Panvel Municipal Corporation

Environmental Status Report 2024-25

Prepared By

Indian Institute of Technology Bombay

Powai, Mumbai- 400076

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List of Awards Received by PMC

❖ **City Beautification Award-2023**, by Hon. Chief Minister of Maharashtra. In the state-wide Urban Development Competition 2022, the Panvel Municipal Corporation (PMC), which falls under the D category, secured the first rank among municipal corporations in its category.

- **Majhi Vasundhara Award-2023** by Hon. Chief Minister of GOM for excellence in city environment. In the year June 2023, PMC secured the third prize in the state under the category of cities with a population of three to ten lakh. As a result, the state government awarded Rs. 5 crores to PMC for its efforts in the campaign.

❖ **Panvel Municipal Corporation has been conferred with Water + status, has a 3 Star rating.**

REPORT FOR THIRD PARTY INSPECTION OF PANVEL

Date of TPI	14-August-2023 - 18-August-2023
Applied for	WATER+
Result Status	WATER+

City Profile:

State	MAHARASHTRA
District	RAIGADH
Census Code	802796
Total Population	180020

Third Party Inspection Summary:

1. **ULB Documentation Status: PASS**
2. **Field Assessment Status: PASS**

Scoring as per WATER+ Parameters:

S.No.	Indicators	Marks Obtained	Max. Marks	To Qualify	Status
1.1	Adequate treatment capacity of STP	30	40	30	PASS
1.2	Operational Efficiency	5	10	5	PASS
2.1	Safe cleaning of Sewer and Septic tanks through mechanised equipment and availability of PPEs	20	20	15	PASS
2.2	Availability of RSA and SRU	20	20	15	PASS
3	Sufficient capacity of desludging vehicles and jetting machines for cleaning of septic tanks with soak pits and sewers respectively in the city	10	10	5	PASS
4	Safe discharge of sewage including septage from CT / PT / IHHL	50	50	35	PASS
5	Re-use of treated water	15	15	5	PASS
6.1	Municipal drains receiving sullage be well maintained	15	20	15	PASS

आज़ादी का अमृत महोत्सव

स्वच्छ भारत
एक कदम स्वच्छता की ओर

Ministry of Housing and Urban Affairs
Government of India

GARBAGE FREE CITY
STAR RATING
★★★★★★★

Star Rating Certificate

Swachh Bharat Mission (Urban)

This is to certify that city of

PANVEL

of the State of Maharashtra has been awarded

★★★ (Three star)

Garbage Free City

ROOPA MISHRA
Joint Secretary & Mission Director
Swachh Bharat Mission-Urban

DURGA SHANKER MISHRA
Secretary

Foreword

It is with great pride and satisfaction that I present the Environmental Status Report of Panvel Municipal Corporation (PMC) for the year 2024–2025. This report highlights the dedicated efforts of PMC members in pursuing environmental improvements and steering the city toward sustainability across various environmental parameters. The report has been meticulously prepared by analyzing quantitative data, conducting extensive monitoring of all environmental matrices, and incorporating publicly available information, stakeholder suggestions, and relevant policy documents.

Panvel Municipal Corporation takes every effort to periodically monitor environmental matrices, dispose the generated waste, maintain roads, drainage, and sewerage systems, and enhance the all-necessary green cover by planting trees to make the system more environmentally friendly and making the city inhabitable by the ever-growing population.

In the PMC region there are numerous industries that strive to maintain environmental balance while manufacturing their products. Environmental protection and conservation have always been a collective as well as individual responsibility therefore (PMC) Panvel Municipal Corporation makes all the efforts to make the city cleaner and safer not only through collective efforts but also educating individuals to make all important impacts.

The Environmental Status Report is the result of a thorough investigation conducted by the Professors and Associates of Indian Institute of Technology, Bombay. Hence, I am confident that the Environmental Status Report would assist Panvel Municipal Corporation in making the city clean, beautiful, and healthy.

Shri. Mangesh Chitale
Hon'ble Municipal Commissioner
Panvel Municipal Corporation

Foreword

The Environmental Status Report (ESR) is not just about the fulfillment of the need for a report; rather, it is a continuous process of measurement of environmental indicators and assessment of the environmental parameters. The results are not just compiled but are analyzed with deep study and discussion, on the basis of which the Panvel City Municipal Corporation will take steps for the mitigation of identified environmental issues and strive towards better environmental management.

We consider this as one of our most important duties, and for these reasons, we conduct a very detailed and comprehensive exercise to develop this report annually. It is a matter of immense pride to be part of a team trying to develop the city in an eco-friendly manner. Through our combined efforts, we are striving to constantly improve the status of Panvel City at all levels social, environmental, or economic.

Finally, I would also like to express my appreciation and thanks to all individuals and departments for their valuable inputs to this report.

Shri. Ganesh Shete
Additional Commissioner
Panvel Municipal Corporation

Foreword

Offering the Environmental Status Report for the years 2024–2025 of Panvel City Municipal Corporation makes me happy and satisfied. The Environmental Status Report is the outcome of paradigm changes that make the city more sustainable and environmentally friendly. It is developed by analyzing quantitative data, vast level of monitoring across all the environmental matrices, publicly available information, beneficial suggestions, and policy documents as noted to be applicable.

The Panvel Municipal Corporation takes every effort to periodically monitor environmental matrices with or without the assistance of an external expert, dispose the generated waste in a systematic and compliant manner, maintain roads, manage and maintain the drainage and sewerage systems, enhance the all-necessary green cover by planting trees to make the system more environmentally friendly and making the city inhabitable by the ever-growing population.

Numerous businesses in the Panvel City Municipal Corporation area make an effort to produce their goods while preserving the environment. Both community duty and individual responsibility have been a part of environmental protection and conservation. The Indian Institute of Technology, Bombay, conducted a comprehensive examination that led to the creation of the Panvel Environmental Status Report.

The Environmental Status Report will undoubtedly help the Panvel City Municipal Corporation make their city a cleaner, more attractive, and healthier place.

Shri. Swarup Manik Kharage
Deputy Commissioner
Panvel Municipal Corporation

Acknowledgement

The development of the "Environmental Status Report for Panvel Municipal Corporation" was a wonderful experience, which the Indian Institute of Technology, Bombay (IIT Bombay) credits to Panvel Municipal Corporation (PMC) officials' for their cooperation and support.

To begin, IIT Bombay wishes to express gratitude to Shri. Mangesh Chitale, Shri. Ganesh Shete, and Mr. Swarup Manik Kharage, all Municipal Administrator officers of Panvel Municipal Corporation, for their continuous support and encouragement.

While formulating the Environmental Status Report, IIT Bombay would like to express its gratitude to the City Engineer and all the officials of PMC, who assisted us during site visits and personal interactions to collate primary as well as secondary information.

The team would also like to thank all of the Executive Engineers of the respective departments and their team members for their assistance, as well as the Hon'ble Committee Members of the PMC for their continued cooperation.

IIT Bombay by heart acknowledges the efforts put forward by all the additional officials from various government ministries, their secretarial staff, and participants in stakeholder meetings, and persons who supplied data, timely assistance, and great cooperation.

Finally, the authors express their gratitude to everyone who helped them compile this study.

Panvel, March, 2025

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Abbreviation

PMC	Panvel Municipal Corporation
AAQ	Ambient Air Quality
AAQMS	Ambient Air Quality Monitoring System
AQI	Air Quality Index
BDL	Below Detectable Limit
BOD	Biological Oxygen Demand
BPMC	Bombay Provisional Municipal Corporation
CAAQM	Continuous Ambient Air Monitoring Station
CETP	Common Effluent Treatment Plant
CGWB	Central Ground Water Board
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
COPD	Chronic Obstructive Pulmonary Disease
CPCB	Central Pollution Control Board
CSR	Corporate Social Responsibility
dBA	Weighted Decibels
DL	Detectable Limit
DMP	Disaster Management Plan
DO	Dissolved Oxygen
DPR	Detailed Project Report
DPSIR	Driving Force Pressure State Impact Response
EC	Electrical Conductivity
ENE	East- northeast
EPIP	Export Promotion Industries Park
ESR	Environmental Status Report
GBD	Global Burden of Disease
GC- FIS	Gas Chromatography- Flame Ionization Detection
GC-FID	Gas Chromatography- Flame Ionization Detector
GIS	Geographical Information System
GOM	Government of Maharashtra
IMD	India Meteorology Department
KLD	Kilo- liters per Day
LPCD	Liters per Capita per Day
LRI	Lower Respiratory Tract Infection
LULC	Land Use Land Cover
MCM	Million Cubic Meters
MIDC	Maharashtra Industrial Development Corporation
MJP	Maharashtra Jeevan Pradhikaran
MLD	Million Liters Per Day
MMC	Maharashtra Municipal Corporation

MMR	Mumbai Metropolitan Region
MMRDA	Mumbai Metropolitan Region Development Authority
MoEF&CC	Ministry of Environment, Forest, and Climate Change
MoHFW	Ministry of Health and Family Welfare
MPCB	Maharashtra Pollution Control Board
MPN	Most Probable Ground
MSEB	Maharashtra State Electricity Board
MSL	Mean Sea Level
MSRDC	Maharashtra State Road Development Corporation
MSRTC	Maharashtra State Road Transport Corporation
MSW	Municipal Solid Waste
MT	Metric Tons
NAAQS	National Ambient Air Quality Standards
NABL	National Accreditation Board for Test & Calibration Laboratories
NAMP	National Air Quality Monitoring Programme
NDMA	National Disaster Management Authority
NE	Northeast
NGO	Non- Government Organization
NNE	North- northeast
NOx	Oxides of Nitrogen
NRW	Non- Revenue Water
NWMP	National Water Monitoring Programme
ODF	Open Defecation Free
OECD	Organization of Economic Co-corporation and Development
PMC	Panvel Municipal Corporation
PM_{10}	Particulate Matter Below 10 micrometers Diameter
$PM_{2.5}$	Particulate Matter Below 2.5 micrometers Diameter
PPP	Public Private Partnership
PWD	Public Works Department
RDS	Reparable Dust Sampler
RSPM	Reparable Suspended Particulate Matter
RTO	Regional Transport Office
SAR	Sodium Absorption Rate
SHG	Self- Help Group
SBM	Swachh Bharat Mission
SO	Sulphur Monoxide
SoE	State of Environment Report
SPM	Suspended Particulate Matter
SSW	South- southwest
STP	Sewage Treatment Plant
SW	Southwest
SWD	Social Welfare Department

TDS	Total Dissolved Solids
TSS	Total Suspended Solids
ULB	Urban Local Bodies
UNCED	United Nation Conference on Environment and Development
WHO	World Health Organization
WIMCO	Western Indian Match Company
WQI	Water Quality Index
WQMS	Water Quality Monitoring Station
WSW	West- southwest
WTP	Water Treatment Plant

Executive Summary

As per the Maharashtra Municipal Corporation (MMC) Act 1949, section 67(A), it is mandatory for all Urban Local Bodies (ULBs) of the state of Maharashtra to submit an annual Environmental Status Report (ESR) to the General Body on or before 31st July of every year.

The 74th Amendment to the constitution has enlarged the roles and responsibilities of municipalities, specifically citing protection of the environment and promotion of ecological aspects. Preparation of an Annual ESR is mandated in the state level legislation (the BPMC Act) following the 74th Constitutional Amendment Act and the 12th Schedule of the Constitution.

Environmental Reporting finds its roots in the Local Agenda 21 mandate that was passed in the Earth Summit of 1990 in Rio. Under this mandate, Urban Local Bodies (ULBs) are required to undertake the preparation and publication of an annual State of Environment Report (SoE) or equivalent.

The ESR indicates the city's environmental concerns, growth factors and its impacts, provides information on the environmental infrastructure including water supply, sewage management, traffic & transportation, solid waste management, biodiversity, overall environmental pollution and degradation and possible mitigation measures required, information for investment and management decisions for the ULB (Urban Local Body), assessment of various natural resources, level of pollution & its direct or indirect impact on human beings and other life forms and annual budgeting and planning exercises etc.

As per the guidelines published in June 2009 by the Department of Environment, Government of Maharashtra (GOM), the ESR has to be developed as per the DPSIR (Driving Force Pressure State Impact Response) framework. This frame-work focuses on dynamic relationship between the human activities and its impact on physical and biological processes of the ecosystem.

The ESR for the financial year (FY) 2024-25 aims to fulfill the objectives stated in the guidelines stipulated by GOM pertaining to ESR. Broadly, the purpose of this study is.

- To highlight the condition of the biophysical environment of PMC
- To analyses of trends or changes in the environment as well as identify the causes of these changes of PMC
- To assess and interpret the implications and impacts of these trends

- To check adequacy of existing environmental infrastructure of PMC
- To set process for public participation
- To redevelop action plans of PMC
- To set targets, allocate responsibilities & institute monitoring and tracking mechanisms for making Panvel city environment friendly sustainable city.

To analyses the environmental health of the Panvel area, environmental survey / on-field was conducted by SAGE to analyze the current environmental health of study area i.e., Panvel area along with reviewing the secondary data accessible from PMC, MJP, MPCB, CPCB, MIDC, MoHFW, MoEF&CC, NDMA, MSEB, Panvel Tehsil etc. The purpose of the on-field survey was to know the environmental issues and efforts of PMC in mitigating the issues and also to understand the reasonable expectations of households in developing the city sustainable and environmentally friendly.

Panvel city is divided into 20 wards. Elections are reportedly conducted in every 5-year interval. As per report released by Census India 2011, total population of PMC is 5,09,901. Out of the total population, approximately 2,71,303 are males while 2,38,598 are females. In Panvel, Male literacy is around 80.38% while female literacy rate is 72.63%. PMC has total administration over 40,478 houses to which it supplies basic amenities like water and sewerage. PMC is authorized to build roads within municipal corporation limits and impose taxes on properties coming under its jurisdiction.

The increasing population due to high growth of affordable housing, well-organized railway connectivity and enlargement of industrial activities are the main drives for increasing pollution load in and around PMC. Increasing population, urbanization & industrialization resulting in the depletion of natural resources like water & biodiversity. Enormous growth of unplanned and unorganized slums, population, urbanization & industrialization in the recent years could potentially resulting in issue like low level of tree cover, high density population, at some area narrow roads at some location.

As part of the ESR analysis of air quality, water quality & noise level was conducted and the reported analytical results were found to be within the stipulated standards which are as per MPCB online monitoring data. The scientific analysis based on GIS & satellite images captures the land use & land cover in the city & also enabled an understanding of the land cover & percentage distribution of land use. Further, analyzing the status of & few changes in

biodiversity helps us understand the impact of urbanization on the environment. The ESR highlights the attempts made by PMC to: a) increase tree cover through tree plantation programs since many years; b) Suggesting the use of sewage treatment plants to produce an effluent that can be reused in the city in a useful manner; C) Initiate segregation of solid waste, processing solid waste to generate unconventional sources of fuel & energy; d) banning the usage of plastic bags, strengthen dissemination of information to reduce the usage of plastic in general, to form an environment regulation body at PMC; e) to initiate to install environment monitoring station at PMC & to enhance the participation of NGOs including SHGs in conserving environment in the city.

PMC recently received an award viz. 'Three Star Garbage Free City' under Swachh Bharat Mission. These are evident for their sincere efforts in making the city clean, beautiful & environmentally friendly. The residents in Panvel appreciated the PMC for efforts relating to solid waste management, sewage system, sanitation, disaster management & services.

1. Background of ESR

ESR is one of the forms of State of Environment Reporting (SoE). This data is analyzed to show trends of environmental pollution, impacts of growth and possible environmental action planning in the city. According to the municipal legislations, the Urban Local Bodies (ULBs) in Class I cities are required to publish an annual ESR, which will indicate the status of environment management in the city and identify the areas where mitigation measures are required to be considered.

The 74th Amendment to Constitution provides that all the Class A Cities have to publish Annual Environmental Status Report (ESR). This report is indicative of the status of environment management in the city. It also identifies the areas where mitigation measures are required to be considered. As per the Maharashtra Municipal Corporation (MMC) Act 1949, section 67(A), it is mandatory for all Urban Local Bodies (ULBs) of the state of Maharashtra to submit an annual Environmental Status Report (ESR) to General body on or before 31st July. Cities in Maharashtra have been publishing ESRs since 1997.

The ESR indicates the city's environmental concerns, growth factors and its impacts, provides information on the environmental infrastructure including water supply, sewage management, traffic & transportation, solid waste management, biodiversity, overall environmental pollution and degradation and possible mitigation measures required, information for investment and management decisions for the ULB (Urban Local Body), assessment of various natural resources, level of pollution & its direct or indirect impact on human beings and other life forms and annual budgeting and planning exercises etc.

As per the guidelines published in June 2009 by the Department of Environment, Government of Maharashtra (GOM), the ESR has to be developed as per the DPSIR (Driving Force Pressure State Impact Response) framework. This frame-work focuses on dynamic relationship between the human activities and its impact on physical and biological processes of the ecosystem.

DPSIR framework assumes a chain of causal links starting with 'driving forces' (economic sectors, human activities) through 'pressures' (emissions, waste) to 'states' (physical, chemical and biological) and 'impacts' on ecosystems, human health and functions, eventually leading to political 'responses' (prioritization, target setting, indicators).

The ESR also includes analysis of trends or changes in the environment, analysis of the causes of these changes, assessment and interpretation of the implications and impacts of these trends, and assessment of the actual and potential societal response to environmental problems. Today, ESR studies have emerged from being solely environment oriented to encompassing, interfacing with economic and social elements. Hence, an ESR report has come to identify and capture the key driving forces that influence environmental change and policies.

The ESR for the financial year (FY) 2024-25 aims to fulfill the objectives stated in the guidelines stipulated by GOM pertaining to ESR. Broadly, the purpose of this study is;

- To highlight the condition of the biophysical environment of PMC
- To analyses of trends or changes in the environment as well as identify the causes of these changes of PMC
- To assess and interpret the implications and impacts of these trends
- To check adequacy of existing environmental infrastructure of PMC
- To set process for Enhancing Public Participation in Environmental Governance.
- To redevelop Action Plan for Sustainable Urban Development of PMC
- To set Annual budgeting, planning exercises and tracking mechanisms for making Panvel city environment friendly sustainable city

2. Panvel City Profile

2.1 Background

Panvel City is known for being rich in nature, history, and culture. It is a fast-growing urban area close to Mumbai, surrounded by highways, shipping and industrial zones. Trading routes such as land and sea are the major reason for its prosperity. The routes were developed during the Mughal era and later developed by Portuguese, British and Marathas. Municipal Corporation is the governing body of the city of Panvel in Raigad district.

Panvel Municipal Council was established on August 25, 1852, as the first municipal council in India by the British. The initial notification for converting Panvel Municipal Council to Municipal Corporation came in the year 1991 but was never finalized. After rapid urbanization post-2000, Panvel Municipal Corporation was eventually upgraded to Municipal Corporation in 2016. Panvel Municipal Corporation is the first Municipal Corporation in Raigad district, 9th in the Mumbai Metropolitan Region and 27th in the state of Maharashtra. The Municipal Corporation includes 29 revenue villages of Panvel taluka, including CIDCO Nodes, Taloja, Kharghar, Kalamboli and Kamothe. As per the Census Report of 2011, Panvel city spreads over 110.06 sq.km. It has a reported population of 5.09 lakhs. It includes areas of gram panchayats, CIDCO, MIDC, Panvel Municipal Corporation and Raigad District Panchayat.

Panvel has been counted as one of the major cities in North Konkan for about seventy-eight hundred years. It is in the Raigad district of Maharashtra state and it is known as Konkan Convener situated at the headquarters of Pune-Mumbai. Panvel is also a taluka and it borders the Thane district. Panvel City, coordinates at 18°59′40″N and 73°06′50″E, is located 60 km away in the suburbs of Mumbai, the capital of the state of Maharashtra.

The corporation area comprises historic temples, mosques, churches, lakes, and the people living in the city. The city is situated on the banks of Panvel Creek, surrounded by the Matheran Hills. It is known for the forts in Raigad and Khopoli. The major historical attraction in Panvel taluka is Karnala Fort which is popular for trekking & bird watching. Panvel is also famous for the two prominent Ganesh temples in Maharashtra: Ballaleshwar, located in Pali, and Varadavinayak in Mahad village. Beth EI Synagogue is a part of the Indian heritage & one of the tourist places in Panvel.

The surface water body in Panvel City is Taloja River & Kasrdi Dam. A major source of water supply in Panvel City is from Dehrang Dam which is across Gadeshwar Lake. The other

sources of water at Panvel are from MIDC, CIDCO and Patalganga MJP and from borewell installed by PMC in Panvel. Also, in the present case, the development of Panvel city is taking place at a rapid pace and CIDCO has developed "New Panvel" which adjoins Old Panvel. Due to the development of Konkan Railway passing through Panvel upcoming Navi Mumbai International Airport near Panvel City, Sewri-Nhava Sea Link Bridge and SEZ projects Panvel city is experiencing rapid growth and urbanization with great number of people coming in Panvel for their livelihood and employment. Panvel station is a junction of railways, and it is an entry of Mumbai. Table 2.1 gives brief information on Panvel city.

Table 2.1: Brief Information of Panvel City

Sr. No	Index	Information
1	City	Panvel
2	Municipal Ground Coverage	110.06 sq. km.
3	Population (as per 2011 census)	5.09 Lakhs
4	AMC Establishment	1st October 2016
5	Municipal Class	D
6	Election Ward	20
9	River	Kasardi, Taloje & Kalundre river
10	Nearby Dam	Dehrang dam
11	MSL	28 m
12	Location	18°59′40″N and 73°06′50″E
13	National Highways No.35	• Mumbai-Pune Expressway • Sion-Panvel Expressway • NH 4B, NH 66 start from here while NH 4 passes through Panvel
14	Railway	• Harbor line from Mumbai CSMT • Central line from Diva / Karjat • Western Freight Corridor from JNPT • Konkan railway line from Mangalore meet at Panvel
15	Heritage	Vadale Lake, Ballaleshwar Temple, Khandeshwar Shiv temple, Beth El Synagogue

Source: PMC Website

2.2 Location

Panvel, with a jurisdiction spanning approximately 110.06 sq.km, is situated at 18°59′40″N latitude and 73°06′50″E longitude, at an elevation of around 28 meters above mean sea level. Located in the Raigad district, Panvel is about 40 km from Mumbai by road and enjoys excellent connectivity to nearby cities such as Mumbai and Pune.

The Panvel Municipal Corporation (PMC) shares its borders with Navi Mumbai Municipal Corporation and Thane Municipal Corporation, enhancing its regional significance. Known for its exceptional road network, Panvel serves as a convergence point for several major highways.

The Sion-Panvel Expressway, a 25-km-long highway, provides seamless connectivity between Sion and Panvel via Navi Mumbai. Figure 2-1 illustrates the location of Panvel city. Figure 2-2 displays the sanctioned plan of Panvel city, sourced from the PMC website.

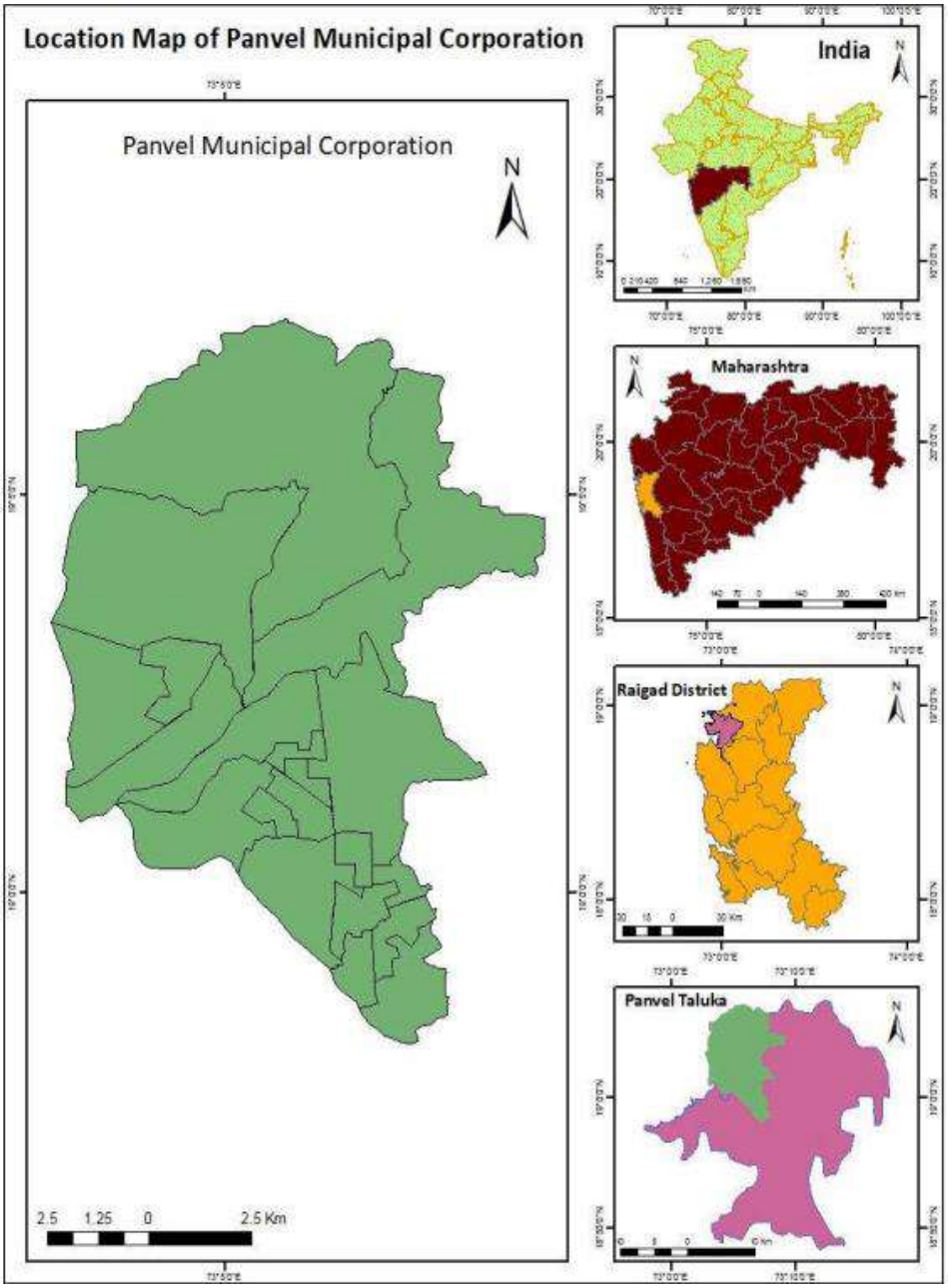


Figure 2.1: Location of Panvel City

Source: PMC Website

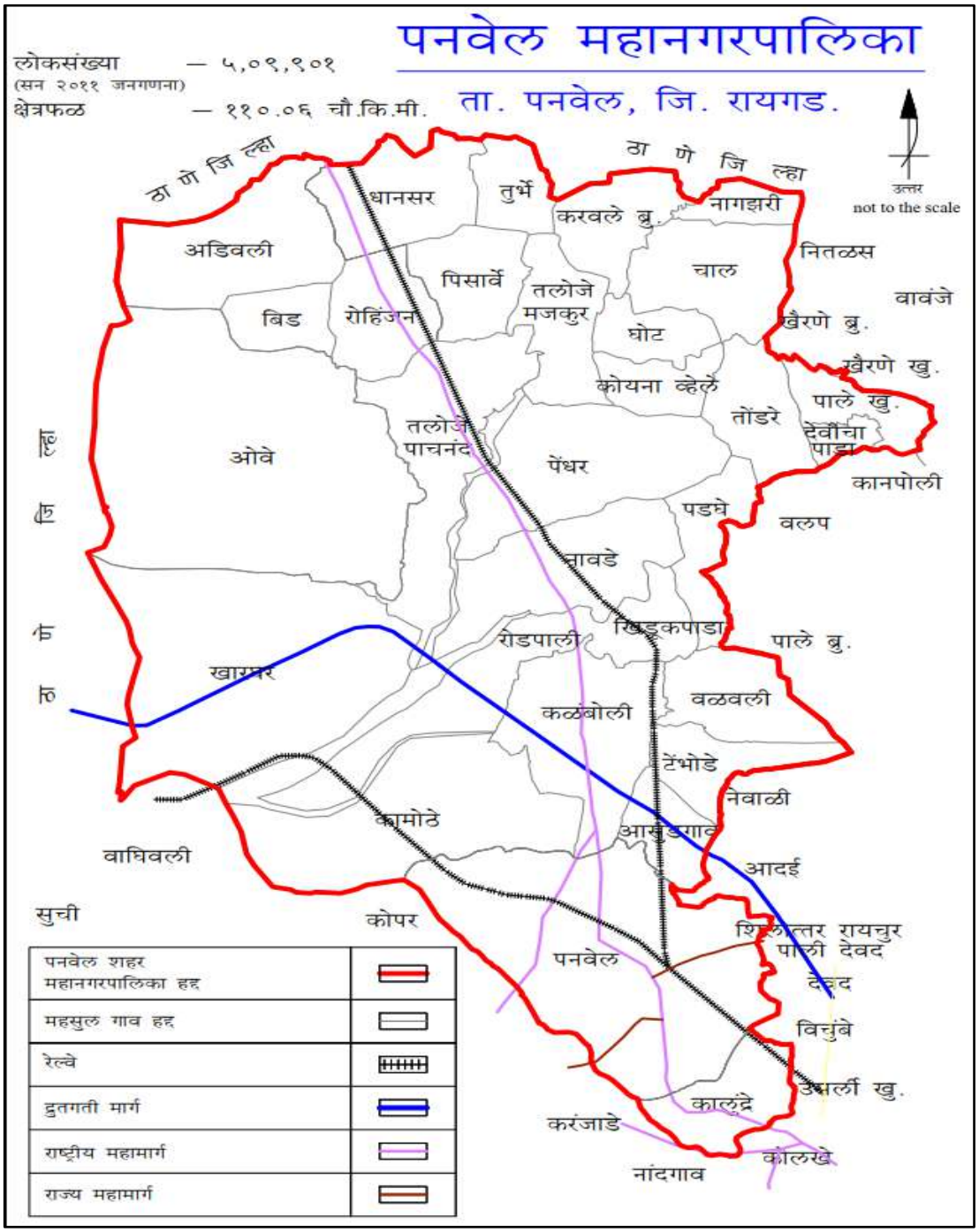


Figure 2.2: PMC Sanction Plan

Source: PMC Website

2.3 Connectivity Network

Panvel has emerged to be one of the fastest-developing cities not only in Maharashtra but in the whole of India as well. The fact that it is a neighboring city to Mumbai has led to an influx of people constantly migrating to it. These people see Panvel as the best option to not only beat the overcrowded, congested ways of Mumbai but also to tackle the paucity of land and

skyrocketing rent that Mumbai is commonly infamous for. This is also one of the driving reasons why the real estate market in Panvel has boomed.

Panvel has been making quite the headlines for the upcoming Navi Mumbai International Airport. Please refer Figure 2.3 for the airport connectivity of Panvel city. Navi Mumbai International Airport will be the second international airport in MMR. It will run alongside with Chhatrapati Shivaji Maharaj International Airport (CSIA) as one of India's first urban multi-airport systems.

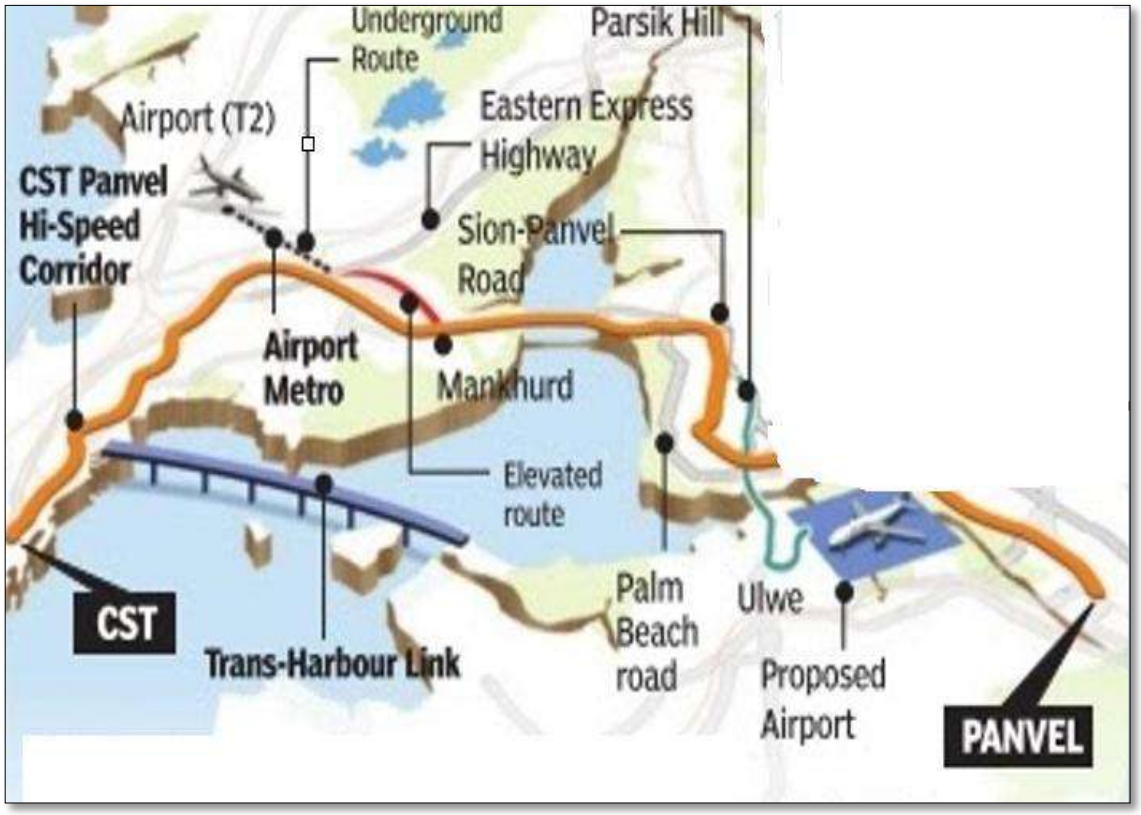


Figure 2.3: Navi Mumbai Airport Connectivity

*Source:*http://www.twenty२२.in/२०१६/०७/navi-mumbai-airport-connectivity.html

Panvel falls in the Raigad district, which lies approximately 40 km from Mumbai by road. Panvel is also very close to Navi Mumbai and Thane. It scores supremely high on its road connectivity as it serves as a meeting point for multiple major highways. The Sion Panvel Expressway is a 25 km long highway that connects Sion to Panvel via Navi Mumbai. It is undoubtedly one of the most important and busiest roads in the Mumbai Metropolitan Region (MMR). The highway is commonly used by people travelling by road from Pune, Goa and Konkan. Moreover, the Mumbai Trans Harbours Link is under construction, which would effectively connect South Mumbai to Navi Mumbai. It is a 21.8 km road bridge that will be the longest sea bridge in India on completion. It is estimated that nearly 70,000 vehicles will use the overpass every day as it will cut the travel time between Mumbai and Navi Mumbai significantly. Please refer Figure 2.4 for the road connectivity of Panvel city.

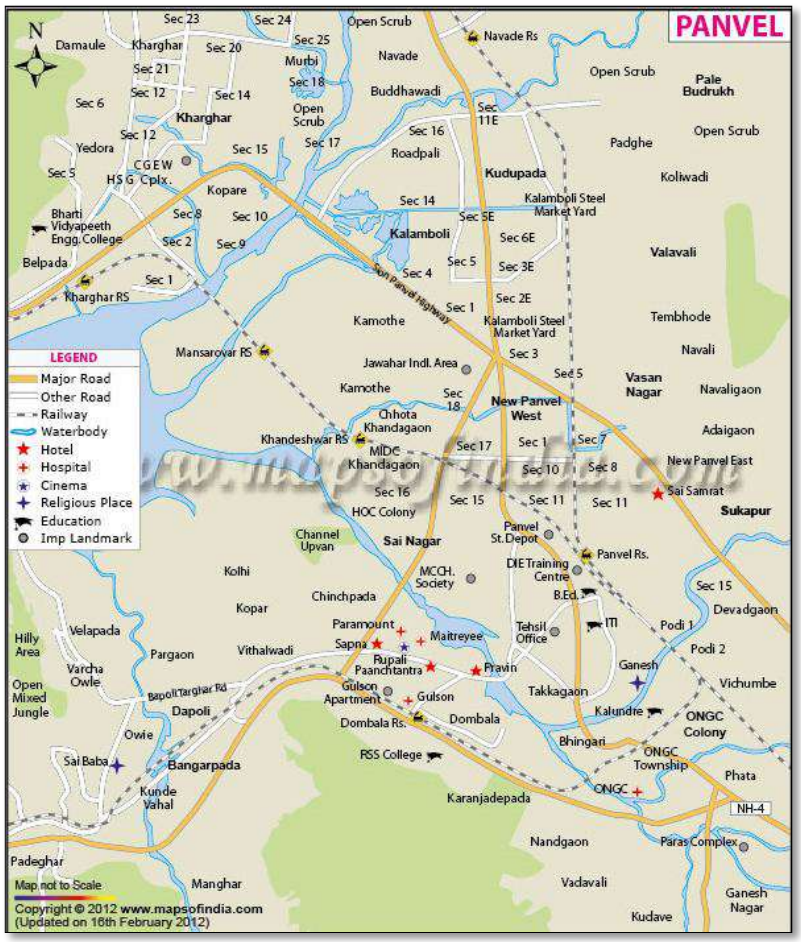


Figure 2.4: Road Connectivity to Panvel

Source: https://www.mapsofindia.com/maps/maharashtra/panvel.html

Panvel rail connectivity has become an epicenter of sorts. Panvel Railway Station functions as one of the most crucial junctions on the Central Railway. While it comes under the Mumbai Division of Central Railway, a harbor line from Mumbai CSMT, a central line from Diva / Karjat, Western Dedicated Freight Corridor from JNPT and the line from Roha, all meet at Panvel. Apart from that, under the jurisdiction of CIDCO, various railway projects are underway and are coming up with great speed. The CST–Panvel fast corridor is a proposed elevated suburban rail corridor on the Harbor Line of the Mumbai Suburban Railway wherein air-conditioned EMUs (Electrical Multiple Units) will operate. Along with that, the Panvel-Karjat railway corridor is also under construction. The proposed project would lead to greater connectivity and accentuate development in the region by connecting the far extremes of the Raigad district. Please refer Figure 2.5 for rail connectivity of Panvel city.

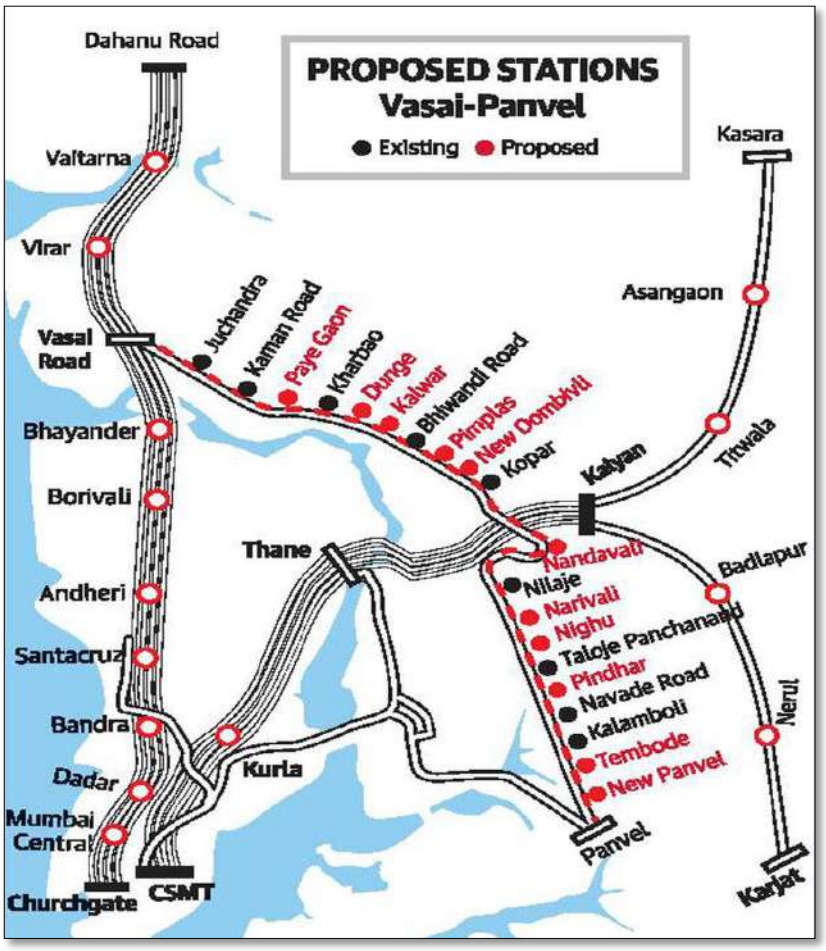


Figure 2.5: Panvel Railway Connectivity Map

Source:https://www.thehindu.com/news/cities/mumbai/mrvc-plans-to-bolster-vasai-panvel corridor/article29892511.ece

2.4 Climatic Conditions

The general climatic regime is fairly equitable since seasonal fluctuations of temperature are not significant. The moderating effects of the nearby sea and fairly high relative humidity in the atmosphere have restricted the variability. According to Department of Agriculture, Government of Maharashtra, the Maharashtra state is divided into 9 Agro- climatic zones. Raigad Districts form part of the North Konkan Agro-climatic zone with the following climatic conditions:

Temperature:

The mean daily maximum and minimum temperatures are 38°C and 16°C, respectively. Humidity is 98 % in monsoon and 60 % in winter.

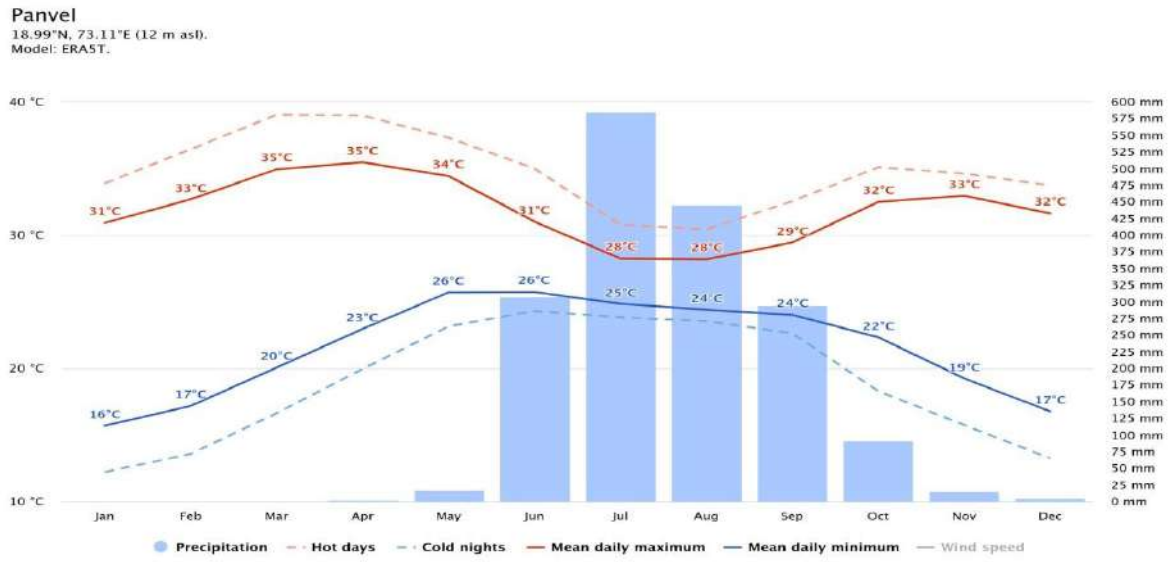


Figure 2.6: Panvel Average Temperature and Precipitation

*(*Source: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/panvel_india_1260434*)*

Rainfall:

The average annual rainfall is 2500 to 3000 mm. being on the western coast, the rainfall is usually experienced from the beginning of June to the end of September with an annual mean rainfall of 2677 mm. The precipitation diagram for Panvel shows how many days per month, certain precipitation amounts are reached.

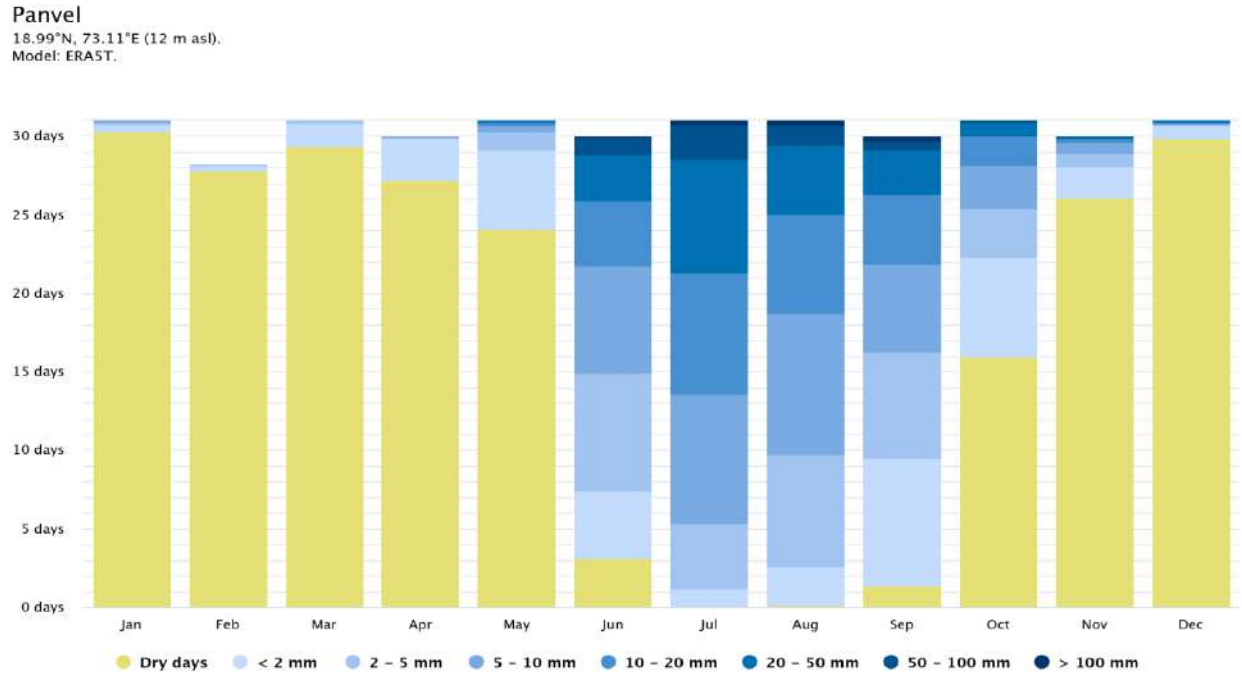


Figure 2.7: Panvel annual Precipitation Diagram

*(*Source: *https://www.panvelcorporation.com/public/map/PMC%20DP%20Report.pdf)*

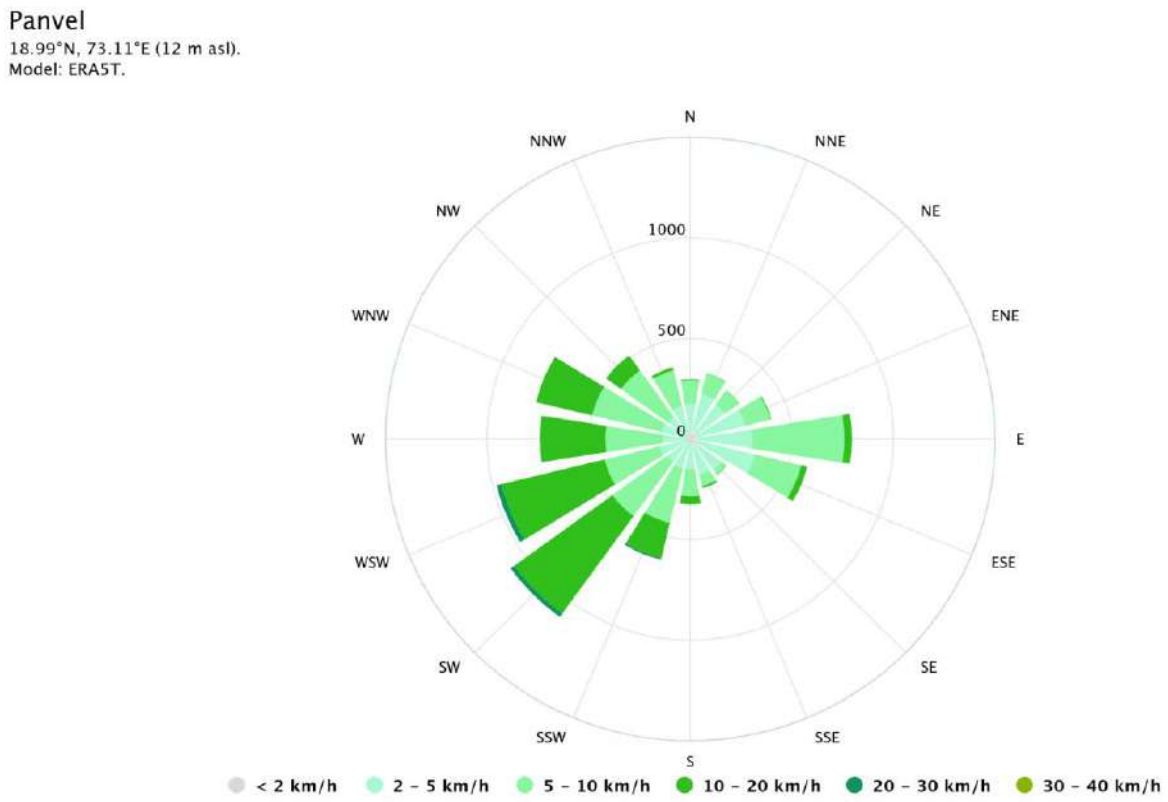


Figure 2.8: Panvel annual Windrose Diagram

*(*Source:*https://www.panvelcorporation.com/public/map/PMC%20DP%20Report.pdf)*

Figure 2.8 shows the annual wind rose for Panvel. The wind rose indicates the wind-flow in hours per year in the particular direction. In Panvel, the wind blows with the speed of >1 km/ hours for around 275 hours in a year from the direction of SW to NE. Similarly, wind blows from West to East for around 350 hours/year at the speed of > 1 km/hours and in the direction from WSW to ENE, with the speed of 1 km/hour for around 246 hours in a year.

Existing Land Use

The land use data gathered by flying the drone at a height of 100m over the entire jurisdiction of Panvel Municipal Corporation for an extensive Existing Land use survey to capture existing land use details of each parcel at block level was used to create an Existing Land Use map on a GIS platform. Examination of the existing land uses and their distribution over the area helps to understand the town and its activities. The Existing Land Use provided information regarding the various uses the land is being put to and the extent of development that has taken place since the previous Development Plan. Urban lands are subjected to diverse land uses which form an intricate and complicated mixture in the city. The procedure for the preparation of the ELU map is mentioned in Section 25 of the MR&TP Act, 1966.

Existing Land Use Classification

Various land use categories have been considered to map the existing land use patterns of the city. Since the Earlier Sanctioned Development Plan and Regional Plan there are significant changes made in both categories as well as classification. In the previous Sanctioned DP and RP only main land use categories were considered, but in GIS-based DP, a detailed classification has been considered like Eco-sensitive area, Specific land uses, wetland and wasteland, etc. in addition to the main land use categories.

To capture the existing land use, the total area has been broadly classified based on development as Developed area, Developable area, and non-Developable area. The developed area consists of the Land use categories like Residential, commercial, Mixed, Industrial, Public-Semi Public, Recreational, Public Utilities, and Transportation. The Developable area has land use categories as Vacant land and Agricultural Land. The non-developable area includes Wetlands, Wastelands, Specific land use, Eco-sensitive area, Water body, Forest and Defence, etc. The main classes are further subdivided into 479 sub-classes covering the existing land use in detail for the Panvel Municipal Corporation area.

Land use distribution

Land use is identification of use or activity on a land parcel. Land use classification system identifies activities taking place on land parcels in various categories such as residential, commercial, industrial, institutional, utilities, road, open spaces, vacant land etc. After the preparation of Existing Land use Map for PMC, we have carried out the existing land use analysis using GIS Platform. This Existing Land use analysis will be helpful to understand the current land use classification. In the table below, we have broadly classified the land use of

PMC into 17 categories. The ELU analysis will also be helpful in finding out most suitable land for development. Subsequent table in this section will carry out the Existing land use analysis for PMC area.

Sr. No.	Land Use	Area (Ha.)	Percentage (%)
1	Residential	458.64	7.5%
2	Gaothan	61.09	1.0%
3	Commercial	55.28	0.9%
4	Mixed Use	223.58	3.7%
5	Industrial	369.21	6.1%
6	Public & Semi-Public Amenities	170.17	2.8%
7	Public Utilities	83.04	1.4%
8	Recreational	67.36	1.1%
9	Transportation	689.14	11.3%
10	Slums	18.13	0.3%
11	Defense	1.80	0.03%
12	Agricultural	1209.40	19.9%
13	Vacant Land	1474.27	24.3%
14	Green Areas	434.71	7.2%
15	Waterbody	224.56	3.7%
16	Mangroves	499.53	8.2%
17	Mining	38.58	0.6%
Grand Total		6078.50	100.00

According to the preceding table, around 8.5% of the land is classified as residential and Gaothan. Additionally, PMC is found to have 1209.40 acres, or 19.9% of its area used for agriculture purpose. The 11 MMR villages on the northern side of the PMC have land that is mostly used for agriculture. In terms of undeveloped land that is available for development, PMC possesses a sizable portion—24.3%.

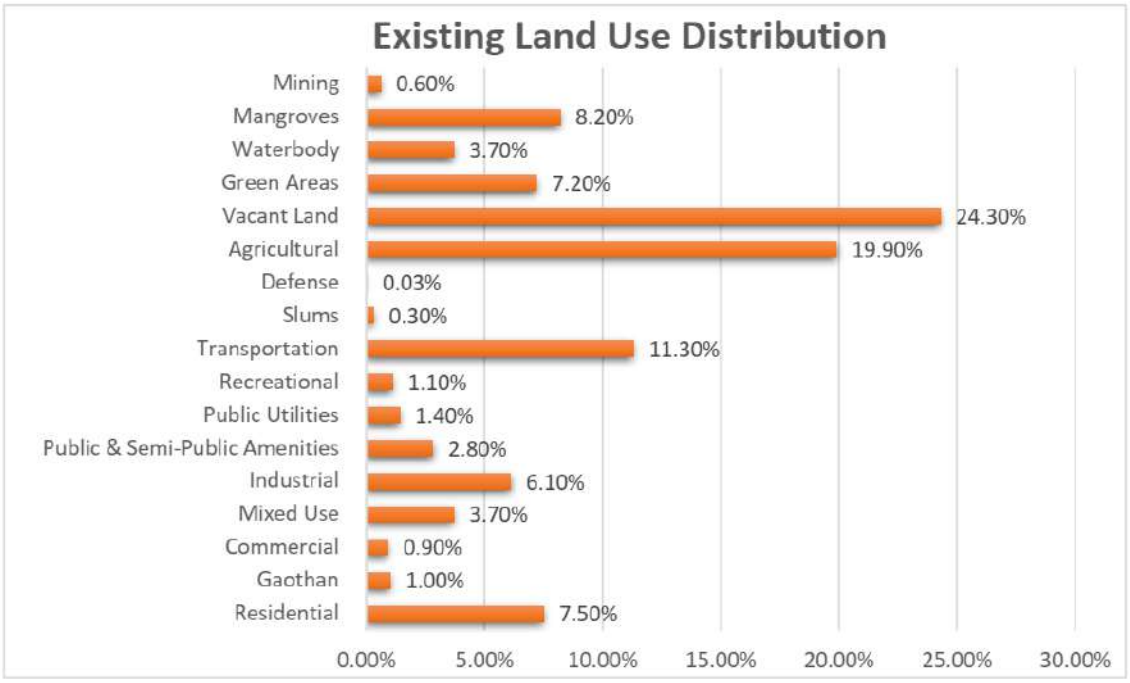
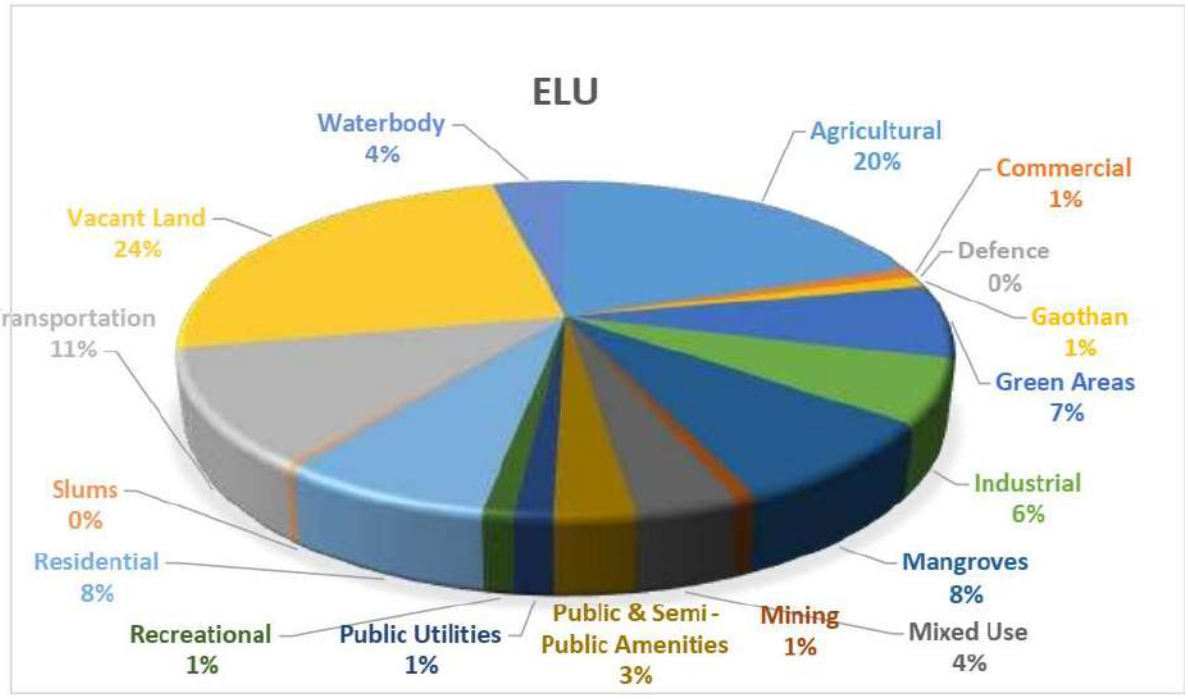


Figure 2.8: Existing land use distribution



Source: Existing Land Use Survey

Figure 2.9: Existing land use

The residential development occupies 458.64 hectares, or 7.5%, of the PMC's total AOI. One percent (61.09 hectares) of the AOI is made up of Gaothan. The CIDCO Nodal areas of Kamothe, Kalamboli, New Panvel, Kalundre, and Panvel Old Council area are where the majority of the residential settlement is located. The non-nodal CIDCO villages and the eleven

MMRDA villages exhibit sporadic expansion for residential growth.

- The commercial development area is 0.9% (55.28 Ha), primarily located in the Kamothe, Kalamboli, and Old Panvel Council areas. Kalamboli and the area along NH4 are home to a number of warehouses, a marble and tile market, and a complex of markets for steel and iron. In the old council region, PMC also maintains the Agriculture Produce Market Committee (APMC) yard. In the urbanized areas of PMC, there are numerous shopping centers, department stores, and daily bazaars.
- Around 3.7% of the total area (223.58 Ha) is made up of mixed-use development. The
- majority of mixed-use developments occur in the CIDCO nodal area because this is the development pattern used there, with the ground level being used for commercial purposes and the upper stories being used for residential purposes.
- The industrial development area is 3,69,21 Ha, or 6.1% of the total. Significant and warehouse industrial activities are cantered in the Kalamboli area and along NH-4. In addition, PMC include the Panvel Industrial Cooperative Estate and the Jawahar Industrial Cooperative Estate. Also, a number of industrial establishments have been constructed close to the Taloja MIDC area.
- The Public Semi-Public covers 2.8% of the area (170.17 Ha). Education facilities, hospitals, government offices, post offices, fire stations, police stations, community centres, and libraries make up the majority of its buildings.
- The Public Utility covers 1.4% of the land (83.04 Ha). It mostly consists of waste management services, public restrooms, crematoriums, sewage and water services, power services, and waste management services.
- The transportation sector accounts for 11.3% (689.14 Ha). Expressways, State and Federal Highways, Roads, Train Lines, Bus Stand & Terminal, Train Station, Metro Station, and Truck Terminals make up the majority of its components.
- A total of 67.36 Ha (1.1%) is developed for recreational purposes. A recreation area consists of a playground, parks, and gardens.
- Of total land use, 434.71 Ha, or 7.2%, are used for green areas. The two types of green areas are forests and PMC tree plantations. Adivali, Bid, Pale Khurd, Owe, and Nagzari are the settlements with the highest concentration of forest lands.
- Agriculture area makes about 19.9% of the total area (1209.40 Ha). The majority of agricultural land is found in the non-nodal CIDCO villages and MMRDA areas.

- The PMC region has a huge amount of open space, totalling 1474 Ha. This space can be used to accommodate the anticipated population needs.

2.6 PMC Urban Infrastructure

PMC is comparatively less developed from the neighboring corporations. Though a slowly developing corporation, it is still a metropolitan city with all the facilities and infrastructure developing at speed. Table 2.4 gives the list of urban infrastructure facilities of PMC.

Table 2.4: Urban Infrastructure Facilities by PMC

Sr. No.	Urbanization	Planning & Design Authority	Developed by	O/M
1	**Planning & Development**	MMRDA, Local Planning Authority		
2.	**Infrastructure & Services**			
	• Water Supply service • Sewerage service • Sanitation service	PMC/MJP/CIDCO/MIDC	PMC/MJP/CIDCO/MIDC	PMC/MJP/CIDCO
	Storm water drainage system	PMC	PMC	PMC
	• Municipal Solid Waste Management • (Collection, Disposal & Treatment)	PMC	PMC	PMC
	• Municipal roads & flyovers	PMC & Town Planning	PMC & PWD	PMC
	• Street lights facility • Fire Brigade • Municipal Gardens • Municipal Hospital • Disaster management	PMC	PMC	PMC
3	**Transportation & Traffic**			
	• Urban transport facilities	MSRTC & NMMT	NMMT	MSRTC
	• Registration & regulations			RTO

Sr. No.	Urbanization	Planning & Design Authority	Developed by	O/M
	• Traffic Management			Traffic Police
	• Indian Railways • Mumbai Suburban Railway – Central Line	Indian Railways		
4	Metro Service	MMRDA		

Source: PMC Site

PMC : Panvel Municipal Corporation
PWD : Public Works Department
MMRDA : Mumbai Metropolitan Region Development Authority
MSRTC : Maharashtra State Road Transport Corporation
NMMT : Navi Mumbai Municipal Transport
RTO : Regional Transport Office

Water Supply: Dehrang Dam is the main source of water in Panvel City. A total of 16 MLD of water is lifted from the Dehrang Dam to fulfill the water demand of the PMC area and nearby villages. During summers, the level of water reduces so, only 5-6 MLD of water is available for abstraction. Panvel gets 6 MLD water from Maharashtra Industrial Development Corporation (MIDC) and 4 MLD from Maharashtra Jeevan Pradhikaran (MJP) & rest of the demand is fulfilled by bore wells constructed by PMC. Considering the current and near future water demand, the PMC need to make certain provision to meet the water demand.

Water may be treated differently in different communities depending on the quality of the source water that enters the treatment plant. The water that enters the treatment plant is either sourced from surface water or from ground water. Surface water typically requires more treatment and filtration than ground water because lakes, rivers, and streams contain more sediment (sand, clay, silt, and other soil particles), germs, chemicals, and toxins than ground water. Public drinking water systems use different water treatment methods to provide safe drinking water for their communities. Public water systems often use a series of water treatment steps that include coagulation, flocculation, sedimentation, filtration, and disinfection.

The coagulation is often the first step in water treatment. During coagulation, chemicals with a positive charge are added to the water. The positive charge neutralizes the negative charge of dirt and other dissolved particles in the water. When this occurs, the particles bind with the

chemicals to form slightly larger particles. Common chemicals used in this step include specific types of salts, aluminum, or iron. Flocculation follows the coagulation step. Flocculation is the gentle mixing of the water to form larger, heavier particles called flocs. Often, water treatment plants will add additional chemicals during this step to help the flocs form. Sedimentation is one of the steps water treatment plants use to separate out solids from the water which is termed as Coagulation. During coagulation, flocs settle to the bottom of the water because they are heavier than water. Once the flocs have settled to the bottom of the water, the clear water on top is filtered.

During filtration, the clear water passes through filters that have different pore sizes and are made of different materials (such as sand, gravel, and charcoal). These filters remove dissolved particles and germs, such as dust, chemicals, parasites, bacteria, and viruses. Activated carbon filters also remove any bad odors. During ultrafiltration, the water goes through a filter membrane with very small pores. This filter only lets through water and other small molecules (such as salts and tiny, charged molecules). After the water is filtered, water treatment plants may add one or more chemical disinfectants (such as chlorine, chloramine, or chlorine dioxide) to kill any remaining parasites, bacteria, or viruses. To help keep water safe as it travels to homes and businesses, water treatment plants will make sure the water has low levels of the chemical disinfectant when it leaves the treatment plant. This remaining disinfectant kill germ living in the pipes between the water treatment plant and your tap. In addition to or instead of adding chlorine, chloramine, or chlorine dioxide (as disinfectant), water treatment plants can also disinfect water using ultraviolet light.

UV light and ozone work well to disinfect water in the treatment plant, but these disinfection methods do not continue killing germs as water travels through the pipes between the treatment plant and your tap and this can only be met by adding residual quantity of disinfectant in the water while they are carried using pipelines.

Source: https://www.cdc.gov/healthywater/drinking/public/water_treatment.html

2.7 PMC Education Facility

Panvel Municipal Corporation is known for quality education in with all Government and Private Infrastructure facilities available. Annexure III gives the list of school and College facilities of PMC.

The Panvel Municipal Corporation (PMC) provides primary education, with the state government covering 80% of staff salaries through grants, while the remaining expenses are

borne by the Corporation. The different types of educational institutions in the PMC area include:

- **Government Schools:** Fully funded and managed by central, state, or local authorities, including corporation-run and zilla parishad schools.
- **Aided Schools:** Operated by private entities but largely funded through government grants. These are classified as private-aided or simply aided schools.
- **Private Schools:** Function independently on fee-based revenue without government funding or administrative interference. They are categorized into recognized and unrecognized schools.

There are a total of 30 zilla parishad schools, 11 PMC-run schools (comprising 8 Marathi medium, 2 Urdu, and 1 Gujarati medium), while the remaining are privately managed institutions.

Other Facilities in PMC-Run Schools

PMC-run schools offer several essential services to students, including:

- No tuition fees for students
- State government-provided uniforms and textbooks
- Since June 2019, the Akshay Patra Foundation has been supplying midday meals to students in 11 PMC-run schools and 50 zilla parishad schools.

PMC's Initiatives

To further enhance educational infrastructure, the PMC has approved the construction of three new primary schools exclusively for girls, with an estimated budget of Rs. 10.50 crore.

In the Panvel Old Council area, Dr. Babasaheb Ambedkar Bhavan functions as a key educational hub, featuring an auditorium for students on the first floor and a library on the second floor.

3. Driving Forces of Panvel City

3.1 Driving Forces, Pressure, State, Impact, Responses (DPSIR) Framework

This framework was initially developed by the Organization for Economic Co-operation and Development (OECD), 1994 and has been used extensively by various national/international environmental agencies to relate effects of human activities on the state of environment. The DPSIR framework can be used as an analytical framework for assessing the environmental issues by examining inter-linkages between each of these elements of DPSIR. Refer Figure 3.1 below which shows the DPSIR framework.

It is the most effective form of conveying environmental status to the citizens and government authorities. This framework helps policy/decision makers in getting ground level/real time feedback about the impacts of various pressures on the states thereby helping prepare a forward action plan necessary for implementation of any future changes in policies useful for mitigating environmental issues.

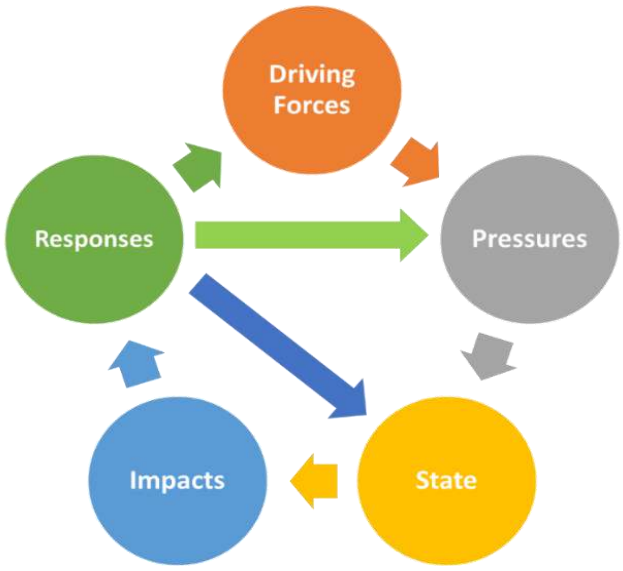


Figure 3.1: DPSIR Framework

Driving Forces: Socio-economic and socio-cultural forces driving human activities which increase or mitigate pressures on the environment

Pressures: Stresses that human activities place on the environment (e.g. Wastewater)

State of the Environment (SoE): The condition of the environment (e.g. Air or water quality assessment)

Impacts: Effects of environmental degradation (e.g., biodiversity loss, economic damage)

Responses: Responses by society to the environmental situation (e.g. Cleaner production, regulations)

The state of the environment is represented by the qualitative and quantitative indicators of environmental resources as well as the quality of services it offers. Environmental monitoring data for air and water quality, and the extent of land contamination are some typical quantitative indicators.

Environment is being degraded due to human intervention like shifting cultivation, over exploitation of forest resources, cattle grazing and changes in land use by converting forests to agricultural lands, urbanization and dwelling sites. These activities have been continuing ever since man started cultivation and exploiting the natural resources for livelihood. The local urban bodies suffer from large human intervention in managing increasing demand for resources that generates pressure on environment and also attempt to conserve and protect the environment with its efforts in creating more environmental resources. Human intervention creates pressure on land and land cover in urban spaces. And hence it becomes imminent to understand the status of land use and resource extraction and evaluate its impact on environment.

3.2 Driving Forces of Panvel City

Urbanization refers to the growth in towns and cities. The process of urbanization is one of the most important dimensions of economic, social and physical change. Although it provides opportunities for job, better housing, education, knowledge, and technology etc. it also exerts enormous stress on natural resources. The growth of the industries results in expansion of the business sector and economic growth of the city, which in turn attracts the inflow of population from other towns, villages, thus setting a continuous and ever-expanding cycle. Thus, population, industrial, economic and spatial growths act as primary driving forces in the growth of any city. Similarly, availability of resources like Air, water, and land act as key factors in the growth of cities. All these factors have been analyzed in the separate sections for their status, the—Pressures being exerted on them, impact of various urban activities on these resources and the response taken by PMC to reduce the impacts.

3.3 Population Growth

The size of the population is one of the main factors that impact the environment by generating pressure on environmental resources available in a region. Natural resources like land and water are scarce and they are to be used efficiently and sustainably. These resources get

exhausted as a large population makes use of them unsustainably. Hence there is some threshold level of population that can sustain the use of environmental resources. An area's carrying capacity can be defined as the maximum number of people that the environment of that area can support through optimum utilization of the available resources (ILPWRM, 2012). Perhaps this carrying capacity is crossed in many regions globally, increasing the pressure on the environment, resulting caused environmental degradation. Crutzen (2016) introduced the concept of Anthropocene Epoch which describes human influence on the environment. Hence one has to contextualize the population and its impact on the environment.

As per census 2011, the household size of PMC is 4.17 which is lower than Raigad (4.31) and Maharashtra (4.60) and the HH size of Panvel as per census 2001 is 4.51. Total population is 5,09,901 of which 2,61,987 are male and 2,47,914 are female. The details are given in the Tables 3.1 The PMC is administratively divided into 20 wards. Figure 3.2 below which shows the Panvel Municipal Corporation Ward Map.

Decreasing HH size from 2001 to 2011 translates directly into increasing space demand for housing. As per census 2011, vast variation of HH size can be seen across different areas of PMC ranging from 3.89 to 5.30. Turbhe (5.30) has the highest HH size followed by Taloja Majkur (5.28) and Taloja Panchnand (5.21). Kharghar (3.89), Devichapada (3.96) and Kalundre (3.96) have the least HH sizes. Turbhe is the only area in PMC where the HH size has increased from being 4.84 in 2001 to 5.30 in 2011.

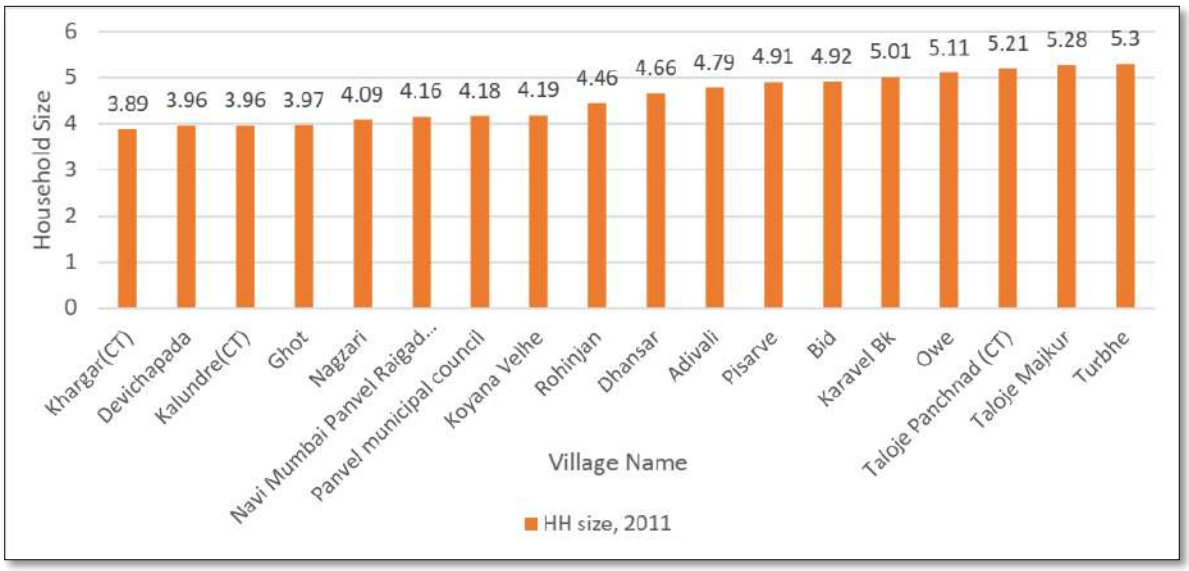


Figure 3.2: DPSIR Framework

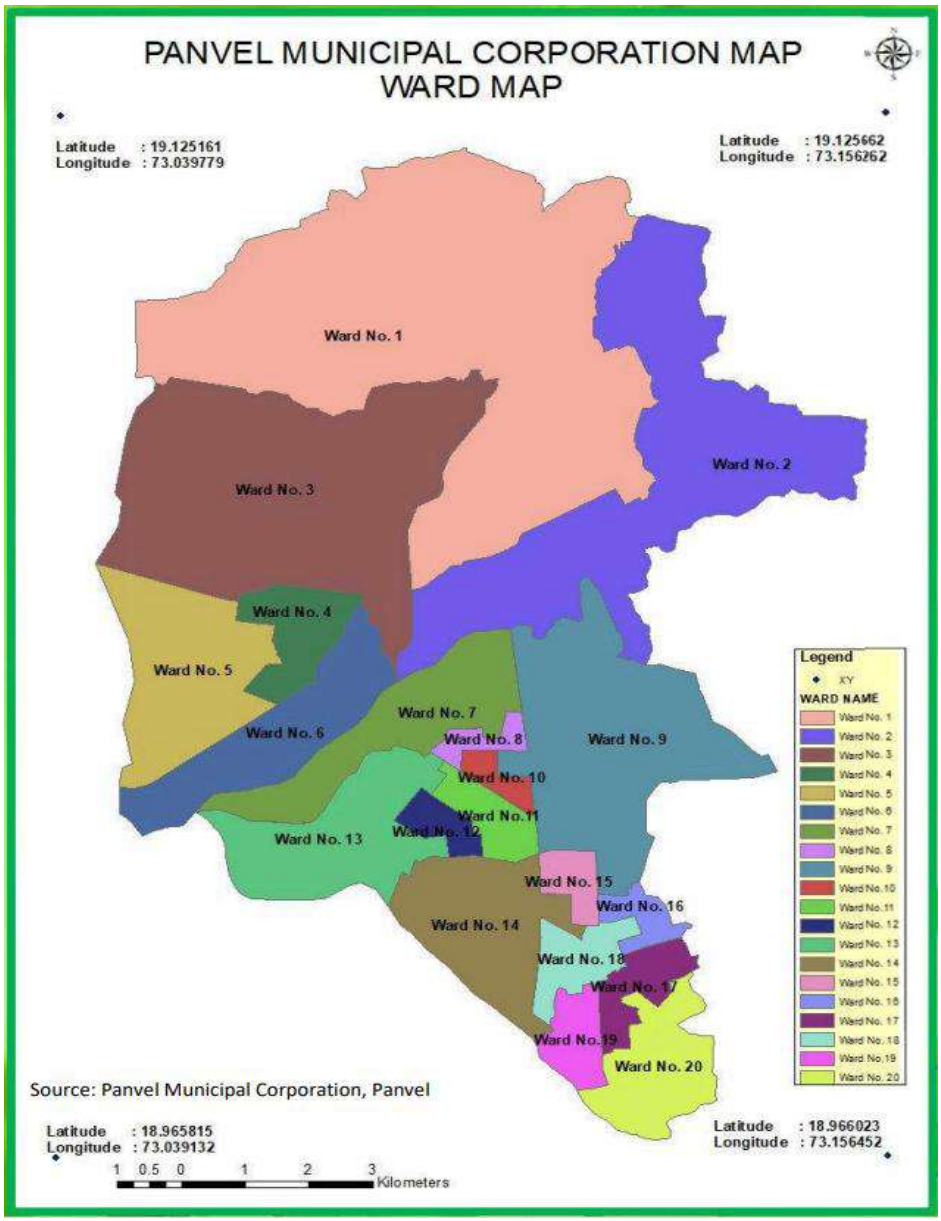


Figure 3.3 Panvel Municipal Corporation Ward Map

Table 3.1: Ward-wise Classification of Concentration of Population in Panvel City

Sr. No.	Size of Population	Wards	Population density
1	Up to 25,000	3,6,7,8,10,11,13,18,20	Low
2	25,001-30,000	1,2,4,5,9,12,14,15,16,17,19	High

Source: Election Department, PMC

Table 3.2: Ward- Wise Total and Percentage Population in Panvel City

Ward No.	Population (As per Census 2011)	Percentage to Total Population	Ward No.	Population	Percentage to Total Population
1	26237	5.15	**11**	18523	3.63
2	25847	5.07	**12**	26154	5.13
3	24064	4.72	**13**	24989	4.90
4	28415	5.57	**14**	28308	5.55
5	28530	5.60	**15**	27526	5.40
6	23667	4.64	**16**	28239	5.54
7	23995	4.71	**17**	28510	5.59
8	23727	4.65	**18**	24380	4.78
9	28102	5.51	**19**	25483	5.00
10	23805	4.67	**20**	21400	4.20
Total Population & Percentage				**5,09,901**	**100**

Source: Election Department, PMC

As per the Tables above, relatively low population density was observed in 9 wards (#: 3,6,7,8,10,11,13,18,20) with population up to 25,000. High population density was observed in 11 wards, with a population density in the range of 25,001- 30,000.

It has a total SC population of 37,923, and that of ST is 12,727. It is important to note that all the wards of PMC have some population belonging of SC and ST as shown below in the Table 3.3.

Table 3.3: Ward-wise Proportion of SC and ST Population

Ward No.	SC Population	Percentage to Total SC Population	ST Population	Percentage to Total ST Population
1	1320	3.48	711	5.59
2	1378	3.63	759	5.96
3	851	2.24	1115	8.76
4	1888	4.98	270	2.12
5	1547	4.08	829	6.51
`6	2315	6.10	435	3.42
7	1329	3.50	478	3.76
8	930	2.45	370	2.91
9	1611	4.25	1162	9.13
10	1080	2.85	420	3.30
11	1976	5.21	390	3.06
12	3729	9.83	736	5.78
13	3331	8.78	569	4.47
14	1163	3.07	782	6.14
15	2827	7.45	544	4.27
16	2546	6.71	498	3.91
17	3169	8.36	596	4.68
18	1867	4.92	350	2.75

Ward No.	SC Population	Percentage to Total SC Population	ST Population	Percentage to Total ST Population
19	1555	4.10	992	7.79
20	1510	3.98	721	5.67
Total	**37,923**	**100.0**	**12,727**	**100.0**

Source: Election Department, PMC

3.4 Industrial Growth

The rapid growth of Panvel has made the city a prime region for commercial growth. The upcoming project of Navi Mumbai International Airport has made this city an attractive destination for new businesses and many industries are interested in initializing a new trade in this area. Panvel is surrounded by some major Maharashtra Industrial Development Corporation (MIDC) regions like Patalganga, Taloja, Nagothane, Roha, Khopoli, and Bhiwandi. Some of the Indian industries like Larsen & Toubro Limited, Reliance, Hindustan Organic Chemicals Ltd, ISRO's Propellant Complex., ONGC, IPCL etc. are providing ample job opportunities for the local population. Apart from the aforementioned industries, many more companies and manufacturers are based out of Panvel. The Jawaharlal Nehru Port Trust (JNPT), also known as Nhava Sheva Port, which is the second largest container port in India is also located near Panvel. Panvel also is anticipated to have a New Special Economic Zone (SEZ) in the near future, as declared by the government.

3.5 Religious Tourism

Panvel is an incredible tourist destination because of its pleasant weather, which keeps its visitor comfortable all the time. It is the most crowded locality in Raigad District of Maharashtra. The place has been developed as a good tourist destination while maintaining its natural rawness.

The city is situated on the banks of Panvel Creek, surrounded by the Matheran Hills. It is known for the forts in Raigad and Khopoli. The major historical attraction in Panvel taluka is Karnala Fort which is popular for trekking & bird watching. Panvel is also famous for the two prominent Ganesh temples in Maharashtra: Ballaleshwar, located in Pali, and Varadavinayak in Mahad village. Beth EI Synagogue is a part of the Indian heritage & one of the tourist places in Panvel. The best time to visit Panvel is during winters as the city receives substantial rainfall during monsoons and scorching summers.

Karnala Bird Sanctuary

Karnala Fort

Beth El Synagogue Panvel

Ballaleshwar Mandir

Khandeshwar Shiv Temple

Figure 3. 2: Tourist destinations in Panvel

Source: http://www.indianjews.org/en/research/jewish-sites-in-india/65-beth-el-panvel-synagogue

3.6 Economic Development

If not managed properly, population and economic growth tend to affect the natural environment adversely. While the economic growth may positively impact measures such as nutrition, health, and life expectancy, coupled with population growth, it also significantly impacts the local eco-systems. Unsustainable natural resource extraction disturbs the waste management systems and unregulated habitat settlements can significantly impact the mid-term sustainability of natural resources. Hence it is vital to assess the effects of economic activities on environment.

Panvel City is located 35 km away from Mumbai city. It is also close to MIDC Trance Thane Creek (TTC) and has Taloja MIDC situated within its region. MIDC Taloja Industrial area is a reserved Chemical Industrial hub developed by MIDC. MIDC Taloja Industrial area is situated adjacent to Navi-Mumbai and Panvel. It is one of the fully developed industrial areas having industries involved in various activities. The dominating industrial activities are Chemical, Food and Fish Processing, Dairy Products & Cold stores, and Engineering services. Panvel is also close to Jawaharlal Nehru Port Trust (JNPT) which generates heavy traffic in and around the city. The city of Panvel has housed the human resources required for industrial and logistic purposes for these industrial zones. It was observed that semi-Skilled & unskilled human resources are readily available in the Taloja and Kalamboli parts of Panvel City. The managerial and senior managerial people travel from Panvel and Kharghar.

4. Air Environment

Earth's atmosphere is a layer of gases surrounding the planet. This mixture of gases that envelopes the earth is commonly known as air. The composition of pure air consists majorly of 78% nitrogen & 21% oxygen, while other gases like argon, carbon dioxide, methane and so on are present in trace amounts. Change in natural composition of air occurs due to addition of undesirable elements arising from anthropogenic activities like the combustion of fossil fuels. Emissions from power plants, industries, automobiles, construction activities and so on emit tones of air pollutants (any solid, liquid, or gaseous substance, including noise) into the atmosphere, which deteriorates the air quality and exposes citizens to great health risks.

Higher concentrations of air pollutants may be or tend to be injurious to human beings, other living creatures, plants, property, or environment. The Global Burden of Disease (GBD) stated about 4.2 million deaths due to exposure to $PM_{2.5}$ (Particulate Matter <2.5 microns) have occurred, thus ranking fifth for total deaths worldwide. In 2015, about 17.1% of deaths occur from ischemic heart disease, 14.2% from stroke, 16.5% from lung cancer, 24.7% from LRIs (Lower Respiratory tract Infections), and 27.1% from COPD (Chronic Obstructive Pulmonary Disease) were recorded due to exposure for Particulate Matter. As per the WHO (World Health Organization), almost 80% of urban population is exposed to air quality which fails to meet the WHO guidelines thus resulting in respiratory disease and other health problems.

In order to monitor the ambient air quality, Central Pollution Control Board (CPCB) at national level, compares the status of ambient air quality parameters, which indicate the comparative status of various cities. In addition to this, at state level, Maharashtra Pollution Control Board (MPCB) and at city level, PMC monitor the air quality parameters. This section discusses the status of the ambient air quality monitoring network and the ambient air quality recorded for various air pollutants and the processing comparisons.

4.1 Ambient Air Quality Monitoring Station

MPCB has established one Ambient Air Quality Monitoring Station (AAQMS) at Panvel. The monitoring station is non-continuous and it is under National Air Quality Monitoring Program (NAMP). The monitoring station is at Panvel Water Supply behind State Transport (ST) bus stand. The details of the monitoring station are given in Table 4.1. (photo in chapter 10. Primary monitoring and monitoring report in Annexure VI)

Table 4-1: Details of AAQMS at Panvel

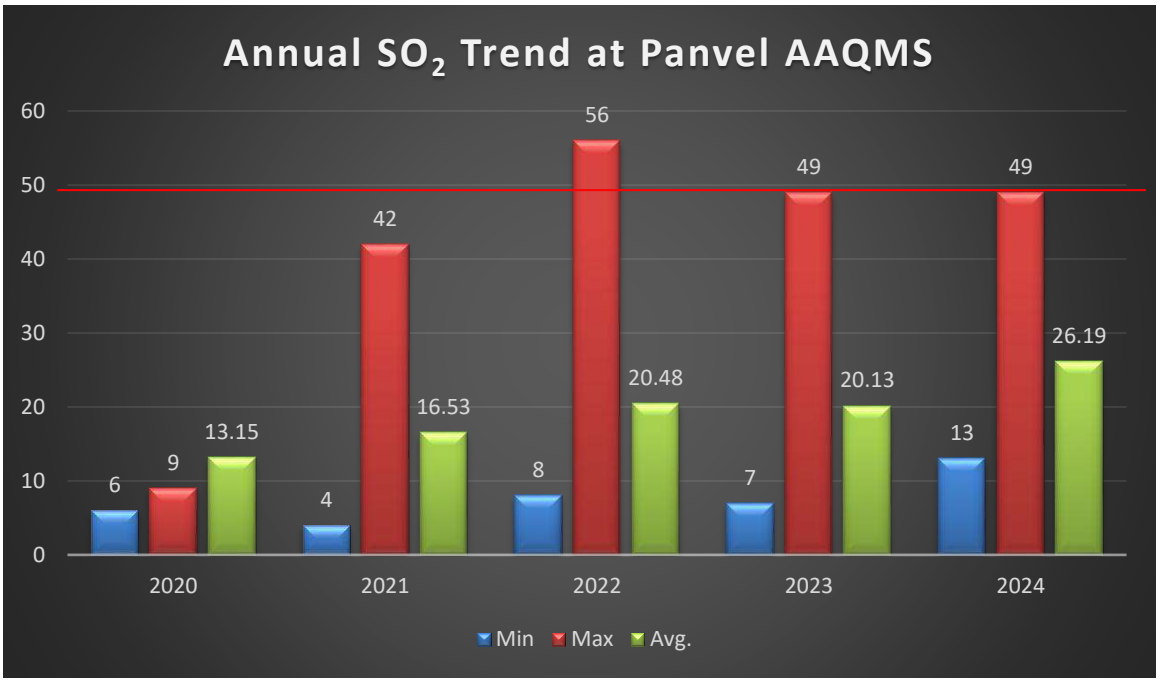
City	**Panvel**
Program	NAMP
Implementing Agency	MPCB
Location	Panvel Water Supply Behind ST Stand
MPCB Region	Panvel
Frequency	Two Days in a Week
Parameters Monitored	SO_2, NO_x, RSPM, SPM

4.1.1 Sulphur Dioxide (SO_2)

Sulfur dioxide is a highly toxic, colorless, nonflammable gas with a pungent odour. SO_2 belongs to sulfur oxides (SO_X) group. Among the oxides, SO_2 is of major concern related to human health compared to other gases within the group. SO_2 is primarily emitted from anthropogenic sources like burning fossil fuels by power plants and other industrial facilities and fuel combustion in mobile sources such as locomotives, ships, and other equipment.

Figure 4.1: Air Monitoring System installed by PMC

Annual Trend in SO_2 Concentration



Annual average standards for SO_2 (49 µg/m^3)

Figure 4.2: Annual SO_2 Trend at Panvel AAQMS

Data Source: MPCB

As per Figure 4.2, it can be observed that SO_2 concentration level was minimum during the year 2020. It can be due to the nationwide lockdown because of COVID- 19 pandemic resulting in shutdown of industrial operations across India. As shown in Figure 4.1, annual average measured SO_2 concentrations is within the annual average standards for SO_2 (49 µg/m^3) as per NAAQS set by CPCB. However, an increasing trend of SO2 concentration from the year 2021 can be seen. This can be primarily because of the gradual increase of traffic, industrialization post covid-19 as the normalcy in businesses has returned.

4.1.2Nitrogen Oxides (NO_X)

NO_X represents seven compounds (N_2O, NO, N_2O_2, N_2O_3, NO_2, N_2O_4 and N_2O_5). Among the NO_X family, NO_2 can have adverse effects on human health since reportedly it can cause lung disorders and contributes to the formation of secondary pollutants such as ozone and acid rain.

Annual Trend in NO_X Concentration

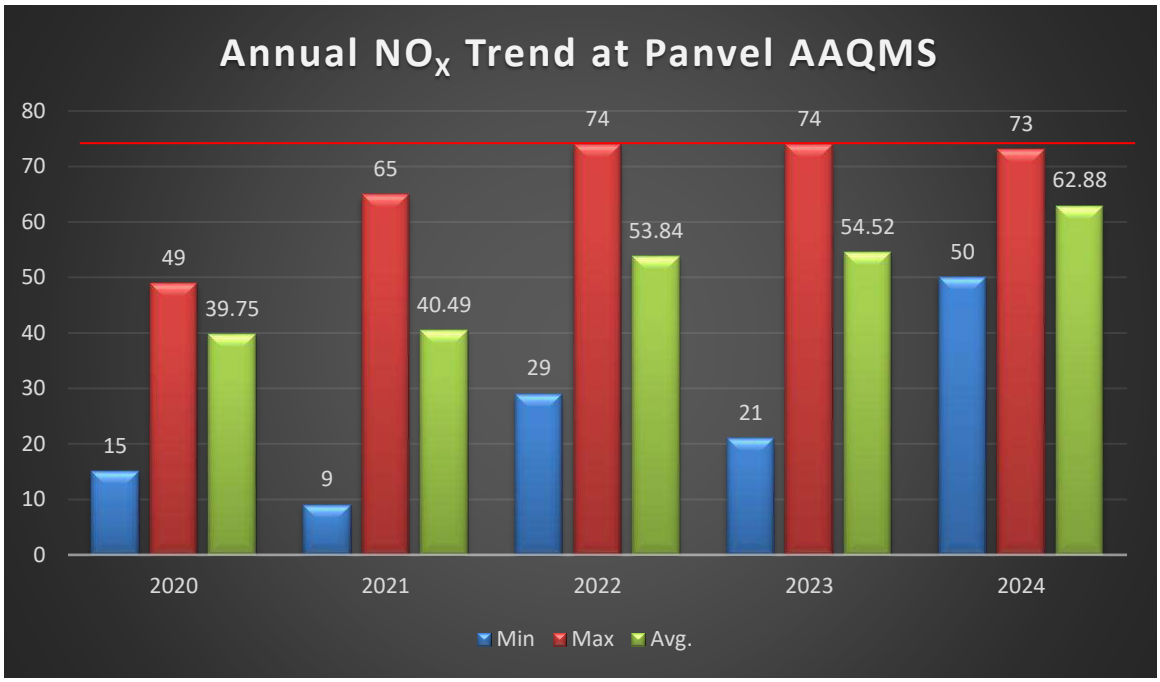


Figure 4.4: Annual NO_X Trend at Panvel AAQMS

Data Source: MPCB

Note *The data is only available until October on the MPCB website.(https://www.mpcb.gov.in/air-quality/Panvel/0000000124?fdate=03-06-2024&tdate=03-07-2024).

It is shown in Figure 4.4 that the NOX concentration level was at its lowest in 2020. The stoppage of industrial activities throughout India owing to the COVID-19 outbreak may be the reason of the statewide lockdown. Fuel combustion in cars and other mobile sources accounts for 50% of NOX emissions, followed by electric power plants (20%) and other residential uses (30%) (EPA 456/F-99-006R, November 1999). From 2018 to 2022, the yearly recorded NOX concentrations are higher than the annual average NOX requirements (40 µg/m3) established by the CPCB's NAAQS. The year 2024 had the highest average NOx content (62.88 µg/m3), while 2020 had the lowest (39.75 µg/m3).

4.1.3 Respirable Suspended Particulate Matter (RSPM)

RSPM (Respirable Suspended Particulate Matter) refers to particulate matter with an aerodynamic diameter of less than or equal to 10 micrometers. They are produced from combustion processes, vehicles, and industrial sources. Particulate matter is a complex mixture of extremely small particles and liquid droplets made up of several components, including acids (such as nitrates and sulfates), organic chemicals, metals and soil or dust particles. Particles that are 10 micrometers in diameter or smaller can pass through the throat and nose and enter

the lungs, commonly referred to as RSPM. Once inhaled, these particles can affect the heart and lungs and cause serious health effects

Annual Trend in RSPM Concentration

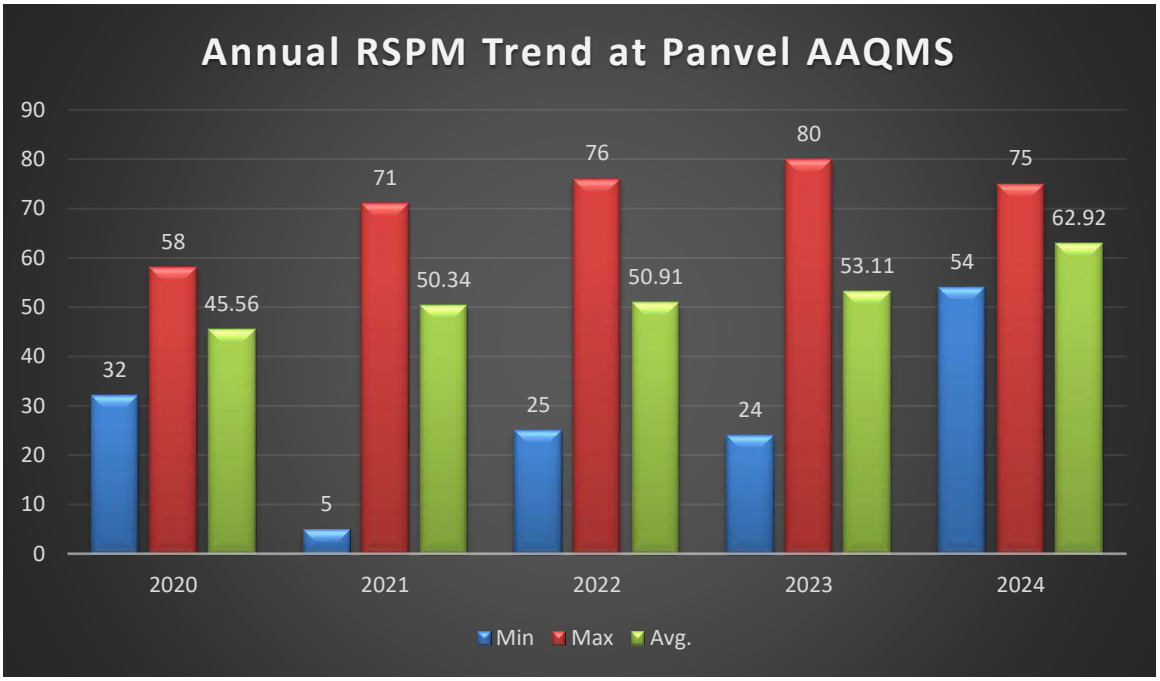


Figure 4.6: Annual RSPM Trend at Panvel AAQMS

Data Source: MPCB

It was observed that RSPM average concentration level was minimum during the year 2020 because of restrictions on use of private & public vehicles as well as industrial operations (because of covid-19 induced nationwide lockdown), except for biomedical waste (generated from hospitals). The projected emissions observed due to operations of vehicles, which were operated under emergency services. It can be seen from Figure 4.6 that the average reported annual RSPM is lower than the CPCB prescribed annual standard of 60µg/m^3 for all the years except 2024. The maximum RSPM concentration is seen in 2023 (80 µg/m^3), and the minimum RSPM concentration was reported in 2021 (5 µg/m^3).

4.1.4 Suspended Particulate Matter (SPM)

SPM (Suspended Particulate Matter) is usually defined as comprising particles less than 10 µm in diameter suspended in the atmosphere. In particular, air particulates less than 2 µm in diameter, which mainly originate from such sources as incinerators, boilers and automobiles, may reach deeply into human lungs during respiration and thus cause respiratory diseases. SPM can be also produced by photochemical reactions of gaseous substances in the atmosphere.

Annual Trend in SPM Concentration

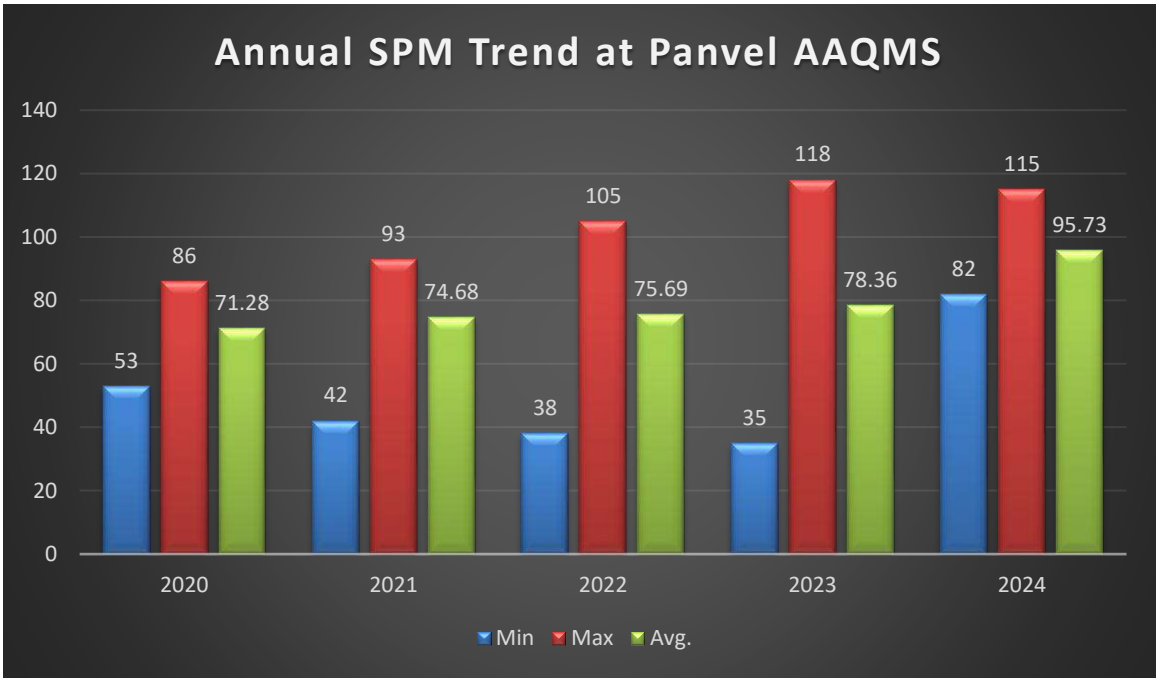


Figure 4.8: Annual SPM Trend at Panvel AAQMS

Source: MPCB

It was observed that the annual SPM average concentration is more than the CPCB prescribed annual standard of 60 µg/m^3 in all the years. The maximum concentration of SPM was seen in the year 2023 (118µg/m^3), while the minimum concentration was seen in the year 2023 (35 µg/m^3).

Air Quality Index

Air Quality Index (AQI) is the most convenient way to convey the information on outdoor air quality which could be easily understood by general public. AQI transforms complex air quality data of various pollutants into a single index value. AQI is calculated using the AQ sub index and the health breakpoints, which are evolved for eight pollutants (PM_{10}, $PM_{2.5}$, NO_2, SO_2, CO, O_3, NH_3, and Pb) for which short-term (up to 24-hours) are prescribed by NAAQS. Based on the measured ambient concentrations of a pollutant, sub-index is calculated, which is a linear function of concentration. The worst sub-index determines the overall AQI. The sub-indices for individual pollutants at a monitoring location are calculated using its 24-hourly average concentration value (8-hourly in case of CO and O_3) and health breakpoint concentration range.[1] AQI are within a range of 0 to 500 and is categorized into 'Good', 'Satisfactory', 'Moderate', 'Poor', 'Very Poor' or 'Severe' based on the concentration of

various pollutants and their health impacts at various concentrations. Higher value of AQI indicates high level of pollution. Figure 4.10 shows the AQI classification. (Air monitoring results attached in Annexure 6.)

Table 4-2: AQI Classification

AQI	Quality Classification	Remarks	Colour Code
0-50	Minimal Impact	Good	
51-100	Minor breathing discomfort to sensitive people	Satisfactory	
101-200	Breathing discomfort to the people with lung, heart disease, children and older adults	Moderate	
201-300	Breathing discomfort to people on prolonged exposure	Poor	
301-400	Respiratory illness to the people on prolonged exposure	Very Poor	
> 401	Respiratory effects even on healthy people	Severe	

Source: MPCB

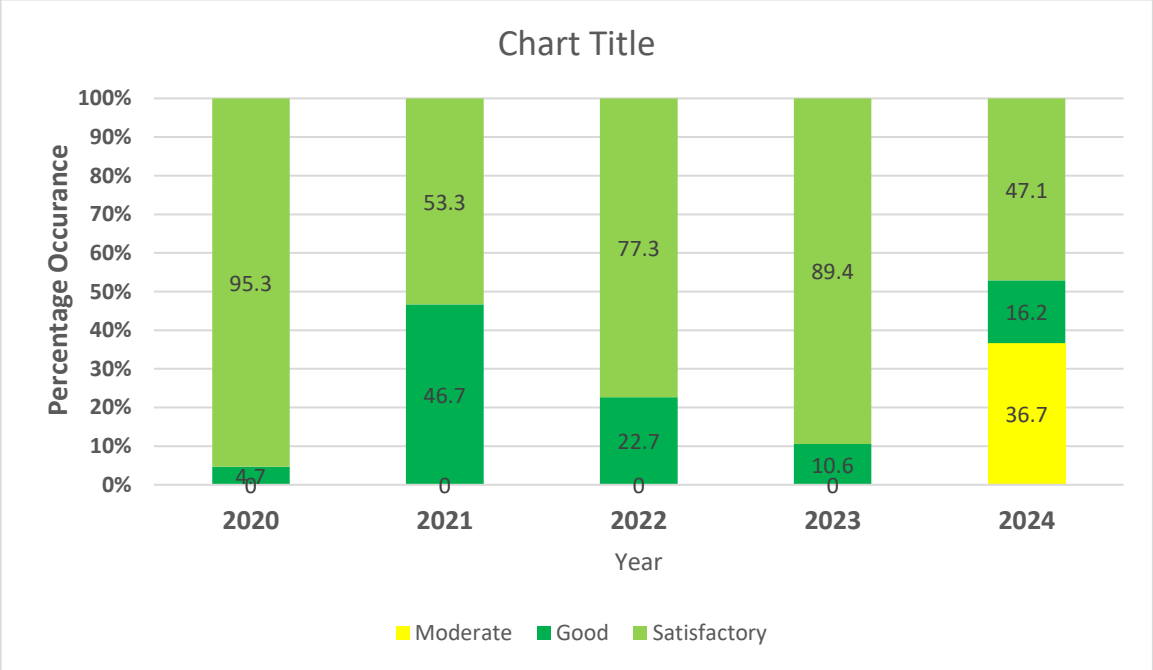


Figure 4.10: Annual AQI Percentage Occurrence at Panvel AAQMS

Source: MPCB

AQI for Panvel was collected from MPCB website for the years 2020-2024. As seen in Figure 4.10, it can be noted that for the year 2020, 2021, 2022,2023 and 2024 the AQI index was in the range of good and satisfactory. It can be due to the COVID– 19 induced lockdown there were restrictions on the use of vehicles and industrial operations. Higher values of AQI could

potentially cause minor breathing discomfort to the sensitive people. For the years 2020-2024, there can be seen a trend of decreasing AQI. The highest numbers of days with good ranges of AQI was good reported for the year of 2020 (viz. 35 days) while the lowest numbers of days with good ranges of AQI was reported in the year of 2019 (viz. 4 days). The percentage of 'Satisfactory' AQI was 80.6% in 2019, while it was 95.3%, 53.3%, 77.3% 89.4% and 47.1% in 2020, 2021, 2022, 2023 & 2024 respectively. 'Moderate' AQI was 36.7% in 2024, respectively.

5. Noise Environment

Noise pollution is caused by an unwanted sound that is produced by various natural or anthropogenic sources such as construction, industries, transportation etc. Noise pollution is one of the major environmental pollutants that are encountered in daily life and has a direct effect on human performance. Noise pollution is regarded as a public nuisance as per Sections 268, 290 & 291 of the Indian Penal Code. There are several other legislations relating to noise pollution such as The Factories Act, 1948 (under which 'noise induced hearing loss' is notified as a disease); Motor Vehicles Act, 1988 (which specifies rules for horns and silencers); Law of Torts (civil suits can be filed for claiming damages); The Air (Prevention and Control of Pollution) Act, 1981 (ambient noise standards have been given), The Environment (Protection) Act, 1986; Noise Pollution (Regulation and Control) Rules, 2000 and regulations in respect of Loudspeakers/Public Address System.

Noise pollution is generally defined as regular exposure to elevated sound levels that may lead to adverse effects in humans or other living organisms. Further, there are standards and guidelines for ambient noise quality, automobiles, domestic appliances and construction equipment, generator sets and firecrackers as notified under the Environment (Protection) Act, 1986. According to the World Health Organization, sound levels less than 70 dBA are not damaging to living organisms, regardless of how long or consistent the exposure is. Exposure for more than 8 hours to constant noise beyond 85 dBA may be hazardous. If you work for 8 hours daily in close proximity to a busy road or highway, you are very likely exposed to traffic noise pollution around 85dBA. CPCB Limits for Ambient Noise is given in the Table 5.1 below.

Table 5-1: CPCB Limits for Ambient Noise

Area Code	Category of Area	Limit in dB (A), L_{eq}	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silent Zone	50	40

Source: MPCB

- Day time shall mean from 6:00 a.m. to 10:00 p.m.
- Night time shall mean from 10:00 p.m. to 6:00 a.m.

- Silence Zone is an area comprising not less than 100 m around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority.
- Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.
- dB (A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.
- A "decibel" is a unit in which noise is measured.
- "A", in dB (A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.
- Leq is the energy mean of the noise level over a specified period.

Noise pollution is inevitable in today's society that we often fail to notice it anymore:

- Street traffic sounds from cars, buses, pedestrians, ambulances etc.
- Construction sounds like drilling or other heavy machinery in operation.
- Airports, with constant elevated sounds from air traffic, i.e., planes taking off or landing.
- Workplace sounds, often common in open-space offices.
- Constant loud music in or near commercial venues.
- Industrial sounds like fans, generators, compressor, mills etc.
- Strain stations traffic.
- Household sounds, from the television set to music playing on the stereo or computer, vacuum cleaners, fans and coolers, washing machines, dishwashers, lawnmowers etc.
- Events involving fireworks, firecrackers, loudspeakers etc.
- Conflicts generate noise pollution through explosions, gunfire etc. The dysfunctions, in this case, are likely caused by the conflict and insecurity and less by the noise pollution in itself, although that compounds stress levels too.

Consequences of Noise Pollution:

Whether we realize to it or not, noise pollution can be hazardous to our health in various ways.

- Hypertension is a direct result of noise pollution caused elevated blood levels for a longer period of time.
- Hearing loss can be directly caused by noise pollution, whether listening to loud music in your headphones or being exposed to loud drilling noises at work, heavy air or land

traffic or separate incidents in which noise levels reach dangerous intervals, such as around140 dB for adult or 120 dB for children.

- Sleep disturbances are usually caused by constant noise because of air or land traffic during night house. These are serious condition as they can impact the daytime performance and lead to serious diseases.
- Child development. Children appear to be more sensitive to noise pollution and a number of noise-pollution-related diseases and dysfunctions are known to affect children, from hearing impairment to psychological and physical effects. Also, children who regularly use music players at high volumes are at risk of developing hearing dysfunctions. Various cardiovascular dysfunctions, Elevated blood pressure caused by noise pollution, especially during the night, can lead to various cardiovascular diseases.
- Dementia isn't necessarily caused by noise pollution, but its onset can be favored or compounded by noise pollution.
- Psychological dysfunctions and noise annoyance. Noise annoyance is, in fact, a recognized name for an emotional reaction that can have an immediate impact. Land animals are also affected by noise pollution in the form of traffic, firecrackers etc., and birds are especially affected by the increased air traffic.

6. Water Environment

Earth is termed as '*Blue Planet*' because 71% of the earth's surface is covered with water. The earth has an abundance of water yet majority of water (97.5%) is saline water. Out of the remaining 2.5% of fresh water, around two third of it is in frozen form in ice caps and glaciers. Only about 0.3% of freshwater is available for human use majority of which comes from rivers. Water is one of the vital renewable resources on earth. Lakes, rivers, streams groundwater are important fresh water sources. The majority of freshwater is found in surface water as soil moisture and in aquifers.

6.1 Surface Water

Rivers, lakes, oceans and wetlands are commonly known as surface water bodies. The surface water body in Panvel City is Taloja River, Kasrdi & Gadhi river. A major source of water supply in Panvel City is from Dehrang Dam which is across Gadeshwar Lake. The other sources of water at Panvel are from MIDC, CIDCO, MJP, Patalganga, and from borewell installed by PMC in Panvel. Table 6.1 captures the PMC water profile and Figure 6.1 shows the distribution of water supply in Panvel City.

Table 6-1: PMC Water Profile

Water Availability	220 MLD
Source of Water Supply	Dehrang dam, hetavne dam (CIDCO), morbe dam (NMMC), barvi dam (MIDC), mjp & midc patalganga river
Water Requirement	250 MLD
Water Coverage	98%
Net Supply Per Person	120 LPCD

Source: Water Supply Department, PMC

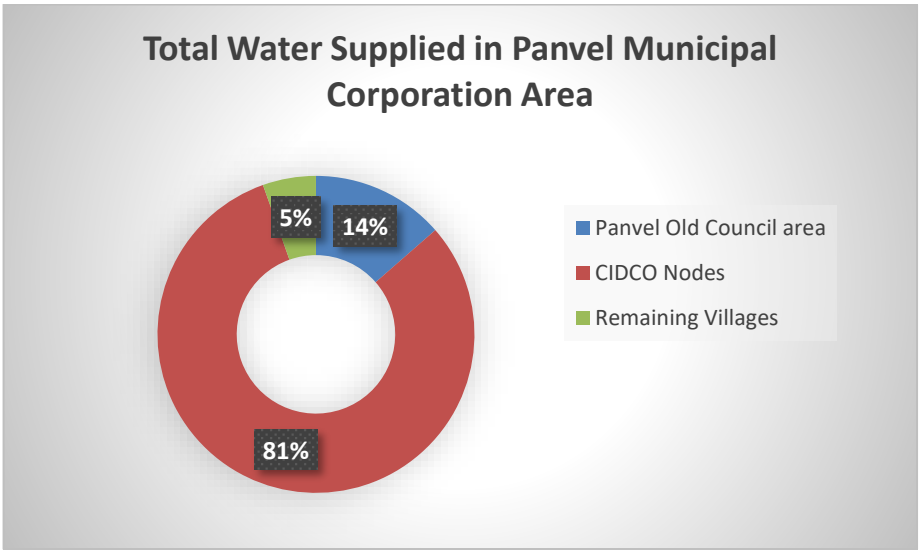


Figure 6.1: Total Water Supplied in Panvel Municipal Corporation Area

6.1.1 Dehrang Dam, Gadeshwar Lake

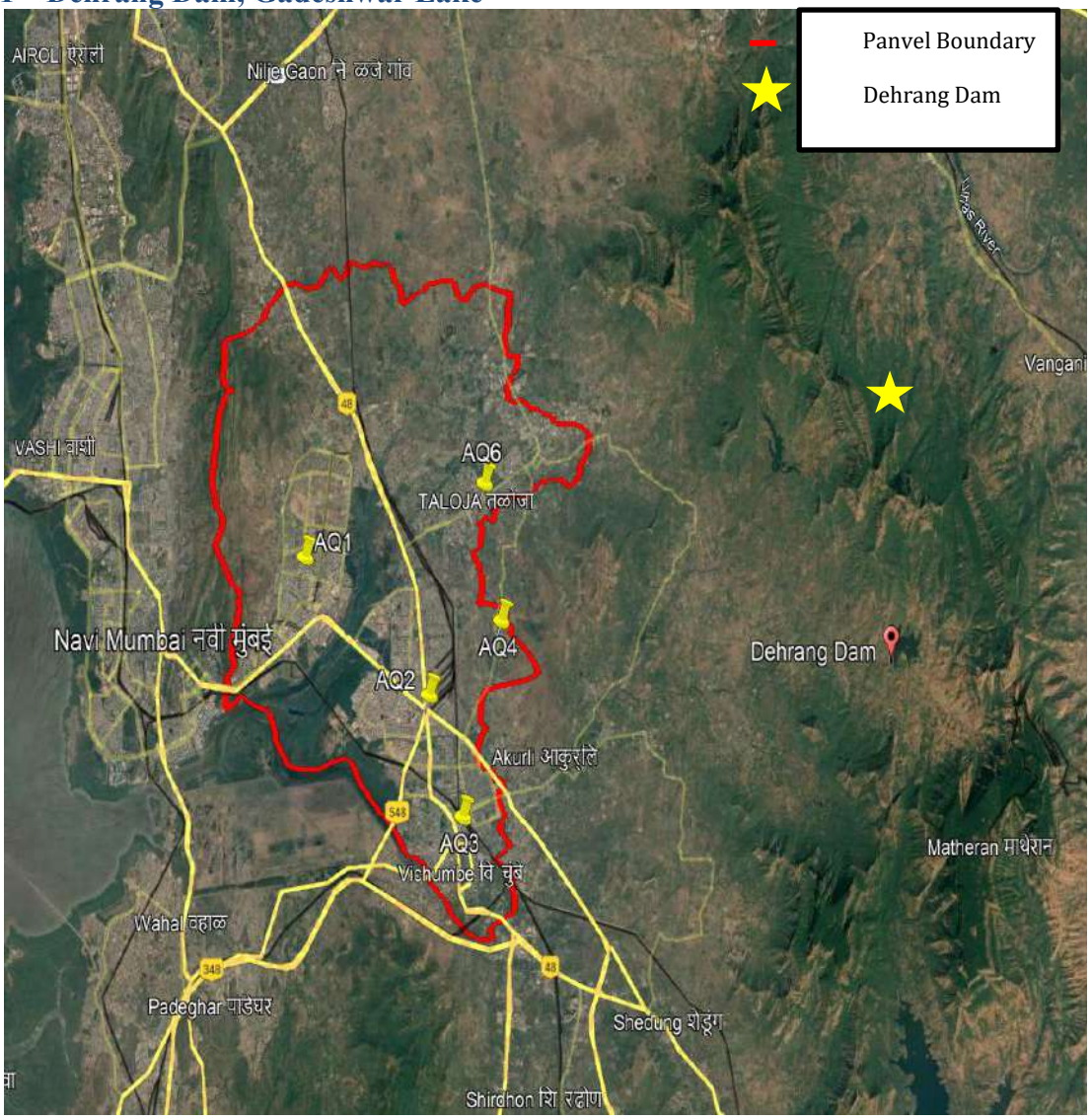


Figure 6.2: Location of Dehrang Dam

Figure 6.3: Gadeshwar Lake, Panvel

Under the ownership of PMC, Dehrang Dam was constructed in the year 1964 and its catchment is spread over 277 acres of land. The Dehrang Dam has been PMC's main source of water supply for around 1.45 lakhs people of old Panvel region, comprising three villages, namely old Khanda, Takka & Podi gaothan area. For remaining population, PMC needs to buy more water from Maharashtra Jeevan Pradhikaran (MJP), Maharashtra Industrial Development Corporation (MIDC) and Navi Mumbai Municipal Corporation (NMMC) and CIDCO.

There are a total of four water distribution systems in PMC through which PMC manages the water supply. They are:

- Water Supply from behind ST stand WTP to Old Municipal Council area.
- From Maharashtra Jeevan Pradhikaran (MJP) Water being Supplied to Kalamboli, New Panvel & Old Panvel.
- NMMC pipe Taping at kamothe-to-kamothe Node.
- At Kharghar & Taloja Node water is being supplied from CIDCO Hetavne Dam & Barvi Dam (MIDC) & NMMC Morbe dam.
- Some villages of Corporation area water being Supplied from MIDC Barvi Dam pipeline Taping & Patalganga River feeder Main Taping.

Water for the village is supplied from the MIDC Barvi dam source. In order to preserve the screened water, the Central Government approved a water supply plan and an underground

sewer system in 29 settlements. The PMC has a total of 45,684 tap connections. Out of which 41,531 are residential & 4,153 are industrial connection.

Figure 6.4: Dehrang Dam, Panvel

6.1.2 Surface Water Quality

Currently, surface water sources are facing a lot of pressure due to anthropogenic activities. Surface water sources are the major receivers of solid waste, industrial effluent and domestic sewage. This causes water pollution and degrades the quality of surface water. It is very detrimental to the aquatic ecosystem and overall components of the ecosystem. The industrial residues are likely to get bio accumulated in the aquatic organisms (fishes etc.) which are in turn consumed by the humans. This will have a very harmful effect on humans. It is very important to continuously track the level of pollutants in water bodies. Therefore, MPCB has installed water quality monitoring stations (WQMS) across the Maharashtra state to monitor the overall water quality of a particular surface water resource. Water quality is monitored per month across all the stations.

MPCB, under **NWMP - National Water Quality Monitoring Programme** has set up Water Monitoring Stations around at Kopra Bridge which is around Panvel city.

Details of the monitoring station, monitoring frequency and the reported concentration of the pollutants from 2018 till 2024 are captured in Table 6.2 and 6.3 below.

Table 6-2: Details of the Monitoring Station – Kopra Bridge (Panvel Creek sample)

Water Quality Monitored at: Kopra Bridge (Panvel Creek sample)			
Name of the Program	NWMP	Type of Sample	Surface
Station Code	2803	Frequency	Monthly (Trend)
Regional Office	Navi Mumbai	Regional Lab	-

Table 6-3: Annual Average Water Quality Monitoring Data of Panvel Creek at Kopra Bridge

Year		pH	DO (mg/l)	BOD (mg/l)	COD (mg/l)	Nitrate (mg/l)	Fecal Coliform (MPN/
2018	Min.	6.4	3	3	20.0	0.1	17
	Max.	8.2	6.9	18	224	7.9	170
	Avg.	7.17	5.18	7.71	65.33	3.38	74.5
2019	Min.	6.5	4.5	4	12	0.1	21
	Max.	8.7	7	11	120	2.8	94
	Avg.	7.18	5.88	5.92	41.67	1.33	40.92
2020	Min.	6.8	4	3.2	16	0.1	13
	Max.	7.5	7	10	128	2	110
	Avg.	7.21	6.03	4.98	37.67	1.03	47.5
2021	Min.	6.5	4.6	3.4	12	0.3 (BDL)	4.5
	Max.	7.9	7.4	8	80	9.2	140
	Avg.	7.2	5.99	5.55	35	2.6	52.21
2022	Min.	7.1	3.8	4	12	0.3 (BDL)	22
	Max.	7.8	6.9	12	184	20.2	94
	Avg.	7.36	5.4	7.44	68.89	3.89	54.11
2023	Min.	7	4	2.2	8	1.33	21
	Max.	7.9	7	14	92	3.17	130
	Avg.	7.49	5.83	5.58	42.67	2.14	64.42
2024	Min.	7.1	5.1	2	5 (BDL)	0.6	23
	Max.	7.9	7.6	9	88	2.3	140
	Avg.	7.44	6.58	5.11	38	1.57	100.18

Source: MPCB

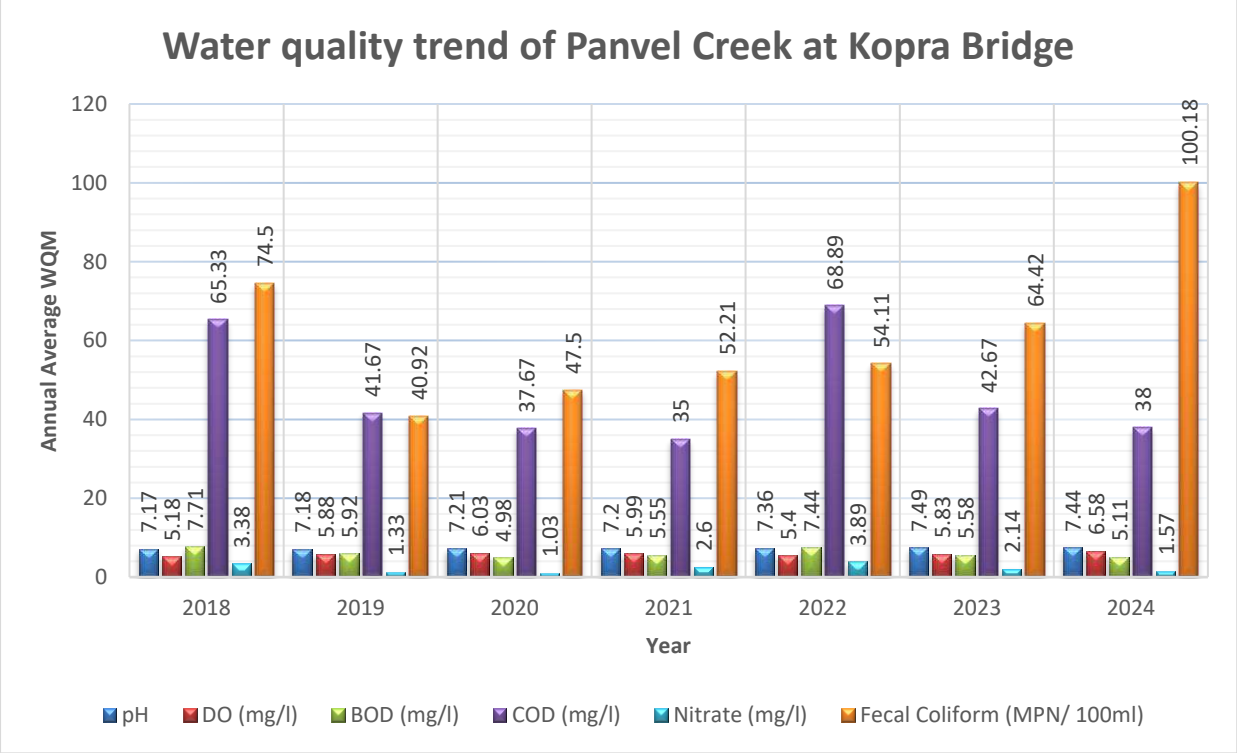


Figure 6.5: Water quality trend of Panvel Creek at Kopra Bridge

The annual water quality trend of Panvel Creek at Kopra Bridge has been depicted in Figure 6.5. As reported, the concentration of COD and fecal coliform are high due to domestic effluent discharge from the nearby area.

Water Quality Index

The water quality index (WQI) provides a single number that expresses the overall water quality, at a certain location and time, based on several water quality parameters. The objective of WQI is to turn complex water quality data into information that is understandable and usable by the public. The water quality index of Panvel creek water samples is shown in Tables 6.4 and 6.5.

Table 6-4: Water Quality Index

WQI	Quality Classification	Remarks	Colour Code
63-100	Good to Excellent	Non-Polluted	
50-63	Medium to Good	Non-Polluted	
38-50	Bad	Polluted	
38 and less	Bad to very Bad	Heavily Polluted	

Table 6-5: Trend of the WQI for Panvel Creek Water Samples (At Kopra Bridge)

Station Code	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2803	2018												
2803	2019												

2803	2020												
2803	2021												
2803	2022										NA	NA	NA
2803	2023												
2803	2024												

Data Source: MPCB

*For the year 2022, data is available only till September. NA: Not Available

As seen from Table 6.5, the WQI of the locations (station code) have been equal to or more than 63 (non-polluted) throughout the year from 2018-2024.

6.2 Water Resource Management

PMC has water supply from Maharashtra Jeevan Pradhikaran (MJP), MIDC and from borewell installed by PMC in Panvel City. Since the inception of PMC, 29 villages from Raigad Zilla Parishad and CIDCO developed areas were transferred to PMC. In these areas, independent water supply systems are available.

As per the draft water supply master plan report 2021, the domestic water demand is 265 MLD and other is 51.7 MLD (Industrial Water Demand, Institutional and Commercial, Waste and Theft demand, Fire Demand) Hence, it indicates that the water demand is more than the water availability. The villages in corporation area gets some of the water supply from Barvi Dam & rest of the demand is fulfilled by borewells constructed by PMC.

The total water supplied in Panvel old corporation area is around 32 MLD & in CIDCO nodes, it is around 179 MLD. In the remaining villages, MIDC supplies around 9 MLD water and CIDCO supplies around 3 MLD of water. As per water supply department of PMC, the total water supply across Panvel City is around 220 MLD which, after treatment goes to the Water Distribution System as depicted in Table 6.6. The system experiences a net approximate water loss of around 9.52%.

Table 6-6: Water Distribution at PMC

Water Distribution from Source	220 MLD
Water Received after Treatment	220 MLD
Actual Distribution of Water	200 MLD
Per capita/day supply of water	120 L
Overall Water Loss	9.52%

Source: Water Supply Department, Panvel

Details about Water Treatment Plants

- Water Treatment Plant (WTP) Behind Panvel ST Stand supplies water to Panvel City area
- At Kharghar & Taloja Node, water is being supplied through CIDCO from Hetavane Dam.

- Maharashtra Jeevan Pradhikarn lifted Water from Patalganga River and it is treated at Bhokarpada WTP and being supplied to Panvel corporation area i.e. Kalamboli, new Panvel and Old Panvel.
- For Kamothe water is supplied by the Navi Mumbai Municipal Corporation from Morbe Dam, and the water is treated at the Bhokarpada treatment plant.

The satellite image locations of the three aforementioned WTPs are shown in Figures 6.6, 6.7 and 6.8 below.

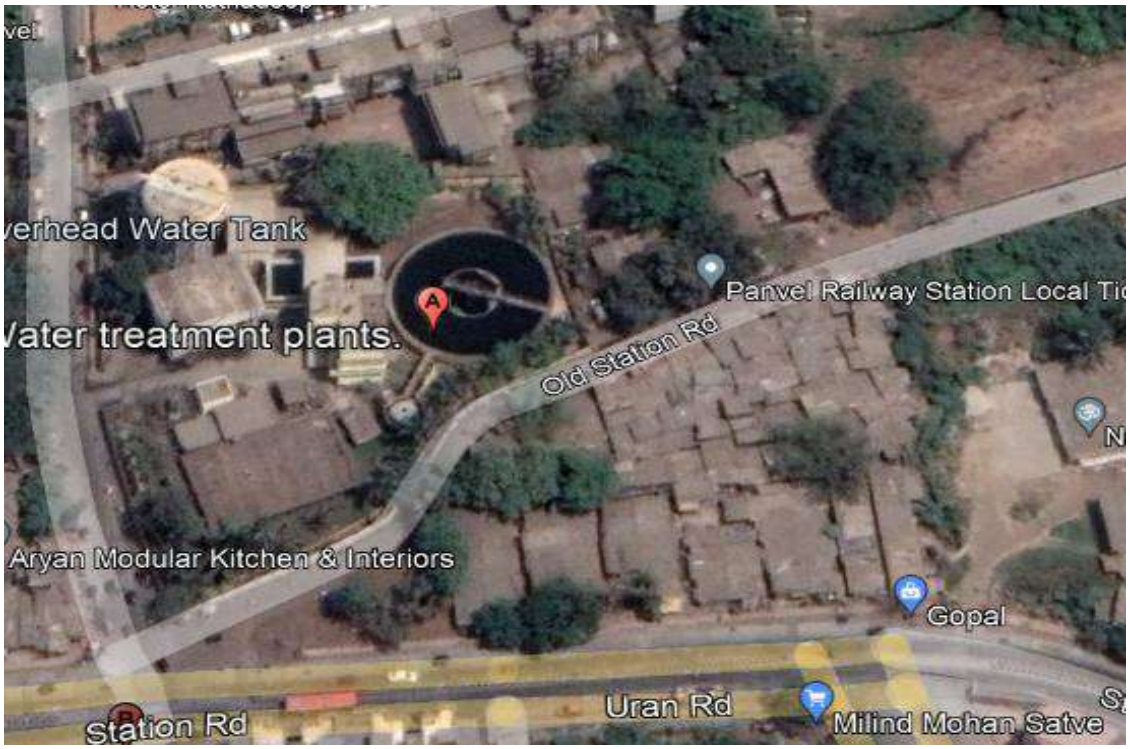


Figure 6.6: Panvel ST Stand WTP (18°59'24.59"N, 73° 7'4.63"E)

Figure 6.7: Badlapur Barrage Dam WTP (19°08'53.81" N, 73°15'09.89" E)

Figure 6.8: CIDCO Water Supply, Kharghar (19° 2'12.32"N, 73° 4'13.51"E)

The per-capita supply of treated water along with the sources is captured in Table 6.7 and Table 6.8 below.

Table 6-7: Per Capita Supply of Water

Details	Period	Mode of supply	Total water supply	LCPD
Existing Water Supply	4 hours	Metering	220 MLD	120
Minimum Water requirements as per norms.	24 hours	Metering	Not Applicable	135

Source: Water supply department of Panvel

Table 6-8: Water Supply by Type

Type	Numbers	Percentage (%)
Residential Connection	41,531	90%
Industrial Connection	4153	10%
Hand Pump	134	-
Borewells	183	-
Well	97	-
Total no. of Tap	45,684	100%

Source: Water supply department

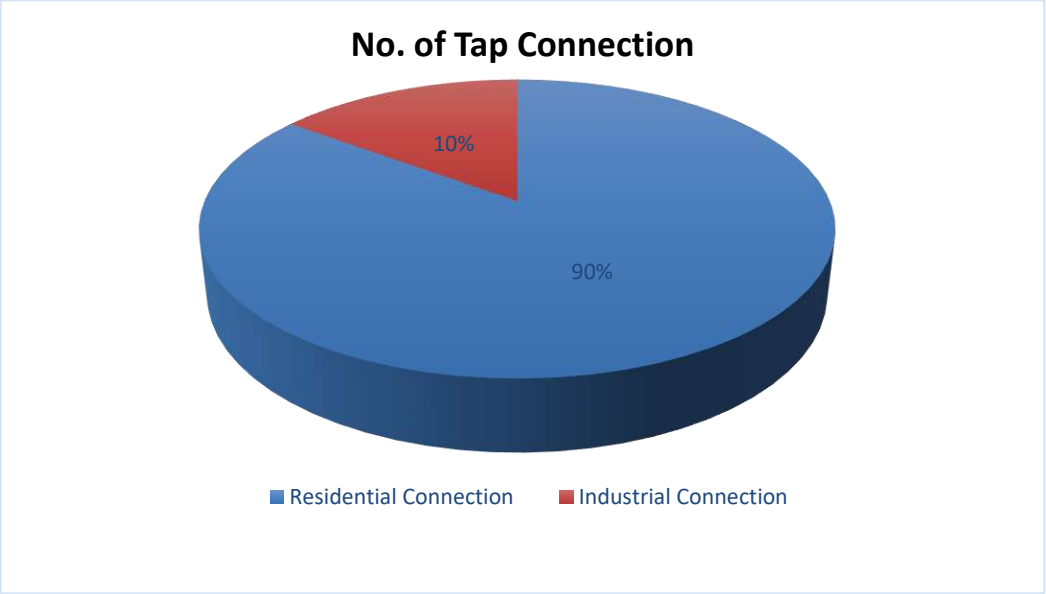


Figure 6.9: Tap Connections in Panvel

6.3 Ground Water

Due to rapid growth and urbanization, the dependency of PMC region on ground water for its daily activities are high compared to other regions in Raigad district. According to the block wise ground water assessment conducted by Central Ground Water Board (CGWB) in 2017, the ground water in Panvel Taluka was deemed 'safe'. Table 6.9 gives the details of ground water resources of Panvel Taluka.

Table 6-9: Ground Water Resources of Panvel Taluka (As on March 2009)

Net annual Ground Water Availability (ham)	**5098.74**
Existing Gross Ground Water Draft for Irrigation (ham)	824.84
Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (ham)	359.42
Existing Gross Ground Water Draft for All Uses (ham)	1184.26
Provision for Domestic and Industrial Requirement Supply to 2025 (ham)	718.83
Net Ground Water Availability for Future Irrigation Development (ham)	3555.03

Stage of Ground Water Development (%)	22.23
Category	SAFE

(Source: Central Ground information, Raigad District, CGWB Repot)

6.3.1 Depth to water: Pre-monsoon and Post-monsoon at Raigad District

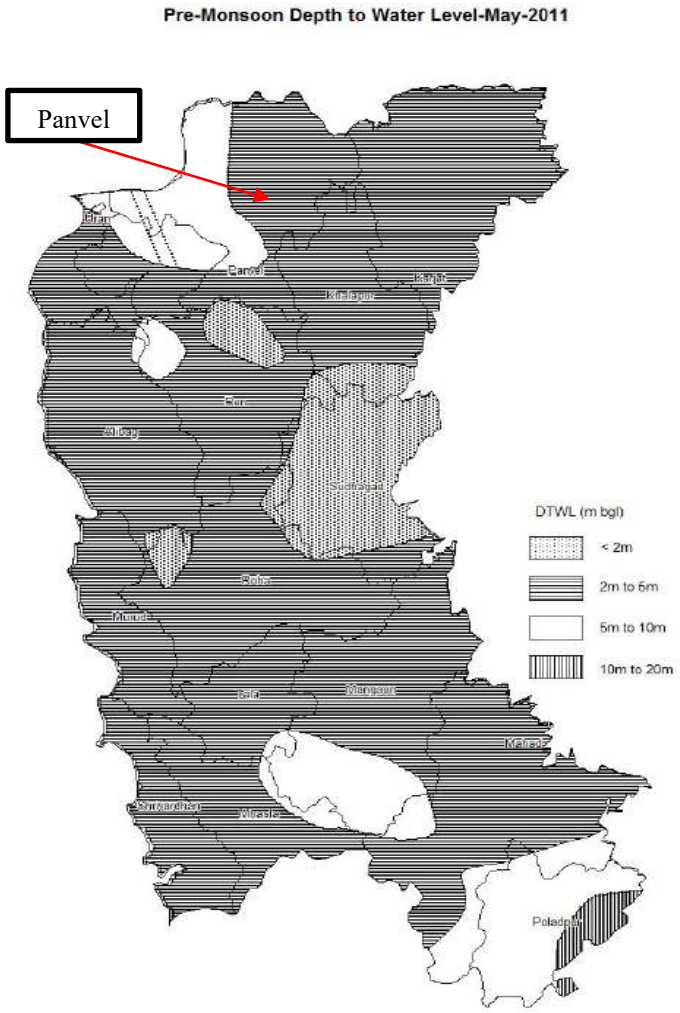


Figure 6.10: Pre-Monsoon Depth of Water Level in Raigad District, May 2011

(Source: Ground Water Information, Raigad District, CGWB Report)

Depth to water: Post-monsoon at Raigad District

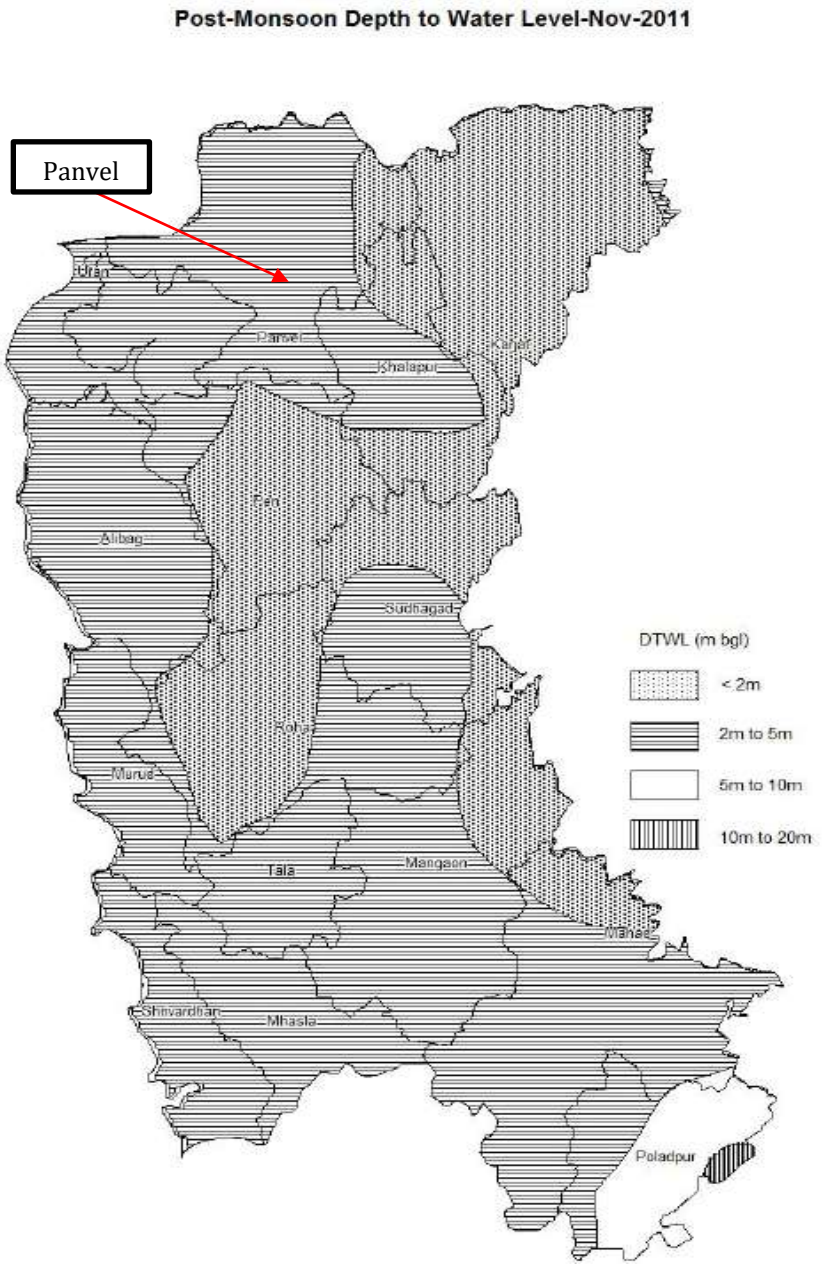


Figure 6.11: Post-Monsoon Depth of Water Level in Raigad District November 2011
(Source: Ground Water Information, Raigad District, CGWB Report)

As shown in Figure 6.10, the pre-monsoon depth to groundwater in the eastern part of Panvel Taluka was reported to be in the range of 2m to 5m below ground level. The water table at the western part of Panvel Taluka was reported to be in the range of 5m to 10m below ground level. The post monsoon depth to water was reported in the range of 2 to 5 m below ground level, as seen in Figure 6.11.

6.4 Sewage Treatment

Sewerage systems are networks for collecting wastewater, conveying it via pipes, conduits, and ancillary works from origin to treatment before discharge back into the environment (Read, NAICS 1997). There are two types of sewage residual generated in urban areas, which are industrial sewage and residential sewage. The Panvel City consists of the areas earlier governed by CIDCO, Raigad Zilla Parishad, MIDC and PMC and hence different levels of development of sewerage systems exist in the city.

Source: Drainage Department, PMC

Figure 6.12: Sewerage systems

The PMC has its sewage treatment plant (STP) at Bandar Road, Panvel with a capacity of 14 million liters per day (MLD). The remaining 6 STP Plants are in CIDCO Nodes and all the individual, public and common toilets are connected through sewerage pipeline to these STPs.

One STP Plant at Kamothe with the capacity of 85 MLD and other STP is at Kharghar with the capacity of 70 MLD. Taloja MIDC has a Common Effluent Treatment Plant (CETP) named Taloja CETP Cooperative Society Ltd located in Taloja, which is of 32 MLD capacities. Taloja CETP Co-operative Society Ltd. has a cluster of 1036 member industries. The remaining STPs are located in Kalamboli and Kalundre and their capacities are 50 MLD & 2 MLD, respectively. STPs and their capacities are given in table 6.10.

Table 6-10: Sewage Treatment Plant and capacities

Sr. No.	Sewage Treatment Plant and Location	Capacity (MLD)
1	STP at Bandar Road	14 MLD
2	Kamothe	85 MLD
3	STP at Kharghar	70 MLD
4	Kalamboli	50 MLD
5	Kalundre	2 MLD
6	Taloja (Phase I & II)	32 MLD

Source: Drainage Department, PMC

The satellite images of all the STP locations are provided under Figures 6.14 to 6.19. The technology used at STP is Sequencing Batch Reactor (SBR). The SBR is an advanced technology that uses a fill and draws activated sludge system for wastewater treatment. It is best for treating both industrial and municipal wastes. The main difference between SBR technology and other STP technologies is that SBR uses a single batch reactor/single tank to process the equalization, aeration, and clarification compared to other technologies that use different batch reactors for various processes.

Source: Drainage Department, PMC

Under the AMRUT 2.0 scheme, three Sewage Treatment Plants (STPs), each with a capacity of 2.0 MLD, have been proposed at Valvali Ghot and Devichapada.

Additionally, one STP with a capacity of 15.5 MLD is currently under construction near the existing STP on Bandar Road. This facility is scheduled for commissioning by the end of August 2025.

Figure 6.13: Kamothe STP (19° 0'48.62"N 73° 5'13.02"E), Capacity – 85 MLD

Figure 6.14: Kharghar STP (19° 2'31.38"N 73° 4'49.38"E), Capacity – 70 MLD

Figure 6.15: Kalamboli STP (19°2'6.59"N 73° 5'52.45"E), Capacity – 50 MLD

Figure 6.16: Taloja STP (19° 4'21.72"N 73° 5'33.21"E), Capacity – 32 MLD

Figure 6.17: Kalundre STP (18°58'40.02"N 73° 7'32.12"E), Capacity – 2 MLD

Figure 6.18: Bandar Road, Panvel STP (18°59'24.55"N, 73° 6'1.29"E), Capacity – 14 MLD
Source: www.mapsofindia.com

SBR technology is considered to be one of the highest performed solutions for wastewater treatment. It requires minimum maintenance and has low costs. It can handle continuous batch operations successfully. The distinct qualities of SBR technology are as follows:

1. High removal capacity- SBRs efficiently remove pollutants from wastewater, making them suitable for both municipal and industrial applications1. They can handle fluctuating hydraulic and organic loads effectively.

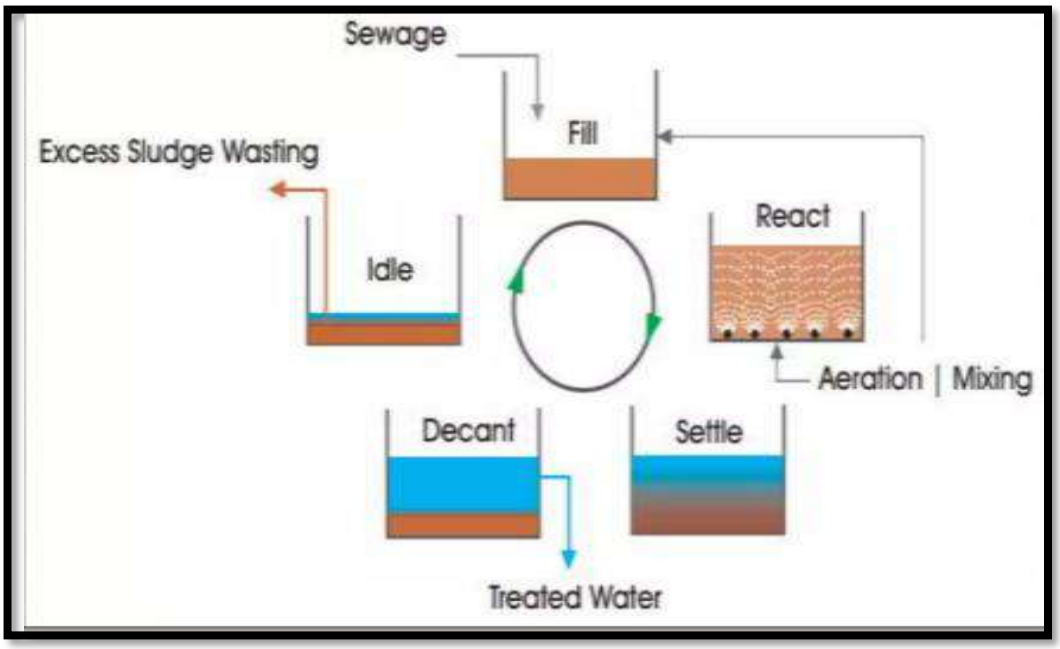
2. Versatile- SBRs can operate in both batch and continuous flow modes. They adapt well to varying influent conditions and can handle intermittent flow conditions1. Their versatility allows for flexible operation.

3. Compliant with stringent discharge standards- SBRs meet stringent water quality standards. Their high removal efficiency ensures that treated effluent meets regulatory requirements.

4. Economical Operation- SBRs have minimal maintenance requirements and lower costs compared to conventional systems. Their simple tank construction and geometry contribute to cost-effectiveness.

The process of SBR is explained in the Figure 6.19 & 6.20 Below.

Figure 6.19: The process of Sequencing Batch Reactor



BASIC COMPONENTS OF THE STPs:

The STPs are constructed on the SBR Technology- Cyclic activated sludge technology e.g. C-TECH technology. All these STP plants comprises of basic units like Raw sewage pumping station, Pre -treatment units, SBR/Cyclic activated sludge process units, Chlorination and Sludge dewatering units, Admin building consisting blower room and PLC & SCADA room, HT, LT substation units and other required ancillary units of STP.

The plants have main components as:

1. Raw Sewage pumping station
    - Inlet gates
    - Coarse screen
    - Sewage pumps
    - Electrical switchgears
    - Valves arrangement
2. Pretreatment Unit
    - Stilling chamber
    - Fine Screens - 2 Nos. Mechanical (Working) + 1 No. manual (Standby)
    - Grit Chamber-2 Nos. Mechanical (working)
    - Flow diversion unit - 1 no.
3. SBR/Cyclic activated Sludge Bio reactor
    - Basins
    - Return activated Sludge (RAS) pump nos.
    - Surplus activated sludge (SAS) pumps
    - Diffusers
    - Decanters
    - Air blowers piping
4. Chlorination System
    - Chlorine contact tank
    - Chlorinator
5. Sludge Sump & Centrifuge house
    - Sludge sump
    - Centrifuge (Working) + standby.
6. Administrative Building
    - Blower Room / Air Blowers
    - PLC and SCADA and room for it
    - Laboratory
7. HT Substation and DG
    - Incoming supply/RMU

- Transformers / DG set

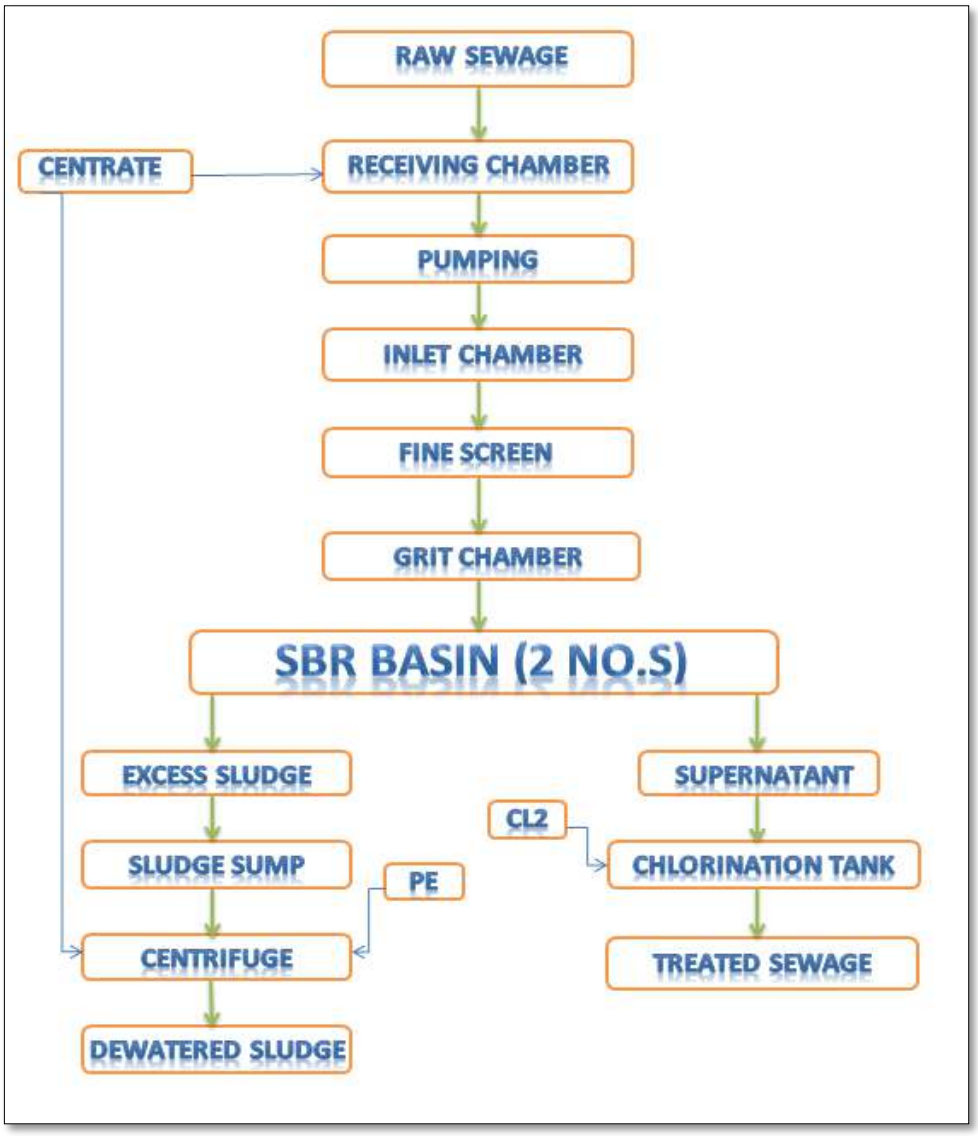


Figure 6.20: Components of STP

The effluent generated by the industries is collected through gravity lines in two collection sumps, one near Ghot Village and the other at CETP. From the Collection Sump at Ghot village, effluent is pumped to the collection sumps of the CETP. The equalization tank is used to dampen the variations in the quality and flow rate. To keep the effluent suspended solids away from settling and ensure proper mixing floating aerators are installed in old plants and diffused coarse aeration are there in the expanded plant. The pH correction is carried out with lime, if required.

The effluent is pumped to a flash mixer wherein Poly Aluminum Chloride (PAC) is dosed with rapid mixing and led to Clariflocculator to flocculate. The flocculated mass then coagulates and settles resulting in the removal of certain portion of suspended organic matter. The Suspended Solids settle down in Primary Clariflocculator, leaving the clear supernatant

overflow from the weir top, which is termed as primary treated effluent. The primary treated effluent goes to the Aeration Tank for secondary biological treatment. The settled sludge is scrapped with a scrapper mechanism and pumped to the sludge sump, further thickened in a thickener and dewatered with Centrifuge Decanter. The centrate water of the Centrifuge Decanter is taken to Equalization Tank for further treatment. In the Aeration Tank, only sludge remains, which is a heterogenic microbial culture. Diffused Aeration System supplies the oxygen required for micro-organism. The bacteria consume the organic matters present in the effluent as their food source and produce Carbon Dioxide and water as by-products. The overflow of the Aeration Tank flows to the Secondary Clarifier where Mixed Liquor Suspended Solids (MLSS), which is a form of biomass only, settle down, leaving clear supernatant at the top, which is treated water. The treated water is discharged in the Waghivali Creek by pumping through High Density Polyethylene (HDPE) closed pipeline. The settled sludge is partially recycled back to Aeration Tank to maintain the MLSS concentration in it and partially wasted in the sludge sump. The MLSS is dewatered and dried along with the sludge which is generated in the primary treatment. The dried sludge is sent to Mumbai Waste Management Ltd. for further disposal by secured landfilling as per the consent conditions.

Though the waste residual from industries is treated by CETP, it is observed that many industries in Taloja discharge residual water in Kasardi River. It is also observed that severe pollutants are discharged at Waghivali Creek by CEPT which are hazardous for residents' health, ecosystem of the river and biodiversity in that region. The sludge is also a matter of grave concern. Lead metal and many chemical components in the sludge generate harmful effects on the ecosystem, including vegetation, aqua system and wildlife in the vicinity.

6.4.1 Reuse of Treated wastewater in Panvel

The sewage Treatment Plants in Panvel process around 180 MLD of wastewater daily. Which further highlights the significant reuse of treated water from the six sewage treatment plants (STPs) in Panvel, collectively capable of treating 253 MLD of wastewater. Importantly, around 0.1 to 0.2% of this treated water is repurposed for various beneficial applications, contributing to sustainable water management practices.

Table 6-11 Detail of STP Plant

Sr. No.	Sewage Treatment Plant and Location	Capacity (MLD)	Treated waste Water generated (MLD)	Treated water Reused (MLD)
1	STP at Bandar Road	14 MLD	12.50	0.125
2	Kamothe	85 MLD	45.05	0.45

3	STP at Kharghar	70 MLD	35.0	0.35
4	Kalamboli	50 MLD	30	0.3
5	Kalundre	2 MLD	1.20	0.012
6	Taloja (Phase I & II)	32 MLD	11.00	0.11

Source: Drainage department

One notable aspect of the reuse initiative is the utilization of treated water to irrigate green spaces within the region. Specifically, the Panvel Municipal Corporation leverages this resource to water 98 gardens under its jurisdiction. This reuse strategy not only conserves freshwater resources but also promotes the health and vitality of urban greenery, enhancing the aesthetic appeal and environmental quality of the community.

Source: Drainage Department, PMC

Figure 6.21: Reuse of Treated wastewater

Furthermore, the report underscores the direct supply of treated water from the STPs to prominent public amenities, namely Central Park and the golf course in Kharghar. Through dedicated pipe connections, these facilities receive a reliable and sustainable water source, reducing dependency on freshwater reserves and mitigating the environmental impact associated with conventional water sourcing methods.

Overall, the reuse of treated water from the kharghar STP exemplifies a proactive approach to environmental stewardship and resource conservation. By repurposing wastewater for irrigation and public amenities, the region not only minimizes water wastage but also contributes to the creation of resilient and sustainable urban landscapes. This initiative aligns with broader efforts to address water scarcity challenges and promote holistic environmental management practices within the community.

Ongoing Projects in support for Improvement in Water Conveyance system:

Projects Comes Under AMRUT 2.0

1. **Water supply distribution system in gaothan area of 29 revenue villages**

- Road restoration work and pipes of different diameters are part of the water distribution network system.

- The feeder main, which includes the pumping machinery, SCADA, sump construction, tapping point to ESR of different widths, etc.

2. **Pisarve lake Rejuvenation**- De-silting, walkway, tree plantation, Pergola structure. hawker zone, a parking area (2-wheeler- 49 & 4-wheeler-51), immersion pond, security cabin, parking fountain, toilet block
3. **Construction of STP-15.50 MLD-Panvel city**- Construction of STP, Sewage pumping station, electromechanical equipment, rising main and piping of various diameter
4. **Providing sewer line system to Gaothan area of 29 revenue villages**- Providing sewer lines of various diameters, pumping stations, construction of sewer manholes, construction of STP and Portable treatment plants
5. **Providing, installing, testing of AMR domestic and non-domestic water meter excl. CIDCO nodes under Panvel Municipal Corporation**- Battery operated/water meters total 11,561 nos. Bulk water meter total 414 nos.

7. Soil Environment

Soil may be defined as a thin layer of earth's crust which serves as a natural medium for the growth of plants. It is the unconsolidated mineral matter that has been subjected to, and influenced by genetic and environmental factors – parent material, climate, organisms and topography all acting over a period of time. They serve in varying degree as a reservoir of nutrients and water for crops, provide mechanical anchorage and favorable tilt. The components of soil are mineral material, organic matter, water and air, the proportion of which vary and which together form a system for plants growth; hence the need to study the soils in perspective.

A study of the soil profile is important from a crop husbandry point of view, since it reveals the surface and the sub- surface characteristic and qualities, namely, depth, texture, structure, drainage conditions and soil moisture relationship which directly affect the plant growth. A study of soil profile supplemented by physical, chemical and biological properties of the soil will give full picture of soil fertility and productivity. Physical properties of the soil include water holding capacity, aeration, plasticity, texture, structure, density and color etc. Chemical properties refer to the mineralogical composition and the content of the type of minerals such as Kaolinite, illite and montmorillonite, base saturation, humus and organic matter content. The biological property refers to a content of extent and types of microbes in the soil, which include bacteria, fungi, worms, and insects. Soil formation in Maharashtra mainly depends on the organic components, original rock, climate, the slope of the land and time. According to the climates in different regions and types of rocks, different classifications of soils are formed. A long time is required for the formation of mature soil, as it is a very slow process.

Some dominant groups of Indian soil, classified according to soil taxonomy and chemical property:

1) **Red Soil**: They are widely spread. The red color is due to diffusion of iron in the soil.
2) **Lateritic Soil**: They are composed of mixture of hydrated oxides of Aluminum and Iron with small amounts of fertility.
3) **Black Soil**: It contains a high proportion of Calcium and Magnesium Carbonates and has a high degree of fertility.
4) **Alluvial Soil:** This forms the largest and agriculturally most important form of soil.
5) **Desert Soil**: Occurs mostly in dry areas and important content is quartz.
6) **Forest and Hill Soils:** high in organic matter.

Source: https://www.gktoday.in/types-of-soils-in-india/

In Konkan zone, mostly laterite and acidic coarse, shallow soil is found and in western ghat zone, light, laterite and reddish-brown soil is found. Most of the rivers flowing in the Konkan area are small and flow with great speed. Therefore, the silt brought by them accumulates at the mouth of the rivers. These categories of soil / silt are found along the mouths of the rivers along the west coast, e.g., the Panvel-Uran coast, Dharamtar Bay etc.

To study the soil quality, soil samples were collected from all the four wards of Panvel. The activities around the sample sites were conducted by taking into consideration to understand the sources of pollution or the factors governing the physico-chemical properties of the soil. Analytical soil sampling results from the laboratory are tabulated and attached in Annexure IV of the report below. The analytical results indicates that the soil texture is sandy and the pH of the soil is ranged between 6.43-8.56. “Mild Alkaline" soil was observed at the residential area. In other locations, it varied from "Slightly acidic” to “Moderately alkaline”. Especially in industrial areas the reported results indicate that the pH is slightly acidic due to the use of toxic chemical in industrial processes. The values for nitrogen at all locations varied between 147-206 kilograms per hectare (kg ha^{-1}) This indicates that Nitrogen is ‘Low’ as per the classification at all the locations. Sandy soil may lose nitrogen through leaching, while heavy, poorly drained soils may lose nitrogen through denitrification. Without enough nitrogen in the plant, the plant cannot grow taller, or produce enough food (usually yellow). The concentration of phosphate was estimated to be between 19-28 kg ha^{-1}. The highest concentration can be observed at location SQ2, while the lowest concentration can be observed at location SQ1 during the monitoring period (for the monitoring locations, please refer Annexure IV). It is observed that phosphate concentration was reported to be in the ‘Medium’ range as per chemical classification of soil quality. The concentration of potassium was found to be ranging between 869-1290 kg ha^{-1}. Here it is observed that potassium concentration was reported to be in the ‘Very High’ range as per chemical classification of soil quality. A severe excess concentration of potassium in the soil will cause the clay particles to disperse and clog needed pore space so that water will tend to stand on top instead of infiltrating the soil. Plants need significant amounts of nitrogen, phosphorus, and potassium (NPK) to grow and thrive. Well-fed plants are healthier and more productive. For the optimal growth of crops, sufficient amounts of nutrients should be available in the root zone of the crops. These nutrients are supplied by the soil and should be partly added with organic manures and fertilizers. Soils will contain different amounts of available nutrients, depending of the parent material (e.g., sand,

clay, peat), and differences in the management history such as preceding crops, management of crop residues and use of manure and fertilizers in the past. Also, differences in climatic conditions may alter the available nutrients. For that reason, it is of utmost importance for farmers to know the NPK content of their soil, so that they know how much N, P and/or K they should add with organic or mineral fertilizers, to optimize crop growth, production and yield.

8. Biodiversity

The state of biodiversity is very well rich in Panvel city. As the temperature of the city is moderate this facilitates a better living environment for human beings and also for the ecosystem. There might be changes is the biodiversity count in the past few years due to changing climatic conditions and natural calamities. Various species of birds and butterflies were observed in that area. Also, various reptile species can also be spotted in the city.

Our planet's essential goods and services depend on the variety and variability of genes, species, populations and ecosystems. Biological resources feed us, provide housing infrastructures, provide medicines and also support spiritual nourishment. The natural ecosystems of forests, savannah, pastures and rangelands, deserts, tundra's, rivers, lakes and seas contain most of the Earth's biodiversity. The decline in biodiversity is largely the result of human activities and represents a serious threat to human development. The loss of biological diversity may reduce the resilience of ecosystems to climatic variations and air pollution damage. Atmospheric change can have an important impact on forests, biodiversity, and freshwater and marine ecosystem, as well as on economic activities, such as agriculture (UNCED, 1992).

All of the Earth's species work together to survive and maintain their ecosystems. However, much of the Earth's biodiversity is in jeopardy due to anthropogenic activities and other activities that disturb and even destroy ecosystems. Pollution, climate change, and population growth are all threats to biodiversity. These threats have caused an unprecedented rise in the rate of species extinction. Some scientists estimate that half of all species on Earth will be wiped out within the next century. Conservation efforts are necessary to preserve biodiversity and protect endangered species and their habitats.

Urbanization is often cited as a major reason for loss of native biodiversity and its replacement with non-native vegetation across the world (McKinney, 2002; Sanderson *et al.*, 2002). While urbanization does have an intense effect on native biodiversity and dramatic transformation of biophysical processes, there is also a growing recognition that urban areas are heterogeneous with variations and transitions in the synthesis of social, political, economic, biophysical processes at different scales (Cadenasso, Pickett, & Schwarz, 2007). Urban ecosystems serve as key sites where scholars across disciplines find common ground to explicitly integrate the dynamics of social-ecological and political processes (Francis, Lorimer, & Raco, 2011).

Measures of Biodiversity

In spite of many tools and data sources, biodiversity remains difficult to quantify precisely. But precise answers are seldom needed to effectively understand where biodiversity is, how it is changing over space and time, the drivers responsible for such change, the consequences for ecosystem services and well-being, and the response options available. Ideally, to assess the conditions and trends of biodiversity either internationally or nationally, it is necessary to measure the abundance of all organisms over space and time, using taxonomy (such as the number of species), functional traits (for example, the ecological type such as nitrogen- fixing plants like legumes versus non- nitrogen fixing plants), and the interaction among species that affect their dynamic and function (predation, parasitism, competition, and facilitation such as pollination, for instance, and hoe strongly such interactions affect ecosystems).

Currently, it is not possible to do this with much accuracy because the data is reportedly lacking. Even for the taxonomic component of biodiversity, where information is the best, considerable uncertainty remains about the true extent and changes in taxonomic diversity (Hassan, Scholes, and Ash, 2005). There are many measures of biodiversity; species richness (the number of species in a given area) represents a single but important metric that is valuable as the common currency of the diversity of life but it must be integrated with other metrics to fully capture biodiversity (Hassan, Scholes and Ash, 2005).

Panvel is a locality of the Konkan Division of Raigad District in the state of Maharashtra. The region is situated on the banks of the Gadhi River (Kalundre river) with coordinates 18°59′40″N 73°06′50″E and MSL 28 m. it falls in between the geographical zone of Western Ghats and Malabar Coastal region. The place is by far the largest and most popular city in the Raigad district. It is the node of Navi Mumbai as it in the center. The whole area of Panvel comprises a small patch of forest, open grass, scrub, agriculture and plantations, freshwater wetlands, urban parks, gardens, or avenues. The adjoining river opens into a creek known as Panvel Creek. Panvel soil is rich in minerals, but the human-dominated localities in Panvel range from rural Agro landscapes to core urban zones. In addition to this, the area has substantial numbers of estuarine habitats that harbor many mangrove species. Environmentalists and some local citizens pointed out that the Gadhi River, is in a poor condition due to untreated sewage wastewater is reportedly getting dumped. Local citizens of Panvel have urged the authorities to clean the river, but the situation of the river has only deteriorated

Suggestion

Environmental protection is an integral component of sustainable development. The environment is threatened in all its biotic and abiotic components: animals, plants, microbes and ecosystems comprising biological diversity; water, soil and air, which from the physical components of habitats and ecosystems; and all the interactions between the components of biodiversity and their sustaining habitats and ecosystem. With the continued increase in chemicals usage, energy and non- renewable resources by an expanding global population, associated environmental damage caused by over consumption, the quantities of waste generated, and the degree of unsustainable land use appear likely to continue growing (UNCED, 1992).

The need for a diverse genetic pool of plant, animal and microbial germ plasma for sustainable development is well established. Biotechnology is one of the tools that can play an important role in supporting the rehabilitation of degraded ecosystems and landscapes (UNCED, 1992).

Since there are no zoos or animal related parks in the city, this shall ideally be the first garden with information on various local animals and birds of Raigad- Panvel region. News published in Hindustan Times on 24 May, 2023 was on the aspects of reforestation at Taloja Hill forest. A barren patch of Taloja Hill is now brimming with greenery and wildlife because of the three-year reforestation drive by local NGOs with the help of the State Forest Department's Alibaug unit and the local community.

A survey for biodiversity was carries out in 2016, where thousands of different tree types were found along with animals and birds which are common in Panvel and Raigad District. (List of Flora and fauna attached in Annexure 1.)

Source: www.newsband.in

Few of the identified species are shown in Figure 8.1 below.

	
Common Indian Toad	**Common Tree Frog**
	
Fungoid Frog	**Bush Frog sps.**
	
Northern cricket frog	**Common Skittering Frog**
	

Indian Spectacled Cobra	Common Green Frog
	
Saw-scaled Viper	**Common Krait**
	
Gram Blue	**Tiny Grass Blue**
	
Common Iora	**Wood Sandpiper**
	
Crested Serpent Eagle	**White-throated Fantail**

	
White-eyed Buzzar	**Rufous Woodpecker**
	
Hibiscus	**Peltophorum**
	
Babul	**Adulsa**
	
Kaju Tree	**Jackfruit Trees**

Figure 8.1: Common Species of Flora & Fauna Found in Panvel

Tree Cover

Urban tree ecosystem provides a range of social and ecological services, but due to the heterogeneity of these canopies, their spatial extent us difficult to quantify and monitor. Traditional pre-pixel classification methods have been used to map urban canopies; however, such techniques are not generally appropriate for assessing these highly variable landscapes. Landsat imagery has historically been used for pre-pixel driven land use/land cover (LULC) classifications, but the spatial resolution limits our ability to map small urban features. In such cases, hyper spatial resolution imagery, such as aerial or satellite imagery with a resolution of one meter or below is preferred. Analysis and classification of remote sensing imagery, along with geographic information system (GIS) analysis and modeling provide the most efficient method for assessment. The detailed survey of biodiversity reveals that there has been a decrease in tree cover and trees are cut due to construction activities by private builders in the city.

The Garden Planning Department has placed a strong emphasis on tree plantation, leading to a significant positive impact across the PMC area. These efforts have been carried out in

collaboration with the Green Yatri Foundation, primarily using the Miyawaki plantation method, which promotes dense and diverse forest growth in urban spaces.

A total of approximately 1 lakh trees have been planted by the Garden Department. In addition:

- The Green Yatri Foundation has planted around 50,000 trees.
- The Environment Department of PMC has also contributed with the plantation of approximately 50,000 trees.

The Garden Department has overseen the distribution of saplings, allotting up to 5 trees per individual and 50 trees per NGO to encourage community participation.

Corporate Social Responsibility (CSR) activities have been integrated into the program, involving both NGOs and individuals. A budget of approximately ₹11,000 was allocated specifically for CSR-related plantation activities.

As of the end of the financial year 2023, the total number of trees planted and accounted for in the PMC area stands at around 6 lakh.

9. Solid Waste Management

Municipal solid waste (MSW) is defined as waste collected by the municipality or disposed of at the municipal waste disposal site and includes residential, institutional, commercial, municipal, and construction and demolition waste. MSW management includes the collection, transportation, and responsible disposal of waste generated in the city.

“Solid Waste" means and includes solid or semi-solid domestic waste, sanitary waste, commercial waste, institutional waste, catering and market waste and other non-residential wastes, street sweepings, silt removed or collected from the surface drains, horticulture waste, agriculture and dairy waste, treated bio-medical waste excluding industrial waste, bio-medical waste and e-waste, battery waste, radio-active waste generated in the area under the local authorities and other entities mentioned in rule 2 (SWM Rules 2016).

Solid waste generation is a continuously growing problem at all levels including local levels. Solid wastes are those organic and inorganic waste materials produced by various activities of the society, which have lost their value to the first user. Improper disposal of solid wastes pollutes all the vital components of the living environment (i.e., air, land and water) at local and global levels. Urban society rejects and generates solid material regularly due to rapid increase in production and consumption. The problem in India is more acute as its economic growth and urbanization have been very rapid in recent times. This necessitates management of solid waste at generation, storage, collection, transfer and transport, processing and disposal stages in an environmentally sound manner in accordance with the best principles of public health, economics, engineering, conservation, aesthetics and environmental considerations. Thus, solid waste management includes all administrative, financial, legal, planning, and engineering functions.

Source: www.sciencedirect.com/topics/engineering/municipal-solid-waste

The daily average solid waste generated and collected by PMC in 2023 was about 418 tons per day (TPD). (As per recent property tax survey 2021- current population will be 15,01,132 (HH 3,10,689)) The main source of solid waste is primarily from the residential areas and commercial areas, falling within the PMC area. The other sources of solid waste in PMC area are vegetable market waste, Institutional waste etc. Total waste generation in PMC is mentioned in Table 9.1

Table 9-1: Category wise Quantity of Waste Generated in PMC

Waste Generating Source	Waste (in TPD)	(%) share of waste generated
Residential area- colonies, apartment complexes	297.2	71.1
Commercial establishments, malls	62	14.8
Hotels and Restaurant	20	4.8
Markets (Vegetable Markets, Mandi, etc.)	30	7.2
Institutional areas, office, schools, universities	5.8	1.4
Hospital and nursing homes (excluding biomedical waste)	3	0.7
Total Waste Generated	**418**	**100**

Source: SWM Department, Panvel 2023

At present, the total waste generated in the city is estimated to be around 418 TPD

PMC has implemented a door-to-door collection mechanism to collect solid waste effectively. PMC has completed 100% door to door collection facility.

Table 9-2: Average Waste Composition from PMC

Sr. No.	Components	Percentage
1	Plastic, Plastic bags etc.	9.86
2	Paper waste	8.01
3	Glass & metals	3.45
4	Leather, rubber & synthetics	2.58
5	Tetra Packs and laminated plastics	5.78
6	Clothes and rags	7.70
7	Food waste/ organic	42.87
8	Horticulture waste & wood	5.36
9	Miscellaneous inert, ash, soil, silt	14.41
	Total	**100.00**

Source: SWM Dept, PMC

9.1 Segregated Waste Transport

More than 90% of the municipal wastes are transported through segregated waste transport system. There is 50 *Ghanta Gadis* that collect and transport municipal solid waste. These *Ghanta Gadis* go door to door to collect solid waste. There are 41 compactors for the transport of solid waste to the processing facility at Ghot,Taloja. All the vehicles are monitored with the help of GPS technology. (GPS Vehicle Dashboard)

Figure 9.1: Ghantagadi and GPS tracking dashboard

9.2 Segregation, Treatment and Disposal (Correction in data)

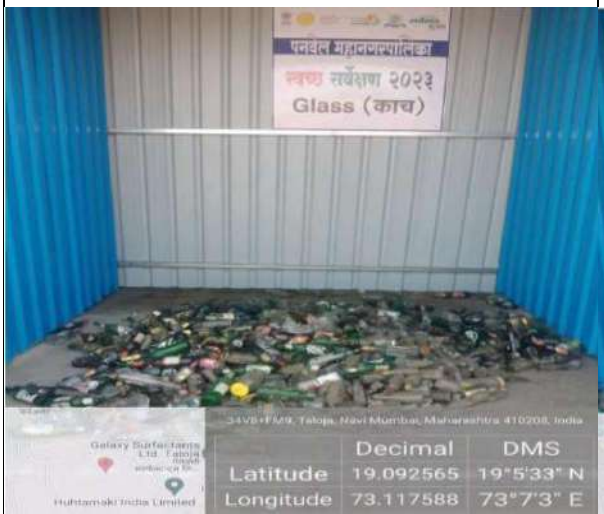
The processing of solid waste is also an important task in solid waste management. Total 418 TPD municipal wastes are processed in CIDCO Solid Waste Management Plant, Ghot, Taloja. Segregated organic waste is processed at a windrow compositing plant (WCP), a place where solid wastes are delivered to be separated, processed, and make as a manure. This manure can sold to farmers and used in the gardens of Panvel Municipal Corporation. The dry waste is processed at material recovery facility (MRF) a place where segregated dry waste are delivered to be the PMC handovers inert waste to CIDCO for scientific landfilling. Sanitary waste, Domestic Hazardous waste and Bio-Medical waste is transported to Mumbai West Management Company, run by RAMKY at Taloja. RAMKY process it with the help of an incineration facility and then a scientific landfill disposal happens at a secured landfill is carried out.

9.2.1 Dry Waste Processing Plant

Dry waste accounts for 40% (168 TPD) of the total solid waste generated daily in Panvel city. These include paper, plastic, metal, glass, tetrapack and other recyclable items. The wet and dry waste is segregated at the site of waste generation (in households and commercial areas). Panvel Municipal Corporation has provided separate vehicles for dry waste, which are used for daily collection. The primary processing of the collected dry waste is done at the MRF centres. Recyclable waste such as paper, plastic, glass, metal, etc. and non-recyclable waste which cannot be recycled. Recyclables are sent to MPCB authorized recycling units. Plastic waste: crushed at the crusher machine of MRF. Paper and glass: are given to specific companies for recycling. Some types of dry waste are used to produce Refuse-Derived Fuel (RDF). Panvel Municipal Corporation has made arrangements to process the waste at CIDCO Solid Waste

Management Project, Taloja. Dry waste is 100% treated. A tipping fee is charged to cover the cost of material recovery facilities (MRFs) and processing of dry waste which is approximately Rs. 736. Recycling of dry waste has reduced the amount of waste that needs to be dumped in scientific landfills. Recycling reduces the use of natural resources for new products. The Panvel Municipal Corporation makes the citizens aware of the importance of segregation of dry and wet waste. Training & IEC programmes on waste management are being conducted in schools, societies, hotels and commercial areas.

Secondary segregation and processed and stered for later use as raw material given to MPCB authorized manufactures and recyclers. Some of the invert material goes for the production or use as a refused derived fuel (RDF) is produced.



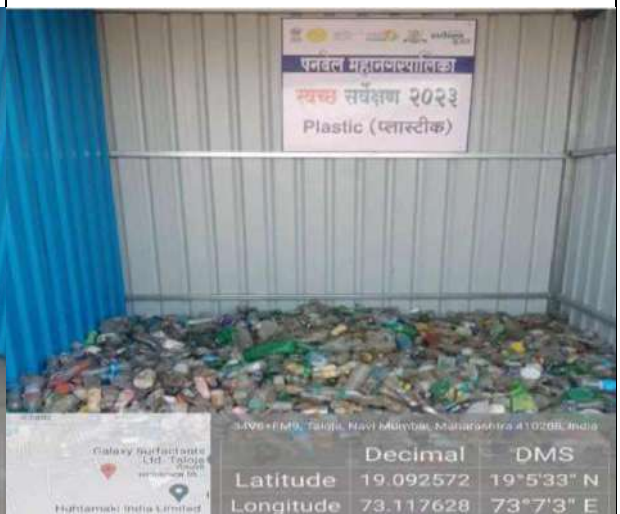


Figure 9.2 Dry Waste Processing Plant

9.2.2 Wet Waste Processing Plant

The Panvel Municipal Corporation has taken effective measures regarding the processing of wet waste in Panvel city. About 450 tonnes per day (TPD) of municipal solid waste (MSW) is generated in the Panvel Municipal Corporation area. About 56% of this is wet waste. These include household organic waste, food waste from hotels and restaurants, and vegetable waste from markets. The Panvel Municipal Corporation has appointed separate vehicles for wet waste, which collect waste from each ward. Emphasis is laid on segregation of wet and dry waste by citizens and commercial sectors. The collected wet waste is sent to the composting units. Biodegradable waste is processed into organic manure. In some places, wet waste is used for biogas production. This leads to environmentally friendly use of waste and promotes energy generation. To process wet waste, Panvel Municipal Corporation has started a project at CIDCO Solid Waste Management Project, Taloja. 100% wet waste is processed at this centre. Recycling of waste: Recycling takes place in the form of organic manure and biogas. 100% treatment of wet waste to reduce landfills has reduced the amount of waste going to landfills. Cleanliness has been maintained in the city. Panvel Municipal Corporation makes citizens aware about the importance of waste segregation and composting. At the local level, home composting projects have been started in some wards. Panvel city has set a good example by using modern technology in wet waste management.

Figure 9.3: Wet Waste Processing Plant

Source: SWM DPR for PMC

9.3 Action on Single Use Plastic Waste

Panvel Municipal Corporation conducts regular awareness campaign for ban on single use plastic. As per recent update, single use plastic with <120 microgram size is banned in city. Panvel Municipal Corporation conducts raids and penalizes the shops, restaurants and other institutions that use singe use plastic. In 2024-25 more than 1141.36 kg single use plastic seized and more than 1.95 lakh rupees fine levied on violators.

9.4 Waste to Art and RRR

Panvel Municipal Corporation installed 21 Reduce Reuse and Recycle Center across 20 wards in the city. These centers are located at high-footfall area and PMC organized awareness

campaign regarding RRR centers and their benefits. Thousands of needy are benefitted from these RRR centers. Important squares and rotaries in the city are beautified by using waste material. Art structures are produced out of the waste material. One of the most beautiful wastes to Art Structure is “City Bus” Structure installed at Shilp Chowk Kharghar

9.5 Biomedical Waste

Medical care is crucial for human health but the wastes associated with medical facilities causes a direct impact on community. Hence it is crucial to scientifically manage and dispose biomedical waste to reduce its direct impact on the environment as well as on humans. According to Biomedical Waste Management Rules, 2016, it is mandatory to follow notified rules for all persons who generate, collect, receive, store, transport, treat, dispose or handle biomedical waste in any form including hospitals, nursing homes, clinics, dispensaries, veterinary institutions, animal houses, pathological labs, blood banks, research and educational institutions, health camps, vaccination camps, forensic labs, blood donation camps, first aid rooms of schools.

As per the Bio medical rules waste segregation has to be done at source in colour coded bags, accordingly RAMKY Providing colour coded bags to HCE's and collecting segregated Biomedical waste from HCE's. Agreement with MPCB authorized Mumbai waste management as Bio medical waste management vendors for RAMKY’s Mumbai waste management, collection, transportation and disposal is made. The capital investment of the Plant is 858.98 Lakhs. Plant Area: - Plot Area 4046.86 M^2 with Built-up area 2832.80 M^2.

Collected Bio-medical waste from the Jurisdiction of Navi Mumbai Municipal Corporation Area of Dist. Thane, and Panvel Municipal Corporation Area, Talukas Pen, Alibag, Karjat, Uran, Khalapur of Dist. Raigad collectively. Approximately 900-1000 kg of biomedical waste is treated in plant daily from above ULBs & Rural areas of Talukas and Raigad district.

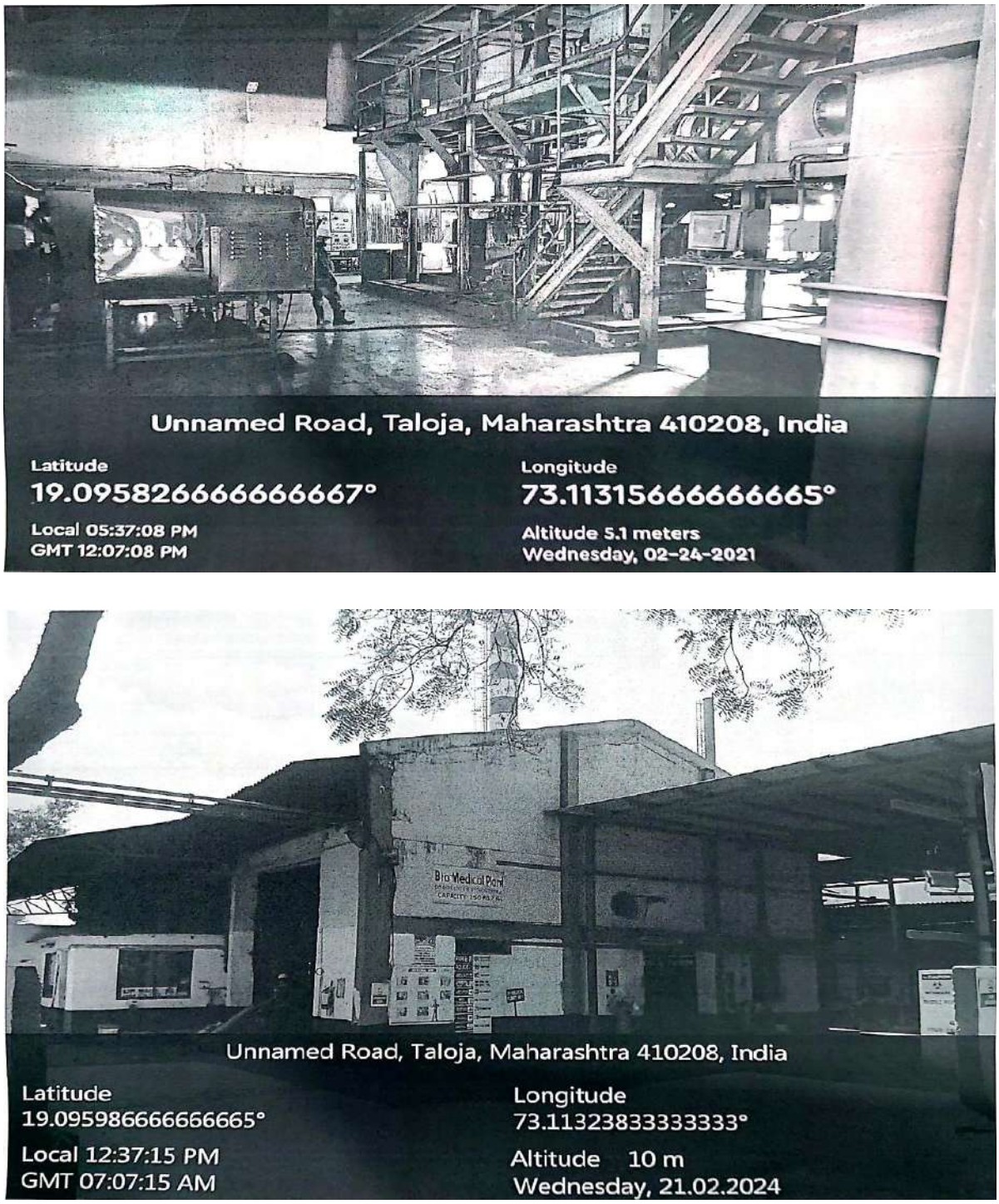


Figure 9.4: Bio-Medical Plant

RAMKY Engineering (RE) Mumbai waste management Ltd. collect, transport and process Biomedical Waste generated from medical facilities across the Panvel city. Incineration plant is one of the best plants in MMR region and real time data synchronizes with Central Pollution Control Board (CPCB) portal.

10. Primary Monitoring

Primary environmental monitoring was carried at selected locations at Panvel city in the month of November 2024. Monitoring for water quality, soil quality, ambient air quality, and ambient noise level monitoring was done by Ultra-Tech Lab. The number of sampling locations for primary monitoring is given in Table 10.1. The results of the primary monitoring are described in the following sub-sections.

Table 10-1: Number of Sampling Locations for Primary Monitoring

Particulars	No. of Sampling Locations
Ambient Air Quality	4
Ground Water Quality	6
Surface Water Quality	8
Ambient Noise Levels	4
Soil Quality	4

10.1 Ambient Air Quality

Ambient air quality was monitored at four locations inside Panvel city to assess the ambient air quality status of the area and also to check its conformity with the National Ambient Air Quality Standards (NAAQS) specified by Central Pollution Control Board (CPCB).

The monitoring locations were selected based on the data analysis done for the past years, topography of the study area and the location of potential sensitive receptors. The factors considered while selecting of the monitoring locations include:

- Topography of the study area
- Representative nature of the sample
- Accessibility
- Location of the receptors
- Availability of power

Particulate Matter – size less than 2.5 µg/m^3 ($PM_{2.5}$), Particulate Matter -– size less than 2.5 µg/m^3 (PM_{10}), Nitrogen Oxides (NO_X), Sulphur Dioxide (SO_2), and Carbon Monoxide (CO) were monitored at four locations. Monitoring was done on 10 March 2025. Monitoring locations for ambient air quality was selected based on the guidelines given in

Environmental Impact Assessment manual from the Ministry of Environment, Forest and Climate Change (MoEF&CC). The purpose is to ascertain the baseline pollutant concentrations in ambient air in and around the study area. Ambient air quality monitoring locations are shown in Figure 10.1 below. The details of the monitoring stations are given in Table 10.2 below. The sampling methodology and protocol are given in Table 10.3. The monitoring results are given in Table 10.4 below.

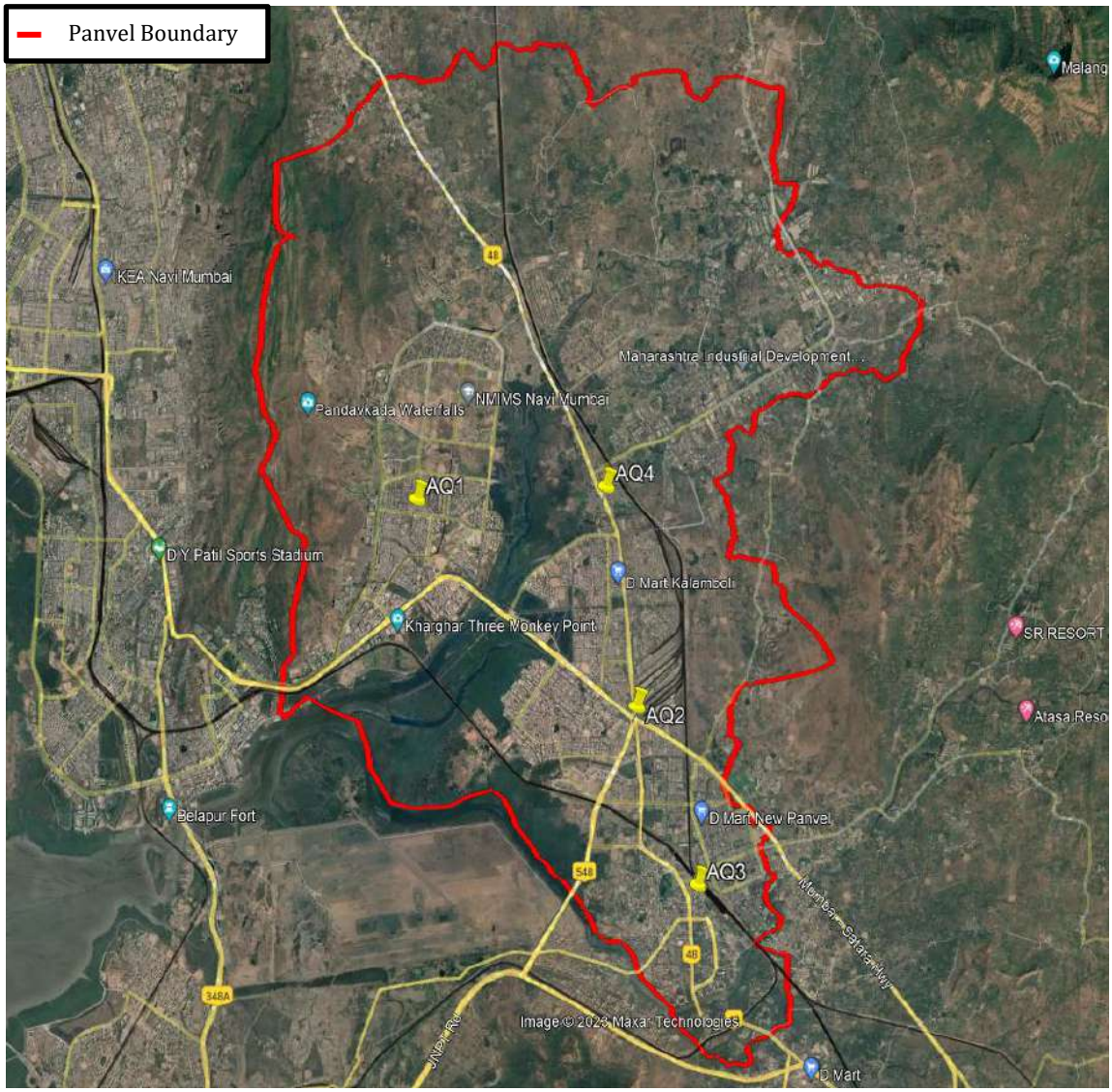


Figure 10.1: Ambient Air Quality Monitoring Locations

Table 10-2: Ambient Air Quality Monitoring Locations and Parameters

Code	Site Location	Location Coordinates	Landmark	Parameters
AQ1	Shilp Chowk	19°2'50.23"N 73° 4'11.65"E	Residential Area	PM_{10}, $PM_{2.5}$, SO_2, NO_X, CO
AQ2	Kalamboli Circle	19° 1'3.56"N 73° 6'22.49"E	Industrial Area	

AQ3	Panvel Bus Depot	18°59'31.95"N 73° 6'58.74"E	Commercial Area	
AQ4	Navade Gram Panchyat	19° 2'56.77"N 73° 6'4.42"E	Industrial Area	

Table 110-3: Sampling Methodology and Protocol

Sampling Parameters	Standard referred	Sample Collection	Sample Analysis	Methodology
		Sampling Equipment	Analytical Equipment	
PM_{10}	IS 5182-Part 23	Respirable Dust Sampler	Electronic Balance	Gravimetric Method
$PM_{2.5}$	-	Fine Dust Sampler		
SO_2	IS 5182-Part 2	RDS with impinger	Spectrophotometer	Improved West & Gaeke Method
NO_x	IS 5182-Part 2			Na Arsenite Method
CO	IS 5182-Part 10	Tadler Bag	GC-FID	Chromatography

Source: Standard Practices

*Particulate Matter (PM_{10} & $PM_{2.5}$), SO2 & NOx were sampled for 24 hrs. CO was sampled for 8 hr.

Figure 110.2: Photograph during Ambient Air Monitoring

Table 110-4: Ambient Air Quality Monitoring Results (Pre- Monsoon)

Code	Parameters / Locations	SO_2 (µg/m³) 24 Hourly	NO_x (µg/m³) 24 Hourly	PM_{10} (µg/m³) 24 Hourly	$PM_{2.5}$ (µg/m³) 24 Hourly	CO (mg/m³) 8 Hourly
AQ1	Shilp Chowk	BDL(DL=5)	19	70	24	1.7
AQ2	Kalamboli Circle	BDL(DL=5)	29	155	41	1.2

AQ3	Panvel Bus Depot	BDL(DL=5)	16	280	76	1.5
AQ4	Navade Gram Panchyat	BDL(DL=5)	27	317	59	1.5
NAAQS		**80**	**80**	**100**	**60**	**2**

Inference:

As seen in Table 10.4, the SO_2, NO_x, CO and PM 2.5 concentrations are below the NAAQS across all the selected locations. However, the concentrations of PM_{10} are above the NAAQS at Shilp Chowk and kalamboli Circle. Generally, PM_{10} concentration increases mainly due to by traffic, industrial activities, domestic fuel burning, as well as from unspecific sources of human origin. In the post-monsoon scenario, the pollution load is usually low as rain depends on particles floating in the air, its falls with them to the ground reducing the concentration of pollutants.

The maximum PM_{10} concentrations are seen at Navade Gram Panchayat and Panvel Bus Stop 73 µg/m³ & 76 µg/m³, respectively. The location is a circle with vehicles coming from all the directions which explains the increased concentration. Also, the major transport route, Mumbai - Satara Highway, Kalamboli Flyover Bridge, MIDC area with cement industries are in the proximity of Kalamboli circle that adds up to increased pollution in the said area.

Table 10-5: Ambient Air Quality Monitoring Results (Post-Monsoon)

Code	Parameters / Locations	SO_2 (µg/m³) 24 Hourly	NOx (µg/m³) 24 Hourly	PM 10 (µg/m³) 24 Hourly	PM 2.5 (µg/m³) 24 Hourly	CO (mg/m³) 8 Hourly
AQ1	Shilp Chowk Near Kharghar Grampanchayat	9	18	71	26	1.2
AQ2	Kalamboli Circle	6	19	72	23	1.0
AQ3	Panvel Bus Depot	7	17	76	25	1.0
AQ4	Navade Gram Panchyat	7	16	73	25	1.1
NAAQS		**80**	**80**	**100**	**60**	**2**

Inference:

As seen in Table 10.5, the SO_2, NOx, and CO concentrations are below the NAAQS in all the areas. The highest $PM_{2.5}$ concentration which exceeded the standard concentration was observed at Shilp Chowk Near Kharghar Grampanchayat, which is 26 µg/m³. The highest PM_{10} concentration which exceeded the standard concentration was observed at Panvel bus depot, Kalamboli Circle, and Navade Gram Panchayat which is 76, 72, 73µg/m³. Generally,

PM_{10} & $PM_{2.5}$ concentration increases mainly due to by traffic, industrial activities, domestic fuel burning, as well as from unspecific sources of human origin. The location is a circle with vehicles coming from all the directions which explains the increased concentration. Also, the major transport route, Mumbai - Satara Highway, Kalamboli Flyover Bridge, MIDC area with cement industries are in the proximity of Kalamboli circle that adds up to increased pollution in the said area.

10.2 Ambient Noise Environment

Baseline noise levels were monitored at the locations where the ambient air quality monitoring was conducted. The ambient noise monitoring was conducted using a spot noise measurement device. Noise level measurement locations were identified for assessment of existing sound level status, keeping in view the land use pattern, residential areas, schools, bus stands etc. The noise monitoring locations are shown in Figure 10.6 below. The day and night time hours as prescribed by CPCB are from 06:00 AM to 10:00 PM and from 10:00 PM to 06:00 AM. CPCB noise limits for day and night time are given in Table 10.6. The results of ambient noise level monitoring for day time and night time are given in Table 10.8.

Table 110-6: CPCB Limits for Ambient Noise

Area Code	Category of Area	Limit in dB (A), L_{eq}	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silent Zone	50	40

- Day time shall mean from 6:00 a.m. to 10:00 p.m.
- Night time shall mean from 10:00 p.m. to 6:00 a.m.
- Silence Zone is an area comprising not less than 100 m around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority
- Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.
- dB (A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.
- A “decibel” is a unit in which noise is measured.

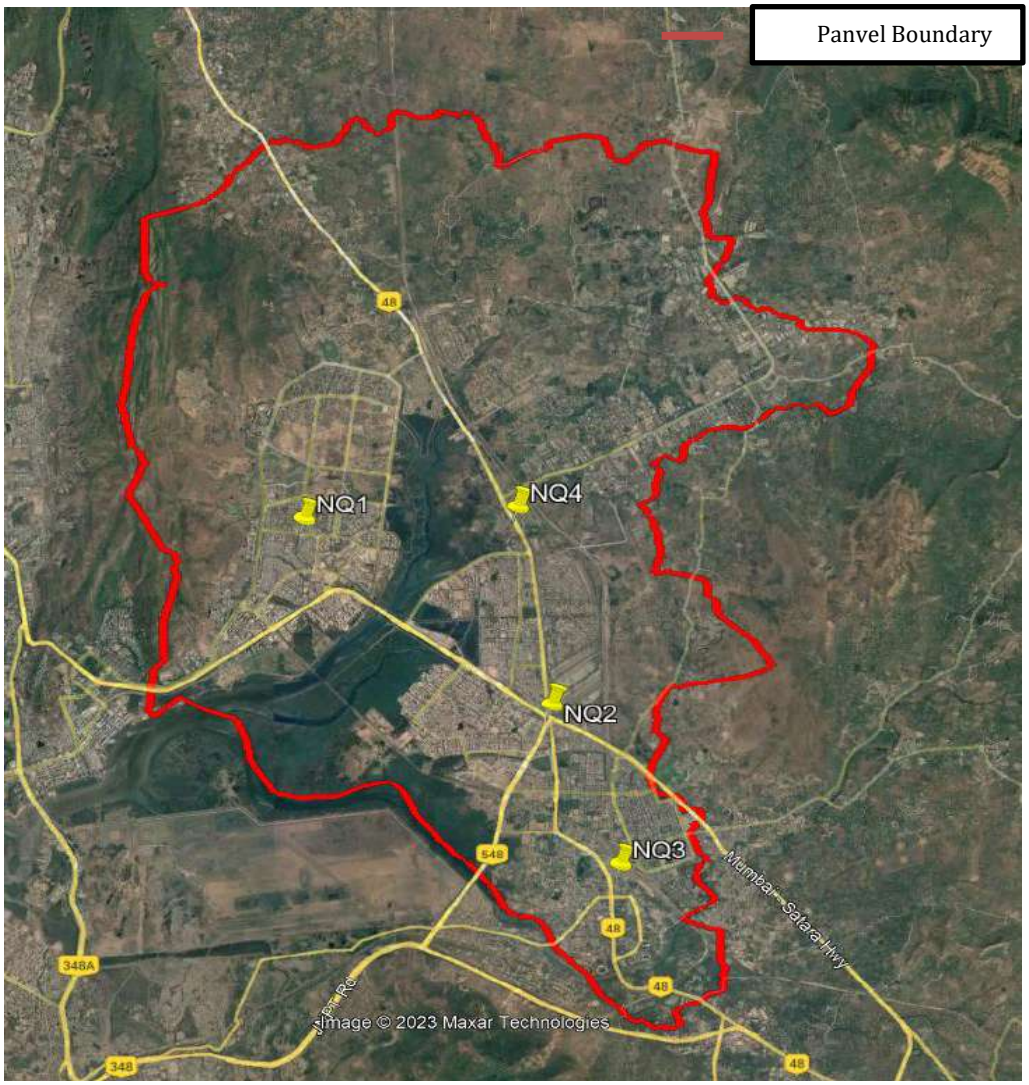
- "A", in dB (A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.
- Leq is the energy mean of the noise level over a specified period.

The noise monitoring location details are given in below Table 10.7 below.

Table 110-7: Ambient Noise Monitoring Locations

Code	Site Location	Location Coordinates	Landmark
NQ1	Shilp Chowk	19°2'50.23"N 73° 4'11.65"E	Residential Area
NQ2	Kalamboli Circle	19° 1'3.56"N 73° 6'22.49"E	Industrial Area
NQ3	Panvel Bus Depot	18°59'31.95"N 73° 6'58.74"E	Commercial Area
NQ4	Navade Gram Panchyat	19° 2'56.77"N 73° 6'4.42"E	Industrial Area

Figure 110.3: Ambient Noise Monitoring Locations



Noise monitoring photographs

Table 110-8: Results for Noise Level Monitoring (Pre-Monsoon)

Code	Parameters / Locations	Zone	Minimum L_{eq}, dB(A)	Maximum L_{eq}, dB(A)	Average Leq, dB(A)
NQ1	Shilp Chowk	Residential	56.8	111.1	74.47
NQ2	Kalamboli Circle	Industrial	35.7	96	65.12
NQ3	Panvel Bus Depot	Commercial	60.8	99.1	69.58
NQ4	Taloja MIDC	Industrial	51.9	98.3	69.32

Table 110-9: Results for Noise Level Monitoring (Post-Monsoon)

Code	Parameters / Locations	Zone	Minimum L_{eq}, dB(A)	Maximum L_{eq}, dB(A)	Average Leq, dB(A)
NQ1	Shilp Chowk	Residential	43.5	92.3	66.35
NQ2	Kalamboli Circle	Industrial	35.4	86.2	58.61
NQ3	Panvel Bus Depot	Commercial	32.1	57.9	42.41
NQ4	Taloja MIDC	Industrial	35.6	102.4	64.47

Inference:

As seen in Tables 10.8 & 10.9, the noise level in commercial, residential and industrial areas were reported above the CPCB limits. The average noise level is highest in Shilp Chowk area and panvel bus depot, which is 74.47 dB (A) and 69.58 db (A). It can be due to its proximity to the railway station and the highway

10.3 Water Quality

The water quality of PMC was assessed for physio-chemical and bacteriological analysis of ground and surface water samples. Five groundwater and eight surface water samples were collected from Panvel city for analysis of the existing water quality in the area. For surface water, samples were collected from the rivers in the city and groundwater samples were collected from bore wells and hand pumps. The surface water samples were rated according to the CPCB Water Quality Criteria against A, B, C, D and E class of water based on the parameters identified in the criteria. The parameters of the ground water samples were compared with the drinking water quality standards specified in IS 10500: 2012.

The details of the CETP, ground water and surface water quality locations and parameters are tabulated under Table 10.10. The sample collection locations of surface water and ground water are shown in Figure 10.4

Table 110-10: Surface & Ground Water Sample Collection Locations and Parameters

Code	Site Location	Location Coordinates	Area	Parameters
SW1	Shree Shiv Samarth	19°2'36.25"N 73°4'24.29"E	Kharghar	pH, Turbidity, Total Coliform, Free Ammonia, TDS, Nitrate, Total hardness as CaCO3, Total alkalinity as $CaCO_3$, COD, BOD, DO, TSS, Sodium Absorption Ratio
SW2	Shiv Temple Pond	19°1'0.34"N 73°5'37.24"E	Kamothe	
SW3	Roadpali	19°2'25.75"N 73°5'54.51"E	Kalamboli	
SW4	Dewale Lake	18°59'21.75"N 73°6'27.51"E	New Panvel	
SW5	Taloje River	19°4'56.61"N 73°6'1.72"E	Up Stream	
SW6	Taloje River	19°4'2.91"N 73°5'36.68"E	Down Stream	
SW7	Kasardi River	19°2'51.25"N 73°6'33.92"E	Up Stream	
SW8	Kasardi River	19°2'48.56"N 73°6'13.00"E	Down Stream	
GW1	Kharghar Gram Panchayat	19° 2'42.51"N 73°4'14.87"E	Kharghar	pH, Turbidity, TDS, Arsenic, Total hardness as $CaCO_3$, Total alkalinity as $CaCO_3$, DO, Chloride, TSS, Fluoride, Mercury, Lead
GW2	Kamothe gram panchyat office	19°0'59.40"N 73°5'25.34"E	Kamothe	
GW3	Kalamboli gram panchyat office	19°1'20.72"N 73°6'10.73"E	Kalamboli	
GW4	Panvel panchyat samiti	18°59'18.67"N 73°6'51.85"E	Panvel	
GW5	Taloje MIDC	19°3'40.58"N 73°7'2.89"E	Taloja MIDC	

10.3.1 Surface Water Analysis

Surface & Ground water samples were collected from all four wards of PMC and also from major rivers around the city. The parameters of the surface water samples were compared against the designated best use classification of CPCB as given in Table 10.11.

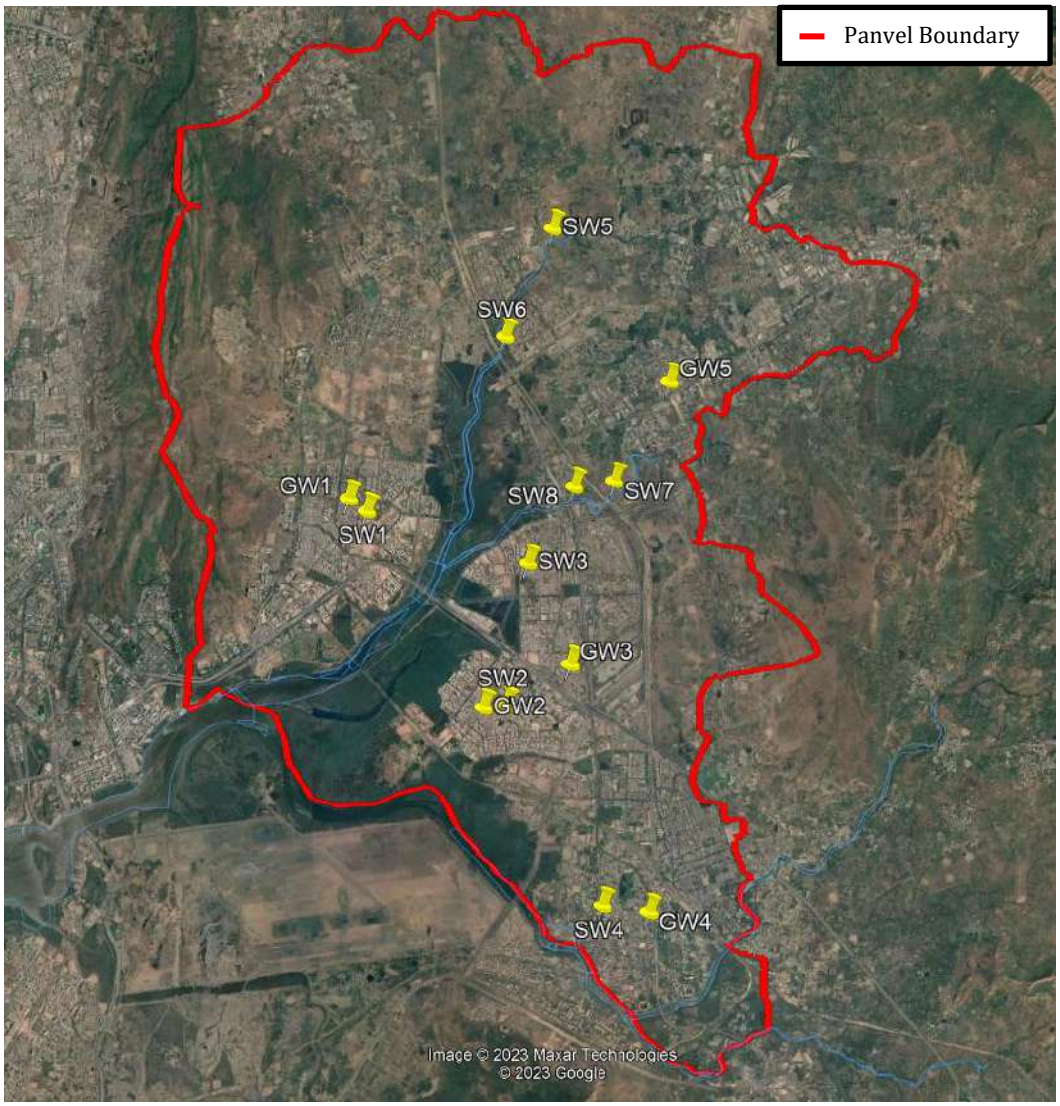


Figure 110.4: Ground Water and Surface Water Monitoring Locations

Table 110-11: Water Quality Standards by CPCB for Best Designated Usage

Designated- Best-Use	Class of Water	Criteria
Drinking Water Source Without Conventional Treatment but After Disinfection	A	Total Coliforms Organism MPN/100 ml shall be 50 or less.
		pH between 6.5 – 8.5
		Dissolved Oxygen: 6 mg/l or more
		Biochemical Oxygen Demand 5 Days 20 °C: 2 mg/l or less

Designated- Best-Use	Class of Water	Criteria
Outdoor Bathing (Organized)	B	Total Coliforms Organism MPN/100 ml shall be 500 or less
		pH between 6.5 and 8.5
		Dissolved Oxygen: 5 mg/l or more
		Biochemical Oxygen Demand 5 Days 20 °C: 3 mg/l or less
Drinking Water Source After Conventional Treatment and Disinfection	C	Total Coliforms Organism MPN/100 ml shall be 500 or less
		pH between 6.5 and 9
		Dissolved Oxygen: 4 mg/l or more
		Biochemical Oxygen Demand 5 Days 20 °C: 3 mg/l or less
Propagation of Wildlife and Fisheries	D	pH between 6.5 and 8.5
		Dissolved Oxygen: 4 mg/l or more
		Free Ammonia (as N): 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Water Disposal	E	pH between 6.5 and 8.5
		Electrical Conductivity at 25°C micro mhos/cm: Max 2250
		Sodium Absorption Ration: Max. 26
		Boron: Max. 2 mg/l
		Free Ammonia (as N): 1.2 mg/l or less
		Chlorides: 600 mg/l
		Sulphates: 1000 mg/l
-	Below-E	Not Meeting A, B, C, D & E Criteria

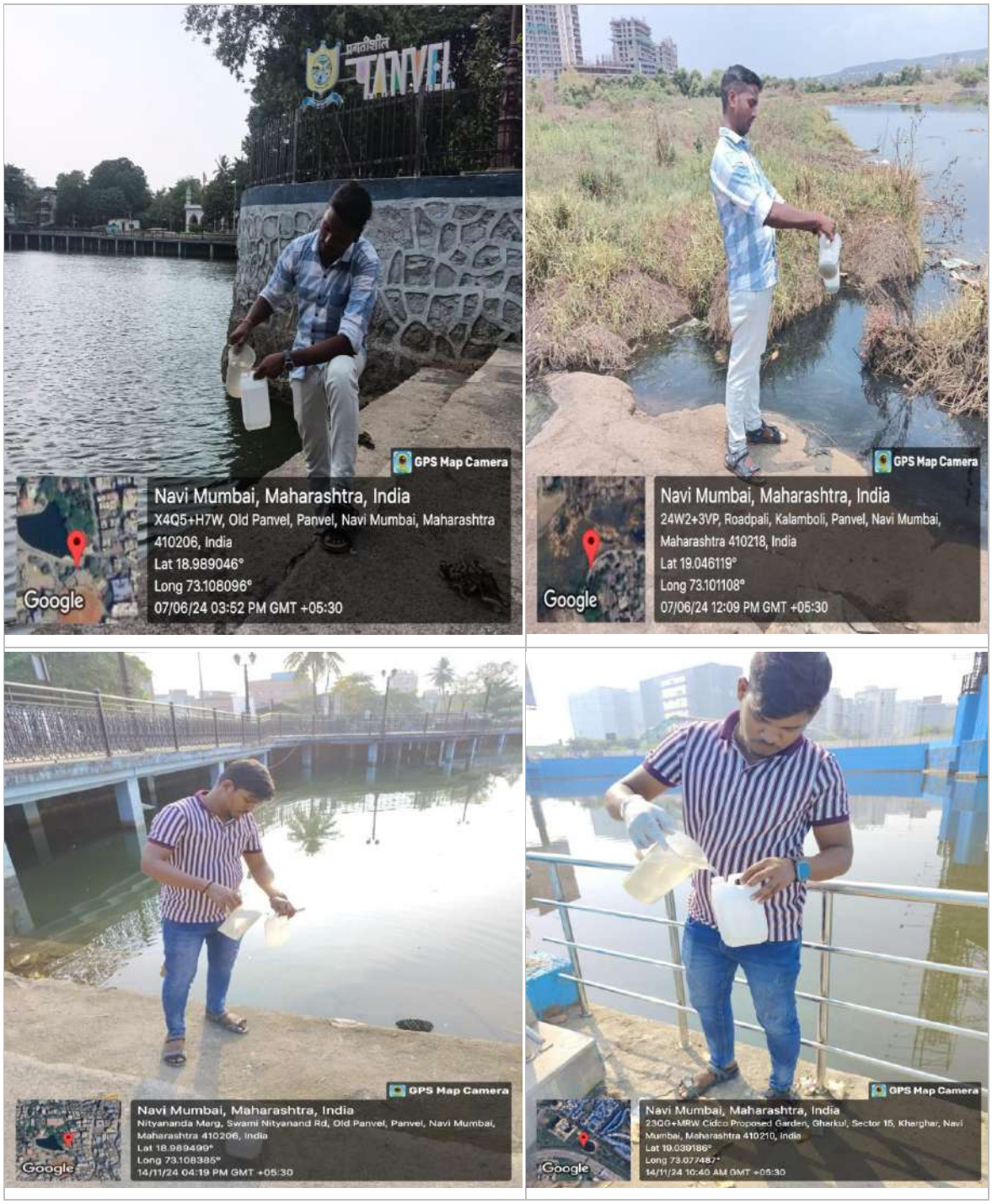


Figure 110.5: Photograph during Surface Water Sample Collection

The Results of Surface Water Samples Analysis (Post-Monsoon) is captured in Table 10.12 below.

Table 110-12: Results of Surface Water Samples Analysis (Pre-Monsoon)

Sr. No.	Parameter	Normal Range	Units	(SW1)	(SW2)	(SW3)	(SW4)
1.	pH	6.5-8.5		7.2	7.2	7.9	7.8
2.	Electrical Conductivity	<2250	µS/cm	3042	1706	103	543
3.	Taste	NS	---	Agreeable	Agreeable	Agreeable	Agreeable

4.	Color	NS	Hazen	BDL [DL=1]	BDL [DL=1]	BDL [DL=1]	BDL [DL=1]
5.	Odour	NS	---	Agreeable	Agreeable	Agreeable	Agreeable
6.	Turbidity	>5	NTU	2.9	3.4	5.6	4.9
7.	TSS	NS	mg/L	8	8	10	7
8.	TDS	<2100	mg/L	1967	1104	60	359
9.	COD	NS	mg/L	16	64	8	24
10.	BOD@ 27ºC for 3 days	NS	mg/L	4.3	8.6	2.3	2.9
11.	DO	NS	mg/L	5.4	4.8	5.8	5.6
12.	Total Hardness as CaCO3	NS	mg/L	1010	505	44	123
13.	Total Alkalinity as CaCO3	NS	mg/L	687	412	24	109
14.	Free Ammonia as N	NS	mg/L	BDL [DL=0.01]	BDL [DL=0.01]	BDL [DL=0.01]	BDL [DL=0.01]
15.	Nitrates as NO^3	NS	mg/L	1.3	0.8	1.1	0.5
16.	SAR	NS	%	8.2	7.5	1.6	5.6
17.	Total Coliform	NS	MPN/100ml	90	60	27	70

NS: Not Specified

Sr. No.	Parameter	Normal Range	Units	(SW5)	(SW6)	(SW7)	(SW8)
1.	pH	6.5-8.5		7.4	7.4	7.2	7.1
2.	Electrical Conductivity	<2250	µS/cm	1923	966	3858	3020
3.	Taste	NS	---	Agreeable	Agreeable	Agreeable	Agreeable
4.	Colour	NS	Hazen	BDL [DL=1]	BDL [DL=1]	BDL [DL=1]	BDL [DL=1]
5.	Odour	NS	---	Agreeable	Agreeable	Agreeable	Agreeable
6.	Turbidity	NS	NTU	3.5	2.9	3.4	2.1
7.	TSS	NS	mg/L	9	7	9	8
8.	TDS	<2100	mg/L	1249	624	2499	1955
9.	COD	NS	mg/L	28	20	8	16
10.	BOD@ 27oC for 3 days	NS	mg/L	3.3	2.4	BDL [DL=2]	BDL [DL=2]
11.	DO	NS	mg/L	5.6	5.8	5.9	5.8
12.	Total Hardness as CaCO3	NS	mg/ L	630	287	1333	1869
13.	Total Alkalinity as CaCO3	NS	mg/L	343	206	848	630

Sr. No.	Parameter	Normal Range	Units	(SW5)	(SW6)	(SW7)	(SW8)
14.	Free Ammonia as N	NS	mg/L	BDL [DL=0.01]	BDL [DL=0.01]	BDL [DL=0.01]	BDL [DL=0.01]
15.	Nitrates as NO3	NS	mg/L	0.3	0.5	0.3	0.4
16.	SAR	NS	%	8.4	4.1	12.2	11.4
17.	Total Coliform	NS	MPN/ 100ml	40	34	21	34

*NS: Not Specified

The Results of Surface Water Samples Analysis (Pre-Monsoon) is captured in Table 10.13 below.

Table 110-13: Results of Surface Water Samples Analysis (Post-Monsoon)

Sr. No.	Parameter	Normal Range	Units	(SWI)	(SW2)	(SW3)	(SW4)
1.	pH	6.5 -8.5		7.4	7.0	7.4	7.8
2.	Electrical Conductivity	<2250	µS/cm	1065	648	1178	268
3.	Taste	NS	---	Agreeable	Agreeable	Agreeable	Agreeable
4.	Colour	NS	Hazen	BDL [DL=1]	BDL [DL=1]	BDL [DL=1]	BDL [DL=1]
5.	Odour	NS	---	Agreeable	Agreeable	Agreeable	Agreeable
6.	Turbidity	NS	NTU	1.1	2.6	2.8	1.0
7.	TSS	NS	mg/L	7	6	10	8
8.	TDS	< 2100	mg/L	692	421	765	174
9.	COD	NS	mg/L	14	44	10	29
10.	BOD@ 27°C for 3 days	NS	mg/L	2.9	10.3	2.2	5.5
11.	DO	NS	mg/L	5.9	4.5	5.8	4.9
12.	Total Hardness as CaCO3	NS	mg/ L	529	227	159	125
13.	Total Alkalinity as CaCO3	NS	mg/L	166	103	103	89
14.	Free Ammonia as N	NS	mg/L	BDL [DL=0.01]	BDL [DL=0.01]	BDL [DL=0.01]	BDL [DL=0.01]
15.	Nitrates as NO^3	NS	mg/L	1.5	1.1	1.2	0.3
16.	SAR	By Calculation	%	4.3	4.3	3.8	3.9
17.	Total Coliform	NS	MPN/100ml	15	20	11	19

Sr. No.	Parameter	Normal Range	Units	(SW5)	(SW6)	(SW7)	(SW8)
1.	pH	6.5 -8.5		7.0	7.3	6.2	6.2
2.	Electrical Conductivity	<2250	µS/cm	566	516	2039	1405
3.	Taste	NS	---	Agreeable	Agreeable	Agreeable	Agreeable
4.	Colour	NS	Hazen	BDL [DL=1]	BDL [DL=1]	BDL [DL=1]	BDL [DL=1]
5.	Odour	NS	---	Agreeable	Agreeable	Agreeable	Agreeable
6.	Turbidity	NS	NTU	1.8	1.2	2.3	2.3
7.	TSS	NS	mg/L	6	8	9	7
8.	TDS	< 2100	mg/L	367	335	1325	913
9.	COD	NS	mg/L	15	25	15	10
10.	BOD@ 27°C for 3 days	NS	mg/L	3.3	4.1	BDL [DL=2]	BDL [DL=2]
11.	DO	NS	mg/L	5.4	5.1	5.7	5.7
12.	Total Hardness as CaCO3	NS	mg/ L	165	204	749	241
13.	Total Alkalinity as CaCO3	NS	mg/L	101	95	360	200
14.	Free Ammonia as N	NS	mg/L	BDL [DL=0.01]	BDL [DL=0.01]	BDL [DL=0.01]	BDL [DL=0.01]
15.	Nitrates as NO^3	NS	mg/L	0.5	0.6	0.6	0.30
16.	SAR	By Calculation	%	5.4	3.6	2.1	2.7
17.	Total Coliform	NS	MPN/100 ml	10	19	13	9

Inference:

The summary of inferences of the analysis of surface water samples results is as follows:

- pH of the surface water samples was observed to be in the range of 6.2 –7.9.
- The Chemical Oxygen Demand (COD) value was reported to be in the range of 8 mg/l to 64 mg/l. The highest level of COD (64 mg/l) was seen in sample SW2 (Shiv temple pond). All values obtained were within the desirable limit for COD as prescribed by CPCB.
- The maximum concentrations of Biochemical Oxygen Demand (BOD) were observed at SW2 (10.3 mg/l), whereas the minimum concentration was observed at SW7, SW8 (BDL [DL=2] mg/l); but all the values are within the permissible limits.

- Total Hardness was observed to be ranging between 44 to 1869 mg/l. The highest value of hardness was recorded at SW8 Kasrdi River & minimum value was recorded at; SW3 which is a sample collected in Roadpali Lake in the study area.
- The concentrations of Total Dissolved Solids were in the range of 60 mg/l to 2499 mg/l.
- Electrical conductivity was observed high in SW1, SW7 & SW8 location of pre monsoon monitoring readings.

10.3.2 Ground Water Analysis

The ground water samples were analyzed for parameters as specified in IS: 10500 (2012) standards, “Drinking Water- Specifications” and analyzed as per methods specified in IS: 3025, “Methods of sampling and test (physical and chemical) for water and wastewater”. The results of the analysis are presented in Table 10.14 & 10.15. The summary of results is presented in the following sub section.

Figure 110.6: Photograph during Ground Water Sample Collection

Table 110-14: Results of Ground Water Samples Analysis (Pre-Monsoon)

Sr. No	Parameters	Units	Normal Range IS10500: 2012	(GW1)	(GW2)	(GW3)	(GW4)	(GW5)
1	pH	-	6.5-8.5	7.1	7.2	7.2	7.7	7.9
2	Colour	Hazen	NS	BDL (DL=1)	BDL (DL=1)	BDL (DL=1)	BDL (DL=1)	BDL (DL=1)
3	Turbidity	NTU	NS	2.5	1.1	0.8	0.6	0.2
4	Odour	-	NS	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5	Taste	-	NS	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
6	Electrical Conductivity	mS/cm	<2250	870	1324	851	424	106
7	Total Hardness	mg/L	< 200.00	192	368	208	87	32
8	TDS	mg/L	<500	560	853	548	263	66
9	TSS	mg/L	<500	8	7	5	5	BDL (DL=2.5)
10	Chloride as	mg/L	< 250.00	46	67	63	20	12
11	Total Alkalinity as CaCO3	mg/L	< 400.00	176	356	198	71	24
12	Lead as Pb	mg/L	< 0.01	BDL [DL=0.6]	BDL [DL=0.6]	BDL [DL=0.6]	BDL [DL=0.6]	BDL [DL=0.6]
13	Arsenic as As	mg/L	< 0.01	BDL [DL=0.003]	BDL [DL=0.003]	BDL [DL=0.003]	BDL [DL=0.003]	BDL [DL=0.003]

Sr. No	Parameters	Units	Normal Range IS10500: 2012	(GW1)	(GW2)	(GW3)	(GW4)	(GW5)
14	Fluoride as F	Mg/L	< 1.00	BDL [DL=0.2]	BDL [DL=0.2]	BDL [DL=0.2]	BDL [DL=0.2]	BDL [DL=0.2]
15	Mercury as Hg	mg/L	< 0.001	BDL [DL=0.006}	BDL [DL=0.006]	BDL [DL=0.006]	BDL [DL=0.006]	BDL [DL=0.006]
16	Dissolved Oxygen	mg/L		5.6	5.2	5.5	5.5	5.3

**BDL: Below Detectable Limit, DL: Detectable Limit*

Inference:

- The below results indicate that the pH of all the ground water samples was observed to be in the range of 7.1 – 7.9.
- Total Dissolved Solids in the samples were in the range of 66 – 853 mg /l.
- Total Hardness was found to vary between 32-368 mg/l.
- Chloride was detected in the range of 12 to 67 mg/l.

Table 110-15: Results of Ground Water Samples Analysis (Post-Monsoon)

Sr. No	Parameters	Units	Normal Range	(GW1)	(GW2)	(GW3)
1	pH	-	6.5-8.5	7.4	7.1	7.5
2	Color	Hazen	NS	BDL [DL=1]	BDL [DL=1]	BDL [DL=1]
3	Turbidity	NTU	NS	0.5	0.5	0.1
4	Odour	-	NS	Agreeable	Agreeable	Agreeable
5	Taste	-	NS	Agreeable	Agreeable	Agreeable
6	Electrical Conductivity	mS/cm	<2250	635	643	288
7	Total Hardness	mg/L	< 200.00	180	192	84
8	TDS	mg/L	<500	410	418	187
9	TSS	mg/L		10	8	BDL [DL=2.5]
10	Chloride as Cl	mg/L	< 250.00	70	85	35
11	Total Alkalinity as CaCO3	mg/L	< 400.00	160	184	75
12	Lead as Pb	mg/L	< 0.01	BDL [DL=0.6]	BDL [DL=0.6]	BDL [DL=0.6]
13	Arsenic as As	mg/L	< 0.01	BDL [DL=0.003]	BDL [DL=0.003]	BDL [DL=0.003]
14	Fluoride as F	Mg/L	< 1.00	0.5	0.6	BDL [DL=0.2]
15	Mercury as Hg	mg/L	< 0.001	BDL [DL=0.006}	BDL [DL=0.006}	BDL [DL=0.006}
16	Dissolved oxygen	mg/L		5.6	5.7	5.6

Table 110-16: Results of Ground Water Samples Analysis (Pre-Monsoon)

Sr. No	Parameters	Units	Normal Range	(GW4)	(GW5)	(GW6)
1	pH	-	6.5-8.5	7.8	7.6	7.6
2	Color	Hazen	NS	BDL [DL=1]	BDL [DL=1]	BDL [DL=1]
3	Turbidity	NTU	NS	BDL [DL=0.1]	BDL [DL=0.1]	1.2
4	Odour	-	NS	Agreeable	Agreeable	Agreeable
5	Taste	-	NS	Agreeable	Agreeable	Agreeable
6	Electrical Conductivity	mS/cm	<2250	103	114	1373
7	Total Hardness	mg/L	< 200.00	47	31	282
8	TDS	mg/L	<500	67	74	890
9	TSS	mg/L		3	6	25
10	Chloride as Cl	mg/L	< 250.00	10	17	154
11	Total Alkalinity as CaCO3	mg/L	< 400.00	24	24	210
12	Lead as Pb	mg/L	< 0.01	BDL [DL=0.6]	BDL [DL=0.6]	BDL [DL=0.6]
13	Arsenic as As	mg/L	< 0.01	BDL [DL=0.003]	BDL [DL=0.003]	BDL [DL=0.003]
14	Fluoride as F	Mg/L	< 1.00	BDL [DL=0.2]	0.2	0.8
15	Mercury as Hg	mg/L	< 0.001	BDL [DL=0.006}	BDL [DL=0.006}	BDL [DL=0.006}
16	Dissolved oxygen	mg/L		5.9	5.8	5.7

**BDL: Below Detectable Limit, DL: Detectable Limit*

Inference:

- The above results indicate that the pH of all the ground water samples was observed to be in the range of 7.1-7.8.
- Total Dissolved Solids in the samples were in the range of 67 – 890 mg /l.
- Total Hardness was found to vary between 31-282 mg/l.
- Chloride was detected in the range of 10 to 154 mg/l.
- Heavy metal concentrations in all the samples were found to be well within the limits.

10.4 Soil Sample Analysis

Four soil sample were collected three from Commercial, Residential area and One from Industrial area. (Soil monitoring report attached in Annexure IV)

Table 110-17: Soil Sample Locations

Code	Site Location	Location Coordinates	Landmark	Parameters

SQ1	Shilp Chowk	19°2'50.23"N 73° 4'11.65"E	Residential Area	pH, Texture, Total Organic Matter, Sodium Adsorption Ratio (SAR), Water holding Capacity, NPK.
SQ2	Kalamboli Circle	19° 1'3.56"N 73° 6'22.49"E	Industrial Area	
SQ3	Panvel Bus Depot	18°59'31.95"N 73° 6'58.74"E	Commercial Area	
SQ4	Navade Gram Panchyat	19° 2'56.77"N 73° 6'4.42"E	Industrial Area	

Table 110-18: Soil Sample Analysis Results (Pre-Monsoon)

Location / Code / Parameter	Unit	Normal Range	SQ1	SQ2	SQ3	SQ4
pH	---	6.5-8.5	8.1	7.4	7.6	7.9
Texture	---	-	Silt Loam	Silt Loam	Silt Loam	Silt Loam
EC	µS/cm	-	355	598	341	412
WHC	%	-	54.6	53.6	43.2	50.5
SAR	(meq/kg)1/2	-	BDL [DL=1]	BDL [DL=1]	BDL [DL=1]	BDL [DL=1]
Available P	(mg/kg)	-	19	24	54	32
Available K	(mg/kg)	-	2	9	1	3
Total Organic Matter	%	< 10	0.4	1.1	1.1	1.2
Total nitrogen N	(mg/kg)	-	343	871	357	343

Table 110-19: Soil Sample Analysis Results (Post-Monsoon)

Location / Code / Parameter	Unit	Normal Range	SQ1	SQ2	SQ3	SQ4
pH	-	6.5-8.5	7.8	7.5	7.7	**7.5**
EC	µS/cm	-	141	928	191	190
WHC	%	-	51.2	49.2	42.1	46.9
Organic Matter	%	< 10	0.3	1.5	0.7	0.8
SAR	(meq/kg)1/2	-	BDL [DL=1]	BDL [DL=1]	BDL [DL=1]	BDL [DL=1]
Available N	(mg/kg)	-	328	857	286	343
Available P	(mg/kg)	-	12	72	16	68
Available K	(mg/kg)	-	3	25	53	37
Texture	-	-	Silt Loam	Silt Loam	Silt Loam	Silt Loam

Inference:

- pH of the soil in the study area ranged between 7.4- 8.1. The “Moderately alkaline" soil was observed at first location (SQ1). In other locations, it varied from "Neutral” to “Slightly alkaline”.
- The concentration of Phosphate was estimated to be between 12-72 mg/kg. The highest concentration can be observed at location SQ2, while the lowest concentration can be observed at location SQ1 during the monitoring period. Here it is observed that Phosphate concentration is ‘High’ as per chemical classification of soil quality.

- The large variation is observed in the values due to their use or application and also due to the variation in the use of fertilizers.

Figure 110.7: Photograph during Soil Sample Collection

11. Conclusion and Recommendation

Panvel City has emerged as a preferred residential destination among the neighboring cities of the Mumbai Metropolitan Region (MMR). The city's population is expanding rapidly due to urbanization, industrialization, and the development of the upcoming Navi Mumbai International Airport. Recognizing this growth potential, several reputed developers have launched new housing projects in and around Panvel, which is expected to exert additional pressure on municipal infrastructure and natural resources, including land, water, and air.

To ensure sustainable urban development, the Panvel Municipal Corporation (PMC) must enhance the quality of life for residents while addressing key environmental concerns. Issues such as water scarcity, pollution of local water bodies, increased waste generation, and deteriorating air quality require immediate attention. The local administration and government have already initiated measures to promote sustainability, but further strategic interventions are necessary.

To manage the rising housing demand, increasing population, and growing ward-wise population density, a comprehensive urban development plan must be formulated, incorporating environmental sustainability and resource conservation measures.

Water supply and Wastewater management

- Access to safe and adequate drinking water is essential. The availability of water in Deharang Dam plays a crucial role in determining Panvel's water supply. The increasing population of Panvel City has put additional pressure on its water resources.
- At present, 245 MLD of water is available daily, with the remaining sourced from other water bodies. PMC manages the city's water supply through four primary sources: Deharang Dam, MIDC, CIDCO, and Patalganga MJP. During summer, certain villages near the municipal limits experience water shortages. To address this issue, PMC has constructed a borewell in affected hamlets to supplement water demand.
- The CIDCO-led Kondhane Dam Project aims to meet the rising drinking water requirements of CIDCO nodes and the Navi Mumbai International Airport region, covering areas such as Kharghar, Kamothe, Kalamboli, Taloja, Karanjade, Kalundre, Dronagari, Ulwe, and Pushpak.

- A significant concern in PMC is the reported pollution of the Taloja and Kasardi Rivers. Since these rivers are not used for drinking purposes, MPCB does not currently monitor their water quality. However, pollution in these water bodies has severe environmental and ecological impacts. PMC should advocate for MPCB to conduct regular water quality monitoring and implement necessary remediation measures if contamination is detected.
- PMC must adopt strategic measures to ensure sustainable water supply, considering future water demand projections.
- Strict regulations should be enforced to prevent the discharge of industrial effluents into surface water bodies.
- Points of sewage disposal into nallahs must be identified, and localized treatment systems should be installed before discharge. A suitable technology must be selected and implemented to improve the water quality of nallahs.
- CETPs should be regularly assessed for their efficiency, and where feasible, their capacity should be enhanced. Routine maintenance and cleaning of CETP unit operations are necessary.
- Regular cleaning and maintenance of all water bodies, including rivers, lakes, and ponds, should be conducted using appropriate equipment.
- Given the presence of industrial estates in and around Panvel, an environmental management framework must be developed and effectively implemented.

Air Quality improvement

- The COVID- 19 scenario-imposed restrictions, which invariably resulted in improved AQI in Panvel. With restrictions on business and anthropogenic activities becoming relaxed, the AQI has deteriorated. All four wards of PMC reported elevated concentration of PM10 and PM2.5 which were found to exceed the standards provided by CPCB. Increased traffic along the Mumbai-Satara Highway and the Kalamboli Flyover Bridge pass could potentially be one of the prime reasons for elevated concentrations of PM10 and PM 2.5. Along with the increase in traffic, presence of cement industries can also be attributed for the elevated concentration of air pollutants.
- It is recommended that PMC should set up three real-time monitoring stations in densely populated areas. According to the Primary ambient air monitoring study conducted, increased traffic density around Kalamboli Circle can be attributed for the increased

concentrations. Therefore, Kalamboli Circle should ideally be one of the main points to set up the monitoring stations.

- Increased urban mobility post Covid restrictions has significantly caused the presence of increased concentration of air pollutants. The majority of the population, it has been found, commutes in single vehicles. Residents of the city should have access to a subsidized low-cost local public transit system to help reduce automotive pollution.
- Encouragement to the commuters to use electric vehicles should be initiated by PMC. Electric buses should also be implemented as a mean of public transportation. PMC is recommended to implement charging infrastructures across all the residential societies.
- CNG based public transport vehicles - The change in fuel type in public vehicles (buses, taxis, rickshaws) from conventional fuels like petrol, diesel to CNG can potentially result in reduction of nitrous oxide by 40%, hydrocarbons by 90%, CO by 80%. The noise level of compressed natural gas (CNG) engine is also low as compared to conventional diesel-based engine.
- Improvement of road quality and introduction of one-way routes to regulate the traffic is highly recommended to help reduce the air pollution of the city.
- In order to help minimize automobile pollution, PMC should launch its own low-cost, heavily subsidized municipal transportation system. This system should primarily consist of electric buses, and it should also incorporate renewable energy sources to cut down on CO2 emissions.
- Panvel is a center for industry, so the city's vegetation is less dense. We can significantly lower PM10 levels by increasing the city's vegetation, or the area along the highways.
- The air pollution mitigation measures for domestic and commercial sector are, to use of Piped Natural Gas (PNG)as effective alternative for firewood and LPG for cooking purposes. Enhance the production and use of biogas and bio-methanation as sources of fuel for cooking.

Control and mitigation measures for noise pollution

- Noise levels were measured using a noise level meter across the city's key areas, which includes the silent zone, industrial area, commercial area, and residential area. The data was collected for 24 hours. Noise levels were found to be exceeding the CPCB standards

falling in the residential, commercial, and industrial zones. Noise levels reported to exceed the standard of comparison primarily due to the increased human activity.

- The Shilp chowk region was reported to have the highest average noise intensity. It might be as a result of its proximity to the highway and the railway station. Panvel ST Stand is close to the commercial district, which contributes to increased noise levels.
- To reduce traffic and noise pollution, encourage people to use public transport instead of driving their own automobile. Create programs that raise awareness and educate the public about the effects of noise pollution.
- Plant trees; it has been proven that trees are good at reducing noise levels in metropolitan areas Plant trees along busy highways along with at residential locations. Additionally, trees enhance air quality and provide other aesthetic benefits.

Solid waste Management

- The PMC area produces around 470.80 TPD of MSW. PMC provided collection and transportation services, and Panvel Municipal Corporation paid CIDCO for solid waste management services such as processing and disposal.
- According to the daily weighted report at the MSW plant, around 56% of the total municipal wastes constitute of wet waste. Approximately 40% is dry waste and approximately 1% constitutes hazardous waste. Rest around 3% is sanitary waste.
- PMC through CIDCO has been processing Approximate 100% dry waste and 100% wet waste since January 2021.
- Domestic and sanitary hazardous garbage noted to be used entirely by Mumbai garbage Management, RAMKY Group.
- Initially the corporation should understand the nature of solid waste of the city and develop a DPR with a long-term vision to mitigate the issues pertaining to solid waste management.
- PMC has sanitary landfill and leachate treatment plant available to treat the solid wastes which are generated. It is use for effective collection and segregation of municipal waste from households.
- Incorporate waste to energy method for effective disposal of solid waste such as bio methanation plant, biomass gasifier, pyrolysis technique etc.
- Adjacent to the Taloja SWM site as well as the nearby to the MIDC region notified, approval for the construction of new homes or housing projects should not be encouraged.

- There are 63 total gardens inside the corporation's boundaries. Fifty-three of which are cleaned and maintained by PMC staff, and the remaining gardens are managed by CIDCO.

12. Initiative by Panvel Municipal Corporation- 2024-2025

➢ **Newspaper cuttings of initiatives taken in various organization for Environmental Awareness**

दैनिक महाराष्ट्र सम्राट

पनवेल महापालिकेच्यावतीने माझी वसुंधराअंतर्गत

लोकमान्य टिळक इन्स्टिट्युट ऑफ फार्मसी महाविद्यालयामध्ये व्याख्यानाचे आयोजन

पनवेल – माझी वसुंधरा अभियान ४.० अंतर्गत पर्यावरण संवर्धन व संरक्षण याचे महत्व शालेय, महाविद्यालयीन स्तरावर विद्यार्थ्यांमध्ये प्रत्यक्ष कृतीद्वारे बिंबवण्यासाठी विविध कार्यक्रम पनवेल महानगरपालिकेच्यावतीने राबविण्यात येत आहे. या अंतर्गत उपायुक्त डॉ. वैभव विधाते यांच्या मार्गदर्शनाखाली आज लोकमान्य टिळक इन्स्टिट्युट ऑफ फार्मसी खारघर येथे महापालिकेच्यावतीने 'पर्यावरणपूरक जीवनशैली' विषयांवरती व्याख्यानाचे आयोजन करण्यात आले.

यावेळी फिजीओथेरपी महाविद्यालयाचे प्राचार्य डॉ.प्रांजल ग्रोव्हर, फार्मसी महाविद्यालयाचे प्राचार्य डॉ. श्रुतिका पाटील, महापालिका पर्यावरण विभाग प्रमुख मनोज चव्हाण, कॅम्पस डायरेक्टर डॉ.प्रणीती टिळक व सहाय्यक प्राध्यापक स्मिता वारघडे, पौर्णिमा जांगळे, वर्षा बडवे, महापालिका अधिकारी व कर्मचारी उपस्थित होते.

यावेळी महाविद्यालयाच्या विद्यार्थ्यांना महापालिका माझी वसुंधरा अंतर्गत करत असलेल्या विविध उपक्रमांची माहिती देण्यात आली. यामध्ये विद्यार्थ्यांनी झाडे दत्तक घेऊन त्यांना वाढविण्याविषयी सांगण्यात आले. तसेच 'पर्यावरणपूरक जीवनशैली' या विषयावरती व्याख्यानाचे आयोजन करण्यात आले होते. याबरोबरच पर्यावरण संवर्धनावर आधारित व्हिडीओ विद्यार्थ्यांना दाखविण्यात आले. तसेच माझी वसुंधराची प्रतिज्ञा घेण्यात आली.

दैनिक महाराष्ट्र सम्राट

पनवेल महापालिका व विसपुते महाविद्यालयाच्या संयुक्त विद्यमानातून टाकाऊपासून टिकाऊ स्पर्धा

पनवेल : पनवेल महानगरपालिकेच्या माझी वसुंधरा ४.० उपक्रमांतर्गत महापालिका व आदर्श शिक्षण प्रसारक मंडळ संचलित बापूसाहेब डी.डी. विसपुते कॉलेज ऑफ एज्यूकेशन, नवीन पनवेल यांच्या संयुक्त विद्यमानातून नुकतेच टाकाऊ पासून टिकाऊ स्पर्धेचे आयोजन करण्यात आले.

उपायुक्त डॉ. वैभव विधाते यांच्या मार्गदर्शनाखाली झालेल्या कार्यक्रमास बापूसाहेब डी. डी. विसपुते कॉलेज ऑफ एज्युकेशनच्या प्राचार्या ॲड. डॉ. सीमा कांबळे, जनसंपर्क अधिकारी वर्षा कुलकर्णी, पर्यावरण विभागाचे रजनीकांत पट्टण, महाविद्यालयाचे शिक्षक व विद्यार्थी उपस्थित होते.

यावेळी बोलताना प्राचार्या डॉ. सीमा कांबळे मॅडम यांनी पर्यावरणाचे संवर्धन व संरक्षण या विषयावरती माहिती देत आजपर्यंत महाविद्यालयाच्या माध्यमातून केलेल्या पर्यावरण विषयक कार्याची माहिती दिली. तसेच विद्यार्थ्यांनी कल्पना शक्तीच्या जोरावरती तयार केलेल्या टाकाऊ पासून टिकाऊ वस्तूंचे कौतुक केले.

या कार्यक्रमाचे सूत्रसंचालन संस्कृती डुबे यांनी केले. या स्पर्धेचे परिक्षण प्रा. डॉ. प्रितेश वाडे व प्रा. विनायक लोहार यांनी केले. या स्पर्धेसाठी प्रा. नेहा म्हात्रे व प्रा. मनीषा सुतार यांनी सहकार्य केले. यावेळी सुमारे १०० विद्यार्थ्यांनी रोजच्या वापरातील टाकाऊ प्लास्टिक बाटल्या, वस्तू, फळांसोबत येणारी आवरणे वापरून सुंदर अशा वस्तू तयार केल्या होत्या.

दैनिक महाराष्ट्र सम्राट

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ठाणे, शुक्रवार, दि. १ मार्च २०२४ वर्ष : १२, अंक : ३०३, पाने : ४, किंमत : २ रुपये Maharashtra Samrat Maharashtra Samrat dainikmahasamrat@gmail.com Reg. No. THC/58/2024-2026
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पर्यावरण सेवा योजनेंतर्गत चांगू काना ठाकूर माध्यमिक व उच्च माध्यमिक विद्यालयामध्ये महापालिकेच्यावतीने व्याख्यान व निबंध स्पर्धेचे आयोजन

पनवेल – माझी वसुंधरा अभियान ४.० अंतर्गत पर्यावरण संवर्धन व संरक्षण याचे महत्व शालेय स्तरावर बाल वयात विद्यार्थ्यांमध्ये प्रत्यक्ष कृतीद्वारे बिंबवण्यासाठी शासन निर्णयाद्वारे माध्यमिक व उच्च माध्यमिक शाळांमध्ये पर्यावरण सेवा योजना पनवेल महानगरपालिकेच्यावतीने राबविण्यात येत आहे. या अंतर्गत आयुक्त श्री.गणेश देशमुख यांच्या मार्गदर्शनाखाली दिनांक २८ फेब्रुवारी रोजी चांगू काना ठाकूर माध्यमिक व उच्च माध्यमिक विद्यालयामध्ये महापालिकेच्यावतीने 'पाणी' या विषयावरती व्याख्यान व निबंध स्पर्धेचे आयोजन करण्यात आले.

माझी वसुंधरा अभियान ४.० अंतर्गत पर्यावरणाचे महत्व शालेय विद्यार्थ्यांना समजावे यासाठी पर्यावरण सेवा योजना महापालिकेच्यावतीने पालिका कार्यक्षेत्रातील २५ माध्यमिक विद्यालयांमध्ये राबविण्यात येत आहे. या योजनेची माहिती देण्यासाठी २५ माध्यमिक शाळांच्या प्रतिनिधींची बैठक उपायुक्त डॉ. वैभव विधाते यांच्या अध्यक्षतेखाली महापालिका मुख्यालयात घेण्यात आली होती. या पर्यावरण सेवा योजनांतर्गत आकाश, जल, वायू, भूमी, अग्नि या माझी वसुंधरा अभियानातील महत्वाच्या घटकांनुसार कृती कार्यक्रम, शिबिरे,व्याख्याने, वक्तृत्व स्पर्धा, पोस्टर स्पर्धा, वृक्षारोपण, प्रश्नमंजूषांचे आयोजन विद्यालयांमध्ये करण्यात येत आहेत.

यावेळी चांगू काना ठाकूर विद्यालयामध्ये पर्यावरण सेवा योजनेची माहिती विद्यार्थ्यांना देण्यात आली. माझी वसुंधरा अंतर्गत 'पाणी' या विषयांतर्गत पाण्याचे संवर्धन यावरती व्याख्यान देण्यात आले. तसेच 'पृथ्वीवरील माती' याविषयावरती निबंध लेखन स्पर्धा घेण्यात आली. तसेच विद्यार्थ्यांनी झाडे दत्तक घेऊन त्यांना वाढविण्याविषयी सांगण्यात आले. याबरोबरच पर्यावरण संवर्धनावर आधारित व्हिडीओ विद्यार्थ्यांना दाखविण्यात आले. तसेच पर्यावरण वाचविण्याची प्रतिज्ञा घेण्यात आली.

यावेळी मुख्याध्यापक चांगू काना ठाकूर इंग्रजी माध्यमिक विभागाचे मुख्याध्यापक संतोष चव्हाण, चांगू काना ठाकूर उच्च माध्यमिक विभाग प्राचार्य प्रशांत मोरे, चांगू काना ठाकूर उच्च माध्यमिक विभाग मुख्याध्यापक कैलास सत्रे, चांगू काना ठाकूर मराठी प्राथमिक विभाग मुख्याध्यापक सुभाष मानकर, चांगू काना ठाकूर उच्च माध्यमिक विभाग पर्यवेक्षक अजित सोनवणे , चांगू काना ठाकूर उच्च माध्यमिक विभाग पर्यवेक्षक कैलास म्हात्रे , पर्यावरण सेवा योजना समन्वयक हरिश्चंद्र ठाकूर तसेच इयत्ता ६ वी ते ८ वीचे विद्यार्थी मोठ्या संख्येने उपस्थित होते. याच पध्दतीने महापालिकेच्यावतीने विविध शाळांमध्ये कार्यक्रम राबविण्यात येणार आहे.

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१. कुमारी अनन्या अजय पवेर	प्रथम क्रमांक
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३.कुमारी दिव्या देविदास मुळीक	तृतीय क्रमांक

इयत्ता सातवी गट

१.कुमार वेदांत नितीन शिंदे	प्रथम क्रमांक
२.कुमारी नंदिनी उमेश साळुंखे	द्वितीय क्रमांक
३.कुमार वरद नवनाथ गावडे	तृतीय क्रमांक

इयत्ता आठवी गट

१. कुमारी भक्ती संतोष पाटील	प्रथम क्रमांक
२. कुमारी माधवी दगडू काबुगडे	द्वितीय क्रमांक
३. कुमारी अर्पिता प्रदिप टेमघिर	तृतीय क्रमांक

ठाणे, रविवार दि. ३१ मार्च २०२४ वर्ष : १२, अंक : ३२६, पाने : ४, किंमत : २ रुपये Maharashtra Samrat Maharashtra Samrat dainikmahasamrat@gmail.com Reg. No. THC/58/2024-2026
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पनवेल : पनवेल महानगरपालिकेच्यावतीने माझी वसुंधरा अभियान ४.० व स्वच्छ भारत अभियान अंतर्गत पर्यावरण संवर्धन व संरक्षण या विषयावरती सातत्याने शालेय , महाविद्यालयीन स्तरावरती विविध कार्यक्रमांचे आयोजन करण्यात येत आहे. पर्यावरणाचे महत्व विद्यार्थ्यांमध्ये प्रत्यक्ष कृतीद्वारे बिंबवण्यासाठी विविध कार्यक्रम पनवेल महानगरपालिकेच्यावतीने राबविण्यात येत आहे. या अंतर्गत उपायुक्त डॉ. वैभव विधाते यांच्या मार्गदर्शनाखाली नुकतेच पिल्लई कॉलेज ऑफ इंजिनिअरिंग येथे महापालिकेच्यावतीने इको ब्रीक स्पर्धेचे आयोजन करण्यात आले.

यावेळी पिल्लई कॉलेज ऑफ इंजिनिअरींगचे प्राचार्य डॉ. संदीप जोशी महापालिका पर्यावरण विभाग प्रमुख मनोज चव्हाण, घनकचरा व स्वच्छता विभागाचे विभाग प्रमुख अनिल कोकरे, अप्लाइड सायन्स विभाग प्रमुख डॉ. अरुण पिल्लई, कार्यक्रम समन्वयक डॉ. बिश्वजीत पांडा, एनएसएस समन्वयक अर्चना इंगोले, प्राध्यापक अक्षय जाधव,नेचर क्लबचे सोनाली निकम, डॉ. सुरभी तसेच परीक्षक डॉ. शबाब रिझवी, एमी जोशी, प्राध्यापक दुर्गाराव व विद्यार्थी मोठ्या संख्येने उपस्थित होते.

या इको ब्रीक स्पर्धेत, वापरलेल्या प्लास्टिक बाटल्यामध्ये वापरलेल्या प्लास्टिक पिशव्या भरून त्यापासून विविध वस्तू, पुतळे असे दहा मॉडेल्स तयार करण्यात आले होते. नागरिकांनी प्लास्टिकचा पुर्नवापर करावा असा संदेश या स्पर्धेतून देण्यात आला.यावेळी महाविद्यालयाच्या विद्यार्थ्यांना महापालिका माझी वसुंधरा अंतर्गत करत असलेल्या विविध उपक्रमांची माहिती देण्यात आली. यामध्ये विद्यार्थ्यांनी झाडे दत्तक घेऊन त्यांना वाढविण्याविषयी सांगण्यात आले. तसेच माझी वसुंधराची प्रतिज्ञा घेण्यात आली. या स्पर्धेला विद्यार्थ्यांचा मोठा प्रतिसाद मिळाला.या स्पर्धेमध्ये सुमारे ७००विद्यार्थ्यांनी सहभाग घेतला .

ठाणे, शुक्रवार दि. २२ मार्च २०२४ वर्ष : १२, अंक : ३२४, पाने : ४, किंमत : २ रुपये Maharashtra Samrat Maharashtra Samrat dainikmahasamrat@gmail.com Reg. No. THC/556/2024-2026

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➢ Facebook posts of measures and initiatives taken for Environmental Awareness

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हवा प्रदूषण नियंत्राणाच्या अनुषंगाने बेकरी, हॉटेल्स,रेस्टॉरंट, ढाबा,खाद्यपदार्थ विक्री केंद्रामध्ये तंदूरसाठी स्वच्छ व पर्यावरणपूरक इंधनाचा वापर अनिवार्य करणेबाबत पनवेल मनपाने आत्तापर्यंत 151 आस्थापनांना नोटीसा दिल्याची माहिती उपायुक्त डॉ. वैभव विधाते यांनी दिली.

मा. उच्च न्यायालय, मुंबई यांनी एमएमआर विभागात वाढत्या प्रदूषणावर नियंत्रण आणण्यासाठी स्वतः जनहित याचिका दाखल करून प्रतिबंधात्मक उपाययोजना राबविण्याबाबत आदेश दिले आहेत. त्या आदेशानुसार महानगरपालिका आयुक्त मंगेश चितळे यांच्या मार्गदर्शनात हवा प्रदूषण संदर्भात प्रतिबंधात्मक उपाय योजना राबविण्यासाठी जोरदार मोहीम सुरू आहे.

या मोहिमेअंतर्गत पनवेल महानगरपालिका कार्यक्षेत्रातील प्रदूषण निर्माण करणाऱ्या, कोळशाचा वापर करणाऱ्या हॉटेल्स, रेस्टारंट, ढाबा, बेकरी , खाद्यपदार्थ विक्री करणाऱ्या 151आस्थापनांना महापालिकेने नोटीस पाठवली आहे. हॉटेल व बेकरीमधील भट्ट्यांसाठी यापुढे इलेक्ट्रिक आणि सीएनजीवर चालणाऱ्या शेगड्यांचा वापर करावा लागणार आहे. नोटीसद्वारे संबधितास सूचित करण्यात आले आहे की त्यांनी बेकरी व तंदुरसाठी स्वच्छ व पर्यावरणपुरक इंधन जसे की सीएनजी, एलपीजी किंवा विद्युत असे इंधन पर्याय वापरावेत. इंधन म्हणून कोळसा किंवा लाकडाचा वापर करण्यास सक्त मनाई आहे. धोकादायक वायू उर्त्सजन कमी करण्यासाठी योग्य वायू प्रदूषण नियंत्रण उपकरणे (स्क्रबर, आधुनिक चिमणी) बसविणे आवश्यक आहे. तसेच वायु प्रदूषणाचे उत्सर्जन रोखण्यासाठी तंदूर उपकरणांची नियमित देखभाल व दुरुस्ती करणे आवश्यक आहे.

महापालिका हद्दीतील 511 हॉटेल्स, रेस्टारंट, ढाबा, बेकरी , खाद्यपदार्थ विक्री करणाऱ्या आस्थापनापैकी 359 आस्थापना विद्युत व गॅसचा वापर करत आहेत. तर 151 आस्थापना या कोळसा व लाकूडचा वापर करत आहेत.या आस्थापनांना या नोटीस देण्यात आल्या.

या सर्व उपाय योजनांची अंमलबजावणी केल्याबाबत महापालिकेला तातडीने कळवण्याच्या सूचना संबंधित बेकरी व हॉटेल्सना देण्यात आल्या आहेत.

#PanvelMunicipalCorporation #Panvel
#pollution #environment #climatechange #nature #climatecrisis #sustainable #green
#pollutionfree

See translation

पनवेल महानगरपालिका
20 February at 17:19 ·

Seminar on 'E-West' in Pillai College of Engineering under my Vasundhara

Various activities are being implemented by Panvel Municipal Corporation to implement the importance of environmental conservation and protection among students at college and school levels through activity in college and school levels. Under the guidance of Commissioner Mangesh Chitale, a seminar was organized on Monday 17th February at Pillai College of Engineering on behalf of the Municipal Corporation.

My earth campaign 5. In order to understand the importance of environment to school students under 0, "Environment Hour" initiative, Deputy Commissioner Dr. According to the instructions of Vaibhav Vidhate, it is being implemented in colleges and schools in the municipal corporation working area. Under this, activity programs, camps, lectures, speech competition, poster competition, tree plantation, quiz, seminars, various games are being organized according to the important factors of my Vasundhara campaign like sky, water, air, land, fire

Under this Pillai College of Engineering students should create awareness about electronic waste here in 'E West', which is electronic waste, guidance was guided on measures to be taken right now considering the increasing problem of electronic waste in future. Also, poster competitions of students were held this time. Students spontaneously participated in the discussion and poster competition held this time.

Also this time students took my oath of earth. College Principal S for this program. M Joshi, NSS Program Officer Akshay Jadhav, Archana Ingole got cooperation.

#PanvelMunicipalCorporation #panvel
#Ewaste #postercompetition #pillaicollege #majhivasundhara #students
#majhivasundharaabhiyan5

· See original · Rate this translation

पनवेल महानगरपालिका
21 February at 18:28 ·

Youth Environment Conference organized by the Municipal Corporation at Pillai College of Arts, Commerce and Science

Youth Environmental Conference was organized on 21 February at Pillai College of Arts, Commerce and Science College College level to implement the importance of Environmental Conservation and Protection among students at school, college level through direct action.

Deputy Commissioner Dr. to explain the importance of environment to school students and college students under my Vasundhara Abhiyan 5.0 Various activities are being implemented as per the instructions of Vaibhav Vidhate. According to the important factors of the Maji Vasundhara campaign, sky, water, air, land, fire, youth environment conference was organized on 21 February at Pillai College of Arts and Commerce, Science College. This time a lecture was organized to create awareness among students about environment. Along with that, a debate competition was organized on the topic of 'Environmental Problems'.

Manoj Chavan, head of Environment Department of Municipal Corporation was present at this program. Principal Dr at this program Gajanan Wader, Deputy Principal Deepika Sharma, Coordinator Dr. Aarti Sukheja, BCom Coordinator Dr. Kiran Deshmukh, head of B.Com Department Creative Literature Association Kanchan Patil got cooperation.

#PanvelMunicipalCorporation #Panvel
#majhivasundharaabhiyan5 #college
#majhivasundhara #पर्यावरणसेवायोजना #पर्यावरण
#युवापर्यावरण #pillaicollege

See original · Rate this translation

- **Cleanliness drives**


MAHATMA GANDHI
MGM INSTITUTE OF HEALTH
UNIVERSITY


सेंटर
॥ श्री स्वामी समर्थ ॥
Decimal DMS
Latitude 40.726767 40°43'36" N


Before
After
Before
After

Annexure I

Lists of Flora and Fauna

List of Amphibians

Sr. No.	Common Name	Scientific Name
1	Common Indian Toad	Duttaphrynus melanostictus
2	Common Tree Frog	Polypedates maculatus
3	Fungoid Frog	Hydrophylax bahuvistara
4	Bush frog sps.	Raorchestes sps.
5	Indian Bullfrog	Hoplobatrachus tigerinus
6	Cricket frog	Minervarya sps.
7	Common Skittering Frog	Euphlyctis cyanophlyctis

Source: www.indiabiodiversity.org

List of Snakes

Sr. No.	Common Name	Scientific Name
1	Indian Spectacled Cobra	Naja naja
2	Russell's Viper	Daboia russelii
3	Saw-scaled Viper	Echis crinatus
4	Common Krait	Bungarus caeruleus
5	Checkered Keelback	Xenochrophis piscator
6	Buff-striped Keelback	Amphiesma stolatum
7	Rat Snake	Ptyas mucosa
8	Common Wolf Snake	Lycodon aulicus
9	Travancore Wolf Snake	Lycodon travancoricus
10	Common Vine Snake	Ahaetulla nasuta
11	Common Cat Snake	Boiga trigonata
12	Indian Rock Python	Python molurus
13	Common Sand Boa	Eryx conicus
14	Red Sand Boa	Eryx jhonii
15	Montane Trinket	Coelognathus helena

Source: www.indiabiodiversity.org

List of Butterflies

Sr. No.	Common Names	Scientific Name
1	Gram Blue	Euchrysops cnejus
2	Tiny Grass Blue	Zizula hylax
3	Grass Jewel	Chilades trochylus
4	Red Pierrot	Talicada nyseus
5	Common Cerulean	Jamides celeno
6	Forget-me-not	Catochrysops Strabo
7	Dark Grass Blue	Zizeeria karsandra

8	Common Lineblue	Prosotas nora
9	Tailless Lineblue	Prosotas dubiosa
10	Pointed Cilliate Blue	Anthene lycaenina
11	Slate Flash	Rapala manea
12	Common Silverline	Spindasis vulcanus
13	Peacock Royal	Tajuria cippus
14	Apefly	Spalgis epius
15	Common Small Flat	Sarangesa dasahara
16	Grass Demon	Udaspes folus
17	Rice Swift	Borbo cinnara
18	Blank Swift	Caltoris kumara
19	Spotted Small Flat	Sarangesa purendra
20	Brown Awl	Badamia exclamationis
21	Common Baron	Euthalia aconthea
22	Gaudy Baron	Euthalia lubentina
23	Baronet	Symphaedra nais
24	Common Crow	Euploea core
25	Plain Tiger	Danaus chrysippus
26	Striped Tiger	Danaus chrysippus
27	Blue Tiger	Tirumala limniace
28	Glassy Tiger	Parantica aglea
29	Great Eggfly	Hypolimnas bolina
30	Danid Eggfly	Hypolimnas misippus
31	Blue Oakleaf	Kallima horsfieldi
32	Common Eveningbrown	Kallima horsfieldi
33	Common Bushbrown	Mycalesis perseus
34	Chocolate Pansy	Junonia iphita
35	Peacock Pasy	Junonia almanac
36	Blue Pansy	Junonia orithya
37	Commander	Moduza Procris
38	Tawny Rajah	Charaxes Bernardus
39	Black Rajah	Charaxes solon
40	Common Nawab	Polyura athamas
41	Common Sailor	Neptis hylas
42	Short-banded Sailor	Neptis hylas
43	Tawny Coster	Acraea terpsicore
44	Common Leopard	Phalanta phalantha
45	Lemon Pansy	Junonia lemonias
46	Common Jezebel	Delias eucharis
47	Indian Wanderer	Pareronia hippie
48	Common Mormon	Papilio polytes
49	Blue Mormon	Papilio polymnestor
50	Common Rose	Pachliopta aristolochiae

Source: www.indiabiodiversity.org

List of Birds

Sr. No.	Common Names	Scientific Name
1	Purple Heron	Ardea purpurea
2	Little Grebe	Tachybaptus ruficollis
3	Little Cormorant	Phalacrocorax niger
4	Eastern Cattle Egret	Bubulcus coromandus
5	Intermediate Egret	Egretta intermedia
6	Great Egret	Egretta alba
7	Little Egret	Egretta garzetta
8	Grey Heron	Ardea cinerea
9	Indian Pond Heron	Ardeola grayii
10	Western Reef Egret	Egretta gularis
11	Black-crowned Night-heron	Nycticorax nectivore
12	Striated Heron	Butorides striatus
13	Black Bittern	Dupetor flavicollis
14	Chestnut Bittern	Ixobrychus cinnamomeus
15	Painted Stork	Mycteria leucocephala
16	Asian Openbill	Anastomus oscitans
17	Woolly-necked Stork	Ciconia episcopus
18	Oriental White Ibis	Threskiornis melanocephalus
19	Eurasian Spoonbill	Platalea leucorodia
20	Glossy Ibis	Plegadis falcinellus
21	Indian Black Ibis	Pseudibis papillosa
22	Ruddy Shelduck	Tadorna ferruginea
23	Northern Pintail	Anas acuta
24	Greylag Goose	Anser answer
25	Common Teal	Anas crecca
26	Spot-billed Duck	Anas poecilorhyncha
27	Garganey	Anas querquedula
28	Gadwall	Anas Strepera
29	Eurasian Wigeon	Anas Penelope
30	Northern Shoveller	Anas clypeata
31	Comb Duck	Sarkidiornis melanotos
32	Lesser Whistling duck	Lesser Whistling duck
33	Black-shouldered Kite	Elanus caeruleus
34	Black Kite	Milvus migrans
35	Brahminy Kite	Haliastur indus
36	Black-eared Kite	Milvus Indus lineatus
37	Shikra	Accipiter badius
38	White-eyed Buzzard	Butastur teesa
39	Oriental Honeybuzzard	Pernis ptylorhynchus
40	Common Buzzard	Buteo Honey buzzard
41	Montagu's Harrier	Circus pygargus
42	Palid Harrier	Circus macrourus
43	Western Marsh Harrier	Circus aeruginosus
44	Crested Serpent eagle	Spilornis cheela

45	Short-toed Snake eagle	Circaetus gallicus
46	Booted Eagle	Hieraaetus pennatus
47	Black Eagle	Ictinaetus malayensis
48	Greater Spotted Eagle	Aquila clanga
49	Indian Spotted Eagle	Aquila pomarina
50	Common Kestrel	Falco tinnunculus

Source: www.indiabiodiversity.org

List of Trees found in Panvel

Sr. No.	Common Names	Scientific Name
1	Gunj	Abrus precatorius
2	Australian acacia	Acacia auriculiformis
3	Khair	Acacia catechu
4	Babul	Acacia nilotica
5	Cat Tail	Acalypha hispida
6	Harit-manjari	Acalypha indica
7	Agada	Achyranthes aspera
8	Ratan Gunj	Adenanthera pavonina
9	Adulsa	Adhatoda vasica
10	Gorakh Chinch/Baobab	Adonsonia digitate
11	Bael	Aegle marmelos
12	Goat Weed	Ageratum conyzoides
13	Shirish	Albizia lebbeck
14	Saptaparni /Devil Tree	Alstonia scholaris
15	Kaju	Anacardiium occidentale
16	Sitaphal	Annona squamosa
17	Supari	Areca catechu
18	Jackfruit	Artocarpus heterophylla
19	Shatavari	Asparagus racemose
20	Bilimbi	Averrhoa bilimbi
21	Kadu Neem	Azadirachta indica
22	Bamboo	Bambusa arundinaceae
23	Butterfly Flower	Bauhinia monandra
24	Apta	Bauhinia racemose
25	Bogainviliea	Bogainvillea spectabilis
26	Kante Savar	Bombax ceiba
27	Tad	Borassua flbellifer
28	Palash	Butea monosperma
29	Bottle Brush	Callistemon lanceolatus
30	Rui	Calotropis gigantea
31	Indian Shot	Canna indica
32	Karvand	Carissa carandas
33	Fish Tail Palm	Caryota urens
34	Candle Cassia	Cassia alata
35	Amaltas	Cassia fistula
36	Takla	Cassia tora

37	Sadaphuli	Catharanthus roseus
38	White Silk Cotton, Kapok	Ceiba pentandra
39	Brahmi	Centella asiatica
40	Tendli	Coccinia grandis
41	Coconut	Cocos nucifera
42	Pan Ova	Coleus aromaticus
43	Bhokar	Cordia dichotoma
44	Kailaspati	Couraupita guienensis
45	Khulkhula	Crotalaria retusa
46	Kali Musali	Curculigo orchioides
47	Amarvel/Dodder	Cuscuta reflexa
48	Umbrella Plant	Cyperus alternifolius
49	Shisham / Indian rosewood	Dalbergia sissoo
50	Datura	Datura inoxia
51	Gulmohar Delonix regia	Gulmohar Delonix regia
52	Shend vel Dioscoria	Shend vel Dioscoria
53	Draceana Dracaena sp.	Draceana Dracaena sp.
54	Maka / Bhringaraj	Eclipta prostrata
55	Pangara /Indian Coral Tree	Erythrina variegate /Erythrina indica
56	Christamas Plant	Euphorbia pulcherrima
57	Wad, Banyan	Ficus bengalensis
58	Pukar	Ficus Benjamin
59	India rubber Tree	Ficus elastica
60	Kala Umbar	Ficus hispida
61	Gular	Ficus racemose
62	Peepal	Ficus religiosa
63	Undirmar	Gliricidia sepium
64	Kal-lavi	Gloriosa superba
65	Dhaman	Grevia tiliaefolia
66	Fire bush	Hamelia patens
67	Sontakka	Hedychium coronarium
68	Anantmol	Hemidesmus indicus
69	Jaswand	Hibiscus rosasinensis
70	Chilbil/Vavla	Holoptelea integrifolia
71	Beach Spider Lily	Hymenocallis littoralis
72	Adulsa / Vasaka	Justicia adhatoda
73	Sausage Tree	Kigelia Africana
74	Jarul	Lagerstroemia speciose
75	Common Lantana	Lantana camara
76	Heena/Mehndi	Lawsonia inermis
77	Subabhul	Leucaena leucocephala
78	Kavath	Limonia acidissima
79	Pan Lavang	Ludwigia octovalvis
80	Mahua	Madhuca indica
81	Chikoo	Manikara zapota
82	Pudina	Mentha viridis
83	Karanj	Millettia pinnata /Pongamia pinnata

84	Bakul	Mimoseps elengi
85	Kadamb	Mitragyana parviflora
86	Noni	Morinda citrifolia
87	Mulberry	Morus alba
89	Khaj Khujali	Khaj Khujali
90	Kaddipatta	Murraya koeni
91	Mussaenda	Mussaenda erythrophylla
92	Kanher	Nerium indicum
93	Parijat	Nyctanthes arbortristis
94	Tulsi	Ocimum sanctum
95	Kevda	Pandanus odorattismus
96	Copper pod, Rusty shield bearer	Peltophorum pterocarpum
97	Avala	Phyllanthes embelica
98	Rai Avla	Phyllanthus acidus
99	Jungli jalebi	Pithacellobium dulce
100	Champa tree	Plumera rubra
101	Bitti	Bitti Cascabela thevetia
102	Amba	Mangifera Indica
103	Bor	Ziziphus mauritiana
104	Tamda Kuda	Writia tomentosa
105	Nirgudi	Vitex negundo
106	Bhendi	Thespesia populnea

Source: www.indiabiodiversity.or

Annexure II

Past Initiatives by PMC

1. **Procure Mobile Air Quality Monitoring Vehicle:**

2. **PMC Launches Multi-Purpose Dust Suppression Vehicles for Pollution Control**:


STOP
ANTONY

3. IEC Vehicle (Information Education & Communication)

Initiatives under Swachha Bharat Abhiyan & Majhi Vasundhra Abhiyan

Awareness and Initiatives

- **Swachhotsav Women Led Sanitation:**

- **International Zero waste Event:**

- **International yoga day Event**.

Deep Clean Drive- Super 150:

- **Clean Toilet Campaign:**

- **Swachh Teerth Campaign:**


नवी मुंबई
महाराष्ट्र
India
28°C
82°F
2024-01-16(Tue) 11:53(AM)


Navi Mumbai
Maharashtra
India
27°C
81°F
2024-01-16(Tue) 11:30(AM)

➢ **Swachhata hi Seva:**

- **Mission Life Felicitation:**

- **Partnerships for Change:**

- **Cycle Marathon:**

- **Certificates of Excellence:**

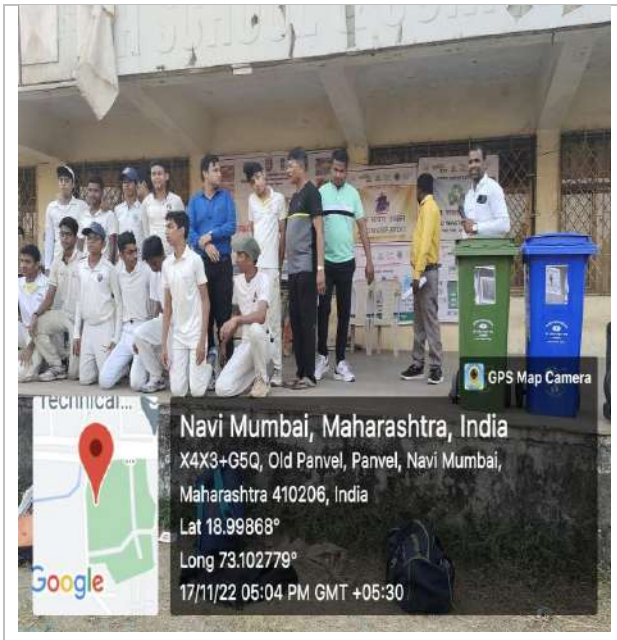
➢ Zero Waste Events:

- **Quiz Competition:**

➢ **Environment Awareness programme**:

➢ **Amrit Kalash Yatra**:

- **Solid Waste Event:**



- **Awareness:**

- **Waste to Art**


स्वच्छ भारत
सर्वेक्षण


स्वच्छ सर्वेक्षण २०२२


I ROADPALI
स्वच्छ सर्वेक्षण २०२२

Annexure III

List of Schools

Sr. No.	Name of Academic Institution	Ward No
1.	R.Z.P. School Kamothe	12
2.	R.Z.P School Jui	13
3.	R.Z.P School Navpada Kamothe	2
4.	Mansarovar Secondary Marathi Vidyalay	12
5.	Shri Siddhivinayak Secondary Marathi High School	11
6.	Shankar Rao Chavan Primary Marathi School	12
7.	St. Agrasen High School and Jr. College, Kamothe	11
8.	Shri Siddhivinayak Primary English School, Kamothe	13
9.	Sushma Patil Primary Marathi School, Kamothe	11
10.	Sushma Patil Primary English School, Kamothe	11
11.	Sushma Patil Secondary English High School, Kamothe	11
12.	Mansarovar Vidhyalav Kamothe (Marathi Medium)	12
13.	Shakarrao Chavan Vidyalaya, Kamothe	11
14.	Sushma Patil Secondary Marathi High School	11
15.	Shankarrao Chavan Primary English School, Kamothe	11
16.	MNR School of Excellence, Kamothe	13
17.	Mansarovar Secondary Hindi High School, Kamothe	12
18.	Mum English Primary Kamothe	11
19.	Mum Eng Madhy Kamothe	11
20.	Shankarrao Chavan Secondary English Highschool	11
21.	H B P Shree Damaji Ganpat Govari Vidyalay Kamothe	12
22.	H B P Shree Damaji Ganpat Govari Vidyalay Kamothe	12
23.	Asidhara Shaikshanik Sanstha Pri Pri & Pri.Sch	13
24.	M.A.Dattusheth Patil Primary School Marathi	12
25.	M.A.Dattusheth Patil Secondary School Marathi	12
26.	M.A.Dattusheth Patil Primary School English	12
27.	M A D P Secondary Vidyalaya Kamothe	13
28.	New English School Devichapada	2
29.	R.Z.P School Pale Khurd	2
30.	R.Z.P School Murbi	4
31.	R.Z.P School Dhamole	3
32.	R.Z.P. School Kharghar Belpada	6
33.	R.Z.P. School Kharghar	4

34.	R.Z.P. School Kopara	6
35.	Sudhagad Education Society Madhyamik Vidyalay, Kopara Marathi Medium	6
36.	Gokhale Education Society's Highschool Kharghar	4
37.	Siddharth Multi.Resi. Primary Marathi School	4
38.	Siddhartha Multi. Resi Eng Pri	4
39.	Dnvanivot Junior College of Science and Commerce, Kharghar	4
40.	D.A.V. Inter.Sch.Kharghar	4
41.	Vishwajyot High Sch. Kharghar	4
42.	Convent Of Jesus and Mary High School and Jr. College, Kharghar	4
43.	K.P.C. Kharghar	4
44.	NEW CITY Sarswati VIDY KHARGHAR	4
45.	Apeejay School Kharghar	5
46.	R Z P School Phanaswadi	5
47.	Dnyanjyot Vidyalaya, Kharghar	4
48.	New City Sarsvati Vid M Kharghar	5
49.	New City International Kharghar Pri E	5
50.	New City International Kharghar Mady E	5
51.	Ryan International School Kharghar	4
52.	Balbharti Pub School Kharghar	4
53.	Sanjivani International Sch Kharghar	6
54.	Sidd Mlut Res School M Madhyamik	4
55.	St. Joseph's High School and Junior College of Science and Commerce,	10
56.	Sidd Multyt Per Sc Eng Mady	4
57.	Harmony Public School Primary Kharghar	5
58.	Convent of Jejus & Mary Highschool & Jr. College	5
59.	Bonny Primary School Kharghar	5
60.	Harmony International School Kharghar	5
61.	K P C Madhy Kharghar	4
62.	Harmony Public Secondary Highschool	5
63.	Gokhale Education Society's High School	5
64.	Sakshi Education Soc. B.S.J.New English	5
65.	Dnyanjyot Junior College of Arts, Com Science	4
66.	M.S.P.M English Primary School Kharghar	4
67.	Ryan Global School Kharghar	4
68.	Bonny Secondary School Kharghar	4
69.	Rahul Shikshan Prasarak Mandat' Latur's	4
70.	M S P M's Junior College of Arts & Com. Kharghar	4
71.	Gokhale Education Societys Primary	4
72.	New English School Medium Eng Kharghar	4
73.	Wonderland School Kharghar	5

74.	Radcliffe School Kharghar	5
75.	Almamater Public School Cbse Kharghar	4
76.	Satish Haware Divyang Centre	
77.	Shri Samarth Primary and Higher Secondary	4
78.	R.Z.P School Kalamboli	10
79.	M.E.S. Dnyanmandir, Secondary, Kalamboli.	7
80.	S.E.S.Hindi Madhymik High School	7
81.	New Mumbai English School, Kalamboli	7
82.	S.E.S. Hindi Pri Sch Kalamboli	9
83.	S.E.S.Primary Marathi School Kalamboli	9
84.	New English School Secondary English	8
85.	New English School Primary English Kalamboli	8
86.	M.E.S.Dnyanmandir Primary Marathi Kalamboli	8
87.	Pre Pri & Sec Sch Kalamboli	8
88.	S E S Urdu Pramary School Kalamboli	9
89.	Smt B. N. Patil Education and Research Society's Prayesh Marathi and English	8
90.	Sm B N Patil School & Resarch Soc. Prayesh Pri (Marathi)	8
91.	Madhyamik Vidhylay Kalamboli	9
92.	Sm B N Patil School & Resarch Soc. Prayesh Sec English	8
93.	Sm B N Patil School & Resarch Soc. Prayesh Sec (Secondary)	8
94.	R.Z.P School Valavali	9
95.	R.Z.P School Asudgaon	9
96.	R.Z.P School Tembhode	9
97.	P.M.C. Saraswati Vidyamandir 1	19
98.	P.M.C.Primary School No 2	19
99.	P.M.C.Primary School No 3	19
100.	P.M.C.Koleshwar Vidyamandir No 4	19
101.	P.M.C.Primary Mothe Khande 5	14
102.	P.M.C. Primary Dhakate Khande No 6	14
103.	P.M.C.Pri School Takka Marathi No 7	17
104.	P.M.C. Primary School Podi No 8	17
105.	P.M.C. Primary School Gujrati No 9	19
106.	P.M.C.Primary School Panvel Urdu No 10	18
107.	P.M.C.Primary School Takka Urdu No 11	17
108.	K E.S. Eng. Madh. Pri. School	18
109.	K F S Dattusheth Patil Primary Marathi School	18
110.	The Eng. High School Panvel	19
111.	S.E.S. Pri. Barns School Eng.	19
112.	S E.S Madhyamik Barns Sch. Eng	19
113.	Mahatma Acd & Spo.Marathi School Khanda Colony	15

114.	Mahat Sch Of Madhya. Eng. Panvel	15
115.	K F S K V Panvel Madhy. Marathi	18
116.	M. E. S. Adyakrantiveer Vasudeo Balwant Phadke Vidyalaya New Panvel English Medium	18
117.	V.K. High School And Jr.College, Panvel	18
118.	Seth Laxmidas Bhaskar High'school Panvel	17
119.	C K Thakur Vidya. Madha. Marathi	16
120.	Yakub Beg Urdu Pri Sch Panvel	18
121.	N.E.S.Market Yard, Panvel	19
122.	K E S Indubai a Wajekar English Medium Secondary School, Panvel.	18
123.	St Joseph Highschool Khanda Colony	16
124.	Shri S. Saibaba Pri Vidy.New Panvel	16
125.	A V B P Vidy Sec E New Panvel	16
126.	The Eng Sch Mady Eng	19
127.	Oxford English Medium School Khanda Colony	16
128.	R C Of Panvel 1 T C T Hi Sch Panvel	19
129.	Huda Eng Sch Panvel	20
130.	Dew Drops Pri Sch Panvel	17
131.	Emmanual Mission Sch Panvel	18
132.	St. Thomas Academy of Education	19
133.	Mahatma Phule A.S.C. College Panvel	
134.	Mahatma International (CBSE)School Khanda	16
135.	Dr. Pillai Golbal Academy, New Panvel	17
136.	People and Parents Ass.Minority English School, Panvel	17
137.	Minority Urdu Girls Highschool Panvel	18
138.	Panvel Little Birds	18
139.	P S English School Panvel	19
140.	R.Z.P. School Koyana Wele	2
141.	P.J Mhatre Vidya Navade	2
142.	R.Z.P. School Rodpali	10
143.	R.Z.P. School Pendhar	1
144.	M.B.M Golden School Pendhar	1
145.	R.Z.P. School Tondare	2
146.	D.A.P. Public School Tondare	2
147.	R.Z.P. School Padghe	1
148.	R.Z.P School Khidukpada	9
149.	Hiranandani School	4
150.	R.Z.P. School Ghot Chal	1
151.	Shri Sadguru Vamanababa Madhyamik Vidyalay Ghot	1
152.	R.Z.P School Taloje Majkur	1
153.	R.Z.P. School Pisarve	1

154.	R.Z.P. School Rohinjan	1
155.	Ch.Shivaji Vidyalay Rohinjan	1
156.	R.Z.P School Pethali	3
157.	R.Z.P. School Ove Navin	3
158.	R.Z.P School Ranjanpada	3
159.	R.Z.P School Ovepeth Marathi	3
160.	J.B.S.P. New English School Owepeth Kharghar	3
161.	R.Z.P School Taloje Pachnand	3
162.	National Urdu High School Taloja	3
163.	R.Z.P Sch Inampuri	3
164.	National Urdu High Sch Pri Taloja	3
165.	B.K.Patil Jr College Cidco Colony Taloja Pachnand	3
166.	The Elite Public School Taloja (Primary)	3
167.	Rahul Shikshan Prasarak Mandal's Ajanta Internation (English Primary)	3
168.	Rahul Shikshan Prasarak Mandal's Ajanta Internation (English Secondary)	3
169.	Rahul Shikshan Prasarak Mandal's Dr.G.K.Dongargao Hindi	3
170.	The Elite Public School Taloja Cbse	3
171.	The Elite Public School and Jr. College Taloja.	3
172.	Kalsekar English Medum School	14
173.	ARQAM English School Taloja	3
174.	Laxmi Public School	5
175.	Vibgyor High School, Kharghar	4
176.	Greenfingers Global School, Kharghar	4
177.	New Horizon Public School & Penguin Kids, Khanda Colony	15
178.	MES AK Vasudeo Balwant Phadke Vidyalay, Panvel	
179.	Yakub Baig High School and Junior College Panvel	18
180.	Vishwajyot High School	4
181.	Dav Public School	15
182.	K E S Indubai a Wajekat English Medium Primary School Panvel	18
183.	New Horizon Public School	15
184.	Rotary Special School for Hearing Impaired Children, New Panvel	15
185.	Rao Junior College of Science Kharghar	4
186.	KPC English High School and Jr College	4
187.	Late. Namdevbuva Khutarika School Taloje Pachand	3
188.	Carmel Convent High School	8
189.	Mspm’s English High School, Kharghar	4
190.	Kendriya Vidyalaya ONGC Colony, Panvel	20
191.	Changu Kana Thakur Arts Commerce and Science College New Panvel	17
192.	Mahatma Phule Arts, Commerce and Science	15
193.	Pillai College Of Arts, Commerce and Science	17
194.	Shikshan Maharshi Dadasaheb Limaye College	17

195.	Govt. Of Maharashtra's Govt. College of Education (CTE), Panvel	17
196.	Adarsh Shikshan Prasrak Mandal's D.D Vispute College of Education, Plot No. 41	17
197.	B.P Marine Academy Nautical Science, Panvel, Raigad-410206	14
198.	Balasaheb Thackeray Law College Taloja Navi Mumbai	3
199.	Bhagubai Changu Thakur College of Law, New Panvel	15
200.	Modern Shikshan Prasarak Mandal Junior College of Art And Commerce	17
201.	ITM Institute of Hotal Management, Kharghar (E), Navi Mumbai-10	5
202.	Kamalgauri Hiru Patil Shikshan Sanstha Sadguru Vamanbaba Commerce & Science College Taloje Raigad	2
203.	Karnala Sports Academy's KSA's Barns College of Arts, Science & Commerce, At Plot No.7, Sector 16	14
204.	Karnataka Lingayat Education Society's KLE College Of Law	10
205.	Kle Society Science & Commerce College, Kalamboli, Navi Mumbai	10
206.	Mahatma Gandhi Mission's College of Education & Reserch	15
207.	Mahatma Gandhi Mission's College of Commerce, Kamothe, Navi Mumbai	12
208.	Mahatma Gandhi Mission's College of Science, Kamothe, Sector 18, Navi Munbai-410209	12
209.	National Institute for The Mentally Handicapped Regional Centre (NIMH RC), Navi Mumbai	5
210.	Navi Mumbai College Balgandhrva Sukapur, Panvel	17
211.	Rahul Shikshan Prasarak Mandal's Satyagraha Mahavidyalaya, At Supparak Bhavan	4
212.	Ramsheth Thakur College of Commerce & Science	3
213.	RSPM's Satyagraha College of Education	4
214.	Shri.D.D. Vispute Collge of Science, Commerce & Management	17
215.	Mahatma Education Society's Vidyabhiraj College Of Phy.Edu.Panvel	15
216.	Jananta Shikshan Prasarak Mandal Women's College of Education, Kharbghar	4
217.	A.D. Mhatre High School & Jr. College	2
218.	Agri Shikshan Sansth's Higher Secondary School, Panvel	15
219.	B.K. Patil Junior College, Taloja	3
220.	Barns Junior College, Panvel	14
221.	Changu Kana Thakur Secondary & Higher Secondary Vidyalaya,New Panvel	17
222.	Convent Of Jesus and Mary High School and Jr College, Kharghar	3
223.	D G Tatkare Junior College, Kalamboli	10
224.	Dnyanjyot Junior College of Arts, Com, Sci, Near Abms Hospital, Kharghar	4
225.	Gokhle Education Society's Jr College of Science	12
226.	H.B.P. Shree Damaji Ganpat Gowari Vidyalaya & Jr College, Kamothe	5
227.	K.E.S. K.V. Kanya Vidyalaya & Jr. College, Panvel	14
228.	K.E.S. V.K. High School & Jr.College, Panvel	14
229.	Khimji Palan Chheda Junior College of Science & Commerece, Kharghar	10

230.	Loknete Ramsheth Thakur English Medium School & Jr College, Kamothe	5
231.	M S P M's Junior College of Arts & Commerece, Kharghar	12
232.	Mahatma Education Society's High School & Jr. College, Khanda Colony, New Panvel	5
233.	Maji Amdar Dattushet Patil Junior College, Kamothe	15
234.	Mansarovar Vidyalaya And Junior College	12
235.	New City International School & Jr College, Kharghar	4
236.	P.E.S. English School & Junior College, Panvel	14
237.	Prayesh Marathi & English Jr College, Sector 9, Kalamboli	10
238.	Ramsheth Thakur Higher Secondary Vidyalaya Kharghar	4
239.	Rao Junior College of Science, Kharghar, Navi Mumbai	5
240.	S.E.S Secondary & Higher Secondary School Kalamboli	10
241.	S.E.S Banthiya Mady N N Paliwala Jr College New Panvel	17
242.	S.S.H School &Jr College Kamothe	12
243.	Sanjivani Junior College, Kharghar	6
244.	Satyagraha Junior College, Kharghar	4
245.	Shankarrao Chavan Vidyalaya & Jr College, Kamothe	11
246.	St Agrase High School Jr College	12
247.	St. Joseph High School & Jr College, Kalamboli	8
248.	Sunrise Global School & Jr College	9
249.	Sushma Patil Secondary and Junior College Kamothe	12
250.	The Elite Public School & Jr College, Taloja	8
251.	Yakub Baig High School & Jr College, Panvel	14
252.	Yashwant Memorial Trustsymt Junior College of Vocational Education, Panvel	14

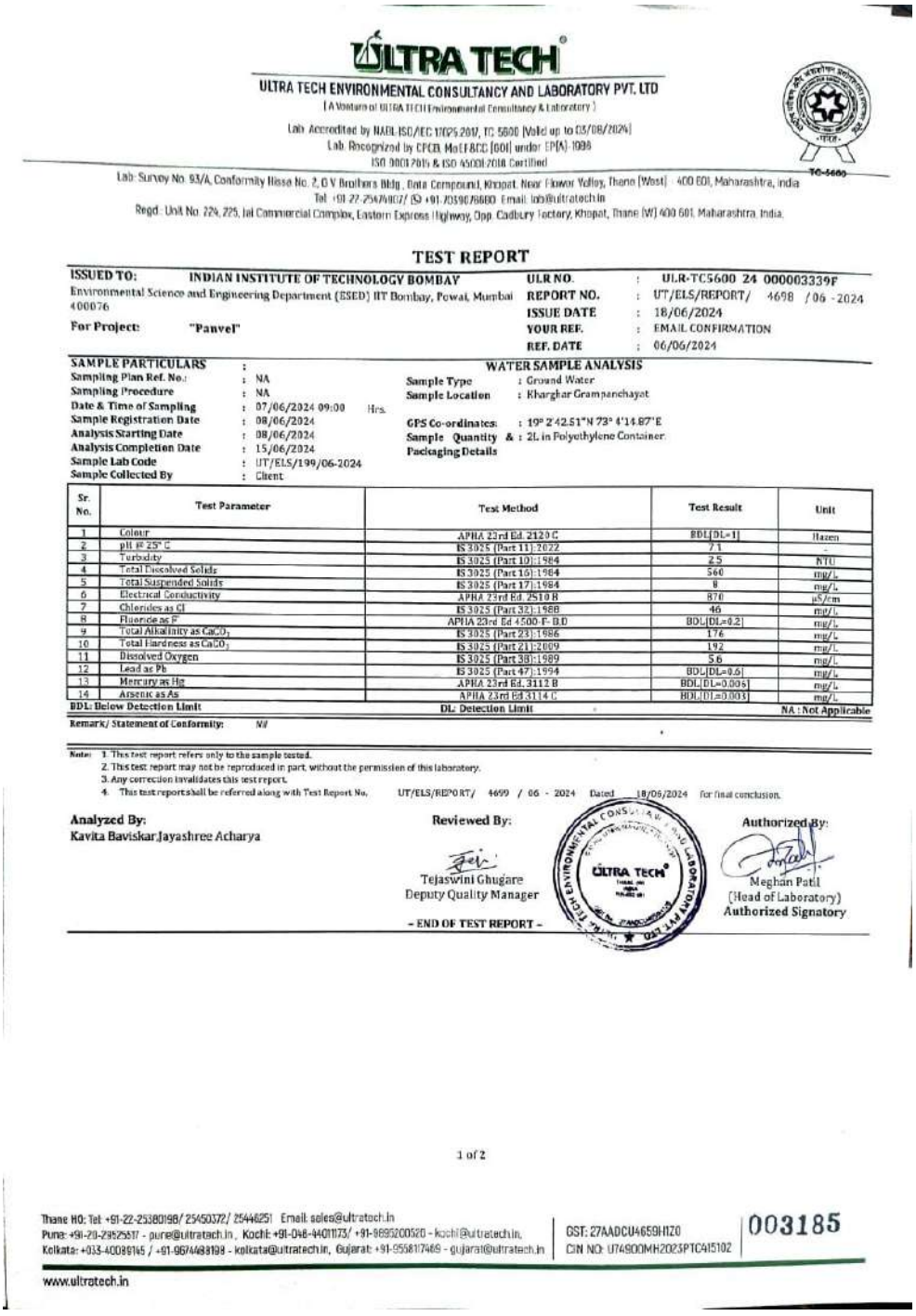
List of Hospitals

Name of Hospital	Location
YMT Hospital	Kharghar Sector 4
Niramaya Hospital	Kharghar Sector 4
Ashwini Hospital	Kharghar Sector 7
VAMC Hospital	Kharghar Sector 12
Mangaldeep multispecialty hospital	Kharghar Sector 12
Sanjeevan Hospital	Kharghar Sector 12
Shree Hospital	Kharghar Sector 12
Om Navjeevan Hospital	Kharghar Sector 21
Airla Hospital	Kharghar Sector 20
Khar ghar medical center	Kharghar Sector 20
Urban Health Center (A Government Organization)	Kharghar Sector 15
BARC Kharghar Dispensary	Kharghar Sector 15
Medicover Hospitals	Kharghar Sector 10
Dr Alat Hospital	Kalamboli
Mangaldeep Hospital	Kalamboli Sector 3E
Meera General And piles Hospital	Kalamboli Sector 3E
Mahatma Gandhi Mission Hospital	Kalamboli Sector 4E
Dr. Singh's City Hospital	Kalamboli Sector 4
Amar Hospital	Kalamboli Sector 10
NPS Hospital Kalamboli	Kalamboli Sector 10
Mathadi hospital kalamboli	Kalamboli
Suasth Hospital	Kalamboli Sector 20
Shree siddhivinayak hospital	Kalamboli Sector 15
Aasha Hospital	Kalamboli
PFA hospital	Kalamboli
VAMC Hospital	Kalamboli
Jeewandeep Hospital	Kalamboli
Samata Hospital	Kalamboli Sector 1
B&J Superspeciality Hospital	Kamothe
MITR Hospital	Kamothe Sector 35
Om Sai Hospital	Kamothe
Prathmik arogya Kendra	Kamothe Sector 1
Shree Sangam Multispecialty Hospital	Kamothe Sector 8
METROCARE HOSPITAL and ICU	Kamothe Sector 8
Galaxy Hospital	Kamothe Sector 8
healthgs Hospitals	Kamothe Sector 12
ZP Hospital	Kamothe Sector 12
Criticare Hospital	Kamothe Sector 12
healthgs Hospitals	Kamothe Sector 12
Aadi Hospital	Kamothe Sector 12
Matoshree Multispeciality Hospital	Kamothe Sector 20
Jeevan Jyot Hospital	Kamothe Sector 21
Yashoda maternity and general hospital	Kamothe Sector 21
Noble Care Hospital	Kamothe Sector 21
ONGC Hospital	Panvel
Panvel Hospital	Panvel
Rural Hospital Panvel	Old Panvel

Name of Hospital	Location
Gandhi Super Speciality Hospital	Panvel
Government hospital	Panvel
Gune Hospital	Old Panvel
Mhatre Accident Hospital	Old Panvel
New Govt Hospital Behind Dargah Panel Mahanagarpalika	Old Panvel
Panvel Rural Hospital	Old Panvel
Panvel B.M.C Hospital	Old Panvel

Annexure IV

Water & Soil Monitoring Results



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ISO 9001:2015 & ISO 45001:2018 Certified

TC-5600

Lab: Survey No. 93/A, Conformity Hisse No. 2, G V Brothers Bldg., Bota Compound, Khopat, Near Flower Valley, Thane (West) - 400 601, Maharashtra, India
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Regd.: Unit No. 224, 225, Jai Commercial Complex, Eastern Express Highway, Opp. Cadbury Factory, Khopat, Thane (W) 400 601, Maharashtra, India.

TEST REPORT

ISSUED TO: INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
Environmental Science and Engineering Department (ESED) IIT Bombay, Powai, Mumbai 400076

For Project: "Panvel"

ULR NO. : ULR-TC5600 24 000003339F
REPORT NO. : UT/ELS/REPORT/ 4698 /06 -2024
ISSUE DATE : 18/06/2024
YOUR REF. : EMAIL CONFIRMATION
REF. DATE : 06/06/2024

SAMPLE PARTICULARS

Sampling Plan Ref. No.	: NA
Sampling Procedure	: NA
Date & Time of Sampling	: 07/06/2024 09:00 Hrs.
Sample Registration Date	: 08/06/2024
Analysis Starting Date	: 08/06/2024
Analysis Completion Date	: 15/06/2024
Sample Lab Code	: UT/ELS/199/06-2024
Sample Collected By	: Client

WATER SAMPLE ANALYSIS

Sample Type	: Ground Water
Sample Location	: Kharghar Gram panchayat
GPS Co-ordinates	: 19° 2' 42.51" N 73° 4' 14.87" E
Sample Quantity & Packaging Details	: 2L in Polyethylene Container

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1	Colour	APHA 23rd Ed. 2120 C	BDL[DL=1]	Hazen
2	pH @ 25° C	IS 3025 (Part 11):2022	7.1	-
3	Turbidity	IS 3025 (Part 10):1984	2.5	NTU
4	Total Dissolved Solids	IS 3025 (Part 16):1984	560	mg/L
5	Total Suspended Solids	IS 3025 (Part 17):1984	8	mg/L
6	Electrical Conductivity	APHA 23rd Ed. 2510 B	870	µS/cm
7	Chlorides as Cl	IS 3025 (Part 32):1988	46	mg/L
8	Fluoride as F	APHA 23rd Ed 4500-F- B,D	BDL[DL=0.2]	mg/L
9	Total Alkalinity as $CaCO_3$	IS 3025 (Part 23):1986	176	mg/L
10	Total Hardness as $CaCO_3$	IS 3025 (Part 21):2009	192	mg/L
11	Dissolved Oxygen	IS 3025 (Part 38):1989	5.6	mg/L
12	Lead as Pb	IS 3025 (Part 47):1994	BDL[DL=0.5]	mg/L
13	Mercury as Hg	APHA 23rd Ed. 3112 B	BDL[DL=0.005]	mg/L
14	Arsenic as As	APHA 23rd Ed 3114 C	BDL[DL=0.005]	mg/L

BDL: Below Detection Limit **DL: Detection Limit** **NA : Not Applicable**

Remark/ Statement of Conformity: Nil

Note: 1. This test report refers only to the sample tested.
2. This test report may not be reproduced in part, without the permission of this laboratory.
3. Any correction invalidates this test report.
4. This test report shall be referred along with Test Report No. UT/ELS/REPORT/ 4699 / 06 - 2024 Dated 18/06/2024 for final conclusion.

Analyzed By:
Kavita Baviskar,Jayashree Acharya

Reviewed By:
Tejaswini Ghugare
Deputy Quality Manager

Authorized By:
Meghan Patil
(Head of Laboratory)
Authorized Signatory

- END OF TEST REPORT -

1 of 2

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GST: 27AADCU4659H1Z0
CIN NO: U74900MH2023PTC415102
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ISO 9001:2015 & ISO 45001:2018 Certified
TC-5600
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Tel: +91-22-25474907/ +91-7039076680 Email: lab@ultratech.in
Regd: Unit No. 224, 225, Jai Commercial Complex, Eastern Express Highway, Opp. Cadbury Factory, Khopat, Thane (W) 400 601, Maharashtra, India

TEST REPORT

ISSUED TO: INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
Environmental Science and Engineering Department (ESED) IIT Bombay, Powai, Mumbai 400076

For Project: "Panvel"

ULR NO. : ULR-TC5600 24 000003338F
REPORT NO. : UT/ELS/REPORT/ 4696 /06 -2024
ISSUE DATE : 18/06/2024
YOUR REF. : EMAIL CONFIRMATION
REF. DATE : 06/06/2024

SAMPLE PARTICULARS :
Sampling Plan Ref. No.: : NA
Sampling Procedure : NA
Date & Time of Sampling : 07/06/2024 09:40 Hrs.
Sample Registration Date : 08/06/2024
Analysis Starting Date : 08/06/2024
Analysis Completion Date : 15/06/2024
Sample Lab Code : UT/ELS/200/06-2024
Sample Collected By : Client

WATER SAMPLE ANALYSIS
Sample Type : Ground Water
Sample Location : Kamothe Grampanchayat Office
GPS Co-ordinates: : 19° 0'59.40"N 73° 5'25.34"E
Sample Quantity & Packaging Details : 2L in Polyethylene Container.

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1	Colour	APHA 23rd Ed. 2120 C	BDL[DL=1]	Hazen
2	pH @ 25° C	IS 3025 (Part 11):2022	7.2	-
3	Turbidity	IS 3025 (Part 10):1984	1.1	NTU
4	Total Dissolved Solids	IS 3025 (Part 16):1984	853	mg/L
5	Total Suspended Solids	IS 3025 (Part 17):1984	7	mg/L
6	Electrical Conductivity	APHA 23rd Ed. 2510 B	1324	µS/cm
7	Chlorides as Cl	IS 3025 (Part 32):1988	67	mg/L
8	Fluoride as F	APHA 23rd Ed 4500-F- E,D	BDL[DL=0.2]	mg/L
9	Total Alkalinity as $CaCO_3$	IS 3025 (Part 23):1986	356	mg/L
10	Total Hardness as $CaCO_3$	IS 3025 (Part 21):2009	368	mg/L
11	Dissolved Oxygen	IS 3025 (Part 38):1989	5.2	mg/L
12	Lead as Pb	IS 3025 (Part 47):1994	BDL[DL=0.6]	mg/L
13	Mercury as Hg	APHA 23rd Ed. 3112 B	BDL[DL=0.006]	mg/L
14	Arsenic as As	APHA 23rd Ed 3114 C	BDL[DL=0.003]	mg/L

BDL: Below Detection Limit **DL: Detection Limit** **NA : Not Applicable**

Remark/ Statement of Conformity: *Nil*

Note:
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Analyzed By:
Kavita Baviskar,Jayashree Acharya

Reviewed By:
Tejaswini Ghugare
(Deputy Quality Manager)

Authorized By:
Meghan Patil
(Head of Laboratory)
Authorized Signatory

– END OF TEST REPORT –

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Lab: Survey No. 93/A, Conformity Hissa No. 2, G V Brothers Bldg., Bata Compound, Khopat, Near Flower Valley, Thane (West) - 400 601, Maharashtra, India
Tel: +91-22-25474907/ +91-7039016680 Email: lab@ultratech.in
Regd. Unit No. 224, 225, Jai Commercial Complex, Eastern Express Highway, Opp. Cadbury Factory, Khopat, Thane (W) 400 601, Maharashtra, India.

TEST REPORT

ISSUED TO: INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
Environmental Science and Engineering Department (ESED) IIT Bombay, Powai, Mumbai 400076

For Project: "Panvel"

ULR NO. : --
REPORT NO. : UT/ELS/REPORT/ 4697 /06 -2024
ISSUE DATE : 18/06/2024
YOUR REF. : EMAIL CONFIRMATION
REF. DATE : 06/06/2024

SAMPLE PARTICULARS

Sampling Plan Ref. No.: NA
Sampling Procedure : NA
Date & Time of Sampling : 07/06/2024 09.40 Hrs.
Sample Registration Date : 08/06/2024
Analysis Starting Date : 08/06/2024
Analysis Completion Date : 15/06/2024
Sample Lab Code : UT/ELS/200/06-2024
Sample Collected By : Client

WATER SAMPLE ANALYSIS

Sample Type : Ground Water
Sample Location : Kamothe Grampanchayat Office
GPS Co-ordinates: : 19° 0'59.40"N 73° 5'25.34"E
Sample Quantity & Packaging Details : 2L in Polyethylene Container.

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1	Odour	IS 3025 (Part 5) 2018	AGREEABLE	-
2	Taste	IS 3025 (Part 7 & 8) : 2017 & 2023	AGREEABLE	-

BDL: Below Detection Limit **DL: Detection Limit** **NA : Not Applicable**

Remark/ Statement of Conformity: *Nil*

Note: 1. This test report refers only to the sample tested.
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4. Parameter/s tested are not covered under NABL scope.
5. This test report shall be referred along with Test Report No. UT/ELS/REPORT/ 4696 / 06 - 2024 Dated 18/06/2024 for final conclusion.

Analyzed By:
Kavita Baviskar,Jayashree Acharya

Reviewed By:
Tejaswini Ghugare
(Deputy Quality Manager)

Authorized By:
Meghan Patil
(Head of Laboratory)
Authorized Signatory

- END OF TEST REPORT -

2 of 2

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TC-5600

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TEST REPORT

ISSUED TO:	**INDIAN INSTITUTE OF TECHNOLOGY BOMBAY**	**ULR NO.**	: **ULR-TC5600 24 000003337F**
Environmental Science and Engineering Department (ESED) IIT Bombay, Powai, Mumbai 400076		**REPORT NO.**	: UT/ELS/REPORT/ 4694 /06 -2024
		ISSUE DATE	: 18/06/2024
For Project:	**"Panvel"**	**YOUR REF.**	: EMAIL CONFIRMATION
		REF. DATE	: 06/06/2024

SAMPLE PARTICULARS :

Sampling Plan Ref. No.:	: NA	**Sample Type**	: Ground Water
Sampling Procedure	: NA	**Sample Location**	: Kalamboli Grampanchayat Office
Date & Time of Sampling	: 07/06/2024 10:50 Hrs.		
Sample Registration Date	: 08/06/2024	**GPS Co-ordinates:**	: 19° 1'20.72"N 73° 6'10.73"E
Analysis Starting Date	: 08/06/2024	**Sample Quantity & Packaging Details**	: 2L in Polyethylene Container.
Analysis Completion Date	: 15/06/2024		
Sample Lab Code	: UT/ELS/201/06-2024		
Sample Collected By	: Client		

WATER SAMPLE ANALYSIS

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1	Colour	APHA 23rd Ed. 2120 C	BDL[DL=1]	Hazen
2	pH @ 25° C	IS 3025 (Part 11):2022	7.2	-
3	Turbidity	IS 3025 (Part 10):1984	0.8	NTU
4	Total Dissolved Solids	IS 3025 (Part 16):1984	548	mg/L
5	Total Suspended Solids	IS 3025 (Part 17):1984	5	mg/L
6	Electrical Conductivity	APHA 23rd Ed. 2510 B	851	µS/cm
7	Chlorides as Cl	IS 3025 (Part 32):1988	63	mg/L
8	Fluoride as F	APHA 23rd Ed 4500-F- B,D	BDL[DL=0.2]	mg/L
9	Total Alkalinity as $CaCO_3$	IS 3025 (Part 23):1986	198	mg/L
10	Total Hardness as $CaCO_3$	IS 3025 (Part 21):2009	208	mg/L
11	Dissolved Oxygen	IS 3025 (Part 38):1989	5.5	mg/L
12	Lead as Pb	IS 3025 (Part 47):1994	BDL[DL=0.6]	mg/L
13	Mercury as Hg	APHA 23rd Ed. 3112 B	BDL[DL=0.006]	mg/L
14	Arsenic as As	APHA 23rd Ed 3114 C	BDL[DL=0.003]	mg/L

BDL: Below Detection Limit **DL: Detection Limit** **NA: Not Applicable**

Remark/ Statement of Conformity: *Nil*

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4. This test report shall be referred along with Test Report No. UT/ELS/REPORT/ 4695+ / 06 - 2024 Dated 18/06/2024 for final conclusion.

Analyzed By:
Kavita Baviskar,Jayashree Acharya

Reviewed By:
Tejaswini Ghugare
(Deputy Quality Manager)

Authorized By:
Meghan Patil
(Head of Laboratory)
Authorized Signatory

- END OF TEST REPORT -

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TEST REPORT

ISSUED TO: INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
Environmental Science and Engineering Department (ESED) IIT Bombay, Powai, Mumbai 400076

For Project: "Panvel"

ULR NO. : ULR-TC5600 24 000003335F
REPORT NO. : UT/ELS/REPORT/ 4690 /06 -2024
ISSUE DATE : 18/06/2024
YOUR REF. : EMAIL CONFIRMATION
REF. DATE : 06/06/2024

SAMPLE PARTICULARS :

Sampling Plan Ref. No.: : NA
Sampling Procedure : NA
Date & Time of Sampling : 07/06/2024 14:00 Hrs.
Sample Registration Date : 08/06/2024
Analysis Starting Date : 08/06/2024
Analysis Completion Date : 15/06/2024
Sample Lab Code : UT/ELS/203/06-2024
Sample Collected By : Client

WATER SAMPLE ANALYSIS

Sample Type : Ground Water
Sample Location : Taloja MIDC
GPS Co-ordinates: : 19° 3'40.58"N 73° 4'72.89"E
Sample Quantity & Packaging Details : 2L in Polyethylene Container.

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1	Colour	APHA 23rd Ed. 2120 C	BDL[DL=1]	Hazen
2	pH @ 25° C	IS 3025 (Part 11):2022	7.9	
3	Turbidity	IS 3025 (Part 10):1984	0.2	NTU
4	Total Dissolved Solids	IS 3025 (Part 16):1984	66	mg/L
5	Total Suspended Solids	IS 3025 (Part 17):1984	BDL[DL=2.5]	mg/L
6	Electrical Conductivity	APHA 23rd Ed. 2510 B	106	µS/cm
7	Chlorides as Cl	IS 3025 (Part 32):1988	12	mg/L
8	Fluoride as F	APHA 23rd Ed 4500-F- B,D	BDL[DL=0.2]	mg/L
9	Total Alkalinity as $CaCO_3$	IS 3025 (Part 23):1986	24	mg/L
10	Total Hardness as $CaCO_3$	IS 3025 (Part 21):2009	32	mg/L
11	Dissolved Oxygen	IS 3025 (Part 38):1989	5.3	mg/L
12	Lead as Pb	IS 3025 (Part 47):1994	BDL[DL=0.6]	mg/L
13	Mercury as Hg	APHA 23rd Ed. 3112 B	BDL[DL=0.006]	mg/L
14	Arsenic as As	APHA 23rd Ed 3114 C	BDL[DL=0.003]	mg/L

BDL: Below Detection Limit **DL: Detection Limit** **NA : Not Applicable**

Remark/ Statement of Conformity: *Nil*

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3. Any correction invalidates this test report.
4. This test report shall be referred along with Test Report No. UT/ELS/REPORT/ 4691 / 06 - 2024 Dated 18/06/2024 for final conclusion.

Analyzed By:
Kavita Baviskar,Jayashree Acharya

Reviewed By:
Tejaswini Ghugare
(Deputy Quality Manager)

Authorized By:
Meghan Patil
(Head of Laboratory)
Authorized Signatory

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TEST REPORT

ISSUED TO: M/s.INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
Environmental Science and Engineering Department (ESED) ,IIT Bombay, Powai, Mumbai 400076

For Project: "PANVEL"

ULR NO. : ULR-TC5600 24 000004284F
REPORT NO. : UT/ELS/REPORT/ 6063 /07 - 2024
ISSUE DATE : 12/07/2024
YOUR REF. : EMAIL CONFIRMATION
REF. DATE : 06/06/2024

SAMPLE PARTICULARS :

SOIL SAMPLE ANALYSIS

Sampling Plan Ref. No.: : NA
Sampling Procedure : NA
Date & Time of Sampling : 07/06/2024 11:00 Hrs.
Sample Registration Date : 08/06/2024
Analysis Starting Date : 08/06/2024
Analysis Completion Date : 19/06/2024
Sample Lab Code : UT/ELS/204/06-2024

Sample Type : Soil
Sample Location : Ship Chowk
Sample Quantity & Packaging Details : 1 Kg. in Ziplock Plastic Bag. (Approximately)

Sample Collected By : Client

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1	pH [1:2.5 Soil:Water]	IS 2720 (Part 22):1972	8.1	-
2	Electrical Conductivity [1:2 Soil:Water]	IS 14767:2000	355	µS/cm
3	Organic Matter	IS 2720 (Part 22):1972	0.4	%
4	Water Holding Capacity	SOP No. UT/LQMS/SOP/S12	54.6	%
5	Sodium Adsorption Ratio	SOP No. UT/LQMS/SOP/S26	BDL[DL=1]	$(meq/kg)^{(0.5)}$
6	Potassium as K	SOP No. UT/LQMS/SOP/S20	2	mg/kg
7	Total Nitrogen as N	IS 14684:1999	343	mg/kg
8	Phosphorous as P_2O_5 (Available)	SOP No. UT/LQMS/SOP/S28	19	mg/kg

BDL: Below Detection Limit **DL: Detection Limit** **NA : Not Applicable**

Remark/ Statement of Conformity: *Nil*

Note:
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4. Test results reported with unit/s † are obtained from scientific conversions/calculations applied to test results in mg/kg.
5. This test report shall be referred along with Test Report No. UT/ELS/REPORT/ 6064 / 07 - 2024 Dated 12/07/2024 for final conclusion.

Analyzed By:
Mayuri Gharge,Tejaswini Ghugare

Reviewed By:
Jayashree Acharya
(Quality Manager)

Authorized By:
Manasi Namjoshi
(Technical Manager)
Authorized Signatory

– END OF TEST REPORT –

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TEST REPORT

ISSUED TO: M/s.INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
Environmental Science and Engineering Department (ESED) ,IIT Bombay, Powai, Mumbai 400076
For Project: "PANVEL"

ULR NO. : ULR-TC5600 24 000004285F
REPORT NO. : UT/ELS/REPORT/ 6065 /07 - 2024
ISSUE DATE : 12/07/2024
YOUR REF. : EMAIL CONFIRMATION
REF. DATE : 06/06/2024

SAMPLE PARTICULARS :
Sampling Plan Ref. No.: : NA
Sampling Procedure : NA
Date & Time of Sampling : 07/06/2024 16:00 Hrs.
Sample Registration Date : 08/06/2024
Analysis Starting Date : 08/06/2024
Analysis Completion Date : 19/06/2024
Sample Lab Code : UT/ELS/205/06-2024

SOIL SAMPLE ANALYSIS
Sample Type : Soil
Sample Location : Kalamboli Circle
Sample Quantity & Packaging Details : 1 Kg. in Ziplock Plastic Bag. (Approximately)

Sample Collected By : Client

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1	pH [1:2.5 Soil:Water]	IS 2720 (Part 22):1972	7.4	-
2	Electrical Conductivity [1:2 Soil:Water]	IS 14767:2000	598	µS/cm
3	Organic Matter	IS 2720 (Part 22):1972	1.1	%
4	Water Holding Capacity	SOP No. UT/LQMS/SOP/S12	53.6	%
5	Sodium Adsorption Ratio	SOP No. UT/LQMS/SOP/S26	BDL[DL=1]	(meq/kg)$^{0.5}$
6	Potassium as K	SOP No. UT/LQMS/SOP/S20	9	mg/kg
7	Total Nitrogen as N	IS 14684:1999	871	mg/kg
8	Phosphorous as P_2O_5 (Available)	SOP No. UT/LQMS/SOP/S28	24	mg/kg

BDL: Below Detection Limit **DL: Detection Limit** **NA : Not Applicable**

Remark/ Statement of Conformity: *Nil*

Note:
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3. Any correction invalidates this test report.
4. Test results reported with unit/s † are obtained from scientific conversions/calculations applied to test results in mg/kg.
5. This test report shall be referred along with Test Report No. UT/ELS/REPORT/ 6066 / 07 - 2024 Dated 12/07/2024 for final conclusion.

Analyzed By:
Mayuri Gharge

Reviewed By:
Jayashree Acharya
(Quality Manager)

Authorized By:
Manasi Namjoshi
(Technical Manager)
Authorized Signatory

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TEST REPORT

ISSUED TO: M/s.INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
Environmental Science and Engineering Department (ESED) ,IIT Bombay, Powai, Mumbai 400076

For Project: "PANVEL"

ULR NO. : --
REPORT NO. : UT/ELS/REPORT/ 6066 /07 - 2024
ISSUE DATE : 12/07/2024
YOUR REF. : EMAIL CONFIRMATION
REF. DATE : 06/06/2024

SAMPLE PARTICULARS : **SOIL SAMPLE ANALYSIS**

Sampling Plan Ref. No.:	: NA	**Sample Type**	: Soil
Sampling Procedure	: UT/LQMS/SOP/S01A	**Sample Location**	: Kalamboli Circle
Date & Time of Sampling	: 07/06/2024 16:00 Hrs.		
Sample Registration Date	: 08/06/2024		
Analysis Starting Date	: 08/06/2024		
Analysis Completion Date	: 19/06/2024	**Sample Quantity & Packaging Details**	: 1 Kg. in Ziplock Plastic Bag. (Approximately)
Sample Lab Code	: UT/ELS/205/06-2024		

Sample Collected By : ULTRA TECH ENVIRONMENTAL CONSULTANCY AND LABORATORY PVT. LTD.

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1	Texture	USDA Soil Texture Triangle	SILT LOAM	--

NA : Not Applicable

Remark/ Statement of Conformity: *Nil*

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3. Any correction invalidates this test report.
4. Sample was collected using laboratory's SOP (UT/LQMS/SOP/S01A)based on Manual on Sampling, Analysis and Characterization of Hazardous Wastes, CPCB, New Delhi.
5. Parameter/s tested are not covered under NABL scope.
6. This test report shall be referred along with Test Report No. UT/ELS/REPORT/ 6065 / 07 - 2024 Dated 12/07/2024 for final conclusion.

Analyzed By:
Mayuri Gharge

Reviewed By:
Jayashree Acharya
(Quality Manager)

ULTRA TECH ENVIRONMENTAL CONSULTANCY AND LABORATORY PVT. LTD.

Authorized By:
Manasi Namjoshi
(Technical Manager)
Authorized Signatory

- END OF TEST REPORT -

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TEST REPORT

ISSUED TO: M/s.INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
Environmental Science and Engineering Department (ESED) ,IIT Bombay, Powai, Mumbai 400076

For Project: Panvel

ULR NO. : ULR-TC5600 24 000004286F
REPORT NO. : UT/ELS/REPORT/ 6067 /07 -2024
ISSUE DATE : 12/07/2024
YOUR REF. : EMAIL CONFIRMATION
REF. DATE : 06/06/2024

SAMPLE PARTICULARS

Sampling Plan Ref. No.: NA
Sampling Procedure : NA
Date & Time of Sampling : 07/06/2024 11:55 Hrs.
Sample Registration Date : 08/06/2024
Analysis Starting Date : 08/06/2024
Analysis Completion Date : 19/06/2024
Sample Lab Code : UT/ELS/206/06-2024

SOIL SAMPLE ANALYSIS

Sample Type : Soil
Sample Location : Panvel Bus Depot
Sample Quantity & Packaging Details : 1 Kg. in Ziplock Plastic Bag. (Approximately)

Sample Collected By : Client

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1	pH [1:2.5 Soil:Water]	IS 2720 (Part 22):1972	7.6	-
2	Electrical Conductivity [1:2 Soil:Water]	IS 14767:2000	341	µS/cm
3	Organic Matter	IS 2720 (Part 22):1972	1.1	%
4	Water Holding Capacity	SOP No. UT/LQMS/SOP/S12	43.2	%
5	Sodium Adsorption Ratio	SOP No. UT/LQMS/SOP/S26	BDL[DL=1]	(meq/kg)$^{0.5}$
6	Potassium as K	SOP No. UT/LQMS/SOP/S20	1	mg/kg
7	Total Nitrogen as N	IS 14684:1999	357	mg/kg
8	Phosphorous as P_2O_5 [Available]	SOP No. UT/LQMS/SOP/S28	54	mg/kg

BDL: Below Detection Limit **DL: Detection Limit** **NA : Not Applicable**

Remark/ Statement of Conformity: *Nil*

Note:
1. This test report refers only to the sample tested.
2. This test report may not be reproduced in part, without the permission of this laboratory.
3. Any correction invalidates this test report.
4. Test results reported with unit/s † are obtained from scientific conversions/calculations applied to test results in mg/kg.
5. This test report shall be referred along with Test Report No. UT/ELS/REPORT/ 6068 / 07 - 2024 Dated 12/07/2024 for final conclusion.

Analyzed By:
Mayuri Gharge

Reviewed By:
Jayashree Acharya
(Quality Manager)

Authorized By:
Manasi Namjoshi
(Technical Manager)
Authorized Signatory

- END OF TEST REPORT -

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TEST REPORT

ISSUED TO: M/s.INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
Environmental Science and Engineering Department (ESED) ,IIT Bombay, Powai, Mumbai 400076

For Project: "PANVEL"

ULR NO. : ULR-TC5600 24 000004287F
REPORT NO. : UT/ELS/REPORT/ 6069 /07 -2024
ISSUE DATE : 12/07/2024
YOUR REF. : EMAIL CONFIRMATION
REF. DATE : 06/06/2024

SAMPLE PARTICULARS :

Sampling Plan Ref. No.: : NA
Sampling Procedure : NA
Date & Time of Sampling : 07/06/2024 16:50 Hrs.
Sample Registration Date : 08/06/2024
Analysis Starting Date : 08/06/2024
Analysis Completion Date : 19/06/2024
Sample Lab Code : UT/ELS/207/06-2024

SOIL SAMPLE ANALYSIS

Sample Type : Soil
Sample Location : Navade Grampanchayat
Sample Quantity & Packaging Details : 1 Kg. in Zipleck Plastic Bag. (Approximately)

Sample Collected By : Client

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1	pH [1 2.5 Soil:Water]	IS 2720 (Part 22):1972	7.9	-
2	Electrical Conductivity [1:2 Soil:Water]	IS 14767:2000	412	µS/cm
3	Organic Matter	IS 2720 (Part 22):1972	1.2	%
4	Water Holding Capacity	SOP No. UT/LQMS/SOP/S12	50.5	%
5	Sodium Adsorption Ratio	SOP No. UT/LQMS/SOP/S26	BDL[DL=1]	(meq/kg)[0.5]
6	Potassium as K	SOP No. UT/LQMS/SOP/S20	3	mg/kg
7	Total Nitrogen as N	IS 14684:1999	343	mg/kg
8	Phosphorous as P_2O_5 (Available)	SOP No. UT/LQMS/SOP/S28	32	mg/kg

BDL: Below Detection Limit **DL: Detection Limit** **NA : Not Applicable**

Remark/ Statement of Conformity: *Nil*

Note:
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3. Any correction invalidates this test report.
4. Test results reported with unit/s † are obtained from scientific conversions/calculations applied to test results in mg/kg.
5. This test report shall be referred along with Test Report No. UT/ELS/REPORT/ 6070 / 07 - 2024 Dated 12/07/2024 for final conclusion.

Analyzed By:
Mayuri Gharge

Reviewed By:
Jayashree Acharya
(Quality Manager)

Authorized By:
Manasi Namjoshi
(Technical Manager)
Authorized Signatory

- END OF TEST REPORT -

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Tel: 022-45119250, 022-45119239 / +91-7039076680 Email: lab@ultratech.in

TEST REPORT

ISSUED TO: **INDIAN INSTITUTE OF TECHNOLOGY BOMBAY**
Environmental Science and Engineering Department (ESED),IIT Bombay, Powai, Mumbai 400076, Project Site-"Panvel"
For Project: **Panvel**

ULR NO. : --
REPORT NO. : UT/ELS/REPORT/ 10037 /12 - 2024
ISSUE DATE : 05/12/2024
YOUR REF. : Verbal Confirmation
REF. DATE : 14/11/2024

SAMPLE PARTICULARS :
Sampling Plan Ref. No.: : NA
Sampling Procedure : UT/LQMS/SOP/S01A
Date & Time of Sampling : 14/11/2024 15:00 Hrs.
Sample Registration Date : 15/11/2024
Analysis Starting Date : 15/11/2024
Analysis Completion Date : 22/11/2024
Sample Lab Code : UT/ELS/0420/11-2024
Sample Collected By : Client

SOIL SAMPLE ANALYSIS
Sample Type : Soil
Sample Location : SL1 SHILP CHOWK
Sample Quantity & Packaging Details : 1 Kg. in Ziplock Plastic Bag. (Approximately)

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1	pH [1:2.5 Soil:Water] @ 25°C	IS 2720 (Part 26) : 1987	7.8	-
2	Electrical Conductivity [1:2 Soil:Water] @ 25°C	IS 14767:2000	141	µS/cm
3	Organic Matter	IS 2720 (Part 22):1972	0.3	%
4	Water Holding Capacity	SOP No. UT/LQMS/SOP/S12	51.2	%
5	Sodium Adsorption Ratio	SOP No. UT/LQMS/SOP/S26	BDL[DL=1]	$(meq/kg)^{(0.5)}$
6	Potassium as K	SOP No. UT/LQMS/SOP/S20	3	mg/kg
7	Total Nitrogen as N	IS 14684, Clause 4:1999	328	mg/kg
8	Phosphorous as P_2O_5 (Available)	SOP No. UT/LQMS/SOP/S28	12	mg/kg
9	Texture	USDA Soil Texture Triangle	SILT LOAM	%

Remark/ Statement of Conformity: *Nil*

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Authorized By:
Damini Chalke
Authorized Signatory

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TEST REPORT

ISSUED TO: **INDIAN INSTITUTE OF TECHNOLOGY BOMBAY**
Environmental Science and Engineering Department (ESED),IIT Bombay, Powai, Mumbai 400076, Project Site-"Panvel"
For Project:

ULR NO. : --
REPORT NO. : UT/ELS/REPORT/ 10038 /12 - 2024
ISSUE DATE : 05/12/2024
YOUR REF. : Verbal Confirmation
REF. DATE : 14/11/2024

SAMPLE PARTICULARS

Sampling Plan Ref. No.: NA
Sampling Procedure : UT/LQMS/SOP/S01A
Date & Time of Sampling : 14/11/2024 15:15 Hrs.
Sample Registration Date : 15/11/2024
Analysis Starting Date : 15/11/2024
Analysis Completion Date : 22/11/2024
Sample Lab Code : UT/ELS/0421/11-2024
Sample Collected By : Client

SOIL SAMPLE ANALYSIS

Sample Type : Soil
Sample Location : SL2 KALAMBOLI CIRCLE
Sample Quantity & Packaging Details : 1 Kg. in Ziplock Plastic Bag. (Approximately)

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1	pH [1:2.5 Soil:Water] @ 25°C	IS 2720 (Part 26) : 1987	7.5	-
2	Electrical Conductivity [1:2 Soil:Water] @ 25°C	IS 14767:2000	928	µS/cm
3	Organic Matter	IS 2720 (Part 22):1972	1.5	%
4	Water Holding Capacity	SOP No. UT/LQMS/SOP/S12	49.2	%
5	Sodium Adsorption Ratio	SOP No. UT/LQMS/SOP/S26	BDL[DL=1]	$(meq/kg)^{(0.5)}$
6	Potassium as K	SOP No. UT/LQMS/SOP/S20	25	mg/kg
7	Total Nitrogen as N	IS 14684, Clause 4:1999	857	mg/kg
8	Phosphorous as P_2O_5 (Available)	SOP No. UT/LQMS/SOP/S28	72	mg/kg
9	Texture	USDA Soil Texture Triangle	SILT LOAM	%

Remark/ Statement of Conformity: *Nil*

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TEST REPORT

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Environmental Science and Engineering Department (ESED),IIT Bombay, Powai, Mumbai 400076, Project Site-"Panvel"
For Project:

ULR NO. : --
REPORT NO. : UT/ELS/REPORT/ 10039 /12 -2024
ISSUE DATE : 05/12/2024
YOUR REF. : Verbal Confirmation
REF. DATE : 14/11/2024

SAMPLE PARTICULARS :
Sampling Plan Ref. No.: : NA
Sampling Procedure : UT/LQMS/SOP/S01A
Date & Time of Sampling : 14/11/2024 15:30 Hrs.
Sample Registration Date : 15/11/2024
Analysis Starting Date : 15/11/2024
Analysis Completion Date : 22/11/2024
Sample Lab Code : UT/ELS/0422/11-2024
Sample Collected By : Client.

SOIL SAMPLE ANALYSIS
Sample Type : Soil
Sample Location : SL3 PANVEL BUS DEPOT
Sample Quantity & Packaging Details : 1 Kg. in Ziplock Plastic Bag. (Approximately)

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1	pH [1:2.5 Soil:Water] @ 25°C	IS 2720 (Part 26) : 1987	7.7	-
2	Electrical Conductivity [1:2 Soil:Water] @ 25°C	IS 14767:2000	191	µS/cm
3	Organic Matter	IS 2720 (Part 22):1972	0.7	%
4	Water Holding Capacity	SOP No. UT/LQMS/SOP/S12	42.1	%
5	Sodium Adsorption Ratio	SOP No. UT/LQMS/SOP/S26	1.1	$(meq/kg)^{(0.5)}$
6	Potassium as K	SOP No. UT/LQMS/SOP/S20	53	mg/kg
7	Total Nitrogen as N	IS 14684, Clause 4:1999	286	mg/kg
8	Phosphorous as P_2O_5 (Available)	SOP No. UT/LQMS/SOP/S28	16	mg/kg
9	Texture	USDA Soil Texture Triangle	SILT LOAM	%

Remark/ Statement of Conformity: *Nil*

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TEST REPORT

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Environmental Science and Engineering Department (ESED),IIT Bombay, Powai, Mumbai 400076, Project Site-"Panvel"
For Project:

ULR NO. : --
REPORT NO. : UT/ELS/REPORT/ 10040 /12 -2024
ISSUE DATE : 05/12/2024
YOUR REF. : Verbal Confirmation
REF. DATE : 14/11/2024

SAMPLE PARTICULARS

Sampling Plan Ref. No.: : NA
Sampling Procedure : UT/LQMS/SOP/S01A
Date & Time of Sampling : 14/11/2024 15:40 Hrs.
Sample Registration Date : 15/11/2024
Analysis Starting Date : 15/11/2024
Analysis Completion Date : 22/11/2024
Sample Lab Code : UT/ELS/0423/11-2024
Sample Collected By : Client

SOIL SAMPLE ANALYSIS

Sample Type : Soil
Sample Location : SL4 NAVADE GRAM PANCHAYAT
Sample Quantity & Packaging Details : 1 Kg. in Ziplock Plastic Bag. (Approximately)

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1	pH [1:2.5 Soil:Water] @ 25°C	IS 2720 (Part 26) : 1987	7.5	-
2	Electrical Conductivity [1:2 Soil:Water] @ 25°C	IS 14767:2000	190	µS/cm
3	Organic Matter	IS 2720 (Part 22):1972	0.8	%
4	Water Holding Capacity	SOP No. UT/LQMS/SOP/S12	46.9	%
5	Sodium Adsorption Ratio	SOP No. UT/LQMS/SOP/S26	1.0	$(meq/kg)^{(0.5)}$
6	Potassium as K	SOP No. UT/LQMS/SOP/S20	37	mg/kg
7	Total Nitrogen as N	IS 14684, Clause 4:1999	343	mg/kg
8	Phosphorous as P_2O_5 (Available)	SOP No. UT/LQMS/SOP/S28	68	mg/kg
9	Texture	USDA Soil Texture Triangle	SILT LOAM	%

NA : Not Applicable

Remark/ Statement of Conformity: *Nil*

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Annexure V

Noise Monitoring Results

Pre monsoon results

Noise Quality (In dB)				
Sr no.	Locations			
	Panvel Bus Depot	Kalamboli Circle	Taloja MIDC	Shilpa Chowk Kharghar
1	66.1	68.5	70.6	56.8
2	60.8	78.3	65.5	61.6
3	77.4	82.7	61.8	66.2
4	73.6	83.1	70.2	61.1
5	64.4	77	62.5	59.8
6	62.1	76.4	61.2	75.1
7	64.9	88.4	78.2	68.1
8	68	83.5	76.8	74.3
9	77.5	96	76.6	67.3
10	64.6	81.9	74.8	73.9
11	64.2	73.2	81.9	73.2
12	62.8	84.9	78.7	70.8
13	76.9	70.5	75.8	80.6
14	67.9	90.9	63.1	76.2
15	64.4	81.5	63.4	77.1
16	62.6	95	79.4	70.7
17	64.8	86.5	81.5	69.2
18	69.6	64.2	60.4	61.1
19	67.3	67.4	67.7	78.9
20	70.2	65.4	67.2	74.8
21	63.3	86.2	63.8	74.6
22	64	72.4	66.3	80.7
23	62.7	67.7	67.8	93.8
24	66.6	66.9	71.4	68.6
25	63.1	67.1	77.6	80.6
26	65.3	66	66.8	84
27	83.9	67.2	98.3	78.3
28	67.4	65.5	81.1	64.8
29	69.5	64	76.2	87.7

30	63	69.3	66.1	67.3
31	61.9	74.3	76.4	66.5
32	79	66.5	72.2	70.3
33	85.6	63.4	64.7	80.2
34	63.8	64.6	64.8	71.4
35	67.2	62.5	63.7	79.6
36	65.5	62.4	71.6	75.8
37	65.9	79.7	65	75.6
38	62.8	61.5	73.6	68.6
39	67.8	61.2	62.4	76.9
40	63.4	73.6	62.5	72
41	66	62.8	74.5	93
42	63	67.3	72.4	81.3
43	62.8	66.1	70.9	74.7
44	74.9	75	70.2	80.6
45	64	77.8	64.1	71.2
46	61.7	67.1	56.2	69.6
47	66.9	76.8	59.9	69.6
48	73.3	63.1	68.8	69.8
49	64.5	78	73.9	69.9
50	99.1	67.9	65.7	66.1
51	69.2	66.8	62.4	74.6
52	63.7	71.9	70.7	74.1
53	63.5	69.2	82.4	69.8
54	64	69	74	69.8
55	70.8	65.4	62.2	68.6
56	61.7	64.3	73.9	64.5
57	63.4	67.7	75.4	64.8
58	62.1	62.1	65.6	67.4
59	66.6	77.9	68.2	67.6
60	64	79.8	62.6	77
61	62.8	64.3	70.2	74.1
62	69.6	60.4	71.2	69.2
63	64.7	75.9	64.9	69.9
64	65.3	64.5	61.9	72.7
65	64.3	70.2	62.2	68.6
66	65.2	68.7	63.4	80.8
67	64.3	63.1	68.8	73.9
68	73.7	66.9	71.5	71.6

69	66.7	59.5	77.1	70.9
70	75.4	61.4	68.8	79.7
71	70	62.2	60.6	72
72	71.2	65.9	72.2	71.7
73	68.6	65.1	64.5	65.8
74	69.4	66.3	67.5	72.9
75	69.8	60.4	71.6	75
76	71.1	65.8	61.1	93.1
77	78.3	70.4	68.3	67.7
78	79.3	64.3	60.1	75.5
79	76.4	60.3	51.9	69.5
80	73	60.3	54.8	65.1
81	75.9	59.2	59.1	65.9
82	68.8	61.2	63.6	69.9
83	72.4	59.8	64.2	68.5
84	74.4	66.8	65.3	65.8
85	86.5	68.4	57.9	75.8
86	73.8	61.8	59.1	64.4
87	68.4	58.6	56.8	71.4
88	72.6	61.1	68	66.5
89	80.4	58.1	65	81.4
90	74.9	61.2	63.8	83
91	77.8	74.4	72.5	77.8
92	75.3	58.2	70.3	73.7
93	80.5	70.1	62.3	87.5
94	81	69.6	63.5	111.1
95	93.6	64.8	65.2	87.2
96	86.8	63.9	64.8	79.4
97	82.6	78.7	68	81.3
98	80.9	60	67.4	67.6
99	61.7	48.1	73.4	83.2
100	66.9	54.6	65.6	68.7
101	73.3	63.6	64.3	76.4
102	64.5	60.3	63	67.1
103	99.1	55.8	65.3	76.7
104	69.2	64.9	71.1	82.8
105	63.7	42.6	66	79.7
106	63.5	77.4	68.1	69
107	64	37	64.2	86

108	70.8	38	56.7	76.8
109	61.7	40.4	65.1	73.4
110	63.4	35.7	59.6	85.9
111	62.1	39.6	74.4	69.6
112	66.6	39.3	82.8	70.3
113	64	42.2	75.8	79
114	62.8	36.1	76.6	70.9
115	69.6	51.2	89.5	75.5
116	64.7	61.2	83.8	75
117	65.3	42.2	87.2	73.4
118	64.3	45.6	87.7	78.8
119	65.2	42	93.6	68.2
120	64.3	53.6	84.3	69.4
min	60.8	35.7	51.9	56.8
max	99.1	96	98.3	111.1
avg	69.36	65.64	69.09	73.77

Post monsoon results

Noise Quality (In dB)				
Sr no.	**Locations**			
	Panvel Bus Depot	**Kalamboli Circle**	**Taloja MIDC**	**Shilpa Chowk Kharghar**
1	46.5	67.6	62.8	59
2	39.2	68.1	70.4	58.9
3	36.9	70.6	78.2	59.4
4	44	76.5	77.4	59.8
5	41.5	77.2	71.3	59.6
6	39.6	76	84.7	59.1
7	38.6	72.1	73	61.1
8	37.1	67.8	70.6	59.3
9	39.5	86.2	81.5	58.9
10	41	63.7	78.7	59
11	38.5	41.6	59.8	59.2
12	40.4	43.2	69.8	59.7
13	36.2	46.2	66.6	59.3
14	36.7	50.2	76.3	59.4
15	37.4	41.1	81.6	59.6

16	40.7	37.4	76.2	59.1
17	39.9	36.8	60.1	59.2
18	43.1	39.7	70.2	59.6
19	42.4	39.2	77.8	58.9
20	36.7	36.7	71.6	59.3
21	34.2	41.3	80.4	59.8
22	45.5	45.5	60.8	59.7
23	40.4	42	62.5	59.7
24	41.3	43.2	57.8	59.3
25	46.8	50	64.1	59.6
26	47.8	42	73.3	59.6
27	46.7	41.8	61.2	60.9
28	42.2	45.9	57.8	58.8
29	40.4	39	57.9	59
30	44.3	41.5	66.3	59.5
31	39.1	40	82.3	59.5
32	50.6	40.8	78.7	60.6
33	47.8	38	77.9	60.9
34	52.3	38	75.6	66.2
35	47.2	37.8	70.2	74.5
36	37.7	43.8	71.7	82.5
37	41.6	40.1	74.2	62
38	43.8	42	73.4	60.5
39	45.1	48.1	75.1	82.4
40	38.1	39.7	68.4	65.9
41	40.6	42.1	68.6	77.9
42	53.5	44.3	75.2	65.9
43	39.3	43.2	88.8	69.1
44	33.9	51.4	102.4	76.4
45	39.2	52.5	94	71.6
46	41	51.4	76.7	68.9
47	50	39.8	66.8	83.7
48	39.9	42	68.8	70.6
49	49.4	38.8	68.8	75.1
50	40.9	45.6	66.8	59.5
51	34.6	40.4	73.9	60.1
52	33.4	43.3	69.3	60.6
53	34.1	36.2	66.7	72.7
54	38.6	36.9	65.4	83.7

55	38.9	39.6	66.7	59.4
56	32.7	38	66.9	76.9
57	39.9	44.5	65.8	59.8
58	37.1	43.2	65.6	59.7
59	44.5	44.7	69.2	74.5
60	41.4	47.4	68.6	76.5
61	38.5	45.2	69.7	83.1
62	42.3	48	73.3	59.2
63	44.9	41.7	66.4	60.7
64	39.9	44.4	66.9	59.8
65	44.3	35.4	69.4	74.9
66	47.7	36.4	66.5	60.5
67	43.9	38.3	65	62.9
68	35.8	43.9	71.7	82
69	36.5	43	65.3	60.7
70	46.9	41.3	69.7	63.2
71	38.1	43.4	70	59.7
72	45.9	45.6	71	84.6
73	48.3	41.3	72.1	66.9
74	41.7	46.2	76.9	81.8
75	40.2	45.7	70.2	60.6
76	49.1	37.6	70.4	71.8
77	39.1	68.9	74.9	79.2
78	35.9	61.8	77.4	75.7
79	40.4	69.8	73.5	84.9
80	41.9	67.7	92.4	76.5
81	49.8	64.5	79.4	72.6
82	50.4	69.8	68.3	83.9
83	48.2	75.4	65	81.1
84	40.8	70.7	66.2	67.6
85	42.6	63.2	64.6	79
86	53.4	62.4	64.7	64.5
87	49.1	70.5	63.4	66.5
88	56.6	68.4	61.9	81.8
89	49.1	77.2	59.8	77.1
90	43.3	56.9	72.2	68.3
91	48.9	60.8	63.6	69.8
92	38.8	70.9	63.7	65.1
93	41	63	69.4	70.8

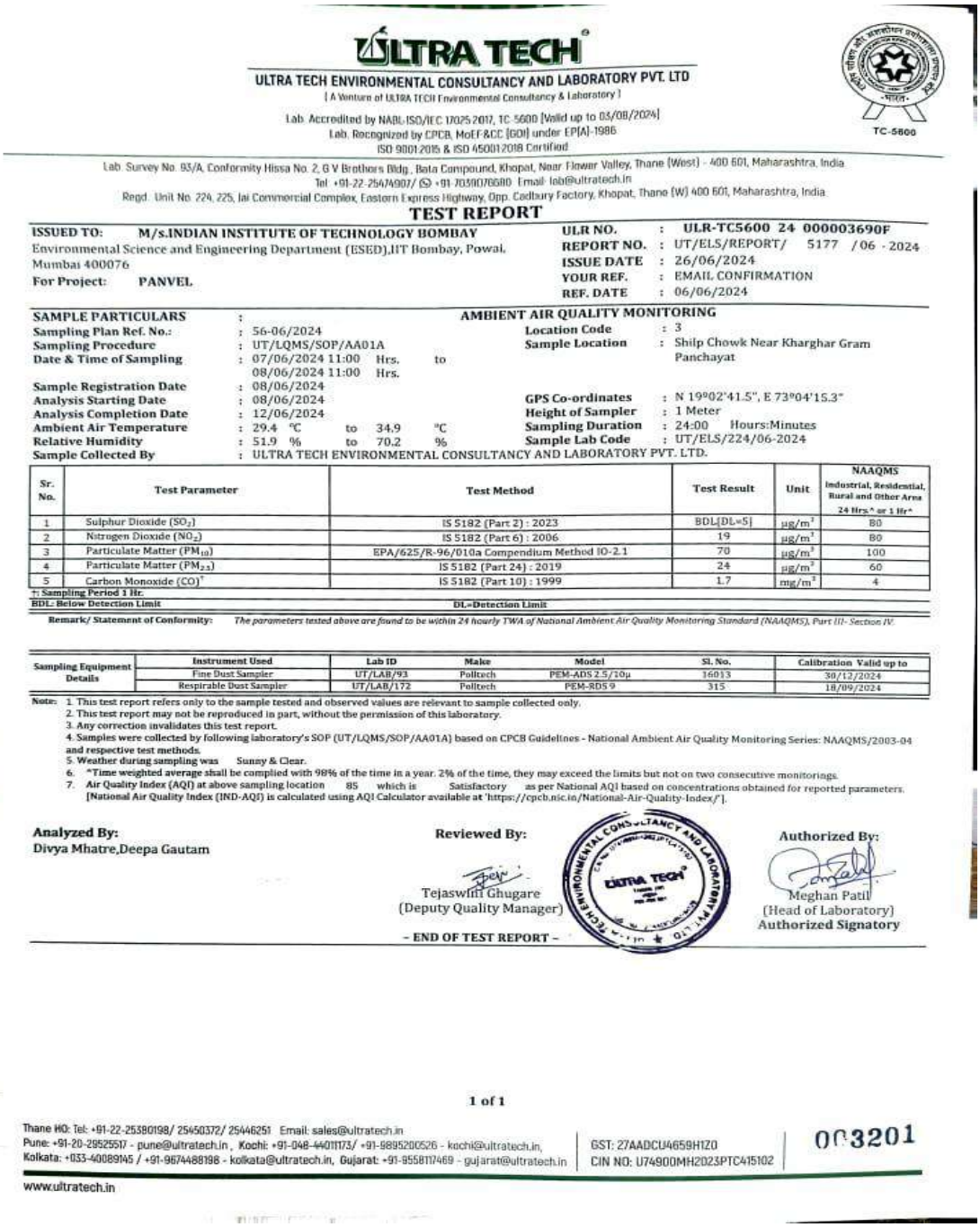
94	36.6	67.4	68.7	80.4
95	43.7	66.6	66.9	71.9
96	44.3	64.2	97.4	73.4
97	48	70.1	71.7	62.8
98	46.5	69.2	66.5	71.9
99	46.1	67.1	64.5	61.2
100	43	79.6	71	86.8
101	43.3	73.9	62.4	73.5
102	50.7	72.8	71.4	72.2
103	39.7	65.4	64.9	68.3
104	42.1	64.5	61.6	66.7
105	46.7	68	64	71
106	43	69.9	68.9	63.5
107	47.9	71.7	62.4	68
108	42.2	69.3	70.2	63.7
109	39.3	64.6	65.1	64.3
110	44.7	63.7	66.9	72.3
111	44.3	61.4	59.3	68.5
112	43.3	67.3	75.7	65.4
113	50.2	64.6	58.9	68.3
114	47.3	63.8	62.3	75.6
115	57.9	65.1	63.2	67.2
116	42.9	67.7	70.8	72.5
117	40.3	69.5	63.7	76.9
118	41.4	72.5	64	75.7
119	41	68.5	60.1	72.1
120	39.3	69.1	61.3	73
121	45	67.5	60.1	73
122	40.9	79	58.1	76
123	40.3	73.7	64.3	76.7
124	57.1	67.4	67.9	76.6
125	42.4	62.1	69.4	71.5
126	44.5	72.9	64.3	75.7
127	39	68.3	65	71.6
128	40.5	62.2	63.8	75.2
129	38.9	70.9	60.7	65.8
130	38.5	64.3	62.3	77.8
131	38.5	77.1	62.9	67.1
132	40.4	81.2	87	69.9

133	39.5	76.9	76.4	65.8
134	48.1	62	65.8	80.3
135	43.8	69.3	83	69.2
136	44.1	66.5	74.5	66.7
137	45.9	59.5	75.8	84.5
138	36.7	72.4	69	84.5
139	47.4	57.2	78.9	78.5
140	53.2	57	60.7	64.3
141	51.3	71.5	78.8	81.2
142	46.8	64.9	56.9	85.8
143	42.6	64.1	58.9	43.7
144	40	58.6	59.1	54.3
145	44.7	62	62.1	59.4
146	45.2	66	62.2	48.3
147	38.1	62.5	58.8	49.9
148	43.9	63.1	57.3	50.5
149	42.2	65.5	57.1	52.8
150	39.3	67	57.3	49
151	40.4	72.3	59.5	44.7
152	46.5	76.9	56.7	47
153	36.7	79.2	61.8	44.8
154	35.6	75.8	57	56.9
155	41.6	76	56.8	45.9
156	38.8	72.9	56.6	54.3
157	44.2	64.8	65.9	58.4
158	46.2	70.3	68	53.5
159	39.4	67	61.9	55.1
160	48.2	74.1	56.7	52.9
161	47.5	74.5	57.1	43.5
162	46.3	74.4	57.1	46.8
163	41.8	75.9	67.9	63.4
164	40.9	77.6	61.2	57.8
165	40.7	66.7	48	52.3
166	38.5	71.8	47.8	49.8
167	46.8	70.1	46.1	62.6
168	44	69.4	44.8	54.6
169	38.7	66.2	39.2	51.7
170	42.2	66	40.7	56.3
171	37.2	64.2	39.8	67.4

172	36.3	60.1	38.9	58.6
173	43.9	71.1	44.5	59.1
174	43.4	60.3	40.2	56.1
175	42.1	60.1	46.9	59.4
176	44.1	61.6	42.6	74.6
177	39.6	70.4	40.6	77.7
178	41.2	62.4	44.5	88.6
179	40.8	60	40.7	58.9
180	35.5	71.2	46.5	57.1
181	48.6	68.2	41.7	56.7
182	42.4	65	36.5	51.5
183	35.7	65.2	55.7	56.5
184	41.3	85.7	62.5	55.1
185	35.1	62.7	73.3	60.7
186	38.1	59.5	65.3	66.8
187	32.1	60.6	55.9	66.2
188	32.7	66.6	63.2	68.4
189	32.7	70.2	69.5	61.4
190	35.2	51.9	63.1	92.3
191	43	48.8	49.5	78.2
192	42.6	50.9	70.4	74.6
193	42.6	57	35.6	71.6
194	42.2	62.7	41.6	58.4
195	38.6	69.9	42.5	61.8
196	41.4	50.4	52	66.2
197	37.9	58.9	49.8	70.7
198	44.7	71.2	36.3	69
199	46	49.5	35.7	64.6
200	40.1	53.7	41.5	81
min	32.1	35.4	35.6	43.5
max	57.9	86.2	102.4	92.3
avg	42.31	59.13	64.79	66.06

Annexure VI

Air Monitoring Results (LAB)



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TC-5600
Lab: Survey No. 93/A, Conformity Hissa No. 2, G V Brothers Bldg., Bata Compound, Khopat, Near Flower Valley, Thane (West) - 400 601, Maharashtra, India
Tel: +91-22-25474907/ +91-7030076680 Email: lab@ultratech.in
Regd. Unit No. 224, 225, Jai Commercial Complex, Eastern Express Highway, Opp. Cadbury Factory, Khopat, Thane (W) 400 601, Maharashtra, India

TEST REPORT

ISSUED TO: M/s.INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
Environmental Science and Engineering Department (ESED),IIT Bombay, Powai, Mumbai 400076
For Project: PANVEL

ULR NO. : ULR-TC5600 24 000003690F
REPORT NO. : UT/ELS/REPORT/ 5177 /06 - 2024
ISSUE DATE : 26/06/2024
YOUR REF. : EMAIL CONFIRMATION
REF. DATE : 06/06/2024

SAMPLE PARTICULARS : **AMBIENT AIR QUALITY MONITORING**

Sampling Plan Ref. No.:	56-06/2024	**Location Code**	3
Sampling Procedure	UT/LQMS/SOP/AA01A	**Sample Location**	Shilp Chowk Near Kharghar Gram Panchayat
Date & Time of Sampling	07/06/2024 11:00 Hrs. to 08/06/2024 11:00 Hrs.		
Sample Registration Date	08/06/2024		
Analysis Starting Date	08/06/2024	**GPS Co-ordinates**	N 19°02'41.5", E 73°04'15.3"
Analysis Completion Date	12/06/2024	**Height of Sampler**	1 Meter
Ambient Air Temperature	29.4 °C to 34.9 °C	**Sampling Duration**	24:00 Hours:Minutes
Relative Humidity	51.9 % to 70.2 %	**Sample Lab Code**	UT/ELS/224/06-2024
Sample Collected By	ULTRA TECH ENVIRONMENTAL CONSULTANCY AND LABORATORY PVT. LTD.		

Sr. No.	Test Parameter	Test Method	Test Result	Unit	NAAQMS Industrial, Residential, Rural and Other Area 24 Hrs.^ or 1 Hr*
1	Sulphur Dioxide (SO_2)	IS 5182 (Part 2) : 2023	BDL(DL=5)	$\mu g/m^3$	80
2	Nitrogen Dioxide (NO_2)	IS 5182 (Part 6) : 2006	19	$\mu g/m^3$	80
3	Particulate Matter (PM_{10})	EPA/625/R-96/010a Compendium Method IO-2.1	70	$\mu g/m^3$	100
4	Particulate Matter ($PM_{2.5}$)	IS 5182 (Part 24) : 2019	24	$\mu g/m^3$	60
5	Carbon Monoxide (CO)*	IS 5182 (Part 10) : 1999	1.7	mg/m^3	4

*: Sampling Period 1 Hr.
BDL: Below Detection Limit DL=Detection Limit

Remark/ Statement of Conformity: *The parameters tested above are found to be within 24 hourly TWA of National Ambient Air Quality Monitoring Standard (NAAQMS), Part III- Section IV.*

Sampling Equipment Details	Instrument Used	Lab ID	Make	Model	Sl. No.	Calibration Valid up to
	Fine Dust Sampler	UT/LAB/93	Polltech	PEM-ADS 2.5/10μ	16013	30/12/2024
	Respirable Dust Sampler	UT/LAB/172	Polltech	PEM-RDS 9	315	18/09/2024

Note: 1. This test report refers only to the sample tested and observed values are relevant to sample collected only.
2. This test report may not be reproduced in part, without the permission of this laboratory.
3. Any correction invalidates this test report.
4. Samples were collected by following laboratory's SOP (UT/LQMS/SOP/AA01A) based on CPCB Guidelines - National Ambient Air Quality Monitoring Series: NAAQMS/2003-04 and respective test methods.
5. Weather during sampling was Sunny & Clear.
6. *Time weighted average shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive monitorings.
7. Air Quality Index (AQI) at above sampling location 85 which is Satisfactory as per National AQI based on concentrations obtained for reported parameters. [National Air Quality Index (IND-AQI) is calculated using AQI Calculator available at 'https://cpcb.nic.in/National-Air-Quality-Index/'].

Analyzed By:
Divya Mhatre,Deepa Gautam

Reviewed By:
Tejaswini Ghugare
(Deputy Quality Manager)

Authorized By:
Meghan Patil
(Head of Laboratory)
Authorized Signatory

- END OF TEST REPORT -

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ISO 9001:2015 & ISO 45001:2018 Certified

TC-5600

Lab: Survey No. 93/A, Conformity Hissa No. 2, G V Brothers Bldg., Bata Compound, Khopat, Near Flower Valley, Thane (West) - 400 601, Maharashtra, India.
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Regd. Unit No. 224, 225, Jai Commercial Complex, Eastern Express Highway, Opp. Cadbury Factory, Khopat, Thane (W) 400 601, Maharashtra, India.

TEST REPORT

ISSUED TO: M/s.INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
Environmental Science and Engineering Department (ESED),IIT Bombay, Powai, Mumbai 400076
For Project: "PANVEL"

ULR NO. : ULR-TC5600 24 000003692F
REPORT NO. : UT/ELS/REPORT/ 5179 /06 - 2024
ISSUE DATE : 26/06/2024
YOUR REF. : EMAIL CONFIRMATION
REF. DATE : 06/06/2024

SAMPLE PARTICULARS

Sampling Plan Ref. No.: : 56-06/2024
Sampling Procedure : UT/LQMS/SOP/AA01A
Date & Time of Sampling : 07/06/2024 11:55 Hrs. to 08/06/2024 11:55 Hrs.
Sample Registration Date : 08/06/2024
Analysis Starting Date : 08/06/2024
Analysis Completion Date : 12/06/2024
Ambient Air Temperature : 29.5 °C to 35.1 °C
Relative Humidity : 51.3 % to 69.5 %
Sample Collected By : ULTRA TECH ENVIRONMENTAL CONSULTANCY AND LABORATORY PVT. LTD.

AMBIENT AIR QUALITY MONITORING

Location Code : 2
Sample Location : Kalamboli Circle Traffic Police Chowki
GPS Co-ordinates : N 19°01'04.8", E 73°06'23.1"
Height of Sampler : 1 Meter
Sampling Duration : 24:00 Hours:Minutes
Sample Lab Code : UT/ELS/226/06-2024

Sr. No.	Test Parameter	Test Method	Test Result	Unit	NAAQMS Industrial, Residential, Rural and Other Area 24 Hrs.* or 1 Hr*
1	Sulphur Dioxide (SO_2)	IS 5182 (Part 2) : 2023	BDL[DL=5]	$\mu g/m^3$	80
2	Nitrogen Dioxide (NO_2)	IS 5182 (Part 6) : 2006	29	$\mu g/m^3$	80
3	Particulate Matter (PM_{10})	EPA/625/R-96/010a Compendium Method IO-2.1	155	$\mu g/m^3$	100
4	Particulate Matter ($PM_{2.5}$)	IS 5182 (Part 24) : 2019	41	$\mu g/m^3$	60
5	Carbon Monoxide (CO)+	IS 5182 (Part 10) : 1999	1.2	mg/m^3	4

+: Sampling Period 1 Hr.
BDL: Below Detection Limit DL=Detection Limit

Remark/ Statement of Conformity: *The parameters tested above are found to be within 24 hourly TWA of National Ambient Air Quality Monitoring Standard (NAAQMS), Part III- Section IV.*

Sampling Equipment Details	Instrument Used	Lab ID	Make	Model	Sl. No.	Calibration Valid up to
	Fine Dust Sampler	UT/LAB/106	Polltech	PEM-ADS 2.5/10μ	18213	30/12/2024
	Respirable Dust Sampler	UT/LAB/191	Polltech	PEM-RDS 9	1018	21/01/2025

Note:
1. This test report refers only to the sample tested and observed values are relevant to sample collected only.
2. This test report may not be reproduced in part, without the permission of this laboratory.
3. Any correction invalidates this test report.
4. Samples were collected by following laboratory's SOP (UT/LQMS/SOP/AA01A) based on CPCB Guidelines - National Ambient Air Quality Monitoring Series: NAAQMS/2003-04 and respective test methods.
5. Weather during sampling was Sunny & Clear.
6. *Time weighted average shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive monitorings.
7. Air Quality Index (AQI) at above sampling location 137 which is Moderate as per National AQI based on concentrations obtained for reported parameters. [National Air Quality Index (IND-AQI) is calculated using AQI Calculator available at 'https://cpcb.nic.in/National-Air-Quality-Index/'].

Analyzed By:
Divya Mhatre,Deepa Gautam

Reviewed By:
Tejaswini Ghugare
(Deputy Quality Manager)

Authorized By:
Meghan Patil
(Head of Laboratory)
Authorized Signatory

– END OF TEST REPORT –

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TC-5600

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Regd: Unit No. 224, 225, Jai Commercial Complex, Eastern Express Highway, Opp. Cadbury Factory, Khopat, Thane (W) 400 601, Maharashtra, India

TEST REPORT

ISSUED TO: M/s.INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
Environmental Science and Engineering Department (ESED),IIT Bombay, Powai, Mumbai 400076
For Project: PANVEL

ULR NO. : ULR-TC5600 24 000003691F
REPORT NO. : UT/ELS/REPORT/ 5178 /06 - 2024
ISSUE DATE : 26/06/2024
YOUR REF. : EMAIL CONFIRMATION
REF. DATE : 06/06/2024

SAMPLE PARTICULARS

Sampling Plan Ref. No.: 56-06/2024
Sampling Procedure : UT/LQMS/SOP/AA01A
Date & Time of Sampling : 07/06/2024 11:30 Hrs. to 08/06/2024 11:30 Hrs.
Sample Registration Date : 08/06/2024
Analysis Starting Date : 08/06/2024
Analysis Completion Date : 12/06/2024
Ambient Air Temperature : 29.6 °C to 35.1 °C
Relative Humidity : 51.4 % to 69.6 %
Sample Collected By : ULTRA TECH ENVIRONMENTAL CONSULTANCY AND LABORATORY PVT. LTD.

AMBIENT AIR QUALITY MONITORING

Location Code : 4
Sample Location : Navade Grampanchayat
GPS Co-ordinates : N 19°02'57.0", E 73°06'05.9"
Height of Sampler : 1 Meter
Sampling Duration : 24:00 Hours:Minutes
Sample Lab Code : UT/ELS/225/06-2024

Sr. No.	Test Parameter	Test Method	Test Result	Unit	NAAQMS Industrial, Residential, Rural and Other Area 24 Hrs.* or 1 Hr^
1	Sulphur Dioxide (SO_2)	IS 5182 (Part 2) : 2023	BDL(DL=5)	$\mu g/m^3$	80
2	Nitrogen Dioxide (NO_2)	IS 5182 (Part 6) : 2006	27	$\mu g/m^3$	80
3	Particulate Matter (PM_{10})	EPA/625/R-96/010a Compendium Method IO-2.1	317	$\mu g/m^3$	100
4	Particulate Matter ($PM_{2.5}$)	IS 5182 (Part 24) : 2019	59	$\mu g/m^3$	60
5	Carbon Monoxide (CO)^	IS 5182 (Part 10) : 1999	1.5	mg/m³	4

*: Sampling Period 1 Hr.
BDL: Below Detection Limit DL=Detection Limit

Remark/ Statement of Conformity: *The parameters tested above are found to be within 24 hourly TWA of National Ambient Air Quality Monitoring Standard (NAAQMS), Part III - Section IV.*

Sampling Equipment Details	Instrument Used	Lab ID	Make	Model	Sl. No.	Calibration Valid up to
	Fine Dust Sampler	UT/LAB/193	Polltech	PEM-ADS 2.5/10μ	1318	30/12/2024
	Respirable Dust Sampler	UT/LAB/108	Polltech	PEM-RDS 8NL	3313	18/09/2024

Note:
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3. Any correction invalidates this test report.
4. Samples were collected by following laboratory's SOP (UT/LQMS/SOP/AA01A) based on CPCB Guidelines - National Ambient Air Quality Monitoring Series: NAAQMS/2003-04 and respective test methods.
5. Weather during sampling was Sunny & Clear.
6. ^Time weighted average shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive monitorings.
7. Air Quality Index (AQI) at above sampling location 267 which is Poor as per National AQI based on concentrations obtained for reported parameters. [National Air Quality Index (IND-AQI) is calculated using AQI Calculator available at 'https://cpcb.nic.in/National-Air-Quality-Index/'].

Analyzed By:
Divya Mhatre,Deepa Gautam

Reviewed By:
Tejaswini Ghugare
(Deputy Quality Manager)

Authorized By:
Meghan Patil
(Head of Laboratory)
Authorized Signatory

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TC-5600

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TEST REPORT

ISSUED TO: **M/s.INDIAN INSTITUTE OF TECHNOLOGY BOMBAY**		**ULR NO.**	: ULR-TC5600 24 000003693F
Environmental Science and Engineering Department (ESED),IIT Bombay, Powai,		**REPORT NO.**	: UT/ELS/REPORT/ 5180 /06 - 2024
Mumbai 400076		**ISSUE DATE**	: 26/06/2024
For Project:	**PANVEL**	**YOUR REF.**	: EMAIL CONFIRMATION
		REF. DATE	: 06/06/2024

SAMPLE PARTICULARS :

AMBIENT AIR QUALITY MONITORING

Sampling Plan Ref. No.:	: 56-06/2024	**Location Code**	: 1
Sampling Procedure	: UT/LQMS/SOP/AA01A	**Sample Location**	: Panvel Bus Depot
Date & Time of Sampling	: 07/06/2024 12:20 Hrs. to 08/06/2024 12:20 Hrs.		
Sample Registration Date	: 08/06/2024		
Analysis Starting Date	: 08/06/2024	**GPS Co-ordinates**	: N 18º59'30.1", E 73º06'60.0"
Analysis Completion Date	: 12/06/2024	**Height of Sampler**	: 1 Meter
Ambient Air Temperature	: 29.4 ℃ to 35.2 ℃	**Sampling Duration**	: 24:00 Hours:Minutes
Relative Humidity	: 51.2 % to 69.4 %	**Sample Lab Code**	: UT/ELS/227/06-2024
Sample Collected By	: ULTRA TECH ENVIRONMENTAL CONSULTANCY AND LABORATORY PVT. LTD.		

Sr. No.	Test Parameter	Test Method	Test Result	Unit	NAAQMS Industrial, Residential, Rural and Other Area 24 Hrs.* or 1 Hr*
1	Sulphur Dioxide (SO_2)	IS 5182 (Part 2) : 2023	BDL[DL=5]	µg/m³	80
2	Nitrogen Dioxide (NO_2)	IS 5182 (Part 6) : 2006	16	µg/m³	80
3	Particulate Matter (PM_{10})	EPA/625/R-96/010a Compendium Method IO-2.1	280	µg/m³	100
4	Particulate Matter ($PM_{2.5}$)	IS 5182 (Part 24) : 2019	76	µg/m³	60
5	Carbon Monoxide (CO)†	IS 5182 (Part 10) : 1999	1.5	mg/m³	4

†:Sampling Period 1 Hr.

BDL: Below Detection Limit **DL=Detection Limit**

Remark/ Statement of Conformity: *The parameters tested above are found to be within 24 hourly TWA of National Ambient Air Quality Monitoring Standard (NAAQMS), Part III- Section IV.*

Sampling Equipment Details	Instrument Used	Lab ID	Make	Model	Sl. No.	Calibration Valid up to
	Fine Dust Sampler	UT/LAB/242	Polltech	PEM-ADS 2.5/10µ	522	01/12/2024
	Respirable Dust Sampler	UT/LAB/171	Polltech	PEM-RDS 9	215	18/09/2024

Note:
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2. This test report may not be reproduced in part, without the permission of this laboratory.
3. Any correction invalidates this test report.
4. Samples were collected by following laboratory's SOP (UT/LQMS/SOP/AA01A) based on CPCB Guidelines - National Ambient Air Quality Monitoring Series: NAAQMS/2003-04 and respective test methods.
5. Weather during sampling was Sunny & Clear.
6. *Time weighted average shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive monitorings.
7. Air Quality Index (AQI) at above sampling location 230 which is Poor as per National AQI based on concentrations obtained for reported parameters. [National Air Quality Index (IND-AQI) is calculated using AQI Calculator available at 'https://cpcb.nic.in/National-Air-Quality-Index/'].

Analyzed By:
Divya Mhatre,Deepa Gautam

Reviewed By:
Tejaswini Ghugare
(Deputy Quality Manager)

Authorized By:
Meghan Patil
(Head of Laboratory)
Authorized Signatory

– END OF TEST REPORT –

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Lab Operates at : Survey No. 93/A, Conformity Hissa No. 2, G V Brothers Bldg., Bata Compound, Khopat, Near Flower Valley, Thane (West) - 400 601, Maharashtra, India.
Tel: 022-45119250, 022-45119239 / +91-7039076680 Email: lab@ultratech.in

TEST REPORT

ISSUED TO: THE INDIAN INSTITUTE OF TECHNOLOGY MUMBAI (INDIAN INSTITUTE OF TECHNOLOGY BOMBAY) o/b/o Sustainable Approach for Green Environment LLP
Environamental Science and Engineering Department (ESED),IIT Bombay, Powai, Mumbai 400076
For Project: "Panvel Municipal Corporation (PMC) Sites"

ULR NO. : ULR-TC14909 25 000001813F
REPORT NO. : UT/ELS/REPORT/ 02630 /03 -2025
ISSUE DATE : 19/03/2025
YOUR REF. : E-Mail Confirmation
REF. DATE : 28/02/2025

SAMPLE PARTICULARS : **AMBIENT AIR QUALITY MONITORING**

Sampling Plan Ref. No.:	49-03/2025	**Location Code**	1
Sampling Procedure	UT/LQMS/SOP/AA01A	**Sample Location**	Near Kharghar Grampanchayat
Date & Time of Sampling	10/03/2025 11:00 Hrs. to 11/03/2025 11:00 Hrs.		
Sample Registration Date	12/03/2025		
Analysis Starting Date	12/03/2025	**GPS Co-ordinates**	N 19°02'42.5", E 73°04'15.8"
Analysis Completion Date	15/03/2025	**Height of Sampler**	1 Meter
Ambient Air Temperature	27.3 °C to 35.4 °C	**Sampling Duration**	24:00 Hours:Minutes
Relative Humidity	45.5 % to 67.5 %	**Sample Lab Code**	UT/ELS/0394/03-2025
Sample Collected By	ULTRA TECH ENVIRONMENTAL CONSULTANCY AND LABORATORY PVT. LTD.		

Sr. No.	Test Parameter	Test Method	Test Result	Unit	NAAQMS Industrial, Residential, Rural and Other Area 24 Hrs.* or 1 Hr*
1	Sulphur Dioxide (SO_2)	IS 5182 (Part 2) : 2023	9	$\mu g/m^3$	80
2	Nitrogen Dioxide (NO_2)	IS 5182 (Part 6) : 2006	18	$\mu g/m^3$	80
3	Particulate Matter (PM_{10})	IS 5182 (Part 23) : 2006	71	$\mu g/m^3$	100
4	Particulate Matter ($PM_{2.5}$)	IS 5182 (Part 24) : 2019	26	$\mu g/m^3$	60
5	Carbon Monoxide (CO)[1]	IS 5182 (Part 10) : 1999	1.2	mg/m^3	4

#: Sampling Period 1 Hr.

Remark/ Statement of Conformity: *The parameters tested above are found to be within TWA of National Ambient Air Quality Monitoring Standard (NAAQMS), Part III- Section IV.*

Sampling Equipment Details	Instrument Used	Lab ID	Make	Model	Sl No.	Calibration Valid up to
	Fine Dust Sampler	UT/LAS/215	Poltech	PEM-ADS 2.5/10μ	3119	27/11/2025
	Respirable Dust Sampler	UT/LAS/191	Poltech	PEM-RDS 9	1018	20/01/2026

Note:
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3. Any correction invalidates this test report.
4. Samples were collected by following laboratory's SOP (UT/LQMS/SOF/AA01A) based on CPCB Guidelines - National Ambient Air Quality Monitoring Series: NAAQMS/2003-04 and respective test methods.
5. Weather during sampling was Sunny & Clear
6. *Time weighted average shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive monitorings.
7. Air Quality Index (AQI) at above sampling location 71 which is Satisfactory as per National AQI based on concentrations obtained for reported parameters. [National Air Quality Index (IND-AQI) is calculated using AQI Calculator available at 'https://cpcbnic.in/National-Air-Quality-Index']

Authorized By:
Meghan Patil
Authorized Signatory

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Tel: 022-45119250, 022-45119239 / +91-7039076680 Email: lab@ultratech.in

TEST REPORT

ISSUED TO: THE INDIAN INSTITUTE OF TECHNOLOGY MUMBAI (INDIAN INSTITUTE OF TECHNOLOGY BOMBAY) o/b/o Sustainable Approach for Green Environment LLP
Environmental Science and Engineering Department (ESED),IIT Bombay, Powai, Mumbai 400076
For Project: "Panvel Municipal Corporation (PMC) Sites"

ULR NO. : ULR-TC14909 25 000001814F
REPORT NO. : UT/ELS/REPORT/ 02631 /03 -2025
ISSUE DATE : 19/03/2025
YOUR REF. : E-Mail Confirmation
REF. DATE : 28/02/2025

SAMPLE PARTICULARS
Sampling Plan Ref. No.: : 49-03/2025
Sampling Procedure : UT/LQMS/SOP/AA01A
Date & Time of Sampling : 10/03/2025 11:45 Hrs. to 11/03/2025 11:45 Hrs.
Sample Registration Date : 12/03/2025
Analysis Starting Date : 12/03/2025
Analysis Completion Date : 15/03/2025
Ambient Air Temperature : 27.2 °C to 35.3 °C
Relative Humidity : 45.3 % to 67.4 %
Sample Collected By : ULTRA TECH ENVIRONMENTAL CONSULTANCY AND LABORATORY PVT. LTD.

AMBIENT AIR QUALITY MONITORING
Location Code : 2
Sample Location : At Navade Gram Panchayat
GPS Co-ordinates : N 19°02'56.6", E 73°06'04.8"
Height of Sampler : 1 Meter
Sampling Duration : 24:00 Hours:Minutes
Sample Lab Code : UT/ELS/0395/03-2025

Sr. No.	Test Parameter	Test Method	Test Result	Unit	NAAQMS Industrial, Residential, Rural and Other Area 24 Hrs.* or 1 Hr^
1	Sulphur Dioxide (SO_2)	IS 5182 (Part 2) : 2023	7	$\mu g/m^3$	80
2	Nitrogen Dioxide (NO_2)	IS 5182 (Part 6) : 2006	16	$\mu g/m^3$	80
3	Particulate Matter (PM_{10})	IS 5182 (Part 23) : 2006	73	$\mu g/m^3$	100
4	Particulate Matter ($PM_{2.5}$)	IS 5182 (Part 24) : 2019	25	$\mu g/m^3$	60
5	Carbon Monoxide (CO)†	IS 5182 (Part 10) : 1999	1.1	mg/m^3	4

†: Sampling Period 1 Hr.

Remark/ Statement of Conformity: *The parameters tested above are found to be within TWA of National Ambient Air Quality Monitoring Standard (NAAQMS), Part III- Section IV.*

Sampling Equipment Details	Instrument Used	Lab ID	Make	Model	Sl. No.	Calibration Valid up to
	Fine Dust Sampler	UT/LAB/110	Polltech	PEM-ADS 2.5/10μ	18313	30/05/2025
	Respirable Dust Sampler	UT/LAB/192	Polltech	PEM-RDS 9	1118	20/01/2026

Note:
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4. Samples were collected by following laboratory's SOP (UT/LQMS/SOP/AA01A) based on CPCB Guidelines - National Ambient Air Quality Monitoring Series: NAAQMS/2003-04 and respective test methods.
5. Weather during sampling was Sunny & Clear
6. ^Time weighted average shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive monitorings.
7. Air Quality Index (AQI) at above sampling location 73 which is Satisfactory as per National AQI based on concentrations obtained for reported parameters. [National Air Quality Index (IND-AQI) is calculated using AQI Calculator available at 'https://cpcb.nic.in/National-Air-Quality-Index/'].

Authorized By:
Meghan Patil
Authorized Signatory

– END OF TEST REPORT –

1 of 1

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TEST REPORT

ISSUED TO: THE INDIAN INSTITUTE OF TECHNOLOGY MUMBAI
(INDIAN INSTITUTE OF TECHNOLOGY BOMBAY)
o/b/o Sustainable Approach for Green Environment LLP
Environmental Science and Engineering Department (ESED),IIT Bombay, Powai, Mumbai 400076
For Project: "Panvel Municipal Corporation (PMC) Sites"

ULR NO. : ULR-TC14909 25 000001815F
REPORT NO. : UT/ELS/REPORT/ 02632 /03 - 2025
ISSUE DATE : 19/03/2025
YOUR REF. : E-Mail Confirmation
REF. DATE : 28/02/2025

SAMPLE PARTICULARS :
Sampling Plan Ref. No.: : 49-03/2025
Sampling Procedure : UT/LQMS/SOP/AA01A
Date & Time of Sampling : 10/03/2025 12:10 Hrs. to 11/03/2025 12:10 Hrs.
Sample Registration Date : 12/03/2025
Analysis Starting Date : 12/03/2025
Analysis Completion Date : 15/03/2025
Ambient Air Temperature : 27.2 °C to 36.0 °C
Relative Humidity : 46.0 % to 69.0 %
Sample Collected By : ULTRA TECH ENVIRONMENTAL CONSULTANCY AND LABORATORY PVT. LTD.

AMBIENT AIR QUALITY MONITORING
Location Code : 3
Sample Location : Kalamboli Circle
GPS Co-ordinates : N 19°01'09.1", E 73°06'20.6"
Height of Sampler : 1 Meter
Sampling Duration : 24:00 Hours:Minutes
Sample Lab Code : UT/ELS/0396/03-2025

Sr. No.	Test Parameter	Test Method	Test Result	Unit	NAAQMS Industrial, Residential, Rural and Other Area 24 Hrs.^ or 1 Hr^
1	Sulphur Dioxide (SO_2)	IS 5182 (Part 2) : 2023	6	$\mu g/m^3$	80
2	Nitrogen Dioxide (NO_2)	IS 5182 (Part 6) : 2006	19	$\mu g/m^3$	80
3	Particulate Matter (PM_{10})	IS 5182 (Part 23) : 2006	72	$\mu g/m^3$	100
4	Particulate Matter ($PM_{2.5}$)	IS 5182 (Part 24) : 2019	23	$\mu g/m^3$	60
5	Carbon Monoxide (CO)†	IS 5182 (Part 10) : 1999	1.0	mg/m^3	4

†: Sampling Period 1 Hr.

Remark/ Statement of Conformity: *The parameters tested above are found to be within TWA of National Ambient Air Quality Monitoring Standard (NAAQMS), Part III- Section IV.*

Sampling Equipment Details	Instrument Used	Lab ID	Make	Model	Sl. No.	Calibration Valid up to
	Fine Dust Sampler	UT/LAB/93	Polltech	PEM-ADS 2.5/10µ	16013	29/12/2025
	Respirable Dust Sampler	UT/LAB/126	Polltech	PEM-RDS BNL	3613	30/05/2025

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5. Weather during sampling was Sunny & Clear. Environment Was Dusty.
6. ^Time weighted average shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive monitorings.
7. Air Quality Index (AQI) at above sampling location 72 which is Satisfactory as per National AQI based on concentrations obtained for reported parameters. [National Air Quality Index (IND-AQI) is calculated using AQI Calculator available at 'https://cpcb.nic.in/National-Air-Quality-Index/']

ULTRA TECH ENVIRONMENTAL CONSULTANCY AND LABORATORY PVT. LTD. THANE (W) INDIA

Authorized By:
Meghan Patil
Authorized Signatory

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ISO 9001:2015 & ISO 45001:2018 Certified

TC-14909

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TEST REPORT

ISSUED TO: THE INDIAN INSTITUTE OF TECHNOLOGY MUMBAI (INDIAN INSTITUTE OF TECHNOLOGY BOMBAY) o/b/o Sustainable Approach for Green Environment LLP
Environmental Science and Engineering Department (ESED),IIT Bombay, Powai, Mumbai 400076
For Project: "Panvel Municipal Corporation (PMC) Sites"

ULR NO. : ULR-TC14909 25 000002005F
REPORT NO. : UT/ELS/REPORT/ 02902 /03 - 2025
ISSUE DATE : 22/03/2025
YOUR REF. : E-Mail Confirmation
REF. DATE : 28/02/2025

SAMPLE PARTICULARS :
AMBIENT AIR QUALITY MONITORING

Sampling Plan Ref. No.: : 49-03/2025
Sampling Procedure : UT/LQMS/SOP/AA01A
Date & Time of Sampling : 10/03/2025 12:30 Hrs. to 11/03/2025 12:30 Hrs.
Sample Registration Date : 12/03/2025
Analysis Starting Date : 12/03/2025
Analysis Completion Date : 15/03/2025
Ambient Air Temperature : 24.1 °C to 35.1 °C
Relative Humidity : 45.1 % to 67.0 %
Sample Collected By : ULTRA TECH ENVIRONMENTAL CONSULTANCY AND LABORATORY PVT. LTD.

Location Code : 4
Sample Location : Panvel Bus Depo
GPS Co-ordinates : N 18°59'29.8", E 73°06'59.8"
Height of Sampler : 1 Meter
Sampling Duration : 24:00 Hours:Minutes
Sample Lab Code : UT/ELS/0397/03-2025

Sr. No.	Test Parameter	Test Method	Test Result	Unit	NAAQMS Industrial, Residential, Rural and Other Area 24 Hrs.^ or 1 Hr^
1	Sulphur Dioxide (SO_2)	IS 5182 (Part 2) : 2023	7	$\mu g/m^3$	80
2	Nitrogen Dioxide (NO_2)	IS 5182 (Part 6) : 2006	17	$\mu g/m^3$	80
3	Particulate Matter (PM_{10})	IS 5182 (Part 23) : 2006	76	$\mu g/m^3$	100
4	Particulate Matter ($PM_{2.5}$)	IS 5182 (Part 24) : 2019	25	$\mu g/m^3$	60
5	Carbon Monoxide (CO)†	IS 5182 (Part 10) : 1999	1.0	mg/m^3	4

†: Sampling Period 1 Hr.

Remark/ Statement of Conformity: *The parameters tested above are found to be within TWA of National Ambient Air Quality Monitoring Standard (NAAQMS), Part III- Section IV.*

Sampling Equipment Details	Instrument Used	Lab ID	Make	Model	Sl. No.	Calibration Valid up to
	Fine Dust Sampler	UT/LAB/121	Polltech	PEM-ADS 2.5/10μ	19013	04/10/2025
	Respirable Dust Sampler	UT/LAB/171	Polltech	PEM-RDS 9	215	17/09/2025

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4. Samples were collected by following laboratory's SOP (UT/LQMS/SOP/AA01A) based on CPCB Guidelines - National Ambient Air Quality Monitoring Series: NAAQMS/2003-04 and respective test methods.
5. Weather during sampling was Sunny & Clear. Environment was Dusty.
6. ^Time weighted average shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive monitorings.
7. Air Quality Index (AQI) at above sampling location 76 which is Satisfactory as per National AQI based on concentrations obtained for reported parameters. [National Air Quality Index (IND-AQI) is calculated using AQI Calculator available at 'https://cpcb.nic.in/National-Air-Quality-Index/']

Authorized By:
Meghan Patil
Authorized Signatory

– END OF TEST REPORT –

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