the year 2023 as compared to the year 2022. Hence score for receptor C is considered as 0 for air, water & land Environment. However, in the CEPI score calculated by CPCB (2018), the receptor C (the health data) score was 10 for water and land environment.
- Collective efforts of the regional office of MPCB, NMMC, administration and environmental organizations are resulting in a significant reduction in pollution levels.
- The present study is the compilation of post-monsoon season, which results in the dilution of environmental samples resulting in lower pollution load, hence also affecting the total score.
- In conclusion, this study reveals an approximately 11% decrease in the CEPI score as compared to last year's (2023) post-monsoon study, and a 36.18% reduction in the CEPI score compared to the CPCB study conducted in 2018 in the Tarapur region.

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

Efforts Taken to Control Water Pollution

- Issued closure direction to Old 25 MLD CETP towards continuous non-performance.
- Commissioned New CETP Diversion of the entire effluent of old CETP to new CETP of 50 MLD (25 MLD partly in operation).
- Improved CETP Inlet Standards which resulted in improved outlet standards
- As per MPC Board directives positive discharge system, 2-way SCADA, NRV & Autosampler installed by CETP members.
- Chamber numbering helps to identify defaulter areas and industries.
- Industry-wise Segregation of high COD/TDS effluent stream.
- Persuasion towards commissioning of common High COD Treatment Facility.1st on-site common HCOD/TDS reduction Facility in Maharashtra (300 CMD) established in MIDC Tarapur & in operation.
- Establishment of eight monitoring stations under the National Water Quality Monitoring Program (NWMP).
- Steps are taken for industrial area/other units to recycle 100% treated effluent to achieve zero liquid discharge (ZLD) -120
- Installation of CEMS installed for Air and Water in Large and Medium scale RED category industries: Two-way SCADA installed by industries

Efforts Taken to Control Air Pollution

- Introduction of Cleaner fuel PNG instead of Coal. 130 industries switched fuel from Cola to PNG. The use of clean fuel (PNG) will reduce dust emissions by industries.
- Which improves air quality in the vicinity.
- Increase Air monitoring vigilance to verify the Air pollution Control system.
- Establishment of three Continuous Ambient Air Quality Monitoring (CAAQM) with meteorological data in the Tarapur industrial area is also proposed by the regional office.
- M/s JSW Steel Ltd has installed a CAAQM station with an AQI display to be aware of Air Quality
- Established 3 manual Air monitoring stations

Efforts Taken to Control Land Pollution

- Persuasion with CHWTSDF to increase the frequency of collecting HW and its transportation.
- Removed and disposed of Sludge lying in Sump No.2 during the COVID period.
- Repeated directives to CETP for Sludge removal and disposal at CHWTSDF which resulted in CETP having disposed of more than 25000 MT of Sludge from 2019 to till date.
- Increase HW disposal quantum

Other Efforts taken to Control Pollution:

- Total 978 trees are planted in last one year (2021-2022).
- Action taken against non-complied industries as mentioned in the below table:

YEAR	2019	2020	2021	2022
SCN	169	70	328	230
PD	22	36	6	3
CD	30	78	280	16
Total	221	184	614	249

Continuous Ambient Air Quality Monitoring Station (CAAQMS)

Ambient Air Quality Monitoring (AAQM) Van

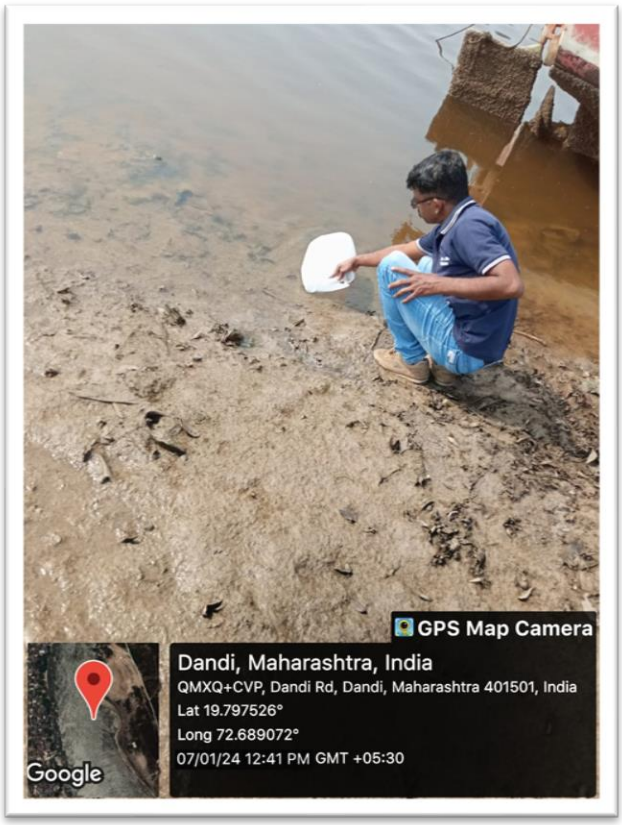
12. Photographs

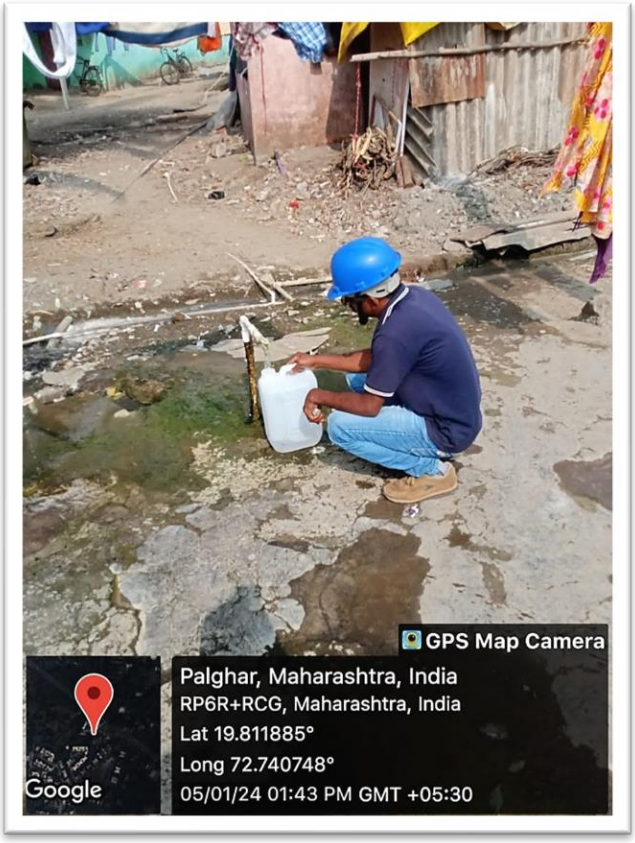
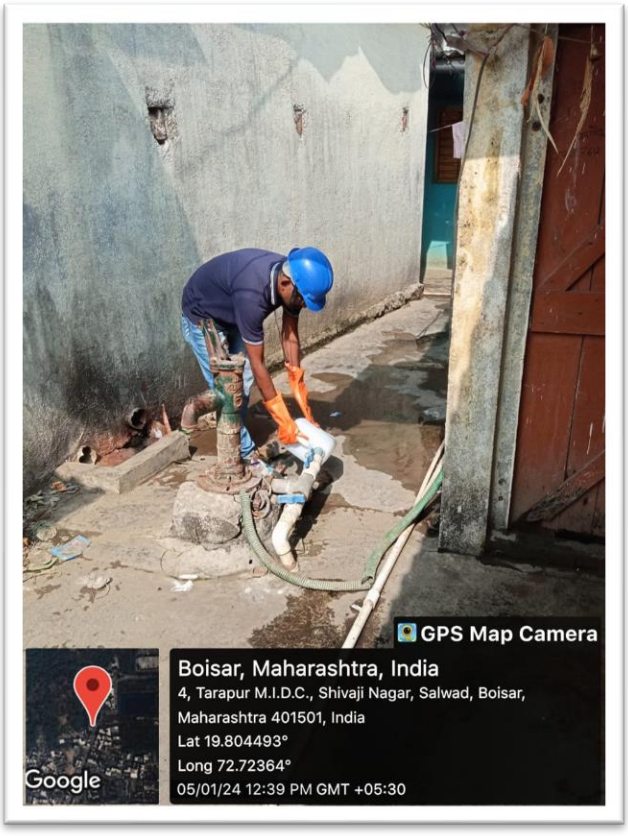
Ambient Air Sampling at Loba Chemical Pvt Ltd.

Ambient Air Sampling at D Docor Export Pvt. Ltd., MIDC.

Ambient Air Sampling MPIL Steel Structure Ltd.

Ambient Air Sampling at AAQM-Kokuyo Camlin Ltd.

	
Surface water sampling at Nalla Carrying Saravalli	**Surface water sampling at Banganga River**
	
Surface water sampling at Khairpada Nalla	**Surface water sampling at Dandi**

	
Ground Sampling at Open well, near nalla Sump 1.	**Ground Sampling at Dhodi Pooja Borewell Water.**
	
Ground water sampling at Gharat	**Ground water sampling at Shivaji Nagar, Boisar**

HEALTH STATISTICS

Required for Comprehensive Environmental Pollution Index (CEPI) Post-monsoon Season (December 2023- February 2024) Study by Maharashtra Pollution Control Board (MPCB), MAHARASHTRA

Name of the Polluted Industrial Area (PIA)	TARAPUR
Name of the major health center/ organization	Thunga HOSPITAL
Name and designation of the Contact person	SANTHOSHA SHETTY 8380005944
Address	AM-32, Tarapur M.I.D.C., Boisar, Maharashtra 401506

S No.	Diseases	No. of Patients Reported	
		Year 2021-2022	Year 2022-2023 Jan.23 to Dec-23
AIRBORNE DISEASES			
1.	Asthma	328	345
2.	Acute Respiratory Infection	2	3
3.	Bronchitis	17	21
4.	Cancer	2	3
WATERBORNE DISEASES			
1.	Gastroenteritis	142	160
2.	Diarrhea	10	12
3.	Renal diseases	45	43
4.	Cancer	—	—

Date:

2

THUNGA HOSPITAL PVT. LTD. TMRCT BOISAR

Signature

HEALTH STATISTICS

Required for Comprehensive Environmental Pollution Index (CEPI) Post-monsoon Season (December 2023- February 2024) Study by Maharashtra Pollution Control Board (MPCB), MAHARASHTRA

Name of the Polluted Industrial Area (PIA)	**TARAPUR**
Name of the major health center/ organization	**Gramin Mantralaya**
Name and designation of the Contact person	Mrs. Savita S. Bogul Staff Nurse / 9961446897
Address	R.H. Boisar

S No.	Diseases	No. of Patients Reported	
		Year 2021-2022	Year 2022-2023
AIRBORNE DISEASES			
1.	Asthma	19	04
2.	Acute Respiratory Infection	253	176
3.	Bronchitis	0	0
4.	Cancer	2	3
WATERBORNE DISEASES			
1.	Gastroenteritis	05	47
2.	Diarrhea	128	56
3.	Renal diseases	0	0
4.	Cancer	02	3

Date: 17/1/2024

SB Bogul
Signature

HEALTH STATISTICS

Required for Comprehensive Environmental Pollution Index (CEPI) Post-monsoon Season (December 2023- February 2024) Study by Maharashtra Pollution Control Board (MPCB), MAHARASHTRA

Name of the Polluted Industrial Area (PIA)	**TARAPUR**
Name of the major health center/ organization	**Shaileela Hospital**
Name and designation of the Contact person	Dr. Jitendra Patil
Address	Boisar, palghar

S No.	Diseases	No. of Patients Reported	
		Year 2021-2022	Year 2022-2023
AIRBORNE DISEASES			
1.	Asthma	8-10 OPD	4-5 OPD
2.	Acute Respiratory Infection	30-40 OPD	10-15 OPD
3.	Bronchitis	3-4 OPD	1-2 OPD
4.	Cancer	Nil	Nil
WATERBORNE DISEASES			
1.	Gastroenteritis	10-12	8-10 OPD
2.	Diarrhea		
3.	Renal diseases	Nil	Nil
4.	Cancer	Nil	

Date:

SAILEELA HOSPITAL ★ FRACTURE, ACCIDENT & GENERAL SURGICAL ★

Signature