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Ref: NMIAL/MOEF/GEN/0129 July 15, 2022

To,
Regional Officer (WCZ),
Integrated Regional Office (IRO)
**Ministry of Environment, Forest & Climate Change (MoEFCC),**
Ground Floor, East Wing, New Secretariat Building,
Civil Lines, Nagpur-440001
Email - apccfcentral-ngp-mef@gov.in

**Subject: –** Submission of Six-Monthly Compliance Report (Jan - Jun 2022) for Environmental and CRZ Clearance in respect of proposed Navi Mumbai International Airport reg.

**Reference: -** Environmental Clearance and CRZ Clearance for on-going project granted No. 21-60/2021-IA-III dated: 28.11.2021

Dear Sir,

We are submitting herewith the six-monthly Environmental Compliance Status report for the period Jan- Jun 22 for proposed establishment of green field airport at Navi Mumbai as per the following:

1. Data Sheet
2. Clause wise EC Compliance Report for the period of Jan - Jun 2022 with annexures
3. Environmental Monitoring Report

We hope the above is to your satisfaction.

Thanking you

Yours faithfully,

**For Navi Mumbai International Airport Pvt Ltd.**

**Charudatta Deshmukh**

Joint President- Planning & Design

Navi Mumbai International Airport Pvt Ltd
11th Floor, V Times Square, Plot no 3,
Sector 15, CBD Belapur,
Navi Mumbai – 400 614
Maharashtra, India

Tel +91 22 6851 9500

CIN - U45200MH2007PTC169174

Registered office: CSMI Airport, 1st Floor, Terminal 1B, Santacruz (E), Mumbai 400 099, India. T +91 22 6685 0900 / 6685 0901

adani

Copy to: 1) The Vice Chairman & Managing Director, City & Industrial Development Corporation of Maharashtra Ltd. (CIDCO), CIDCO Bhavan, CBD Belapur, Navi Mumbai- 400614 for information and necessary action.

2) The Member Secretary, Maharashtra Pollution Control Board, 3rd Floor, Kalpataru Point, Sion, Mumbai – 400 022.

3) The Zonal Officer, Central Pollution Control Board, Parivesh Bhavan, Opp. VNC ward office No. 10, Subhanpura, Vadodara – 390023.

4) The Chairman, Maharashtra Coastal Zone Management Authority, Room No. 217, Mantralaya (Annex Building), Mumbai – 400 032.

5) Monitoring Cell, MoEF&CC, Indira Paryavaran Bhavan, Jor Bagh Road, New Delhi – 3.

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# Six Monthly Compliance Report of Environmental & CRZ Clearance

For Ongoing project For Establishment of Greenfield Airport

**Navi Mumbai International Airport (NMIA)**

At Panvel, Dist. Raigad, Maharashtra

Submitted to:

**Integrated Regional Office (IRO),**
**Ministry of Environment, Forest & Climate Change (MoEF&CC), Nagpur.**

**Central Pollution Control Board, New Delhi.**

**Maharashtra Pollution Control Board, Mumbai**

Submitted By:
Navi Mumbai International Airport Pvt Ltd. (NMIAL)

For

Period of January to June -2022

**Index**

**Monitoring the Implementation of Environmental Safeguards**
**Ministry of Environment, Forest & Climate Change**
**Regional Office (West Central Zone), Nagpur**
**Monitoring Report**
**Part – I**
**DATA SHEET**

**1st January to 30th June2022**

| | | |
|---|---|---|
| 1. | Project type: River-valley/ Mining/Industry/Thermal/ Nuclear/Other (Specify) | Other- Infrastructure, Greenfield International Airport at Navi Mumbai |
| 2. | Name of the Project | Navi Mumbai International Airport Pvt. Ltd (NMIAL) |
| 3. | Clearance letter (s)/OM No. And Date | Earlier EC and CRZ clearance granted to CIDCO as Nodal agency appointed by Government of Maharashtra as under:<br>1 EC received vide F. No. 10-53/2009-I.A.III dtd. 22.11.10 valid upto 21.11.2017<br>2 Extension of validity received vide F. No. 10-53/2009-IA.III dt 20.12.17 upto 21.11.2020.<br><br>EC transferred from CIDCO to NMIAL (Navi Mumbai International Airport Ltd) by MoEFCC vide F. No. 10-53/2009-IA-III dtd. 17.08.2020 with same validity.<br><br>Validity extended vide S. O. No. 4254 (E) dt 27.11.20 upto 21st May 2021 for all projects due to nCOVID pandemic by MOEFCC.<br><br>CRZ recommendation received from Environment & Climate Change Department, Govt. of Maharashtra vide Letter No. CRZ 2021/CR 156/TC 4 Dated – 27.09.2021.<br><br>Environmental Clearance and CRZ Clearance for on-going project granted by MOEFCC vide No. 21-60/2021-IA-III dated: 28.11.2021 valid upto 27.11.2028 |
| 4. | Location:<br>a) District (s) | Raigad |
| | b) State (s) | Maharashtra |
| | c) Location | Taluka Panvel |

| | | |
|---|---|---|
| | d) Latitude/Longitude | Longitude - $73^0$ 4' 18.00" E<br><br>Latitude - $18^0$ 59' 33.00" N |
| 5. | Address for correspondence<br><br>a) Address of the Concerned Project Chief Engineer (With Pin Code and telephone/telex/fax numbers) | **Mr. Charudatta Deshmukh,**<br><br>**Joint President (Planning and Design)**<br><br>Navi Mumbai International Airport Limited (NMIAL),<br>11th Floor, V Times Square Building, Plot No 03, Sector 15, CBD Belapur, Navi Mumbai 400614<br><br>**Tel** 022-68519500<br><br>**Email**: Charudatta.Deshmukh@adani.com |
| 6. | Salient features<br><br>a) Of the project | Proposed project is for establishment of International Airport on a site of area 1160 Ha.<br><br>Airport is designed to accommodate the aircraft (A-380 and equivalent) compatible to ICAO Standard of aerodrome 4-F. The ultimate passenger capacity of airport will be 60 MPPA (which will be reached in four stages commencing from 10 MPPA) and cargo capacity of 1.5 MTPA.<br><br>Airport will have two parallel independent runways with spacing of 1.58 Km for simultaneous and independent operation with the provision of full-length parallel taxi way along runways. The length of runway is of 3700 m x 60 m with runway safety area of 150 m X 60 m, approach lighting of 900 m, terminal building of domestic and international including Cargo with facilities such as Multi Level Parking, GSE storage area, ATC Tower, airport ground lighting, airport lighting, cargo apron, maintenance, and hanger along with other allied facilities etc.<br><br>The project activities during construction phase to be done by NMIAL are land development by cutting of balance portion of hill and filling from + 5.5m AMSL to +8.5m AMSL.<br><br>• Phase- I & II BUA (20 MPPA)- 6,27,335.678 $m^2$.<br>• Total BUA Area (60 MPPA)- 14,13,069.178 $m^2$.<br>• Project Cost (Phase-I & II) – Rs 19,647 Crores<br>• Total Project Cost- Rs 41,302 Crores. |

<table>
<tr><td></td><td>b) Of the Environmental management plans</td><td>NMIAL is planned to be one of the most resource efficient & Green airport in the world. Environment Management Plan at operations phase includes the following:<br>• Carbon neutrality followed by Net Zero emission commitments<br>• Zero Sewage Discharge<br>• Rainwater Harvesting Ponds<br>• Utilization of Solar Power<br>• Energy Optimization<br>• Waste Re-cycling<br>• Natural Day Lighting<br>• Plantation & Landscape</td></tr>
<tr><td rowspan="2">7.</td><td>Breakup of the project area<br><br>a) Submergence area forest and non-forest</td><td>a) Not Applicable</td></tr>
<tr><td>b) Others</td><td>Air side Area- 942.25 Ha.<br>Landside area- 217.75 Ha (Total 1160 Ha).<br><br><table><tr><td>Land use</td><td>Area (Ha)</td></tr><tr><td>Facilities, pavements, building and structures</td><td>605.47</td></tr><tr><td>Green/open spaces</td><td>384.9</td></tr><tr><td>Transportation roads, parking, metro</td><td>139.32</td></tr><tr><td>Utilities</td><td>10.12</td></tr><tr><td>Drains</td><td>20.19</td></tr></table><br>Permission for Removal of Mangroves (Order from Hon'ble Bombay High Court) Notice of Motion No. 419 of 2011 in PIL No. 87of 2006 dated 29th Oct 2013.<br><br>Forest Clearance- 250.0635 Ha (Stage I and Stage II clearance obtained vide F. No. 8-95/2012-FC dated 17 December 2013 and 24 April 2017 respectively)</td></tr>
<tr><td></td><td>a. Total Plot Area</td><td>Total Plot Area 1160 Ha.</td></tr>
<tr><td></td><td>b. Built - Up Area (Including Road)</td><td>Phase- I&II BUA (20MPPA)- 6,27,335.678 $m^2$<br><br>Total BUA Area (60 MPPA)- 14,13,069.178 $m^2$</td></tr>
<tr><td></td><td>c. Open Space available</td><td>Phase I & II (20 MPPA) - 27,06,720 $m^2$<br>Total Final Phase (60 MPPA) - 38,49,047.682 $m^2$</td></tr>
<tr><td></td><td>d. Green Belt Area</td><td>Same as above</td></tr>
<tr><td>8.</td><td>Breakup of the project affected population with enumeration of those losing house/dwelling units only agricultural land only. Both dwelling units and agricultural</td><td>The entire land for the airport site i.e., 1160 ha has been acquired and handed over to NMIAL by CIDCO.</td></tr>
</table>

| | | |
|---|---|---|
| | land and landless laborers/ artisans: | At present as on Jun 10 2022 there is no structure around site and 100% of R&R has been completed by CIDCO. |
| | a) SC, ST/Adivasis | -- |
| | b) Others | -- |
| 9. | Financial details:<br>a) Project cost as originally planned and subsequent revised estimates and the year of price reference: | a) Total cost of the development of airport consists of aeronautical and nonaeronautical activities works out for four Phases at FY 2010 prices by CIDCO Rs.9,625 Cr.<br>• Revised FY 2015 prices by CIDCO Rs 13,560 Cr<br>• Revised FY 2019 prices by NMIAL Rs 36,538 Cr.<br>• Revised FY 2020-21: - Rs 41,302 Crores. |
| | b) Allocation made for environmental management plans with item wise and year wise break-up. | NMIAL has allocated Rs. 291.37 Cr for EMP for Development & Operation Phase of NMIA. |
| | c) Benefit cost ratio/Internal rate of return and the year of assessment | - |
| | d) Whether (c) includes the cost of environmental management as shown in the above | - |
| | e) Actual expenditure incurred on the project so far | a) Expenditure by CIDCO on pre-development works including land acquisition, rehabilitation and resettlement of project displaced persons and land development works: Rs. 5478 Cr<br>b) Expenditure by NMIAL on land development, planning & design, contractor advances, etc. till 30 June 2022: Rs. 1919 Cr. |
| | f) Actual expenditure incurred on the environmental management plans so far | Rs. 6.12 Cr incurred on EMP till 30 June 2022. |
| 10. | Forest land requirement:<br>a) The status of approval for diversion of forest land for non-forestry use | Diversion of 250.0635 Ha of forest land is required for the project.<br>Stage-I Forest Clearance was accorded to CIDCO vide F.No.8-95/2012-FC dt. 17.12.2013. |

| | | |
|---|---|---|
| | | Stage-II Forest Clearance was granted to CIDCO vide F. No. 8-95/2012-FC dt. 24.04.2017.<br>HOFF (Head of Forest Forces, Maharashtra state, Nagpur) has visited site on 12th Dec 2018 and reviewed the compliance to Forest Clearance |
| | b) The status of clearing felling | Completed |
| | c) The status of compensatory afforestation if any | Status of Compensatory Afforestation<br>I. Request for allotment of land for CA plantation at Jite village near Alibaug is pending with GoM<br>II. 250.0635 Ha Degraded Forest Land taken up in Alibaug, Dahanu and Shahpur Division and total of 70,073 trees planted through Forest Department.<br>III. CIDCO has undertaken 109 Ha compensatory mangroves plantation to NE of site on S. No. 27, village Kolhekhar in between Jui creek and Taloja creek through the Mangrove Cell of State Forest Dept.<br>IV. Compensatory Mangrove Plantation done over 109 Ha as per FC condition (to compensate loss of mangroves) linked to the airport development Location: S. No. 27, village Kolhekhar.<br>V.HOFF (Head of Forest Forces, Maharashtra state, Nagpur) has visited site on 12th Dec 2018 and reviewed the compliance to Forest Clearance. |
| | d) Comments on the viability and sustainability of compensatory afforestation programme in the light of actual field experience. | Plantation and protection of Mangroves over 109 ha as compensatory afforestation has been completed by Mangrove Cell on the instance of CIDCO at village Kolekhar. Thane Forest Division has certified vide letter dt 31.10.19 that out of 100,000 mangrove saplings planted at above site about 92.5 % survived |
| 11. | The status of clear felling in non-forest areas (such as submergence area of reservoir, approach roads), if any with quantitative information | - |
| 12. | Status of construction<br>a) Date of commencement (Actual and/or planned) | April 2017 Pre-development works commenced by CIDCO |

| | | |
|---|---|---|
| | b) Date of completion (Actual and/or planned) | December 2024 (Phase-I & II, 20 MPPA) (planned) |
| 13. | Reason for the delay of the project is yet to start | Project work could not be commenced till April 2017 pending grant of Stage II Forest Clearance for the project. Pre-Development Works prior to commencement of construction are nearing completion at the site. |
| 14. | Dates of site visits | |
| | a) The dates on which the project was monitored by the Regional Office on previous occasions, if any | Site visit done by RO, MOEFCC on 11.11.20 for monitoring compliance of EC.<br>Compliance Report is received from Integrated Regional Office, MoEF&CC Nagpur vide Letter No. 6-22/2010 (ENV)/ 7994 Dated 31.01.2021 for which action taken report has been submitted (vide NMIAL/MOEF/GEN/0069 dt 01st Oct 21) closing the raised observations. |
| | b) Date of site visit for this monitoring report | - |
| 15. | Details of correspondence with project authorities for obtaining action plans / information on status of compliance to safeguards other than the routine letters for logistic support for site visits.<br>(The first monitoring report may contain the details of all the letters issued so far, but the later reports may cover only the letters issued subsequently.) | 1. Action Taken Report (ATC) of Certification EC Compliance Report submitted to Regional Office Nagpur MOEF&CC dated 1st Oct 2021.<br>2. Certified Compliance Report Received vide letter F. No: 6-22/2010(ENV)/7994 dated 31st March 2021.<br>3. RO- MOEFCC has visited NMIA site on 11th Nov 2020.<br>4. Letter dated 29th Oct 2020 sent to IRO, Nagpur with monitoring data sheet and additional information of project for issuance of certification of Compliance Report for NMIA<br>5. Request letter dated 12th Oct 2020 sent to MOEF&CC Nagpur for Issuance of Certification of Compliance Report for Navi Mumbai International Airport (NMIA).<br>6. Request letter dated 4th June 2020 sent to MOEF&CC Nagpur for Issuance of Certification of Compliance Report for Navi Mumbai International Airport (NMIA). |

## EC COMPLIANCE REPORT
## (01.01.2022 to 30.06.2022)

**Introduction**

Environmental Clearance (EC)and CRZ Clearance was granted to NMIA project with CIDCO as project proponent, by Ministry of Environment, Forest, and Climate Change (MoEF&CC) on November 22, 2010, and Extension of Validity to EC was granted on December 20,2017. It was valid till November 2020. The MoEF&CC had extended validity of the EC accorded to NMIA project till November 21, 2021 during pandemic period.

NMIAL received transfer of EC, which was in CIDCO's name and valid till November 21, 2021, on NMIAL's name on August 17 2020 from MOEF & CC. Fresh EC and CRZ Clearance has been granted for on-going project for 60 Million Passengers Per Annum (MPPA) & Cargo capacity 1.5 MTPA, NMIA as the project proponent by MoEF&CC granted on November 28 2021 and issued on December 01 2021,

**Present Status of completed/ on-going works are given as follows:**
It comprises the following:

1. Cutting of hills at site up to +8m AMSL, and filling of site up to + 5.5m AMSL completed.
2. CIDCO has handed over 100% encumbrance free project site of 1160 Ha to NMIAL by 10th June 2022.
3. CIDCO has handed over 100% encumbrance and R&R free project site of 1160 Ha to NMIAL on 10th June 2022
4. Cutting and/or transplantation of trees in non-forest area in the site as directed by Tree authority.
5. Construction of Ulwe recourse channel on the south of site completed.
6. Shifting /relocation of existing Utilities completed.
7. Re-routing of High Voltage Transmission Lines from NMIA site by Tata Power and MSETCL are completed.

**MOEF&CC's Environment and CRZ Clearance identification No.EC21A029MH183036 & file no 21-60/2021-IA-III dated November 28 2021 and issued on December 01 2021.**

Project is under construction. Detailed pointwise compliance report pertaining to the reporting period (Jan – Jun 2022) for construction phase is given below. Compliance with operation phase conditions will be complied prior to the commissioning of the airport.

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| **A** | **Specific Condition** | |
| i. | Conditions specified in Environmental & CRZ Clearance issued vide letter No. 10-53/2009- | **Agreed to Comply:** We will abide by the conditions specified in Environmental & CRZ Clearance issued vide letter No. 10-53/2009- |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| | IA.III dated 22.11.2010 shall be strictly complied. | IA.III Dated 22.11.2010. is given **Annexure-I.** |
| ii. | PP shall submit compliance report to IRO-MoEF&CC, Nagpur for pending compliances within 6 months. | **Complied** |
| iii | Where construction activity is likely to cause noise nuisance to nearby residents, restrict operation hours between 7 AM to 6 PM. | **Agreed to Comply:** We will abide by the condition.<br>Noise making activities of construction phase will be carried during Day time to avoid noise nuisance to nearby residents.<br><br>**Following measures will be taken to reduce load on Ambient Noise & Air:**<br>▪ Temporary barricades are erected around the premises.<br>▪ The noise generating activities will be carried out only during daytime.<br>▪ Transportation of the construction material will be carried out during daytime. Operation hours will be restricted to 7 am to 6 pm.<br>▪ Separate Entry & Exit for the construction vehicles will be provided. |
| iv | Hazard Identification and Risk Assessment for the project shall be carried out and adequate mitigation measures shall be adopted to ensure that all safety issues are addressed. The documentation shall be reviewed periodically and shall be submitted to the regional office along with six-monthly compliance report. | **Agreed to Comply:** NMIAL has engaged an EPC contractor for ongoing work (currently only land development work is ongoing at site). Contractor will have own HSE team at site which will be supervised by NMIAL site HSE Team led by GM – Safety of NMIAL.<br><br>Each contractor works out an Environmental Health, Safety Emergency plan identifying aspects requiring attention and how each will be tackled. Contractor adopts following tools to identify safety measures required during ongoing work<br>- conduct Training program<br>- Tool Box Talks on HSE issues |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| | | - Safety committees<br>- HSE audit<br>- HIRA<br>- accident investigation<br>- Monthly & quarterly reports<br>Similar practices are being continued during construction phase. |
| v | A detailed traffic management and traffic decongestion plan shall be drawn up to ensure that the current level of service of the roads within a 05 km radius of the project is maintained and improved upon after the implementation of the project. This plan should be based on cumulative impact of all development and increased habitation being carried out or proposed to be carried out by the project or other agencies in this 05 Kms radius of the site in different scenarios of space and time and the traffic management plan shall be duly validated and certified by the State Urban Development Department and the P.W.D./ competent authority for road augmentation and shall also have their consent to the implementation of components of the plan which involve the participation of these departments. | **Complied:** CIDCO & MMRDA have appointed consultant for carrying out study for Detailed traffic management and traffic decongestion plan for the Airport project. CIDCO has submitted final report for detailed traffic management and traffic decongestion plan for Airport to MOEF vide letter No. CIDCO/GM(ENV&F)/NMIA/2020 /491 dated 14th July 2020.<br><br>Development of all off site infrastructure (along with obtaining clearances and compliances to the same) is being done by CIDCO as per NOC for transfer of EC and CRZ clearance given by CIDCO to NMIAL vide letter No. CIDCO/T&C/CT&CP/ NMIA/1317 dt 10th Feb 2020. |
| vi | Solar power generation capacity of 22.14 MW shall be established as proposed. | **Agreed to Comply:** NMIA is likely to enhance solar power generation capacity to approximately 40 MW from current commitment of 22.14 MW in EMP. |
| vii | Rainwater harvesting pond of 29,747 cum capacity shall be provided as proposed. Rainwater harvesting structures shall conform of CGWA designs. Before recharging the surface run off, pre-treatment must be done to | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition. |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| | remove suspended matter, oil and grease. | |
| viii | A certificate from the competent authority/ agency handling municipal solid wastes should be obtained, indicating the existing civic capacities of handling and their adequacy to cater to the M.S.W generated from project. | **Agreed to Comply:** During the reporting period, only land development work is ongoing at site. We assure MOEFCC to abide by the condition during construction & operational phases. |
| ix | Fresh water requirement from local authority shall not exceed 10.61 MLD during final operational phase. As committed, no groundwater abstraction shall be done during construction as well as operation phase of the project. | **Agreed to Comply:** We will abide by the condition.<br>The total water demand in final phase is 21.82 MLD. Of which, freshwater demand of 10.61 MLD will be sourced from CIDCO and balance 11.21 MLD will be recycled water from on – site STPs.<br>There will be no ground water abstraction carried out during construction phase as well as operational phase of project. |
| x | As proposed, wastewater shall be treated in onsite STPs of total 14.25 MLD capacity (during final phase). Treated water from the STP shall be recycled and reused for gardening, flushing etc. There shall be no discharge of treated water from the project as proposed. | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition. There will be no discharge of treated water from the project. |
| xi | The project proponents would commission a third-party study on the implementation of conditions related to quality and quantity of recycle and reuse of treated water, efficiency of treatment systems, quality of treated water being supplied for flushing (specially the bacterial counts), comparative bacteriological studies from toilet seats using recycled treated waters and fresh waters for flushing, and quality of water being supplied through spray faucets attached to toilet seats. | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition. |
| xii | Area for greenery shall be provided as per the details provided in the project document i.e., about | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition. |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| | 384.90 ha. will be developed as green area. | |
| xiii | PP shall explore the use of non-ozone depleting substances in air conditioning systems. | **Agreed to Comply:** Non-CFC refrigerant is specified for chillers & DX units such substances for use in air conditioning system to avoid depletion of ozone layer in environment. We assure to abide by the condition. |
| xiv | The PP shall also provide electric charging points in the parking areas for e-vehicles. | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition. |
| xv | The proposed ongoing work of Navi Mumbai International Airport should be carried out strictly as per the provisions of CRZ Notification, 2011 as amended from time to time and with a commitment of protection and conservation of coastal environment. | **Agreed to Comply:** provisions of CRZ Notification will be strictly complied.<br>Project has obtained CRZ recommendation from Environment & Climate Change Department, Govt. of Maharashtra vide letter No. CRZ 2021/CR 156/TC 4 dated 27.09.2021. |
| xvi | NMIA shall carry out the balance work without change in location, scope, area or capacity. | **Agreed to Comply:** NMIA will carry out development work without change in location, scope area or capacity. |
| xvii | No mangrove destruction is allowed to carry out balance ongoing work of the project. There shall not be violation of the Hon'ble High Court order dated 23rd October, 2013 in PIL 87/2006. | **Agreed to Comply**: We undertake that no mangrove destruction will be carried out for balance ongoing work at the project. and that there will not be violation of the Hon'ble High Court order dated 23rd October, 2013 in PIL 87 /2006. |
| xviii | Work of diversion of Ulwe and Gadhi River is completed. NMIA shall carry out the studies pertaining hydraulic flow conditions, to understand the impact of diversion of Ulwe and Gadhi streams on Panvel Creek coastline, its coastal ecology and surrounding area/ settlements/ habitat/ social economic pattern. The hydraulic study shall also consider the anticipated impacts of climate change and sea level rise on proposed airport site and surrounding area. Hydraulic studies need to be carried out with | **Complied:** It may be noted, as per CIDCO report, as submitted to MOEFCC, that:<br>1. CWPRS, Pune has carried out 1D, 2D mathematical & physical Model studies based on the MoEF's approved layout plan of airport covering 1160 Ha. CIDCO is designing the master drainage plan of surrounding areas by incorporating the various recommendations of CWPRS.<br>2. The detailed drainage plan for the airport has been prepared by the NMIAL as a part of Master Plan, incorporating CWPRS |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| | an objective to anticipate the probable flooding situations in low lying areas and accordingly implement the possible mitigation measures. | recommendations and integrating with CIDCO plans and abiding by EC conditions. The whole storm Water from NMIA project area will be discharged in Gadhi River after settling fine particles in the holding pond..<br>3. The master drainage plan of airport and surrounding area is prepared for the worst conditions (highest high tide, tidal surge, maximum rainfall condition and flooding in all rivers and a safety factor which is dependent upon climate surge) as submitted by NMIAL. It was submitted that NMIAL has also engaged CWPRS for checking the internal drainage system designed for the airport area so that it ties very well with the Master Drainage system planned for the area.<br>4. The Master plan developed by NMIA has ensured that there will be no discharge into the Ulwe recourse channel from Airport as mandated in EC. CIDCO has signed long term MOU with CWPRS, so that the drainage plans for all areas in Navi Mumbai prepared by it are checked by CWPRS. This practice is followed for all areas near the proposed airport also.<br>All matters pertaining to Ulwe recourse channel will be in scope of CIDCO as per NOC for transfer of EC and CRZ clearance given by CIDCO to NMIAL vide letter No. CIDCO/T&C/CT&CP/NMIA/1317 dt 10th Feb 2020. |
| xix | NMIA shall regularly monitor the marine water quality of the Panvel creek during construction and post construction of the project. | **Agreed to Comply:**<br>During construction period Marine Water quality monitoring is carried out by NMIAL through MoEF&CC recognized & NABL accredited Lab. Monitoring will be continued during operation phase. |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| | | Environmental analytical reports for the reporting period are enclosed herewith **Annexure-II**. |
| xx | NMIA shall ensure that all ground service vehicles will be operated on Electric or CNG. No petrol/diesel vehicles would be allowed in the Airport Premises. | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition. |
| xxi | Mangrove Park shall be developed in consultation with Mangrove Cell, on site identified by the CIDCO. | **Agreed to Comply:**<br>All matters pertaining to development and maintenance of mangrove pockets will be in scope of CIDCO as per NOC for transfer of EC and CRZ clearance given by CIDCO to NMIAL vide letter No. CIDCO/T&C/ CT&CP/NMIA/1317 dt 10th Feb 2020.<br><br>As discussed in the 74th EAC meeting held on 8th Oct'21 in which the Committee expressed that, as the conditions pertain to the proposal for the development of NMIA. Therefore, even if CIDCO is the implementing agency w.r.t the said conditions, the Project Proponent (PP) shall continue to be involved in the process, to monitor & ensure compliance to aforesaid conditions. |
| xxii | NMIA to implement environment measures such as rainwater harvesting, solar lighting, efficient solid and hazardous waste management practices. NMIA shall ensure the zero liquid discharge during construction and operation of the project. | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition.<br>Necessary energy conservation and water conservation measures will be adopted. |
| xxiii | NMIA during construction shall not disturb the coastal ecology comprising mangroves/mudflats present along the Panvel creek, present outside the northern boundary of the project site. | **Agreed to Comply:** Repeat Condition- already replied in Sr. No (XVIII) of EC 2021. |
| xxiv | NMIA should carry out detailed study on the impact of fishing and livelihood of people depending on local fishing and take efforts to | **Agreed to Comply:** NMIA will be engaging specialist agency to conduct livelihood assessment study particularly for fishermen |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| | maintain the livelihood of traditional fisher folks supposed to be affected by the project directly or indirectly. | community dependent on local fishing and make efforts to maintain their livelihood. |
| xxv | Green bell area (33% of total project area) of adequate width and density with local species along the periphery of the project site shall be developed so as to provide protection against particulate matter and noise | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition. |
| xxvi | NMIA shall set up a full-fledged in house Environment Management Cell comprising concern experts for effective implementation of Environment Management Plan. The EM Cell shall carry out marine water quality monitoring, erosion/accretion status of the coastline along Panvel Creek, monitoring of tidal flow patterns due to diversion of Ulwe & Gadhi streams, development of mangrove park etc. and implement recommendations of the Socio-economic study as well as Disaster Management Plan. | **Agreed to Comply:** NMIA has a full-fledged in -house Environment Management Cell comprising General Manager (Environment and Sustainability) with a site Health, Safety and Environment (HSE) Team headed by General Manager (HSE) which is part of construction vertical. General manager – E & S reports to the Joint President (Planning and Design), who in turn reports to Top Management.<br><br>EM Cell is responsible for following up on ensuring all environmental compliances and sustainability issues for the project.<br><br>The Environment Management Plan detailing the mitigation measures and the Environmental budget is being updated as part of the EIA being prepared. Roles and responsibilities of various parties and timelines of completion will be given therein. |
| xxvii | NMIA/ CIDCO to implement. the recommendations of the report on the BNHS with respect to protection/ conservation of the biodiversity around the Airport site. | **Agreed to Comply:** BNHS is appointed to do the periodic base line survey of avian fauna and quarterly as well as annual reports are being received and placed on CIDCO'S website. CIDCO has also signed a long-term MOU (ten-year period ending 2028) to track Bird movements and advice regarding overall development of Navi |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| | | Mumbai to ensure adequate habitats are maintained for the sustenance and growth of birds and do not endanger flight movements.<br><br>NMIAL will abide by CIDCO directives in this regard. |
| xxviii | The Environmental and CRZ Clearance to the project is primarily under provisions of EIA Notification, 2006 and CRZ Notification, 2011. The Project Proponent is under obligation to obtain approvals/clearances under any other Acts/ Regulations or Statutes as applicable to the project. | **Complied:** NMIAL is obtaining all necessary approvals for the project for establishment of green field airport.<br>Similarly, CIDCO is obtaining separate approvals for associated infrastructure of surrounding airport area. |
| | | |
| **B** | **Standard Conditions:** | |
| I | **Statutory compliance:** | |
| | | |
| i. | The project proponent shall obtain forest clearance under the provisions of Forest (Conservation) Act, 1980, in case of the diversion of forest land for non-forest purpose involved in the project. | **Complied:** Stage-I & Stage-II forest clearance for 250.0635 Ha land has been obtained from MoEF&CC vide letter no 8-98/212-FC dated 17-12-2013 and 24.04.2017 respectively. |
| ii. | The project proponent shall obtain clearance from the National Board for Wildlife, if applicable. | **Complied:** Wildlife Clearance was recommended in the 29th Meeting of Standing Committee and communicated vide Minutes No. P.No.6-43/2007 WL-I dt. 1st August, 2013 of Wildlife Division of Ministry of Environment & Forest, Govt. of India. |
| iii | The project proponent shall prepare a Site-Specific Conservation Plan & Wildlife Management Plan and approved by the Chief Wildlife Warden. The recommendations of the approved Site-Specific Conservation Plan/ Wildlife Management Plan shall be implemented in consultation with the State Forest Department. The | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by condition. |

| | EC & CRZ Conditions-2021 | Compliance Status |
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| | implementation report shall be furnished along with the six-monthly compliance report (in case of the presence of Schedule-I species in the study area). | |
| iv. | The project proponent shall obtain Consent to Establish/Operate under the provisions of Air (Prevention & Control of Pollution) Act, 1981 and the Water (Prevention & Control of Pollution) Act, 1974 from the concerned State Pollution Control Board/ Committee, | **Complied:** NMIA has been granted CTE for 20 MPPA & 0.57MTPA Cargo by MPCB vide letter dated June 15 2022 (**Annexure-III**)<br>Consent to Operate (CTO) will be obtained prior to the commencement of the project operation. |
| V. | The project proponent shall obtain the necessary permission from the Central Ground Water Authority, in case of drawl of ground water/ from the competent authority concerned in case of drawl of surface water required for the project. | **Not applicable**<br><br>No ground water to be tapped during construction or operation phases. CIDCO has assured water supply for the project. |
| vi | Clearance from Directorate General of Civil Aviation (DGCA) and Airports Authority of India (AAI) for safety and project facilities shall be obtained. | **Agreed to Comply:** NMIAL has prepared Airport safety and security plan which are approved by DGCA, AAI, BCAS & CIDCO as per following details<br>1. In-Principle Approval to NMIA Master Plan for Construction of Navi Mumbai International Greenfield Airport at Navi Mumbai by Director General of Civil Aviation (DGCA), Govt. of India vide AV.20024/40/2003-AL dt 28th August, 2018<br>2. In-Principle Approval to NMIA Master Plan for Construction of Navi Mumbai International Greenfield Airport at Navi Mumbai by Bureau of Civil Aviation Security (BCAS), Govt. India vide CAS-6/2018/Div-Ops-I/Navi Mumbai (E-135357) dt 28th August, 2018<br>3. Approval of Bureau of Civil Aviation Security (BCAS), Govt. of India for construction of Terminal-1 Building on NMIA vide CAS- |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| | | 6/2018/Div-Ops-I/Navi Mumbai (E-135357) dt 26th July, 2019.<br><br>The DCA mandates safety requirements and procedures will be followed while developing the plan. |
| vii | A certificate of adequacy of available power from the agency supplying power to the project along with the load allowed for the project should be obtained. | **Agreed to Comply:** The energy demand is estimated under the Master Plan prepared by the NMIAL and shows that cumulative peak power demand will be 96 MVA which is much lower than the CEIA estimate 190 MVA, by adhering to ECBC norms.<br><br>The power supply requirement will be met through Maharashtra State Electricity Transmission Company Limited (MSETCL) Approval/NoC from MSETCL for Power Supply to NMIA vide MSETCL/CO/STU/EHV Cons/ NMIA/ NO13379 dt 27th December 2018. |
| viii | All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Civil Aviation Department shall be obtained, as applicable by project proponents from the respective competent authorities. | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition.<br>NMIAL has obtained Fire safety approvals as per following details<br><br>1. Approval/NoC of Fire Dept. CIDCO for Location for Airport Rescue & Fire Fighting Stations (ARFF) in NMIA Master Plan vide CIDCO/FIRE/HQ/ 2019/542 dt 30th September, 2019.<br>2. Fire NoC from Fire Dept. CIDCO for Construction of Terminal-1 Building on NMIA vide CIDCO/FIRE/HQ/ 665/2019 dt 20th December, 2019.<br><br>The DGCA mandates safety requirements and procedures will be followed while developing the plan. |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| **I.** | **Air quality monitoring and preservation:** | |
| i. | The project proponent shall install system to carryout Ambient Air Quality monitoring for common/criterion parameters relevant to the main pollutants released (e.g., $PM_{10}$ and $PM_{2.5}$ in reference to PM emission, and $SO_2$ and NOx in reference to $SO_2$ and NOx emissions) within and outside the airport area at least at four locations (one within and three outside the plant area at an angle of 120 each), covering upwind and downwind directions. | **Complied:** NMIAL has appointed a Laboratory recognized by MOEFCC, for the monitoring for Air & noise (9 stations) and Ground water sampling (5 locations) on monthly basis. Marine/ Surface water (10 stations), & soil sampling (5 locations) on quarterly basis. Environmental analytical reports for the reporting period are enclosed herewith. (**Annexure-II**) |
| ii | Diesel power generating sets proposed as source of backup power should be of enclosed type and conform to rules made under the Environment (Protection) Act, 1986. The height of stack of DG sets should be equal to the height needed for the combined capacity of all proposed DG sets. Use of low Sulphur diesel. The location of the DG sets may be decided with in consultation with State Pollution Control Board. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases.<br><br>The DG sets will be operated only during power failure. Location of DG sets will be in utility blocks and plan showing utility block locations is submitted to MPCB at the time of grant of CTE. |
| iii | Soil and other construction materials should be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty material wet. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction phase. Water is sprinkled on trucks carrying excavated material, soil and sub stratum as also on roads and near construction sites e.g., material handling, RMC plant etc. to suppress dust prior to loading, unloading at regular intervals. |
| iv | The excavation working area should be sprayed with water after operation so as to maintain the entire surface wet. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction phases. |
| v | Excavated materials shall be handled and transported in a manner that they do not cause any problems of air pollution. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction phase. |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| vi | The soil/ construction materials carried by the vehicle should be covered by impervious sheeting to ensure that the dusty materials do not leak from the vehicle. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction phases. |
| | **II. Water quality monitoring and preservation:** | |
| i | Run off from chemicals and other contaminants from aircraft maintenance and other areas within the airport shall be suitably contained and treated before disposal. A spillage and contaminant containment plan shall be drawn up and implemented to the satisfaction of the State Pollution Control Board. | **Agreed to Comply**: Since, project is yet to be operational. We assure MOEFCC to abide by the condition. |
| ii | Proper drainage systems, emergency containment in the event of a major spill during monsoon season etc. shall be provided. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases. |
| iii | The runoff from paved structures like Runways, Taxiways, can be routed through drains to oil separation tanks and sedimentation basins before being discharged into rainwater harvesting structures. | **Agreed to Comply**: To reduce the impact on water quality, measures taken will include (1) providing bunds around areas storing chemicals, wastes and soil for containing spills (2) passing the spill collected through Grit chamber and Oil water separator We assure MOEFCC to abide by the condition. |
| iv | Storm water drains are to be built for discharging storm water from the air-field to avoid flooding/ water logging in project area. Domestic and industrial waste water shall not be allowed to be discharged into storm water drains. | **Agreed to Comply:** Separate storm water drains to avoid water logging in project area. Approval of CWPRS for NMIA Drainage Master Plan has been received vide A.P.Y.P/CIDCO/2019 /434 /318 dt 18th July 2019 and A.P.Y.P/NMIAPL/ 2020 dt 23rd June 2020.<br>Since, project is yet to be operational. We assure MOEFCC to abide by the condition. |
| v | Rain water harvesting for roof run-off and surface run-off, as plan submitted should be implemented. Rain water harvesting structures shall conform to CGWA designs. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during operational phase. |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| | Before recharging the surface run off, pre-treatment must be done to remove suspended matter, oil and grease. | |
| vi | Total freshwater use shall not exceed the proposed requirement as provided in the project details. Prior permission from competent authority shall be obtained for use of fresh water. | **Agreed to Comply**: The total water demand in final phase is 21.82 MLD. Of which, freshwater demand of 10.61 MLD will be sourced from CIDCO.<br>Water assurance has been obtained from Water Supply Dept. CIDCO for Water Supply to NMIA vide CIDCO/ EE (Hetwane)/ 2018/ 322 dt 3rd August 2018. |
| vii | A certificate from the competent authority for discharging treated effluent/untreated effluents into the Public sewer/ disposal / drainage systems along with the final disposal point should be obtained. | **Agreed to Comply**: Consent to Establish Phase-I&II granted by MPCB. Vide Format1.0/CAC/UAN No MPCB-CONSENT-0000128221 /CE/2206000673 dated 15th Jun 2022.<br><br>Since, project is yet to be operational. We assure MOEFCC to abide by the condition |
| viii | A detailed drainage plan for rain water shall be drawn up and implemented. | **Agreed to Comply**: Since, project is yet to be operational. We assure MOEFCC to abide by the condition |
| **III.** | **Noise monitoring and prevention:** | |
| i | Noise level survey shall be carried as per the prescribed guidelines and report in this regard shall be submitted to Regional Officer of the Ministry as a part of six monthly compliance report. | **Agreed to Comply**: Ambient Noise monitoring are regularly carried out as per Environmental Protection Act 1986 & reports in this regard submitted to regional office of the Ministry as part of six-monthly compliance report regularly. (**Annexure II**) |
| ii | Noise from vehicles, power machinery and equipment on-site should not exceed the prescribed limit. Equipment should be regularly serviced. Attention should also be given to muffler maintenance and enclosure of noisy equipment's. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases.<br><br>All contractors have been asked to establish maintenance workshop at site to ensure regular servicing of the equipment |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| iii | Acoustic enclosures for DG sets, noise barriers for ground-run bays, ear plugs for operating personnel shall be implemented as mitigation measures for noise impact due to ground sources. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases. |
| iv | During airport operation period, noise should be controlled to ensure that it does not exceed the prescribed standards. During nighttime the noise levels measured at the boundary of the building shall be restricted to the permissible levels to comply with the prevalent regulations. | **Agreed to Comply**: Since, project is yet to be operational. We assure MOEFCC to abide by the condition. |
| **IV.** | **Energy Conservation measures:** | |
| i. | Energy conservation measures like installation of LED/CFL.s/TFLs for the lighting the areas outside the building should be integral part of the project design and should be in place before project commissioning. | **Agreed to Comply**: Necessary energy conservation and water conservation measures will be adopted. |
| **V.** | **Waste management:** | |
| i. | Soil stockpile shall be managed in such a manner that dust emission and sediment runoff are minimized. Ensure that soil stockpiles are designed with no slope greater than 2:1 (horizontal/ vertical). | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction phase.<br><br>Opportunity to conserve the stock pile is limited as most of the excavated material is used in raising plot level to 8.5 m AMSL |
| ii | The project activity shall conform to the fly Ash notification issued under the E P. Act of 1986. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction phase. |
| iii | Solid inert waste found on construction sites consists of building rubble, demolition material, concrete; bricks, timber, plastic, glass, metals, bitumen etc. shall be reused/ recycled or disposed off as per Solid Waste Management Rules, 2016 and Construction and Demolition Waste Management Rules, 2016. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases. |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| iv | Any wastes from construction and demolition activities related thereto shall be managed so as to strictly conform to the Construction and Demolition Waste Management Rules, 2016. | **Agreed to Comply**: Construction and demolition waste generated during development phase shall be handled as per The Construction and Demolition (C&D) Waste Management Rules, 2016. We assure MOEFCC to abide by the condition during construction phase. |
| v | The project proponents shall implement a management plan duly approved by the State Pollution Control Board and obtain its permissions for the safe handling and disposal of: | **Agreed to Comply**: We assure MOEF&CC to abide by the condition during construction & operational phases. |
| | a. Trash collected in flight and disposed at the airport including segregation, collection and disposed. | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition |
| | b. Toilet wastes and sewage collected from aircrafts and disposed at the Airport. | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition |
| | c. Wastes arising out of maintenance and workshops | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition |
| | d. Wastes arising out of eateries and shops situated inside the airport complex. | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition |
| | e. Hazardous and other wastes | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases. |
| vi. | The solid wastes shall be segregated as per the norms of the Solid Waste Management Rules, 2016. Recycling of wastes such as paper, glass (produced from terminals and aircraft caterers), metal (at aircraft maintenance site), plastics (from aircrafts, terminals and offices), wood, waste oil and solvents (from maintenance and engineering operations), kitchen wastes and vegetable oils (from caterers) shall be carried out. Solid wastes shall be disposed in accordance to the | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases. |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| | Solid Waste Management Rules, 2016 as amended. | |
| vii. | Used CFLs and TELs should be properly collected and disposed off/ sent for recycling as per the prevailing guidelines/rules of the regulatory authority to avoid mercury contamination. | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition.<br><br>Used CFL and TFLs will be collected and disposed of through MPCB authorized disposal facilities. |
| **VI.** | **Green Belt:** | |
| i. | Green belt shall be developed in area as provided in project details, with native tree species in accordance with Forest Department. The greenbelt shall inter alia cover the entire periphery of the Airport. | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition. |
| | Topsoil shall be separately stored and used in the development of green belt. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases. |
| **VII.** | **Public hearing and Human health issues:** | |
| i | Construction site should be adequately barricaded before the construction begins. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction phase. |
| ii | Traffic congestion near the entry and exit points from the roads adjoining the airport shall be avoided. Parking should be fully internalized and no public space should be utilized. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases. |
| iii | Provision of Electro-mechanical doors for toilets meant for disabled passengers. Children nursing/feeding room to be located conveniently near arrival and departure gates. | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition |
| iv | Emergency preparedness plan based on the Hazard identification and Risk Assessment (HIRA) and Disaster Management Plan shall be implemented. | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition. |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| v | Provision shall be made for the housing of construction labor within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures lo be removed after the completion of the project. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction phase.<br><br>Appropriate clauses have been incorporated in the EPC tenders and contracts |
| vi | Occupational health surveillance of the workers shall be done on a regular basis. | **Agreed to Comply**: Regular health check-up of workers will be carried out by contractor appointed by NMIA. We assure MOEFCC to abide by the condition during construction & operational phases. |
| **VIII.** | **Miscellaneous:** | |
| i | The project proponent shall make public the environmental clearance granted for their project along with the environmental conditions and Safeguards at their cost by prominently advertising it at least in two local newspapers of the District or State, of which one shall be in the vernacular language within seven days and in addition this shall also be displayed in the project proponent's website permanently. | **Complied:** Public was informed about the grant of EC by advertisement in newspaper Business Standard Mumbai on 10.12.2021 and Lokmat (Marathi) on 10.12.2021 and copies of Newspaper cutting were submitted with EC Compliance report July- December 2021.<br>Copy of EC and CRZ clearance, Consent to establish are available on NMIAL web site https://www.nmiairport.co.in/circulars.html |
| ii | The copies of the environmental clearance shall be submitted by the project proponent to the Heads of local bodies, Panchayats and Municipal Bodies in addition to the relevant offices of the Government who in turn has to display the same for 30 days from the date of receipt. | **Complied:** MOEF&CC granted EC copy submitted Local Bodies, Panchayats and municipal bodies. Acknowledgement copies were submitted with EC Compliance report July- December 2021. |
| iii | The project proponent shall upload the status of compliance of the stipulated environment clearance conditions, including results of monitored data on their | **Agreed to Comply**: All EC related compliance reports filed by NMIAL are uploaded on NMIAL website and available at the link (https://www.nmiairport.co.in/circulars.html) |

| | EC & CRZ Conditions-2021 | Compliance Status |
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| | website and update the same on half-yearly basis. | |
| iv | The project proponent shall submit six-monthly reports on the status of the compliance of the stipulated environmental conditions on the website of the Ministry of Environment, Forest, and Climate Change at environment clearance portal. | **Agreed to Comply**: All EC related compliance reports filed by NMIAL are uploaded on NMIAL website and available at the link (https://www.nmiairport.co.in/circulars.html)<br>Also, same will be get uploaded on Parivesh portal of ministry of Environment, Forest and Climate Change for environment clearance on regular basis |
| v | The company shall have a well laid down environmental policy duly approved by the Board of Directors. The environmental policy should prescribe for standard operating procedures to have proper checks and balances and to bring into focus any infringements/ deviation/ violation of the environmental /forest/ wildlife norms/ conditions.<br><br>The company shall have defined system of reporting infringements/ deviation/ violation of the environmental/ forest/ wildlife norms/ conditions and/or shareholder's/ stake holders. The copy of the board resolution in this regard shall be submitted to the MoEF&CC as a part of six-monthly report. | **Agreed to Comply**: NMIA has prepared Environmental Policy.<br><br>Environment Management at NMIA shall evolve a system of checks and balances through continuous inspection and monitoring of environment, health & safety standards, regular assessment of methods/processes & records and review for further improvements at policy level.<br><br>This will also facilitate to identify gaps which lead to update guidelines and to undertake remedial measures as well. Proactive & preventive measures on Environment, Health and Safety will be thoroughly implemented during development and operation phases of NMIA. |
| vi | A separate Environmental Cell both at the project and company head quarter level, with qualified personnel shall be set up under the control of senior Executive, who will directly report to the head of the organization. | **Agreed to Comply**: Details of Environmental Management Cell is given in Sr No. (xxvi) above<br><br>During the development/ construction phase, the EPC contractor will be engaged. NMIAL will have in house Environment Management Cell (EMC) will be headed by GM (Environment and Sustainability) who will have a |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| | | field team to support on day to day compliance on site.<br><br>EPC contractor will have EMC and will be responsible for developing EMP for each of their activities.<br><br>Day to day environment management and monitoring of safety will be the responsibility of the contractor's EMC team under supervision of NMIAL HSE Team, while legal compliances will be under Sustainability and Environment Team. |
| vii | Action plan for implementing EMP and environmental conditions along with responsibility matrix of the company shall be prepared and shall be duly approved by competent authority. The year wise funds earmarked for environmental protection measures shall be kept in separate account and not to be diverted or any other purpose. Year wise progress of implementation of action plan shall be reported to the Ministry/Regional Office along with the Six Monthly Compliance Report. | **Agreed to Comply**: Various activities during construction phase and HSE impacts, and mitigation measures will be identified. Site level EMP is Responsibility of EPC Contractor in accordance with contract and will be submitted to NMIAL for approval of the same before commencement of construction work. NMIAL will ensure that all their activities of EPC contractor and sub-contractors are carried out in accordance with the Contractor's EMP and will adhere to conditions imposed by various statutory authorities.<br><br>Implementation of the EMP for development phase as applicable to each work area and activity. Responsibility matrix of the company will be prepared and will be duly approved by competent authority.<br><br>The year wise funds earmarked for environmental protection measures will be kept in separate account and not to be diverted for any other purpose. Year wise progress of implementation of action plan will be reported to the |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| | | Ministry/ Regional Office along with the Six-Monthly Compliance Report.<br><br>NMIAL will thus ensure compliance always with the requirements of applicable legislations and relevant standards as outlined in this document, and all requirements of this EMP for development phase and Contractor's EMP. |
| viii | Self environmental audit shall he conducted annually. Every three years third party environmental audit shall be carried out. | **Agreed to Comply:** NMIAL will conduct internal & external regular inspections, audits & trainings of all contractor and sub contractor works from environmental and occupational health and safety angle during construction/ development phase at defined frequency. Also regular inspections, audits & trainings will be undertaken for each department, to ensure their readiness to comply the environmental regulatory requirements. |
| ix | The project proponent shall submit the environmental statement for each financial year in Form-V to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently and put on the website of the company. | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition.<br>Environmental Statement as per Form V will be prepared during operations and will be submitted at the end of each financial year-end to MPCB. |
| x | The criteria pollutant levels namely, PM10, PM2.5, SO2, NOx (ambient levels) shall be monitored and displayed at a convenient location near the main gate of the company in the public domain. | **Agreed to Comply:** All EC related compliance reports will be uploaded on NMIAL website.<br><br>NMIA will regularly monitored pollutants like PM10, PM2.5, SO2, NOx will be monitored and will be displayed at main gate in public domain. |

| | EC & CRZ Conditions-2021 | Compliance Status |
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| xi | The project proponent shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities, commencing the land development work and start of production operation by the project. | **Agreed to Comply:** Financial Closure for NMIA project Phase I & II (20 MPPA) was achieved on March 29 2022 when State Bank of India (SBI) as a lead bank agreed to underwrite full loan amount of Rs. 12770 Cr. |
| xii | The project. authorities must strictly adhere to the stipulations made by the State Pollution Control Board and the State Government. | Noted |
| xiii | The project proponent shall abide by all the commitments and recommendations made in the EIA/EMP report, commitment made during Public Hearing and also that during their presentation to the Export Appraisal Committee. | Agreed |
| xiv | No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment, Forests and Climate Change (MoEF&CC). | Agreed |
| xv | Concealing factual data or submission of false/fabricated data may result in revocation of this environmental clearance and attract action under the provisions of Environment (Protection) Act, 1986. | Noted |
| xvi | The Ministry may revoke or suspend the clearance, if implementation of any of the above conditions is not satisfactory. | Noted |
| xvii | The Ministry reserves the right to stipulate additional conditions if found necessary. The Company in a time bound manner shall implement these conditions. | Noted |

| | EC & CRZ Conditions-2021 | Compliance Status |
|---|---|---|
| xviii | The Regional Office of this Ministry shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data/information/ monitoring reports. | Noted |
| xix | The above conditions shall be enforced, inter-alia under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986, Hazardous and Other Wastes (Management and Transboundary Movement| Rules, 2016 and the Public Liability Insurance Act, 1991 along with their amendments and Rules and any other orders passed by the Hon'ble Supreme Court of India/ High Courts/NGT and any other Court of Law relating to the subject matter. | Noted |
| xx | Any appeal against this EC shall lie with the National Green Tribunal. if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010. | Noted |

# Annexure-I

# Compliance to conditions stipulated in Environment Clearance & CRZ Clearance No.10-53/2009-I.A. III dt. 22.11.2010 & dt 20.12.2017

**Present Status of Compliance to Conditions stipulated in EC &CRZ Clearance No.10-53/2009-I.A. III dt. 22.11.2010 & dt 20.12.2017 (Annexure- I)**

| Sr. No | | Stipulated Condition-2010 | Compliance status |
|---|---|---|---|
| | | **Specific Condition** | |
| **I.** | | **Construction Phase** | |
| | (i) | "Consent for Establishment" shall be obtained from State Pollution Control Board under Air and Water Act and a copy shall be submitted to the Ministry before start of any construction work at the site. | **Complied:** Consent for Establish (CTE) is granted to NMIA by MPCB vide letter No. Format 1.0/ CAC/UAN No. MPCB-CONSENT-0000128221/CE-2206000673 dt. 15.06.2022 for Phase I & II (20 MPPA & Cargo Capacity 0.57 MTPA) which is valid up to 5.10.2026. (**Annexure III**) |
| | (ii) | CIDCO shall rehabilitate about 3000 families of 10 settlements from 7 villages falling within the airport zone as per the R & R policy of the Government of India or the Government of Maharashtra, whichever is more beneficial to the project affected persons. | **Complied:**<br>R and R package development and implementation is in scope of CIDCO as per NOC for transfer of EC and CRZ clearance given by CIDCO to NMIAL vide letter No. CIDCO/T&C/CT&CP/ NMIA/ 1317 dated 10th Feb 2020.<br><br>CIDCO has handed over 100% encumbrance and R&R free project site of 1160 Ha to NMIAL on 10th June 2022. |
| | (iii) | CIDCO shall obtain necessary permission from Hon'ble High Court of Bombay for cutting or damaging of mangroves and clearance under Forest Conservation Act 1980 as per the orders in respect of notice of Motion no. 417 of 2006 in PIL no. 87/2006, as required. | **Complied:** Necessary approvals / clearances have been taken by CIDCO from the MoEF&CC (stage II Forest clearance vide File No.: 8-95/2012-FC dated 24th April 2017 for diversion of 250.0635 ha area) and Permission for Removal of Mangroves over 108.607 Ha (98 Ha within site and balance in offsite area) vide Bombay High Court order dated October 29, 2013 as applicable. |
| | (iv) | The plantation and protection of mangroves over an area of 615 ha (245 hectares of good quality Mangroves Park shall be developed at Vaghivli on the north of the airport area + 60 hectare area located on the | **Complied:** The Urban Development Department, GoM has sanctioned change in Navi Mumbai Development Plan vide letter G.R.No.TPS/1711/2495/ C.R.202/11 /UD -12 dated 21st march, 2012. It was noted that |

| Sr. No | | Stipulated Condition-2010 | Compliance status |
|---|---|---|---|
| | | west side of the airport site around Moha creek and Panvel Creek + 310 hectares area on the northeast of the airport site between Gadhi River, Mankhurd Panvel Rail corridor and National Highway 4B shall be declared as No-development zone and CIDCO shall under take the development as Mangroves park/green area) would be developed and maintained in the shape of Biodiversity Mangrove Parks well before the airport project is initiated and its progress reported to the high level committee mentioned below at (xxxiii). CIDCO shall formally amend the land use in the sectioned development plan of Navi Mumbai following the due procedure under MRTP Act to achieve this objective. | work of plantation & Protection of 310 ha + 60ha + 20 ha has been completed by Mangrove Cell, State Forest department as submitted in the earlier six-monthly report. In addition, 108 ha mangrove plantation has been completed in Kolekhar village near this NDZ as per the Forest clearance condition of compensatory mangrove plantation. Details of mangrove pockets development including compensatory mangrove plantation and development of other pockets has been submitted by CIDCO vide letter CIDCO/GM(ENV&F)/nmia/2019/038 dtd 11th September 2020.<br>Since the villagers have not vacated the Vaghivali village and considering the recommendation of BNHS,<br>• Mangrove Park should be located away from the airport influence zone considering the bird hazard issue<br>• The island will be protected as NDZ for the time being and mangroves will be retained in their natural state as reported by CIDCO in the earlier compliance report. |
| | [v] | The proposed re-coursing of tidally influenced water body outlets from Ulwe river has a large cross sectional area at the middle with the river/creek on either end remaining unchanged with its natural course. The whole system should function as was functioning earlier without airport project. Surface runoff should not be let into the channel just because the area of cross section is large. The whole | **Complied:** Details are same as submitted earlier vide letter no NMIA/MOEF/GEN/0061 dated 30th Aug 2021.<br>It may be noted, as per CIDCO report, as submitted to MOEFCC, that:<br>1. CWPRS, Pune has carried out 1D, 2D mathematical & physical Model studies based on the MoEF's approved layout plan of airport covering 1160 Ha. CIDCO is designing the master drainage plan of surrounding areas by |

| Sr. No | | Stipulated Condition-2010 | Compliance status |
|---|---|---|---|
| | | airport area will be reclaimed, and the level raised to 7m whereas the existing level all around the airport will continue to be low in its natural state. There will be flow all around due to surface runoff. This additional quantity must be collected by appropriate drainage system and let into Gadhi River and not into the re-coursing channel. The recourse channel may be able to take it but not the river or creek on either side of the channel. This aspect shall be examined by CIDCO in details to avoid the flooding of the low-lying areas besides inducting other hydrological and environmental studies. | incorporating the various recommendations of CWPRS.<br>2. The detailed drainage plan for the airport has been prepared by the NMIAL as a part of Master Plan, incorporating CWPRS recommendations and integrating with CIDCO plans and abiding by EC conditions. The whole Storm Water from Airport area will be discharged in Gadhi River.<br>3. The master drainage plan of airport and surrounding area is prepared for the worst conditions (highest high tide, tidal surge, maximum rainfall condition and flooding in all rivers and a safety factor which is dependent upon climate surge) as submitted by NMIAL. It was submitted that NMIAL has also engaged CWPRS for checking the internal drainage system designed for the airport area so that it ties very well with the Master Drainage system planned for the area.<br>4. The Master plan developed by NMIA has ensured that there will be no discharge into the Ulwe recourse channel from Airport as mandated in EC. CIDCO has signed long term MOU with CWPRS, so that the drainage plans for all areas in Navi Mumbai prepared by it are checked by CWPRS. This practice is followed for all areas near the proposed airport also. |
| | (vi) | The entire system shall be studied as one composite system with appropriate boundary conditions to reflect the worst conditions – minimum 100 years to be specified and compliance ensured such as - flooding, surface runoff not only from the airport but also from surrounding areas as well, normal flow, tidal flow due to | **Complied:** Details are same as submitted earlier vide letter no NMIA/MOEF/GEN/0061 dated 30th Aug 2021. |

| Sr. No | | Stipulated Condition-2010 | Compliance status |
|---|---|---|---|
| | | tidal surge having a long return period, possible obstructions to flow, tributaries joining the main river etc. so as to take appropriate protection and remedial measures. Due to construction of recourse Channels and also due to tail end of the Gadhi & Ulwe Rivers into Panvel Creek, there is a need to prepare a Comprehensive Master Plan for Surface drainage and Flood protection, keeping in view the proposed developments. CIDCO shall submit the above Master Plan to the Ministry. | |
| | (vii) | Systemic and periodic monitoring mechanism need to be put in place by CIDCO to assess the impact on sub-surface flow/ impact on aquifers as well as surface water bodies in different seasons. Necessary additional environmental protection measures to be adopted to address the impact of proposed development in coastal sub-subsurface flow as well as impact on aquifers. | **Complied:** NMIAL has appointed a Laboratory recognized by MOEFCC, for the monitoring for Air & noise (9 stations) and Ground water sampling (5 locations) on monthly basis. Marine/ Surface water (10 stations), & soil sampling (5 locations) on quarterly basis. Environmental analytical reports for the reporting period are enclosed herewith. (**Annexure II**) |
| | (viii) | CIDCO shall prepare a Management Plan to handle the runoff from the airport and to ensure that runoff associated risks/ impacts such as siltation in receiving water body are avoided and are taken care within airport area during monsoons. | **Complied:**<br>Master Drainage Plan Report of Airport and its surrounding area is prepared which includes the issue of management of runoff and associated risks during the monsoon. CWPRS studies show that siltation rates in Gadhi River and Panvel creek are fairly low and obstructions due to such factors are considered while designing Master Drainage layout. During construction phase run off will be passed silt traps before letting out to nearby area.<br><br>The SW drainage will incorporate features like grit chamber and Oil |

| Sr. No | | Stipulated Condition-2010 | Compliance status |
|---|---|---|---|
| | | | water separator to remove suspended matter and oils. Thus it will be ensured that no additional load of suspended matter during development & operation phase. |
| | (ix) | On the northern part of the airport there is a secondary channel of the Gadhi River which will be filled up for the airport runway construction. This will be replaced by a shorter channel along the northern boundary of the airport. The channel shall be designed appropriately through overall modeling study so that the channel provides tidal water to the mangrove park and moderate tidal flows under worst environmental conditions. Need for widening and deepening of Gadhi River may also be studied simultaneously, if required. The revised widths and depths of recourse channels shall be determined with modified drainage and worst rainfall/ tide conditions including appropriate factor of safety. | **Complied:** Details are same as submitted earlier vide letter no NMIA/MOEF/GEN/0061 dated 30th Aug 2021.<br><br>Construction of new Channel for Gadhi River, north of NMIA Site is to be completed by CIDCO before commencement of Phase-I operations of NMIA, same discussed in the 74th EAC meeting held on 8th Oct'21 in which the Committee expressed that, as the conditions pertain to the proposal for the development of NMIA. Therefore, even if CIDCO is the implementing agency w.r.t the said conditions, the Project Proponent (PP) shall continue to be involved in the process, to monitor & ensure compliance to aforesaid conditions. |
| | [x] | The flow channels and the low - lying mangrove area which will receive water from diverted recourse/ channels should remain undisturbed. No road, embankment or any other construction shall be permitted. Any island formed due to deposition of sediment in front of Panvel creek shall be periodically removed. | **Complied:** Details are same as submitted earlier vide letter no NMIA/MOEF/GEN/0061 dated 30th Aug 2021. |
| | [xi] | A detailed map shall be submitted by CIDCO to the Ministry with quantification of affected mangrove area with density i.e., initial proposal & modified proposal and proposed mangrove forestation with | **Complied:** Details are same as submitted earlier vide letter no NMIA/MOEF/GEN/0061 dated 30th Aug 2021. |

| Sr. No | | Stipulated Condition-2010 | Compliance status |
|---|---|---|---|
| | | species. The work on the proposed compensatory mangrove park should commence well before the construction of the airport is undertaken. The mangrove irrigation systems and diverse species selections for all the four areas may be scientifically made. The river front development in all the areas not protected by adequate mangrove buffer along the Panvel creek and Gadhi river may be considered through studies. | |
| | [xii] | Whatever EIA data was submitted and presented was related to a situation for "no airport condition". The project proposal has under gone many changes in terms of converting the lagoon as Mangrove Park, shifting of non-aeronautical activities to the south etc. Updated EIA report with all the modifications and commitments given by CIDCO shall be submitted to the MoEF, MPCB and to MCZMA. This updated EIA report will serve as the preliminary baseline data. CIDCO shall submit the second report (EIA Report II) after finalization of all the facilities followed by Comprehensive EIA report prepared with approved layout of the airport, new hydrological scenario, altered topography and land use. The Comprehensive EIA report should also include ecological aspects answering quires raised by BNHS and several other points raised during the meeting. After completion of Phase I of the project, the CIDCO shall conduct the | **Complied:** Details are same as submitted earlier vide letter no NMIA/MOEF/GEN/0061 dated 30th Aug 2021.<br>NMIAL has submitted EIA report 2021 to MOEFCC vide letter dated 25th Oct 2021 for obtaining fresh clearance. The EIA report is uploaded on web site also & link is: https://nmiairport.co.in/circulars.html<br><br>Environmental Audit will be conducted after commissioning of phase-I of the airport. It may be noted that the same has been mandated in the Concession Agreement for NMIA. |

| Sr. No | | Stipulated Condition-2010 | Compliance status |
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| | | "Environmental Audit" with a reputed organization and the audit shall also include the "Validation of the conclusions drawn in the EIA Report" and to submit to MoEF, MPCB and to MCZMA and shall be uploaded on the website. | |
| | [xiii] | The water quality of the River Gadhi, Ulwe, the Panvel Creek and the ground water is to be monitored on quarterly basis for TOC, Pb, Cd and Hg at all the locations identified in the EIA study for a period of at least 2 years from the commencement for the construction work and the quarterly reports to be submitted to Ministry of Environment and Forests Govt. of India and MPCB. | **Complied:** Water quality monitoring is being carried out on monthly basis by NMIAL through MoEF&CC recognized Lab.<br><br>During construction and operation period also monitoring of the water quality will be carried out by NMIAL and the EPC contractor.<br><br>Environmental analytical reports for the reporting period are enclosed as **Annexure -II** |
| | (xiv) | The waste water generated from the aircraft maintenance hangers may contain hazardous materials like lead, chromium, Sulphates, Phenolic compounds, V.O.C's etc. The surface runoff from the airport area shall also contain oils, grease, Sulphates etc, which cannot be sent directly to sewage treatment plant for the treatment. A separate treatment plant for managing the wastewater shall be specified and adopted. | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition. |
| | [xv] | Based on the geological profile underneath the proposed airport, suitable consolidation factor shall be arrived to assess the additional noise/ vibration levels that would be produced during impact of landing & take off the air crafts simultaneously on both the runways. Further, the partially quarried hills in the vicinity will become a rebound shell for noise. CIDCO shall examine the details of noise/ | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition. NMIAL has undertaken detailed Noise modelling studies for various air traffic scenarios and submitted as part of EIA studies.<br><br>However, it may be noted that runway pavement will be designed taking into consideration subsoil condition beneath to minimize noise/vibration. Necessary actions |

| Sr. No | | Stipulated Condition-2010 | Compliance status |
|---|---|---|---|
| | | vibration levels those are likely to be increased both during day and nighttime and the mitigation measures shall be installed to reduce the (noise/ vibration levels) impacts. | to reduce noise/vibration levels during the operations phase will be taken. |
| | [xvi] | Standard instrument arrival and departure procedure shall be designed to minimize the noise levels within the permissible limits for the area falling in the funnel near the airport on either side. | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition. |
| | (xvii) | Energy conservation to the extent of 20% shall be incorporated in the bidding documents including water conservation (reuse/ recycle, rainwater harvesting and water efficient fixtures) and other green building practices for various buildings proposed within the airport complex. CIDCO shall consider ECBC Guidelines 2009 to achieve the energy – efficient design. | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition. However, we also assure that necessary energy conservation and water conservation measures have been envisaged and will be adopted. |
| | (xviii) | CIDCO shall prepare a detailed traffic management plan to take care of increased vehicular traffic which should also cover/ clearly delineate widening/ increasing the existing roads and associated road infrastructure approving / installation of road safety features/ pedestrian facility/ FOB / under passes etc. (that can be done by carrying out road safety audits). Measures shall be taken to prevent encroachment along/within the ROWs on connecting/ main arterial roads. | **Complied:** Details are same as submitted earlier vide letter no NMIA/MOEF/GEN/0061 dated 30th Aug 2021. |
| | (xix) | Necessary road (National and State Highways) and rail connectivity shall also be upgraded to handle the increased passenger and cargo | **Complied:** Details are same as submitted earlier vide letter no NMIA/MOEF/GEN/0061 dated 30th Aug 2021. |

| Sr. No | | Stipulated Condition-2010 | Compliance status |
|---|---|---|---|
| | | traffic, in addition to metro for transition of passengers. The proposal of Hoverport shall not be taken up on the north part of the airport area as this shall damage the mangroves. | |
| | (xx) | The measures should be taken to improve public transportation including dedicated road / MRTS corridors to access to Airport, may also be considered for the same. Energy Efficient dedicated rail based public transport facility; suburban/ metro train in particular, may be created between the Santa Cruz and the Navi Mumbai Airport in addition to all other links connecting various parts of Mumbai city. | **Complied:** Details are same as submitted earlier vide letter no NMIA/MOEF/GEN/0061 dated 30th Aug 2021. |
| | (xxi) | Traffic Management during construction phase should be clearly planned so that the traffic situation is not further worsened on the existing connecting roads. Installations of Noise barrier/ Green Belts should be clearly indicated in the plan (After identifying critical locations). | **Agreed to Comply:** Since project is yet to be developed & Operational, we assure to abide by the condition. Noise barriers will be installed as required. |
| | (xxii) | To avoid accidental damage (fire, hazardous material waste handling, oil spills, wastewater disposal) in the adjacent ecologically fragile surroundings and mangrove area – a risk assessment plan and disaster management plan should be prepared and with periodic compliance of safety measures in place to avoid loss due accidental damage that could have been otherwise avoided. Further CIDCO shall appoint a dedicated professional team/cell to | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition. However, we submit that Risk Assessment and Disaster Management Plan is prepared for development & operational phases to avoid accidental damage in the adjacent ecologically fragile surroundings and mangrove area. Disaster Management Plan will be updating periodically. |

| Sr. No | | Stipulated Condition-2010 | Compliance status |
|---|---|---|---|
| | | handle disaster and associated risks. | |
| | (xxiii) | In addition to the above – CIDCO shall ensure that all the risks (such as fire, hazardous material waste handling, oil spills, waste – both liquid/solid wastes) associated/ resultant risk during various stages of development (like planning, construction, operation) are managed within the airport area. In case of any unforeseen event as stated above the liability – environmental and social will rest with the developer/ CIDCO, the decision of the high-level Committee, stipulated below will be full and final for liability fixations. | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition. However, we assure that action will be taken as per condition (xxii) cited above. |
| | [xxiv] | The compliance report of the monitoring committee shall be made 'public' (put online and/or also displayed for wider dissemination of compliance) at all stages (planning, construction, operation) to ensure effective monitoring and compliance of conditions. | **Complied:** After approval of MoEF&CC for Transfer of Environment & CRZ Clearance from CIDCO to NMIAL has been obtained vide letter No. F. No. 10-53/2009-IA-III dated 17th August 2020, onwards NMIAL uploaded on NMIA website EC Compliance Report at the following link.<br><br>https://www.nmiairport.co.in/circulars.html |
| | [xxv] | Environment Management Plan or associated monitoring plan shall ensure that mitigation measures detailed out in terms of role, responsibility, budgetary provisions, timeline for completion, frequency of monitoring and compliance etc. | **Complied** Detailed Construction and Operation phase EMP and monitoring plan with budgetary allocation have been dealt in EIA report September 2021 which was submitted to MOEF&CC. Further, we assure you to abide by the condition. |
| | [xxvi] | In order to meet all the essential aeronautical requirements and the further airport expansions, no property development shall be undertaken within the proposed aeronautical Airport Zone area (1160 ha). | **Agreed to Comply:** Since project is yet to be operational, we assure to abide by the condition. |

| Sr. No | | Stipulated Condition-2010 | Compliance status |
|---|---|---|---|
| | [xxvii] | The Master plan/ Development plan of Navi Mumbai shall be revised and recasted in view of the airport development to avoid and unplanned haphazard growth around the airport. The land use should take care of bird menace including that from the Mangrove Parks. | **Complied:** Details are same as submitted earlier vide letter no NMIA/MOEF/GEN/0061 dated 30th Aug 2021. |
| | [xxviii] | All other nearby villages, if not required to be relocated should be provided with best possible infrastructure so that they compare well with the adjoining ultra-modern airport infrastructure. | **Complied:** Details are same as submitted earlier vide letter no NMIA/MOEF/GEN/0061 dated 30th Aug 2021. |
| | [xxix] | CRZ provisions shall be applicable on the tidally influenced diverted channels of Ulwe and Gadhi Rivers and CIDCO shall finalize the Airport plans accordingly. | **Agreed to Comply:** Details are same as submitted earlier vide letter no NMIA/MOEF/GEN/0061 dated 30th Aug 2021.<br>Master Plan was prepared for NMIA development is in strict compliance of the prevailing CRZ provisions and requirement for compliance in this regard has been incorporated appropriately into the Concessionaire Agreement with NMIAL. Further, it shall be monitored by Environment Cell as well as HLAMC. |
| | [xxx] | Any cutting or filling up the airport site will create significant turbidity problem. CIDCO shall examine the impact on the marine life. The details will be put up on the website every 3 months. | **Complied:** Turbidity during pre-construction and construction period is tested and analyzed regularly through MOEF & CC recognized laboratory appointed to carry out regular environmental monitoring at pre-defined locations in surface waters around the airport. The quarterly monitoring of turbidity is being carried out. Environmental analytical reports for the reporting period are enclosed herewith. (**Annexure -II** ). |
| | [xxxi] | CIDCO shall conduct the baseline survey of avian fauna before the start of construction and the details shall be put up | **Complied:** Details are same as submitted earlier vide letter no NMIA/MOEF/GEN/0061 dated 30th Aug 2021. |

| Sr. No | | Stipulated Condition-2010 | Compliance status |
|---|---|---|---|
| | | every 3 months on the website in association with BNHS. | |
| | [xxxii] | The Environmental Clearance / CRZ Clearance is recommended below is only for the Navi Mumbai Airport project. CIDCO shall obtain the Environmental and CRZ clearance separately for off airport facilities and other off infrastructure projects after finalizing the locations and details as may be required under the EIA Notification 2006 and the CRZ Notification. | **Complied:** Details are same as submitted earlier vide letter no NMIA/MOEF/GEN/0061 dated 30th Aug 2021. |
| | [xxxiii] | Taking a cue from the man-made 26/11 incident arising out of external threat to our country, a strategic airport safety and security plan covering also surrounding inhabited areas of the airport shall be prepared and put in place in consultation with appropriate government departments | **Agreed to Comply:** We assure that Airport safety and security plan will be prepared as per DGCA mandates safety requirements and procedures for submission to DGCA, AAI, BCAS. |
| | [xxxiv] | A high level advisory and monitoring committee which should include international experts of repute, reporting directly to the highest Airport Management Authority shall be constituted by CIDCO to plan, execute and maintain the environmental issues / recommendations mentioned above. The monitoring shall be done at various stages (planning, construction, operation) of project for compliance of conditions. Budgetary provisions shall be made to the satisfaction of this Committee. The committee shall meet at least once in three months and the decisions taken in the meetings shall be put up | **Agreed to Comply:** The implementation was discussed in the EAC 74th Meeting held on 8th Oct 2021, and it was explained that the project is periodically monitored by CM, GOM and Chief Secretary, GOM. Thus, condition may be considered as complied and no separate meeting is required. |

| Sr. No | | Stipulated Condition-2010 | Compliance status |
|---|---|---|---|
| | | on the web site for public information. | |
| | [xxxv] | Regular modeling study of air, noise shall be carried out due to the increase in traffic. | **Complied**: Air and noise modelling was carried out during EIA study. Monthly monitoring of ambient air and noise levels is being continued by NMIAL and reports are being submitted along with six monthly compliance reports (**Annexure - II**). Modeling study of air and noise will be carried out again after the project goes operational |
| | [xxxvi] | The solid waste shall be properly collected, segregated and disposed as per the provision of Solid Waste (Management and Handling) Rules, 2000. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases. |
| | [xxxvii] | Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases.<br><br>EPC Contractor is mandated to give proper labour housing facilities during construction phase of the airport as per requirements of CA and EC. |
| | [xxxviii] | A First Aid Room will be provided in the project both during construction and operation of the project. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases.<br>First aid facilities will be provided at offices of various contractors as also in labour colony. In addition, EPC contract mandates contractor to maintain an ambulance and have tie up with local Hospitals to ensure that in case of emergency necessary facilities will be available to working personnel. |
| | [xxxix] | Disposal of muck during construction phase should not create any adverse effect on the neighboring communities and | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases. |

| Sr. No | | Stipulated Condition-2010 | Compliance status |
|---|---|---|---|
| | | be disposed taking the necessary precautions for general safety and health aspects of people, only in approved sites with the approval of competent authority. | |
| | [xl] | Soil and ground water samples will be tested to ascertain that there is no threat to ground water quality by leaching of heavy metals and other toxic contaminants. | **Complied:** Soil & ground water quality monitoring during pre-development work was being carried out by CIDCO through MOEFCC recognized Lab and regular reports have been submitted to MOEFCC along with six monthly compliance reports. NMIAL has continued the monitoring for Air & noise (9 stations) and Ground water sampling (5 locations) on monthly basis. Marine/ Surface water (10 stations), & soil sampling (5 locations) on quarterly basis. Environmental analytical reports for the reporting period are enclosed herewith (**Annexure-II** ). |
| | [xli] | Construction spoils, including bituminous material and other hazardous materials, must not be allowed to contaminate watercourses and the dump sites for such material must be secured so that they should not leach into the ground water. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases. |
| | [xlii] | Installation and operation of DG set shall comply with the guidelines of CPCB. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases. |
| | [xliii] | The diesel generator sets to be used during construction phase should be low sulphur diesel type and should conform to Environment (Protection) Rules prescribed for air and noise emission standards. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases. |
| | [xliv] | The diesel required for operating DG sets shall be stored in underground tanks and if required, clearance from | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases. |

| Sr. No | | Stipulated Condition-2010 | Compliance status |
|---|---|---|---|
| | | Chief Controller of Explosives shall be taken. | |
| | [xlv] | Vehicles hired for bringing construction material to the site should be in good condition and should have a pollution check certificate and should conform to applicable air and noise emission standards and should be operated only during non-peak hours. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases. |
| | [xlvi] | Ambient noise levels should conform to residential standards both during day and night. Incremental pollution loads on the ambient air and noise quality should be closely monitored during construction phase. Adequate measures should be made to reduce ambient air and noise level during construction phase, so as to conform to the stipulated standards by CPCB/ MPCB. | **Agreed to Comply:** Noise levels monitoring during pre-development work was being carried out by CIDCO through MOEFCC recognized Lab and regular reports have been submitted to MOEFCC along with six monthly compliance reports. NMIAL has continued the monitoring for Air & noise (9 stations) and Ground water sampling (5 locations) on monthly basis. Marine/ Surface water (10 stations), & soil sampling (5 locations) on quarterly basis. Environmental analytical reports for the reporting period are enclosed herewith (**Annexure-II**). |
| | **[xlvii]** | Fly ash should be used as building material in the construction as per the provisions of Fly Ash Notification of September, 1999 and amended as on 27th August, 2003. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction phase. |
| | **[xlviii]** | Ready mixed concrete must be used in building construction. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction phase. |
| | **[xlix]** | Storm water control and its re-use as per CGWB and BIS standards for various applications. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases. |
| | **(l)** | Water demand during construction should be reduced by use of pre-mixed concrete, curing agents other best practices referred. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction phase. |

| Sr. No | | Stipulated Condition-2010 | Compliance status |
|---|---|---|---|
| | **(li)** | Use of glass may be reduced by upto 40% to reduce the electricity consumption and load on air-conditioning. If necessary, use high quality double glass with special reflective coating in windows. | **Agreed to Comply**: We assure MOEFCC to abide by the condition once construction works are commenced. We have designed our airport buildings in accordance with ECBC standards to make them more energy efficient. |
| | **(lii)** | The approval of the competent authority shall be obtained for structural safety of the buildings due to earthquake, adequacy of firefighting equipment, etc. as per National Building Code including protection measures from lightening etc. | **Agreed to Comply**: We assure MOEFCC to abide by the condition once construction works are commenced. |
| | **(liii)** | Regular supervision of the above and other measures for monitoring should be in place all through the construction phase, so as to avoid disturbance to the surroundings. | **Agreed to Comply**: We assure MOEFCC to abide by the condition during construction & operational phases. |
| | | | |
| **II.** | | **Operation Phase: -** Project is under construction, the condition pertaining to operation phase will be implemented. However, We assure MOEFCC to comply all the conditions once construction is completed. Further, status of few conditions pertaining to construction phase as included in this section is given below. | |
| | **iv)** | Weep holes in the compound walls shall be provided to ensure natural drainage of rainwater in the catchment area during the monsoon period. | **Agreed to Comply**: We assure MOEFCC to abide by the condition once construction works are commenced. |
| | **vi)** | The ground water level and its quality should be monitored regularly in consultation with Central Ground Water Authority. | **Complied:** Monitoring of ground water level and its quality around the project site have been carried out by CIDCO and reports were submitted along with Six monthly compliance report to MOEFCC.<br>NMIAL has continued the monitoring for Air & noise (9 stations) and Ground water sampling (5 locations) on monthly basis. Marine/ Surface water (10 stations), & soil sampling (5 locations) on quarterly basis. |

| Sr. No | Stipulated Condition-2010 | Compliance status |
|---|---|---|
| | | Environmental analytical reports for the reporting period are enclosed herewith (**Annexure -II**). |
| | **General Conditions:** | |
| **(i)** | In the event of any change in the project profile a fresh reference shall be made to the Ministry of Environment and Forests. | **Agreed to Comply**: We will abide by the condition. |
| **(ii)** | This Ministry reserves the right to revoke this clearance, if any, of the conditions stipulated are not complied with to the satisfaction of this Ministry. | **Agreed to Comply**: We will abide by the condition. |
| **(iii)** | This Ministry or any other competent authority may stipulate any additional conditions subsequently, if deemed necessary, for environmental protection, which shall be complied with. | **Agreed to Comply**: We will abide by the condition. |
| **(iv)** | Full support should be extended to the officers of this Ministry's Regional Office at Bhopal and the offices of the Central and State Pollution Control Board by the project proponents during their inspection for monitoring purposes, by furnishing full details and action plans including the action taken reports in respect of mitigative measures and other environmental protection activities. | **Complied:** Full support was extended to the officers of this Ministry's Regional Office during visit and assured to render the same as & when required. |
| **8** | These stipulations would be enforced among others under the provisions of water (Prevention and Control of Pollution) Act, 1974 the Air (Prevention and Control of Pollution) Act 1981, the Environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991 and Municipal Solid Wastes (Management and Handling) Rules, 2000 including the | **Agreed to Comply**: We will abide by the condition. |

| Sr. No | Stipulated Condition-2010 | Compliance status |
|---|---|---|
| | amendments and rules made thereafter. | |
| **9** | All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department and Civil Aviation Department from height point of view, Forest Conservation Act, 1980 and Wildlife (Protection) Act, 1972 etc. shall be obtained, as applicable by project proponents from the respective competent authorities. | **Complied:** All the necessary approvals required for the project have been obtained and copies have been submitted to R.O, MOEFCC, Nagpur. We will abide by the condition. |
| **10** | The project proponent should advertise in at least two local Newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded CRZ Clearance and copies of clearance letters are available with the State Pollution Control Board and may also be seen on the website of the Ministry of Environment and Forests at http://www.envfor.nic.in. The advertisement should be made within 10 days from the date of receipt of the Clearance letter and a copy of the same should be forwarded to the Regional office of this Ministry at Bhopal. | **Complied:** Public was informed about the grant of EC by advertisement in newspaper DNA, Mumbai on 30.11.2010 and Lokmat (Marathi) on 30.11.2010 and copies of Newspaper cutting were submitted to Regional Office. |
| **11** | Environmental Clearance is subject to final order of the Hon'ble Supreme Court of India in the matter of Goa Foundation Vs. Union of India in Writ Petition (Civil) No.460 of 2004, if applicable to this project. | **Agreed to Comply**: We will abide by the condition. |
| **12** | A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zilla Parisad / Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom | **Complied:** CIDCO had submitted status as "Complied" in the earlier compliance report. |

| Sr. No | Stipulated Condition-2010 | Compliance status |
|---|---|---|
| | suggestions/ representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent. | |
| **13** | The proponent shall upload the status of compliance of the stipulated EC conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; SPM, RSPM, $SO_2$, NOx (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the project shall be monitored and displayed at a convenient location near the main gate of the company in the public domain. | **Complied:** CIDCO has been submitting six monthly compliance reports regularly. All EC related compliance reports are uploaded on the CIDCO website at the following link: https://cidco.maharashtra.gov.in/navi_mumbai_airport# under Pre-Development tab as submitted by CIDCO.<br><br>After approval of MoEF&CC for Transfer of Environment & CRZ Clearance from CIDCO to NMIAL has been obtained vide letter No. F. No. 10-53/2009-IA-III dated 17th August 2020, onwards NMIAL uploaded on NMIA website EC Compliance Report at the following link. https://nmiairport.co.in/circulars.html |
| **14** | The project proponent shall also submit six monthly reports on the status of compliance of the stipulated EC conditions including results of monitored data (both in hard copies as well as by e-mail) to the respective Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB. | **Complied:** Same as mentioned above in General Condition 13. |
| **15** | The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall | **Agreed to Comply**: Will be submitted in Operation Phase of project. |

| Sr. No | Stipulated Condition-2010 | Compliance status |
|---|---|---|
| | also be put on the website of the company along with the status of compliance of EC conditions and shall also be sent to the respective Regional Offices of MoEF by e-mail. | |

**Compliance to additional conditions stipulated by MOEFCC while granting Extension of Validity for Environmental and CRZ Clearance to NMIA Project vide letter dated 20th Dec 2017.**

| No. | Stipulated Condition- | Compliance status |
|---|---|---|
| **i)** | Certified report on sources and availability of water from the local body supplying water along with the permission received by them for the shall be submitted. This report shall specify the total annual water availability with the organization (local Body), the quantity of water already committed to other development projects, the quantity of water committed for this project and the balance water available for distribution. This should be specified separately for ground water and surface water sources and ensure that there is no impact on other uses. | **Complied:** Details are same as submitted earlier vide letter no NMIA/MOEF/GEN/0061 dated 30th Aug 2021. |
| **ii)** | Detailed traffic management and traffic decongestion plan, to ensure that the current level of service of the roads within a 5 kms radius of the project site is maintained and improved upon, shall be drawn up through an organization of repute and specializing in Transportation Planning within next 6 months. This should be based on the cumulative impact of all development and increased inhabitation being carried out by the project or other agencies in this 5 kms radius from the site under different scenarios of space and time and shall be implemented to the satisfaction of State Urban Development and Transports Departments with the consent of all the concerned implementing agencies. | **Complied:** Details are same as submitted earlier vide letter no NMIA/MOEF/GEN/0061 dated 30th Aug 2021. |

| No. | Stipulated Condition- | Compliance status |
|---|---|---|
| iii) | Treated effluents shall also be used for irrigation and Road side plantation after taking due permissions from the concerned authorities/Forest department. | **Agreed to Comply**: We assure to abide by the condition. |
| iv) | Project proponent shall satisfactorily address all the complaints that have been received against the project and submit a compliance report to the Ministry. | **Agreed to Comply:** Details are same as submitted earlier vide letter no NMIA/MOEF/GEN/0061 dated 30th Aug 2021. |
| v) | The extension of validity is being granted for the original proposal for which Environmental and CRZ Clearance was granted earlier. The Project proponents will not make any changes any changes in the project nature, structure and configuration and limit themselves to activities for which the Environmental and CRZ Clearance has been given earlier. | **Agreed to Comply:**<br>The approval of MoEF&CC for Transfer of EC from CIDCO to NMIAL has been obtained vide letter No. F. No. 10-53/2009-IA-III dated 17th August 2020. NMIAL has applied to MOEFCC for grant of fresh EC & CRZ clearance and validity of existing EC is extended up to 21st Nov 2021 in reference to MOEFCC's Notification dated 18th Jan 2021.<br>Fresh Environmental Clearance and CRZ Clearance for on-going project granted No. 21-60/2021-IA-III dated: 28.11.2021 and issued on 1st Dec 2021. |

# Annexure-II

# Environmental Monitoring Report
# (January- June 2022)

# ENVIRONMENTAL COMPLIANCE MONITORING REPORT
# for
# Navi Mumbai International Airport (NMIA)

**SUBMITTED TO:**

**Navi Mumbai International Airport Pvt. Ltd. (NMIAL)**

**Period:**

**January to June 2022**

**PREPARED BY**

**ADITYA ENVIRONMENTAL SERVICES PVT.LTD.**
**MOEFCC Recognized Laboratory under EP Act 1986**
**Accredited under ISO 9001: 2015 & OHSAS 18001: 2007 by ICQS**
**www.aespl.co.in**

**INDEX**

## List of Tables

## List of Figures

## 1. INTRODUCTION

Mumbai Metropolitan Region (MMR) comprises of areas in and around Mumbai city and includes parts of Mumbai, Thane and Raigad Districts in Maharashtra. Mumbai is known as the commercial capital of India and the MMR is an industrially and technologically advanced region, which has experienced rapid growth in income and employment. The increase in trading, business and financial services demands the highest order of infrastructure. There is a need for enhancement of the available capacity of the airport, as the existing airport in Mumbai is under tremendous pressure to meet the air traffic demands of this vibrant region. Realizing this need, the Government of Maharashtra conceptualized the Navi Mumbai International Airport (NMIA) project and appointed City and Industrial Development Corporation of Maharashtra Ltd. (CIDCO) as the Nodal Agency for implementation of the project.

The site for the airport was selected near Panvel in Raigad district of Maharashtra with central coordinates 18°59'33.00"N and 73°4'18.00"E. The Director General of Civil Aviation (DGCA) has approved the site. Environmental Impact Assessment (EIA) study was conducted by Centre for Environmental Science and Engineering (CESE), Indian Institute of Technology (IIT) Mumbai and updated report submitted in April 2011.

City and Industrial Development Corporation of Maharashtra Ltd (CIDCO) as the Nodal Agency appointed by the Government of Maharashtra obtained Environmental and CRZ Clearance (EC) for the project vide F. No. 10-53/2009-IA.III dated 22 November 2010 valid up to 21 November 2017 and later, Extension of Validity dated 20 December 2017 valid up to 21 November 2020. Further, Environmental Clearance and CRZ Clearance for on-going project granted No. 21-60/2021-IA-III dated: 28.11.2021

Consent for Establish (CTE) is granted to NMIA by MPCB vide letter No. Format 1.0/ CAC/UAN No. MPCB-CONSENT- 0000128221/CE-2206000673 dt. 15.06.2022 for Phase I & II (20 MPPA & Cargo Capacity 0.57 MTPA) which is valid up to 5.10.2026.

Pre-development works including Land Development Works, R & R, shifting of Ulwe Recourse channel, shifting of EHVT and utility lines and compensatory Mangrove plantation for the project were commenced on site by CIDCO in April 2017 after receiving Stage-II Forest Clearance.

## 2. APPOINTMENT OF NMIAL AS CONCESSIONNAIRE FOR THE PROJECT

This project was taken up on Public Private Partnership (PPP) basis, on approval of the Government of India and the Government of Maharashtra. After an open global bidding process, CIDCO issued Letter of Award dated 25 October 2017 to Mumbai International Airport Pvt Ltd (MIAL) for development of the project. A Special Purpose Vehicle, namely Navi Mumbai International Airport Pvt Ltd (NMIAL) was formed and appointed as Concessionaire vide Concession Agreement (CA) dated 08 January 2018 for execution of the project with CIDCO holding 26% share and MIAL holding 74% share in the SPV. NMIAL is to Design, Build, Finance, Operate and Transfer (DBFOT) the Navi Mumbai International Airport over a concession period of 30 years, which is further extendable by 10 years.

As per the Concession Agreement signed between CIDCO and NMIAL, NMIAL will be responsible for obtaining and complying all applicable permits for the construction, operation and maintenance of the project.

Pre-development work for the project is now nearing completion and CIDCO has handed over 100% encumbrance free project site of 1160 Ha to NMIAL by 10th June 2022.

CIDCO has issued NOC for transfer of Environmental and CRZ Clearance and Consent to Establish to the name of NMIAL vide letter No. CIDCO/T&C/CT&CP/NMIA/1317 dated 10 February 2020. EC transfer letter to that effect has been granted by the MoEF&CC dated 17 August 2020 with same validity as earlier EC (that is 21 November 20). NMIAL has initiated process for grant of fresh EC.

However, as per Clause-9A of recent MoEF&CC Notification vide S.O No. 221 (A) dated 18th Jan 2021, the validity of Environment and CRZ clearance granted to NMIA project vide F.No.10-53/2009 stands further extended up to 21st November 2021. The project obtained CRZ recommendations by Environment & Climate Change Department, Government of Maharashtra vide letter CRZ 2021/CR 156/TC4 dated 27th September 2021. The project has been considered in the 74th meeting of Expert Appraisal Committee (infrastructure 2) held on 8th October 2021 and the minutes of meeting was uploaded on 18th October 2021. Environmental Clearance for NMIA project was issued on 1st December 2021.

During the pre-development works at site, to comply the conditions stipulated in the Environmental and CRZ Clearance, CIDCO had undertaken Compliance Environmental Monitoring for the New Mumbai International Airport (NMIA) site and vicinity.

The six-monthly reports for compliance to EC conditions were submitted by CIDCO until December 2020 as per above and also hosted on its web site. Now, in light of the transfer of EC to NMIAL from CIDCO, six monthly compliance reports will be prepared and filed by NMIAL.

The focus of compliance monitoring is to assess the baseline environmental conditions in and around the surrounding project area to check for possible impacts on environment at an early stage so that necessary actions can be initiated. The assignment comprises monitoring of following parameters:

- Ambient Air Monitoring
- Ambient Noise Level Monitoring
- Soil
- Ground/Surface Water
- Marine Water for Biological and Physicochemical Parameters

# 3. SCOPE OF MONITORING WORK

## 3.1 Scope of Monitoring Work as per Work Order:

Scope of monitoring work as per Work Order are as given below:

**Table 3-1: Scope of Environmental Monitoring Work as per Work Order**

| Sr. No. | Parameters – as per Annexure B | Location | Frequency | Samples/ Year |
|---|---|---|---|---|
| 1. | **Ambient Air Quality:** As per NAAQS standards Published by CPCB (12 Parameters) | 9 | 9 Stations per Month | 108 |
| 2. | **Noise: Parameters: Leq Noise level** - Day time & Nighttime separately as per CPCB norms. | 9 | Same as Air Quality | 108 |
| 3. | **Ground Water Quality:** As per IS 10500:2012 Revised | 5 | 5 Stations per Month | 60 |
| 4. | **Soil: Parameters:** pH, Texture, EC, Na, Available N, Available K, Available Phosphorus, Sulphate, Chloride, Ca, Mg, Fe, Mn, Cu, Hg, Cd, As, Pb, Zn, Al, Ni, Co, Cr, Na | 8 | 8 Stations (Quarterly) | 32 |
| 5. | **Marine/Surface Water Quality parameters:**<br>**Physico Chemical parameters:** PH, Temperature, Turbidity, EC, Salinity (ppt),<br>**Chemical Parameters:** DO, BOD, Magnesium, Hardness, Alkalinity, Chloride, Sulphate, Fluoride, Sodium, Potassium, Phenol, Total phosphorus, Total Nitrogen.<br>**Heavy Metals:** Fe, Zn, Mg, Mn, Cd, Cr, Hg, Pb<br>**Bacteriological parameters:** Coliform Colonies (MPN).<br>**Marine Biology:** Chlorophyll, Phaeophytin, Phytoplankton, Zooplankton, Benthos, Diversity indices | 10 | 10 stations (Quarterly) | 40 |

## 3.2 Locations of Monitoring:

Sampling was carried out twenty-four hours once a month at each station for every month using pre-calibrated respirable dust samplers. In each of the stations earmarked, samples were collected for $SO_2$, $NO_2$, fine respirable particulate matter $PM_{2.5}$ (FRPM), respirable particulate matter $PM_{10}$ (RPM), ozone, ammonia, lead, arsenic, nickel, benzo (a) pyrene and benzene samples were collected at twenty-four hourly and one hourly interval and same were sent to field laboratory for analysis.

The ambient air quality has been established through a scientifically designed ambient air quality monitoring network and is based on the following considerations:

- Meteorological conditions on synoptic scale;
- Topography of the study area;

- Representatives of regional background air quality; and
- Representatives of likely impact areas.

The Ambient Air Quality Monitoring (AAQM) stations were set up at 9 locations were monitored for ambient air quality with due consideration to the above-mentioned points and as per the MoEF&CC guidelines for NAAQS for CPCB.

To assess the environment monitoring around the proposed NMIA project site during construction phase on the ambient air, parameters like $PM_{10}$, $PM_{2.5}$, Sulfur di-Oxide ($SO_2$), Nitrogen di-Oxide ($NO_2$), Carbon monoxide (CO), Ozone ($O_3$), Ammonia ($NH_3$), Lead (Pb), Arsenic (As), Nickel (Ni), Benzo (a) Pyrene (B(a)P) and Benzene ($C_6H_6$) were monitored.

**Table 3-2: Details of Ambient Air Quality Monitoring Stations**

| Station Code | Station | Location Co-Ordinates | Distance & Direction |
|---|---|---|---|
| A1 | Owale | 18°58'46"N 73°03'55"E | 0.5 Km, South |
| A2 | Pargaon | 18°58'50"N 73°04'33"E | 0.4 Km, South |
| A3 | Ulwe Node | 18°57'32"N 73°02'13"E | 2.2 Km, SW |
| A4 | NMIA Project Site | 18°59'55"N 73°02'20"E | - |
| A5 | Kille Gaothan | 19°00'12"N 73°01'40"E | 0.9 Km, NW |
| A6 | Kombadbhuje (Balaji Site Office) | 18°59'57"N 73°02'47"E | - |
| A7 | Panchsheel | 19°01'26"N 73°01'42"E | 2.8 Km, NNW |
| A8 | Jui | 19°00'17"N 73°01'58"E | 0.9 Km, NNE |
| A9 | Panvel | 18°59'58"N 73°06'12"E | 1.4 Km, E |

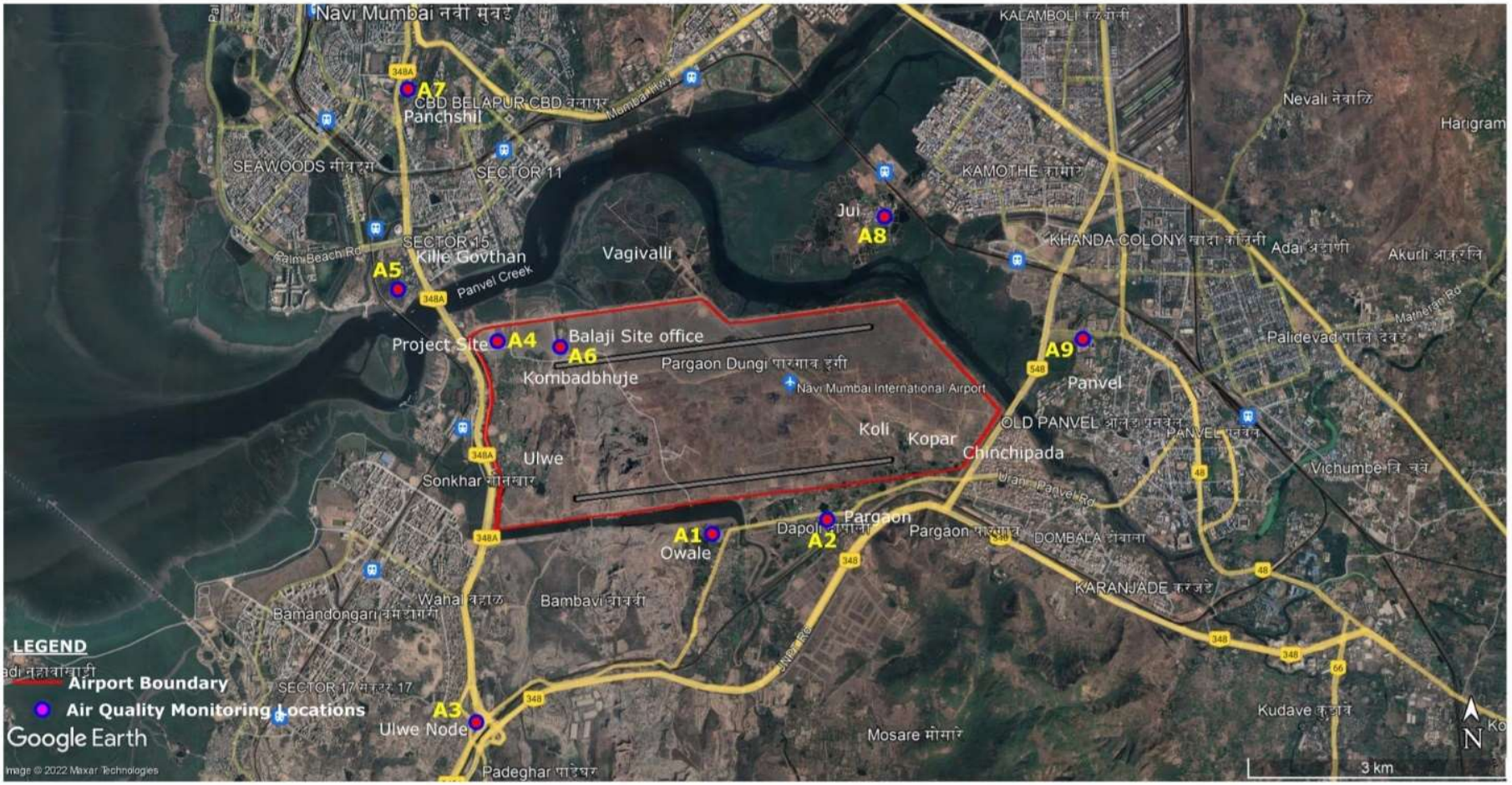



**Figure 3-1 Ambient Air Monitoring Locations**

**Table 3-3: Ambient Noise Level Monitoring Stations**

| Sr. No. | Station Name | Category of area | Station Name | Category of area |
|---|---|---|---|---|
| | **January, March and April 2022** | | **February and May 2022** | |
| N1 | Pargaon | Residential Area | Owale | Residential Area |
| N2 | Owale | Residential Area | Pargaon | Residential Area |
| N3 | Ulwe Node | Commercial Area | Ulwe Node | Commercial Area |
| N4 | NMIA Project site | Commercial Area | NMIA Project site | Commercial Area |
| N5 | Kombadbhuje (Balaji Site Office) | Commercial Area | Kombadbhuje (Balaji Site Office) | Commercial Area |
| N6 | Kille Gaothan | Residential Area | Kille Gaothan | Residential Area |
| N7 | Panchsheel | Residential Area | Panchsheel | Residential Area |
| N8 | Jui | Residential Area | Jui | Residential Area |
| N9 | Panvel | Residential Area | Panvel | Residential Area |
| N10 | Vadghar (No sampling Done in Jan, Feb, March, April 2022) | Residential Area | Vadghar (Sampling done in May) | Residential Area |
| N11 | Bhangarpada (No sampling done in Jan, Feb, March, April 2022) | Residential Area | Bhangarpada (Sampling done in May) | Residential Area |

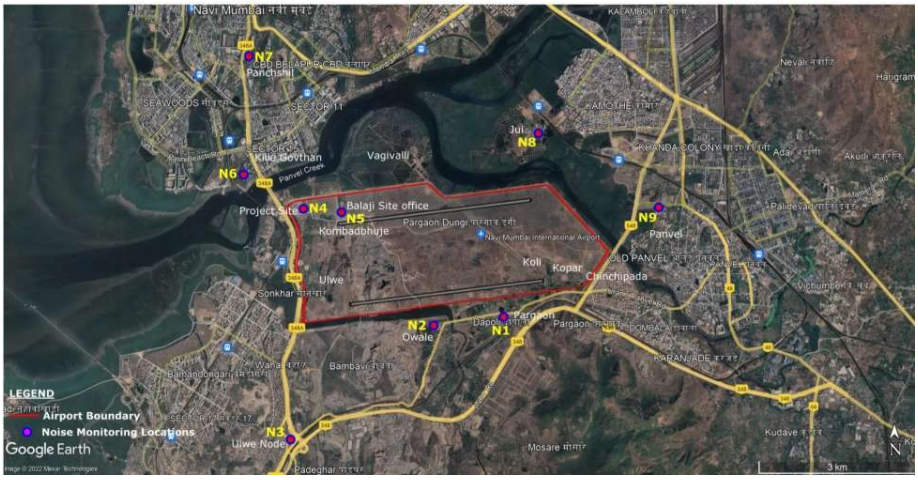



**Figure 3-2 Noise Level Monitoring Locations for January, March and April 2022**

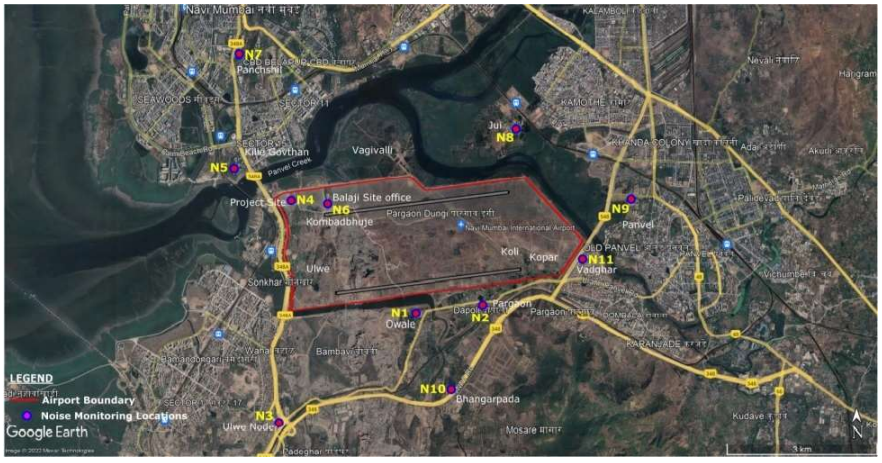



**Figure 3-3 Noise Level Monitoring Locations for February and May 2022**

**Table 3-4: Soil Quality Monitoring Stations**

| Station Code | Stations Name | |
|---|---|---|
| | **February 2022** | **May 2022** |
| S1 | Pargaon | Owale |
| S2 | Chinchpada | Chinchpada |
| S3 | Koli | Koli |
| S4 | Kopar | Kopar |
| S5 | Ulwe | Ulwe |
| S6 | NMIA project Office | NMIA project Office |
| S7 | Kombadbhuje | Kombadbhuje |
| S8 | Owale | Pargaon |

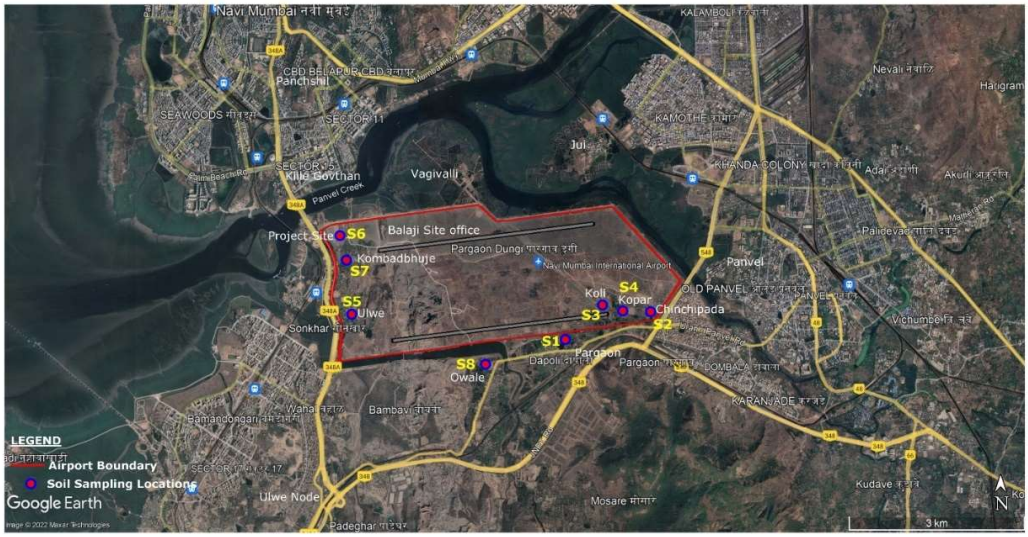



**Figure 3-4 Soil Sampling Locations for February 2022**

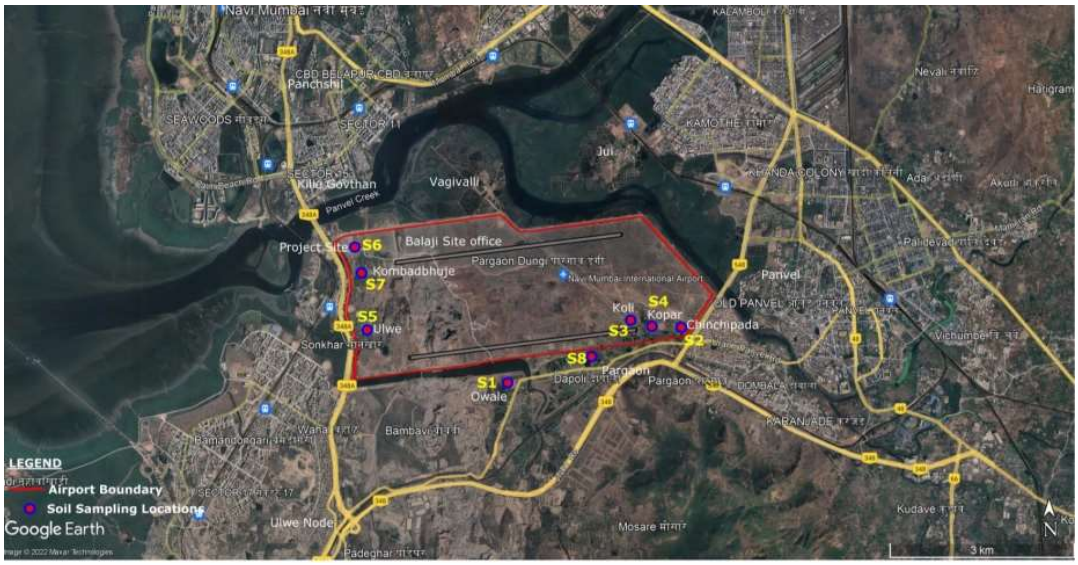



**Figure 3-5 Soil Sampling Locations for February 2022**

**Table 3-5: Details of Ground Water Quality Monitoring Stations (Dug wells) for January to June 2022**

| Station Code | Stations | | | | | |
|---|---|---|---|---|---|---|
| | **January 2022** | **February 2022** | **March 2022** | **April 2022** | **May 2022** | **June 2022** |
| GW1 | Owale | Kombadbhuje | Owale | Ulwe | Chinchpada | Ulwe |
| GW2 | Pargaon | Kille Gavthan | Pargaon | Kombadbhuje | Dapoli | Kombadbhuje |
| GW3 | Chinchpada | Panvel | Koli | Kille Gavthan | Pargaon | Kille Gavthan |
| GW4 | Kopar | Jui | Chinchpada | Panvel | Owale | Panvel |
| GW5 | Koli | Ulwe | | Jui | | Jui |

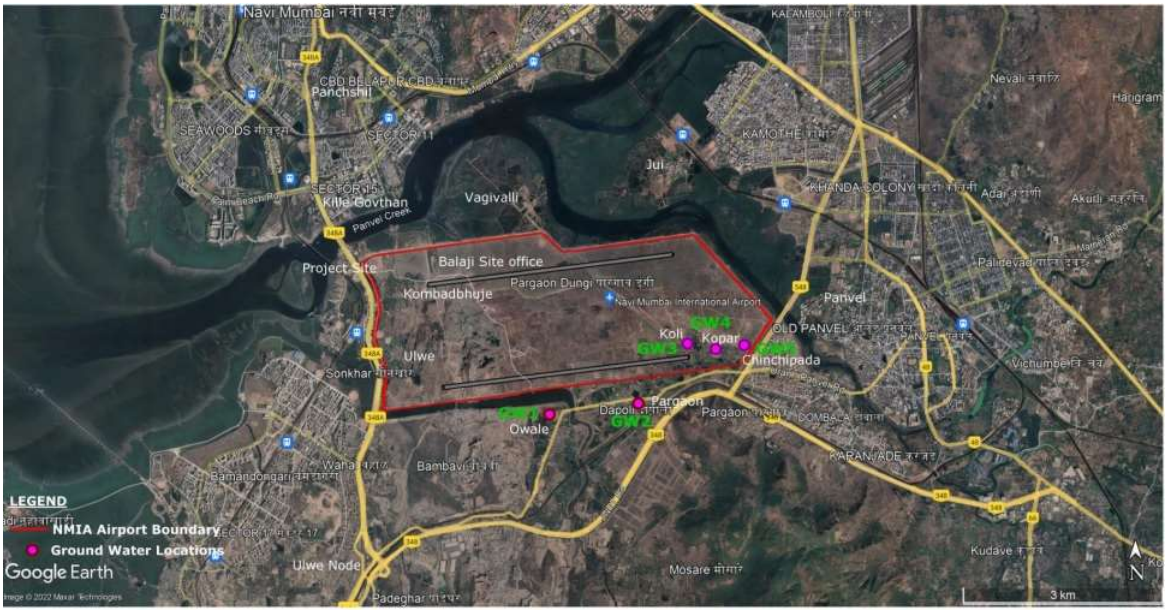



**Figure 3-6 Ground Water Sampling Locations for January 2022**

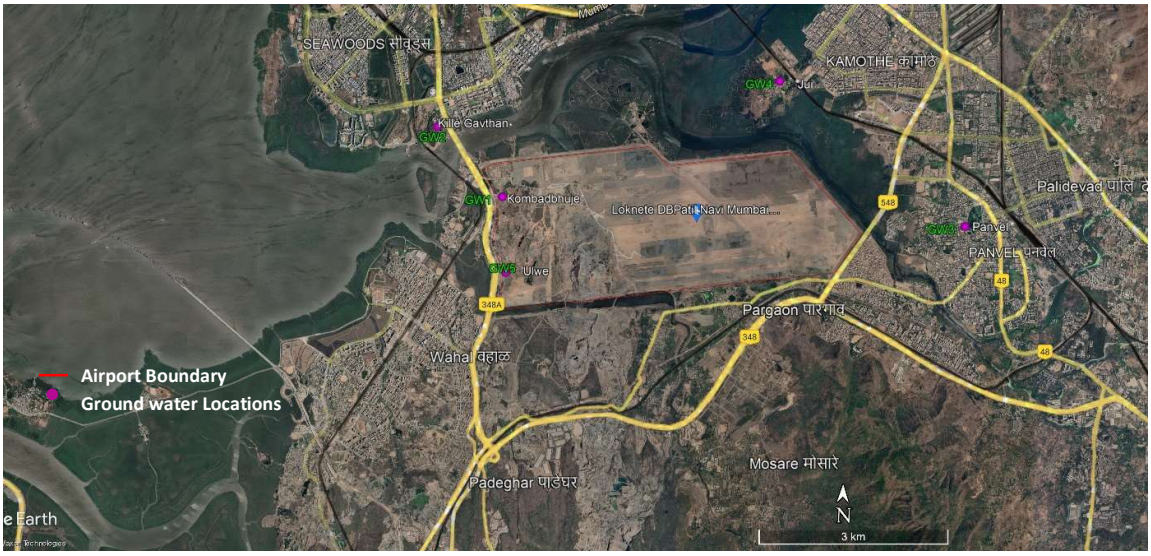



**Figure 3-7 Ground Water Sampling Locations for February 2022**

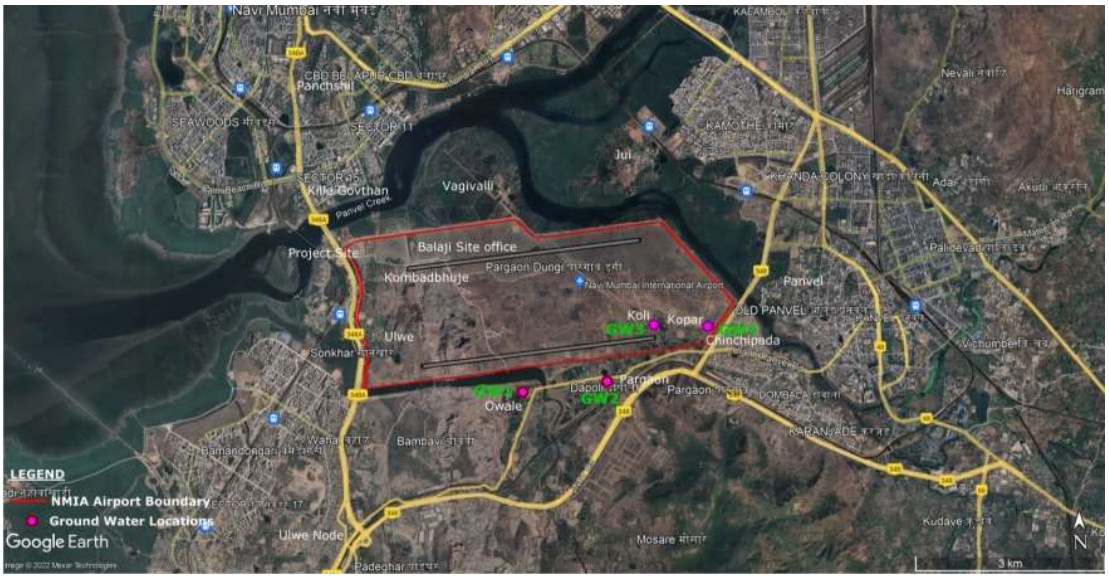



**Figure 3-8 Ground Water Sampling Locations for March 2022**


**Figure 3-9 Ground Water Sampling Locations for April 2022**


**Figure 3-10 Ground Water Sampling Locations for April 2022**


**Figure 3-11 Ground Water Sampling Locations for June 2022**

**Table 3-6: Details of Marine Water Quality Monitoring Stations**

| Station Code | Station details / Location |
|---|---|
| MW1 | Extreme end of Gadhi River (upstream side) |
| MW2 | Near Chinchpada village (2 km from MW1) in Gadhi River |
| MW3 | Near Jui Village (1.8 from MW2) in Gadhi River |
| MW4 | At Junction of Ulwe and Gadhi Rivers in Panvel Creek |
| MW5 | Near Vaghivali village (2 km from MW4) in Gadhi River |
| MW6 | Near CBD Belapur (1.5 km from MW5) in Panvel Creek |
| MW7 | Near Vaghivali Creek Junction (800m from MW6) in Gadhi River |
| MW8 | Near Rathi bander in Panvel Creek |
| MW9 | Mouth of Panvel Creek |
| MW10 | Ulwe River near Owle Village |

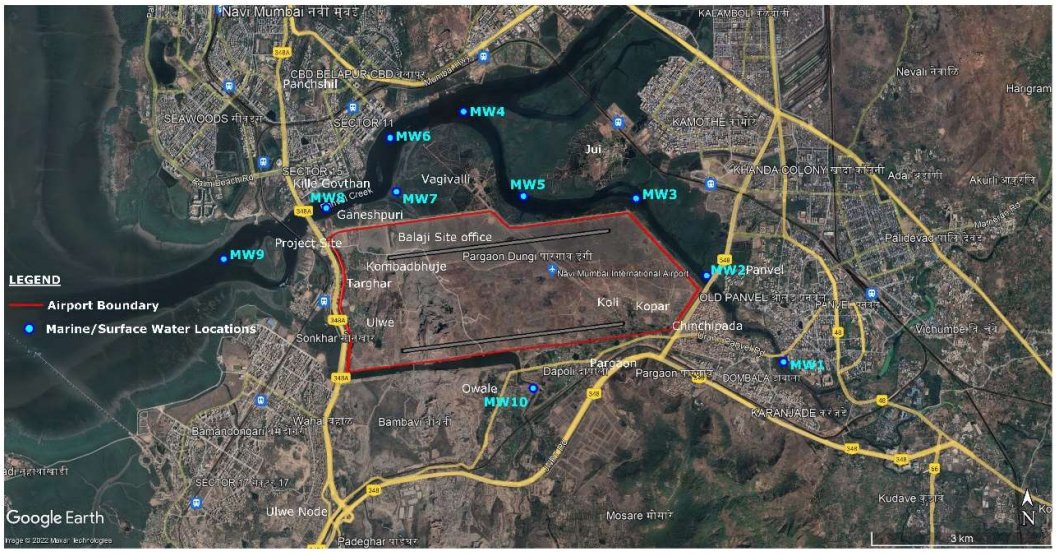



**Figure 3-12 Marine Water Sampling Locations**

### 3.3 Period/Time of Sampling (January to June 2022):

The sampling survey was planned to carry out as per schedule mentioned in Table below.

**Table 3-7: Period/Time of Sampling for this Survey**

| Month | Parameter | Sampling Stations | Dates of Sampling | Time Period |
|---|---|---|---|---|
| January 2022 | AAQ | A2,A3, A9 | 27.01.2022 | 24 hours starting from 10:00am |
| | | A4, A6, A7 | 28. 01.2022 | |
| | | A1,A5,A8 | 29. 01.2022 | |
| | NLS | N4, N8, N9 | 27.01.2022 | |
| | | N1,N5, N7 | 28. 01.2022 | |
| | | N2,N3, N6 | 29.01.2022 | |
| | GW | GW1, GW2, GW3, GW4, GW5 | 27. 01.2022 | Grab Sample |
| February 2022 | AAQ | A2, A3, A9 | 21.02.2022 | 24 hours starting from 10:00am |
| | | A4, A6, A7 | 22.02.2022 | |
| | | A1, A5, A8 | 23.02.2022 | |
| | Noise Level | N4,N8, N9 | 22.02.2022 | |
| | | N2, N5, N7 | 23.02.2022 | |
| | | N1,N3, N6 | 24.02.2022 | |
| | GW | GW1, GW2, GW3, GW4, GW5 | 23.02.2022 | Grab Sample |
| | Soil | S1, S2, S3, S4, S5, S6, S7, S8 | 24. 02.2022 | Grab Sample |
| | Marine Water | MW1, MW2, MW3, MW4, MW10 | 24.02.2022 | Grab Sample |
| | | MW5, MW6, MW7, MW8, MW9 | 25.02.2022 | |
| March 2022 | AAQ | A2, A3,A9 | 21.03.2022 | 24 hours starting from 10:00am |
| | | A4,A6, A7 | 22.03.2022 | |
| | | A2, A5, A8 | 23.03.2022 | |
| | Noise Level | N4, N8,N9 | 21.03.2022 | |
| | | N2,N5, N7 | 22.03.2022 | |
| | | N1, N3, N6 | 23.03.2022 | |
| | Ground Water | GW1, GW2, GW3, GW4, GW5 | 24.03.2022 | Grab Sample |
| April 2022 | AAQ | A2,A3,A9 | 18.04.2022 | 24 hours starting from 10:00am |
| | | A4, A6, A7 | 19. 04.2022 | |
| | | A1, A5,A8 | 20. 04.2022 | |
| | Noise Level | N4, ,N3, N9 | 18.04.2022 | |
| | | N4, N5, N7 | 19. 04.2022 | |
| | | N1, N6, N9 | 20. 04.2022 | |
| | Ground Water | GW1, GW2, GW3, GW4, GW5 | 18.04.2022 | Grab Sample |
| May 2022 | AAQ | A2, A3, A9 | 16.05.2022 | 24 hours starting from 10:00am |
| | | A4,A6, A7 | 17. 05.2022 | |
| | | A1, A5, A8 | 18. 05.2022 | |
| | Noise Level | N4, N8, N9 | 16.05.2022 | |
| | | N2, N5, N7 | 17.05.2022 | |
| | | N1, N3, N6, N10 | 18. 05.2022 | |

*(January - June 2022)*

| Month | Parameter | Sampling Stations | Dates of Sampling | Time Period |
|---|---|---|---|---|
| | | N11 | 18.05.2022 | |
| | Ground Water | GW1, GW2, GW3, GW4, GW5 | 18.05.2022 | Grab Sample |
| | Soil | S1, S2, S3, S4, S5, S6, S7, S8 | 18.05.2022 | Grab Sample |
| | Marine Water | MW1, MW2, MW3, MW4, MW10 | 20.05.2022 | Grab Sample |
| | | MW5, MW6, MW7, MW8, MW9 | 21.05.2022 | |
| June 2022 | AAQ | A2, A3, A9 | 13.06.2022 | 24 hours starting from 10:00am |
| | | A4, A6,A7 | 14. 06.2022 | |
| | | A1, A5, A8 | 15. 06.2022 | |
| | Noise Level | N2, N8, N9,N10 | 13.06.2022 | |
| | | N4, N5, N7 | 14. 06.2022 | |
| | | N1, N3, N6, N11 | 15. 06.2022 | |
| | Ground Water | GW1, GW2, GW3, GW4, GW5 | 16.06.2022 | Grab Sample |

# 4. METHODOLOGY ADOPTED FOR ENVIRONMENTAL MONITORING

## 4.1 AMBIENT AIR QUALITY

### 4.1.1 Reconnaissance Survey:

Reconnaissance survey in study area (10 km around proposed airport site) shows that sources of air pollution include the following:

- Airport land development work and predevelopment works
- heavy traffic along Amara Marg, NH4/4BB and Uran / JNPT Road
- construction activity in Ulwe node and nearby areas
- industries in Panvel (private), MIDC Taloja (6km NE of site) & MIDC TTC (4km N of site)
- burning of poor quality fuels in villages to the south of proposed site

In order to arrest the deterioration in air quality, Govt. of India has enacted Air (Prevention and Control of Pollution) Act in 1981. The responsibility has been further emphasized under Environment (Protection) Act, 1986. The National Ambient Air Quality Standards (NAAQS) have been published by CPCB in November 2009 giving methods for measurement.

### 4.1.2 Methodology for Ambient Air Quality Monitoring:

To monitor Air Pollutants in Ambient air following method of analysis adopted

**Table 4-1 Methods Adopted for Analysis of AAQ Parameters**

| S N | Parameter | Sampling Equipment | Method of Analysis |
|---|---|---|---|
| 1. | $PM_{10}$ | RSPM Sampler/ Glass Fiber filter paper. | IS 5182 (Part 23) RA2017 |
| 2. | $PM_{2.5}$ | $PM_{2.5}$ Sampler/Filter – PTFE, Teflon membrane | IS 5182 (Part 24) 2019 |
| 3. | $SO_2$ | Absorption in TCM | IS 5182 (Part 2) RA2017 |
| 4. | $NO_X$ | Absorption in NaOH | IS 5182 (Part 6) RA2017 |
| 5. | CO | Sampling in Tedlar bags / CO Meter | IS 5182 (part 10) RA2019 |
| 6. | Lead | Sampling using EPM 2000 equivalent Glass Fiber Filter paper | APHA Air method 822-3rd |
| 7. | $NH_3$ | Absorption in sulfuric acid | IS 5182 (part 25) RA 2018 |
| 8. | Ozone | Absorption in Potassium Iodide | IS 5182 (part 9) RA2019 |
| 9. | Benzene[$C_6H_6$] | Collection Activated Carbon | IS 5182 (part 11) RA2017 |
| 10. | Benzopyrene | Sampling using EPM 2000 equivalent Glass Fiber Filter paper | CPCB manual vol. I:2013 |
| 11. | Arsenic [As] | Sampling using EPM 2000 equivalent Glass Fiber Filter paper | APHA Air method 302-3rd |
| 12. | Nickel [Ni] | Sampling using EPM 2000 equivalent Glass Fiber Filter paper | APHA Air method 822-3rd |


**Figure 4-1 Ambient Air Quality Monitoring**

### 4.1.3 Selection of air sampling location

Selection of representative location is very important. Following precautions have been taken while installing AAQM stations:

- It is away from source & other interferences
- Samplers are installed at free flowing well mixed area (3m) above ground level
- Only Calibrated Air Samplers are used
- the samples are transported to the laboratory at the earliest for further analysis
- Gaseous samples were preserved in cold box before taking to laboratory

## 4.2 AMBIENT NOISE LEVEL

### 4.2.1 Reconnaissance Survey:

Reconnaissance survey in study area (10 km around proposed airport site) shows that sources of air pollution include the following:

- Airport land development work and predevelopment works
- heavy traffic along Amara Marg, NH4/4BB and Uran / JNPT Road
- construction activity in Ulwe node and nearby areas
- industries in Panvel (private), MIDC Taloja (6km NE of site) & MIDC TTC (4km N of site)
- burning of poor quality fuels in villages to the south of proposed site

Noise pollution in urban areas is now being recognized as a major environmental issue around the world. With increasing awareness of the adverse impacts of noise on human health, more and more people becoming less tolerant to environmental noise. The objective of this exercise is to assess the baseline status within study area and to compare the noise levels with Ambient Noise Standards as prescribed under Environmental Protection Act, 1986.

### 4.2.2 Methodology for Sample Collection

Integrated Sound Level Meter C390 was used for undertaking the surveys and installed on tripods at the selected locations over a 24-hour period. This Meter is then taken to laboratory where the data collected is downloaded onto PC using specialized software.

***Center C-390 Sound level Meter with data logger***

Noise is measured in decibel (dB) and 'A' weighting is used for this entire monitoring since in this method of frequency weighting, the signal generated reproduces the way the human ear responds to a range of acoustic frequencies. Leq: The equivalent continuous Sound Pressure Level for a particular duration. The Day-Night Equivalent Sound Level refers to average sound exposure over a 24- hour period. Leq day & night values are calculated from hourly Leq values, with the Leq values for the nighttime increased by 10 dB to reflect the greater disturbance potential from nighttime noises.

**Figure 4-2 Ambient Noise level Monitoring**

### 4.3 Soil

The purpose of soil testing is to identify contamination of soil due to land development works and the soil fertility from a viewpoint of use for landscape development.

### 4.3.1 Reconnaissance Survey:

Southern side of study area is rural in character and large tracts are being cultivated as paddy fields. Soil is also seen plentifully at bottom of hills where it supports large vegetation. However, Northern portion of study area is mostly urban in character since it has seen largescale development being part of Navi Mumbai.

### 4.3.2 Methodology of Sample Collection:

Soil samples are collected after removing top two inches – which may contain high amount of organic carbon and humus. The soil area and volume could be a large field, a small garden, or simply the root zone of a single tree or shrub. The most difficult step in soil testing is accurately representing the desired area of soil. When the sampling area is determined, a sufficient number of soil cores taken to acquire a representative sample. This is generally 10 to 20 cores.

The depth of sample for surface soils was taken from 0 to 6 inches or as deep as the primary tillage.

Soil samples collected from proposed project stations by using stainless steel soil sampling probe, packed in labeled polythene bags & send for analyze the physicochemical characteristics. The sample so collected is then made representative by coning- quartering and then stored in plastic bags, sealed and then sent to laboratory for analysis.


**Figure 4-3 Soil Sample Collection**

## 4.4 GROUND WATER SAMPLING

### 4.4.1 Reconnaissance Survey:

The villages to the south of airport site use ground water from open/bore well for other domestic purposes. Ground water gets contaminated due to bad sanitary habits such as washing of utensils, cattle and bathing and location of septic tanks in/near the open wells.

### 4.4.2 Methodology of Sampling:

Ground water sample is collected by using containers and the sampling container is rinsed before using it for storing water samples. Ground water samples are stored in two separate containers for Physicochemical & Microbiological analysis and preservatives added as recommended by Standard Methods APHA, stored in cold storage box and transferred to the laboratory for the further analysis.


**Figure 4-4 Ground Water Sampling**

## 4.5 MARINE WATER, SEDIMENTS & PLANKTON SAMPLING EQUIPMENTS

### 4.5.1 Reconnaissance Survey:

The site for the project is located in four different micro water sheds – viz Panvel creek, Gadhi river, Kasardi river, Ulwe river. The study area represents complex hydrodynamic system. The Ulwe river flows down through the mountains (to the south) towards the centre of project site and has been diverted/retrained as part of the project. The Gadhi River flows from the East to the West and is partly retrained towards the northern part of the site. The river Gadhi receives sewage from Panvel town and nearby areas. Both the rivers drain into the Panvel creek flowing adjacent to the North of site which drains into the Arabian sea to the west. The Panvel creek also receives treated effluents from CETP at MIDC Taloja and sewage from NMMC STPs in Nerul.

### 4.5.2 Methodology of Sampling:

#### 4.5.2.1 Bucket - Surface water collection

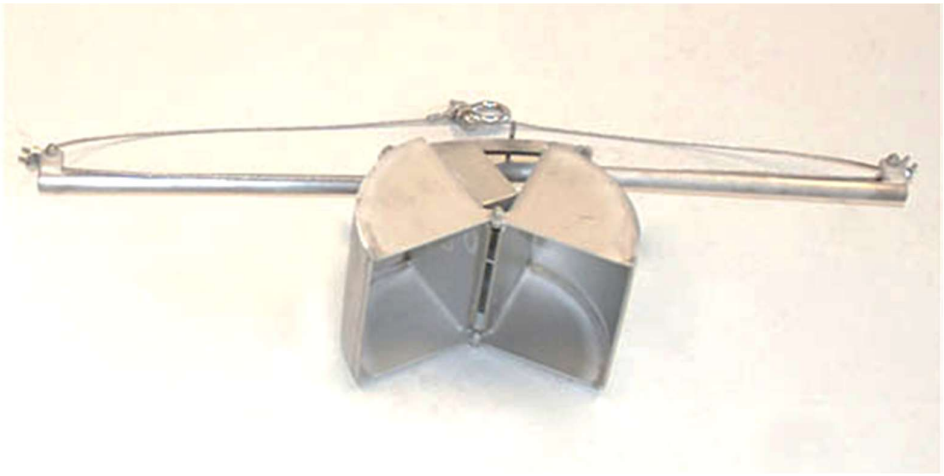
Bucket is used for collection of Surface water from Water bodies (Panvel Creek, Gadhi and Ulwe River) situated around NMIAL project site.

#### 4.5.2.2 Plankton Net - Biological Samples

This plankton net operates a cable or lined by hand or behind a boat, it can be towed vertically or horizontally. Nets comes in varieties of size (Mesh no 00 equal an aperture of 0.30 inches)

#### 4.5.2.3 Grab Sampler - For Marine Sediments

Sediment grab operate at any depth on a cable or line by free fall (without a messenger). It is extremely heavy and can take samples of hardest rocky ocean bottoms.



**Grab Sampler**

**4.5.2.4 Selection of Stations, Preservation and Transportation of Samples:**

Marine water samples were collected from sampling locations in Gadhi River, Ulwe River and Panvel Creek at the locations indicated by NMIAL – in all, 10 samples were collected from 10 sampling locations for physicochemical and biological samples (Stations 1 to 4 are located in Gadhi River & Station 5 & 8 are Panvel Creek while station 9 Mouth of Panvel Creek and Station 10 in Ulwe River. A good amount of mangrove vegetation was noted on either side of stream 2, 3, 4 and 7. Sampling locations were approached by boats (wherever possible) and collection done irrespective of tide. Sampling was done only for surface water. The samples were preserved and taken to laboratory using vehicle on same day.

**4.6 Laboratory Credentials**

Sampling and analysis were done by laboratory of Aditya Environmental Services Pvt Ltd located at Plot P-1, MIDC Commercial plots, Mohopada, Tal Panvel, Dist. Raigad.

- Environmental Laboratory is recognized by Ministry of Environment & Forest (MoEFCC), Govt. of India under Environment (Protection) Act, 1986.
- Laboratory is also certified ISO 9001:2015 and OHSAS 18001:2007.
- Laboratory is accredited under ISO/IEC 17025:2005 (vide Certificate No. TC-7085) for water, wastewater and soil parameters
- Environmental sampling conducted by our experienced, qualified environmental staff & Analysis and reporting by approved Government Analyst.
- Instruments used for sampling are from reputed manufacturers & are regularly calibrated.
- Chemicals used are Analytical Reagent grade and from reputed manufacturer.

- Analytical Instrumentation used in the laboratory is regularly calibrated.
- Laboratory has a regular program of Preventive & Annual Maintenance for all critical equipment.
- Ground Water, Soil Analysis - using APHA, BIS, ASTM & CPCB standards Methods for water Analysis.
- Standard Methods Adopted in the laboratory are those prescribed by APHA, BIS, ASTM & CPCB for water, waste & marine water analysis using methods as per NIO (National Institute of Oceanography) Manual.
- Laboratory has CRMs (Certified Reference Material) for heavy metals from reputed manufacturers for heavy metals and Standard Sea water which we use for analysis.
- Laboratory is regularly participating in Proficiency testing with reputed Organizations like Central Pollution Control Board (CPCB), Goa State Pollution Control Board and others as also Intra laboratory QC testing to check performance of our chemists.
- Overall approach & methodology is with Annexure IA Scope of the work & the Best practices as per prevailing norms of Central Pollution Board /Ministry of Environment & Forest etc. /Internationally adopted practices.

## 5. COMPILATION OF DATA & INFERENCE

### 5.1 Ambient air quality monitoring report

### 5.1.1 AAQM Data

Ambient Air Quality was monitored at various locations for relevant parameters as per NAAQS standards published by CPCB in November 2009. Data is compiled and presented below:

**Table 5-1: Ambient Air Quality monitoring at various stations during January 2022**

| Sampling Locations | Ulwe Node | Pargaon High School | Owale Village | Kille Gaothan Guest House | NMIA Project Site | Balaji Office | Panvel | Panchsheel Guest House | Jui Village | Limit # | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sampling Date** | **27.01.2022** | | | **28.01.2022** | | | **29.01.2022** | | | | |
| $SO_2$ | 14.9 | 12.9 | 13.1 | 14.9 | 14.4 | 13.9 | 11.1 | 15.2 | 14.7 | 80 | µg/m³ |
| $NO_X$ | 25.7 | 23.3 | 23.9 | 24.9 | 25.0 | 24.5 | 19.5 | 25.9 | 25.2 | 80 | µg/m³ |
| $PM_{10}$ | 74.3 | 62.7 | 68.9 | 63.9 | 67.4 | 68.8 | 51.8 | 69.2 | 65.8 | 100 | µg/m³ |
| $PM_{2.5}$ | 27.5 | 21.2 | 23.3 | 22.9 | 24.2 | 24.2 | 17.5 | 24.2 | 23.3 | 60 | µg/m³ |
| Ozone ($O_3$) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | 180 | µg/m³ |
| Lead (Pb) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL (DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | 1 | µg/m³ |
| CO | 0.45 | 0.38 | 0.41 | 0.39 | 0.43 | 0.27 | 0.26 | 0.46 | 0.43 | 4 | mg/m³ |
| Benzene ($C_6H_6$) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL (DL-0.2) | BDL (DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | 5 | µg/m³ |
| Benzopyrene | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | 1 | ng/m³ |
| Arsenic (As) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | 6 | ng/m³ |
| Nickel (Ni) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | 20 | ng/m³ |
| $NH_3$ | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | 400 | µg/m³ |

**BDL**–Below Detectable Limit (Note # Limits as per National Ambient Air Quality Standards NAAQS,2009)

**Results:**

**Particulate Matter ($PM_{10}$):** A maximum value for PM10 is observed at Ulwe Node as 74.3 µg/m³ with the minimum value observed at Pargaon as 62.7 µg/m³ in the month of January,2022.

**Particulate Matter ($PM_{2.5}$)**: A maximum value for PM2.5 is observed at Ulwe Node as 27.5 µg/m³ with the minimum value observed at Pargaon as 21.2 µg/m³ in the month of January,2022.

**Sulphur Dioxide ($SO_2$)**: Maximum value for SO2 is observed at near Panchsheel as 15.2 µg/m³ with the minimum value observed at Pargaon as 12.9 µg/m³ in the month of January,2022.

**Oxides of Nitrogen ($NO_x$):** Maximum value for NOx is observed at Ulwe Node as 25.9 µg/$m^3$ with the minimum value observed at Pargaon as 23.2 µg/$m^3$ in the month of January,2022.

**Carbon Monoxide (CO)**: The maximum value for CO is observed at Panchsheel as 0.46 mg/$m^3$ with the minimum value observed at Pargaon as 0.38 mg/$m^3$ in the month of January,2022.

All above parameters are observed to be in compliance with permissible limits as per NAAQ Standards in the month of Janaury,2022. Also, parameters such as Ozone ($O_3$), Lead (Pb), Arsenic (As), Nickel (Ni), Ammonia ($NH_3$), Mercury (Hg), Benzo(a)Pyrene (BaP) and Benzene ($C_6H_6$) were found to be within the prescribed limits in the month of January,2022.

**Table 5-2: Ambient Air Quality monitoring at various stations during February 2022**

| Sampling Locations | Ulwe Node | Pargaon High School | Owale Village | Kille Gaothan Guest House | NMIA Project site | Balaji Office | Panvel | Panchsheel Guest House | Jui Village | Limit # | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sampling Date** | **21.02.2022** | | | **22. 02.2022** | | | **23. 02.2022** | | | | |
| $SO_2$ | 15.2 | 13.1 | 13.4 | 13.9 | 14.1 | 14.4 | 14.9 | 14.4 | 13.9 | 80 | µg/m³ |
| $NO_X$ | 25.4 | 24.0 | 24.4 | 24.6 | 24.8 | 24.8 | 26.1 | 25.0 | 24.8 | 80 | µg/m³ |
| $PM_{10}$ | 77.1 | 56.0 | 66.5 | 64.9 | 65.9 | 72.3 | 70.7 | 66.5 | 67.9 | 100 | µg/m³ |
| $PM_{2.5}$ | 28.3 | 22.9 | 23.3 | 22.5 | 23.3 | 25.8 | 25.0 | 22.9 | 23.7 | 60 | µg/m³ |
| Ozone ($O_3$) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | 180 | µg/m³ |
| Lead (Pb) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL (DL-0.8) | 1 | µg/m³ |
| CO | 0.47 | 0.39 | 0.38 | 0.37 | 0.43 | 0.41 | 0.48 | 0.42 | 0.45 | 4 | mg/m³ |
| Benzene ($C_6H_6$) | BDL (DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL (DL-0.2) | 5 | µg/m³ |
| Benzopyrene | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | 1 | ng/m³ |
| Arsenic (As) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | 6 | ng/m³ |
| Nickel (Ni) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | 20 | ng/m³ |
| $NH_3$ | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | 400 | µg/m³ |

**BDL**–Below Detectable Limit (Note # Limits as per National Ambient Air Quality Standards NAAQS,2009)

**Results:**

**Particulate Matter ($PM_{10}$)**: A maximum value for PM10 is observed at Ulwe Node as 77.1 µg/m³ with the minimum value observed at Paragaon as 56.0 µg/m³ in the month of February,2022.

**Particulate Matter ($PM_{2.5}$)**: A maximum value for PM2.5 is observed at Ulwe Node as 28.3 µg/m³ with the minimum value observed at Kille Gavthan as 22.5 µg/m³ in the month of February,2022.

**Sulphur Dioxide ($SO_2$)**: Maximum value for SO2 is observed at near Ulwe Node as 15.2 µg/m³ with the minimum value observed at two locations, i.e. Paragaon as 13.1 µg/m³ in the month of February,2022.

**Oxides of Nitrogen ($NO_X$)**: Maximum value for NOx is observed at two locations i.e, Panval as 26.1 µg/m³ with the minimum value observed at Pargaon as 24.0 µg/m³ in the month of February,2022.

**Carbon Monoxide (CO)**: The maximum value for CO is observed at Panvel as 0.48 mg/m³ with the minimum value observed at Kille Gavthan as 0.37 mg/m³ in the month of February,2022.

All above parameters are observed to be in compliance with permissible limits as per NAAQ Standards in the month of February,2022. Also, parameters such as Ozone ($O_3$), Lead (Pb), Arsenic (As), Nickel (Ni), Ammonia (NH3), Mercury (Hg), Benzo(a)Pyrene (BaP) and Benzene ($C_6H_6$) were found to be within the prescribed limits in the month of February,2022.

**Table 5-3: Ambient Air Quality monitoring at various stations during March 2022**

| Sampling Locations | Pargaon High School | Ulwe Node | Owale Village | Kille Gaothan Guest House | NMIA Project site | Balaji Office | Panvel | Panchsheel Guest House | Jui | Limit # | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sampling Date** | **21.03.2022** | | | **22.03.2022** | | | **23.03.2022** | | | | |
| $SO_2$ | 14.1 | 14.7 | 14.4 | 14.1 | 14.9 | 14.1 | 15.4 | 14.9 | 15.2 | 80 | µg/m³ |
| $NO_X$ | 25.0 | 25.6 | 25.3 | 24.4 | 25.0 | 24.8 | 25.7 | 25.5 | 25.4 | 80 | µg/m³ |
| $PM_{10}$ | 65.5 | 69.2 | 74.2 | 66.5 | 72.4 | 67.7 | 74.7 | 73.0 | 66.6 | 100 | µg/m³ |
| $PM_{2.5}$ | 22.1 | 23.7 | 24.2 | 22.1 | 25.4 | 23.3 | 26.2 | 24.6 | 23.7 | 60 | µg/m³ |
| Ozone ($O_3$) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | 180 | µg/m³ |
| Lead (Pb) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL (DL-0.8) | 1 | µg/m³ |
| CO | 0.42 | 0.44 | 0.44 | 0.41 | 0.45 | 0.43 | 0.46 | 0.42 | 0.44 | 4 | mg/m³ |
| Benzene ($C_6H_6$) | BDL (DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL (DL-0.2) | 5 | µg/m³ |
| Benzopyrene | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | 1 | ng/m³ |
| Arsenic (As) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | 6 | ng/m³ |
| Nickel (Ni) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | 20 | ng/m³ |
| $NH_3$ | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | 400 | µg/m³ |

**BDL**–Below Detectable Limit (Note # Limits as per National Ambient Air Quality Standards NAAQS,2009)

**Results:**

**Particulate Matter ($PM_{10}$)**: A maximum value for PM10 is observed at Panvel as 74.7 µg/m³ with the minimum value observed at Pargaon as 65.5 µg/m³ in the month of March,2022.

**Particulate Matter ($PM_{2.5}$)**: A maximum value for PM2.5 is observed at Panvel as 26.2 µg/m³ with the minimum value observed at Kille Gavthan as 22.08 µg/m³ in the month of March,2022.

**Sulphur Dioxide ($SO_2$):** Maximum value for SO2 is observed at near Panvel as 15.4 µg/m³ with the minimum value observed at Pargaon Kille Gavthan and Balaji Site as 14.1 µg/m³ in the month of March,2022.

**Oxides of Nitrogen ($NO_X$):** Maximum value for NOx is observed at Panvel as 25.7 µg/m³ with the minimum value observed at Kille Gavthan (AAQ-5) as 24.4 µg/m³ in the month of March,2022.

**Carbon Monoxide (CO)**: The maximum value for CO is observed at Panvel as 0.46 mg/m³ with the minimum value observed at Kille Gavthan (AAQ-5) as 0.41 mg/m³ in the month of March,2022.

All above parameters are observed to be in compliance with permissible limits as per NAAQ Standards in the month of November,2009. Also, parameters such as Ozone ($O_3$), Lead (Pb), Arsenic (As), Nickel (Ni), Ammonia ($NH_3$), Mercury (Hg), Benzo(a)Pyrene (BaP) and Benzene ($C_6H_6$) were found to be within the prescribed limits in the month of March,2022.

**Table 5-4: Ambient Air Quality monitoring at various stations during April 2022**

| Sampling Locations | Pargaon High School | Ulwe Node | Owale Village | Kille Gaothan | NMIA Project site | Balaji Office | Panvel | Panchsheel Guest House | Jui Village | Limit # | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sampling Date** | **18.04.2022** | | | **19. 04.2022** | | | **20. 04.2022** | | | | |
| $SO_2$ | 13.6 | 15.7 | 13.6 | 13.1 | 14.4 | 15.2 | 15.2 | 14.1 | 14.4 | 80 | µg/m³ |
| $NO_X$ | 24.9 | 26.4 | 24.6 | 24.4 | 24.9 | 25.0 | 25.3 | 25.2 | 24.8 | 80 | µg/m³ |
| $PM_{10}$ | 66.3 | 72.2 | 67.2 | 63.3 | 67.3 | 75.5 | 67.9 | 65.0 | 66.5 | 100 | µg/m³ |
| $PM_{2.5}$ | 23.3 | 25.8 | 24.2 | 22.1 | 23.7 | 24.6 | 24.6 | 22.5 | 22.9 | 60 | µg/m³ |
| Ozone ($O_3$) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | 180 | µg/m³ |
| Lead (Pb) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL (DL-0.8) | 1 | µg/m³ |
| CO | 0.41 | 0.46 | 0.40 | 0.35 | 0.42 | 0.44 | 0.45 | 0.41 | 0.41 | 4 | mg/m³ |
| Benzene ($C_6H_6$) | BDL (DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL (DL-0.2) | 5 | µg/m³ |
| Benzopyrene | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | 1 | ng/m³ |
| Arsenic (As) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | 6 | ng/m³ |
| Nickel (Ni) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | 20 | ng/m³ |
| $NH_3$ | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | 400 | µg/m³ |

**BDL**–Below Detectable Limit (Note # Limits as per National Ambient Air Quality Standards NAAQS,2009)

**Results:**

**Particulate Matter ($PM_{10}$):** A maximum value for PM10 is observed at Kombadbhuje (Balaji Site Office) as 75.5 µg/m³ with the minimum value observed at Kille Gavthan as 63.3 µg/m³ in the month of April,2022.

**Particulate Matter ($PM_{2.5}$)**: A maximum value for PM2.5 is observed at Ulwe Noda as 25.8 µg/m³ with the minimum value observed at Kille Gavthan as 22.1 µg/m³ in the month of April,2022.

**Sulphur Dioxide ($SO_2$):** Maximum value for SO2 is observed at near Ulwe Node 15.7 µg/m³ with the minimum value observed at Kille Gavthan as 13.1 µg/m3 in the month of April,2022.

**Oxides of Nitrogen ($NO_X$)**: Maximum value for NOx is observed at Ulwe Node as 26.4 µg/m³ with the minimum value observed at Kille Gavthan as 24.4 µg/m³ in the month of April,2022.

**Carbon Monoxide (CO)**: The maximum value for CO is observed at Ulwe Node as 0.46 mg/m³ with the minimum value observed at Kille Gavthan as 0.35 mg/m³ in the month of April,2022.

All above parameters are observed to be in compliance with permissible limits as per NAAQ Standards November,2009. Also, parameters such as Ozone ($O_3$), Lead (Pb), Arsenic (As), Nickel (Ni), Ammonia (NH3), Mercury (Hg), Benzo(a)Pyrene (BaP) and Benzene ($C_6H_6$) were found to be within the prescribed limits in the month of April,2022.

**Table 5-5: Ambient Air Quality monitoring at various stations during May 2022**

| Sampling Locations | Pargaon High School | Ulwe Node | Owale Village | Kille Gaothan Guest House | NMIA Project site | Balaji Office | Panvel | Panchsheel guest House | Jui Village | Limit # | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sampling Date** | **16.05.2022** | | | **17.05.2022** | | | **18.05.2022** | | | | |
| $SO_2$ | 14.4 | 16.2 | 14.7 | 15.2 | 15.4 | 15.7 | 15.4 | 14.9 | 14.4 | 80 | µg/m³ |
| $NO_X$ | 24.6 | 25.7 | 24.9 | 24.8 | 25.1 | 25.4 | 25.8 | 25.1 | 24.8 | 80 | µg/m³ |
| $PM_{10}$ | 67.1 | 73.4 | 70.8 | 66.0 | 75.5 | 78.2 | 69.4 | 66.5 | 68.0 | 100 | µg/m³ |
| $PM_{2.5}$ | 24.6 | 25.8 | 25.4 | 23.3 | 25.4 | 27.5 | 24.2 | 21.7 | 23.3 | 60 | µg/m³ |
| Ozone ($O_3$) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | 180 | µg/m³ |
| Lead (Pb) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL (DL-0.8) | 1 | µg/m³ |
| CO | 0.42 | 0.46 | 0.44 | 0.39 | 0.43 | 0.45 | 0.47 | 0.44 | 0.42 | 4 | mg/m³ |
| Benzene ($C_6H_6$) | BDL (DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL (DL-0.2) | 5 | µg/m³ |
| Benzopyrene | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | 1 | ng/m³ |
| Arsenic (As) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | 6 | ng/m³ |
| Nickel (Ni) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | 20 | ng/m³ |
| $NH_3$ | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | 400 | µg/m³ |

**BDL**–Below Detectable Limit (Note # Limits as per National Ambient Air Quality Standards NAAQS,2009)

**Results:**

**Particulate Matter ($PM_{10}$)**: A maximum value for PM10 is observed at Balaji Office, as 78.4 µg/m³ with the minimum value observed at Kille Gavthan (AAQ-5), as 66.0 µg/m³ in the month of May,2022.

**Particulate Matter ($PM_{2.5}$)**: A maximum value for PM2.5 is observed at Balaji Office, as 27.5 µg/m³ with the minimum value observed at Panchsheel as 21.7 µg/m³ in the month of May,2022.

**Sulphur Dioxide ($SO_2$)**: Maximum value for SO2 is observed at Ulwe Node as 16.2 µg/m³ with the minimum value observed at Paragaon and Jui as 14.4 µg/m³ in the month of May,2022.

**Oxides of Nitrogen ($NO_X$)**: Maximum value for NOx is observed at Panval as 25.8 µg/m³ with the minimum value observed at Pargaon as 24.6 µg/m³ in the month of May,2022.

**Carbon Monoxide (CO)**: The maximum value for CO is observed at Panvel as 0.47 mg/m³ with the minimum value observed at Kille Gavthan as 0.39 mg/m³ in the month of May,2022.

All above parameters are observed to be in compliance with permissible limits as per NAAQ Standards in the month of May,2022. Also, parameters such as Ozone ($O_3$), Lead (Pb), Arsenic (As), Nickel (Ni), Ammonia (NH3), Mercury (Hg), Benzo(a)Pyrene (BaP) and Benzene ($C_6H_6$) were found to be within the prescribed limits in the month of May,2022.

**Table 5-6: Ambient Air Quality monitoring at various stations during June 2022**

| Sampling Locations | Balaji Office | Pargaon High School | Ulwe Node | Kille Gaothan Guest House | Panchsheel guest House | NMIA Project site | Panvel | Jui Village | Owale Village | Limit # | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sampling Date** | **13.06.2022** | | | **14. 06.2022** | | | **15. 06.2022** | | | | |
| $SO_2$ | 15.2 | 13.9 | 14.9 | 14.1 | 14.4 | 14.4 | 15.2 | 13.9 | 14.1 | 80 | µg/m³ |
| $NO_X$ | 25.1 | 23.7 | 25.1 | 23.9 | 24.8 | 24.6 | 25.1 | 24.3 | 24.2 | 80 | µg/m³ |
| $PM_{10}$ | 71.1 | 64.7 | 70.1 | 64.7 | 64.6 | 69.8 | 66.3 | 64.1 | 67.4 | 100 | µg/m³ |
| $PM_{2.5}$ | 25.4 | 22.1 | 24.6 | 21.3 | 21.3 | 24.6 | 23.3 | 22.1 | 24.2 | 60 | µg/m³ |
| Ozone ($O_3$) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | 180 | µg/m³ |
| Lead (Pb) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL(DL-0.8) | BDL (DL-0.8) | 1 | µg/m³ |
| CO | 0.44 | 0.39 | 0.44 | 0.38 | 0.42 | 0.41 | 0.45 | 0.39 | 0.41 | 4 | mg/m³ |
| Benzene ($C_6H_6$) | BDL (DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL(DL-0.2) | BDL (DL-0.2) | 5 | µg/m³ |
| Benzopyrene | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | BDL (DL-0.5) | 1 | ng/m³ |
| Arsenic (As) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | BDL (DL-0.1) | 6 | ng/m³ |
| Nickel (Ni) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | BDL (DL-0.3) | 20 | ng/m³ |
| $NH_3$ | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | BDL (DL-1.0) | 400 | µg/m³ |

**BDL**–Below Detectable Limit (Note # Limits as per National Ambient Air Quality Standards NAAQS,2009)

**Results:**

**Particulate Matter ($PM_{10}$)**: A maximum value for PM10 is observed at Balaji Office, as 71.1 µg/m³ with the minimum value observed at Jui as 64.1 µg/m³ in the month of June,2022.

**Particulate Matter ($PM_{2.5}$)**: A maximum value for PM2.5 is observed at as 27.5 µg/m³ with the minimum value observed at Jui and pargaon as 21.3 µg/m³ respectivey in the month of June,2022.

**Sulphur Dioxide ($SO_2$)**: Maximum value for SO2 is observed at Balaji as 15.2 µg/m³ with the minimum value observed at Owale 14.1 µg/m³ in the month of June,2022.

**Oxides of Nitrogen ($NO_X$)**: Maximum value for NOx is observed at 25.1 µg/m³ at Balaji Office, Ulwe Node, Panvel respectively with the minimum value observed at Pargaon as 23.7 µg/m³ in the month of June,2022.

**Carbon Monoxide (CO)**: The maximum value for CO is observed at Balaji Office and Ulwe Node as 0.44 mg/m³ respectively with the minimum value observed at Kille Gavthan as 0.38 mg/m³ in the month of June,2022.

All above parameters are observed to be in compliance with permissible limits as per NAAQ Standards in the month of May,2022. Also, parameters such as Ozone ($O_3$), Lead (Pb), Arsenic (As), Nickel (Ni), Ammonia (NH3), Mercury (Hg), Benzo(a)Pyrene (BaP) and Benzene ($C_6H_6$) were found to be within the prescribed limits in the month of May,2022.

### 5.1.2 Inference of AAQM Data

The concentration of Particulate Matter – 10 µ ($PM_{10}$) was observed in range of 51.8 – 78.2 µg/$m^3$ - at all sampling locations monitored and level of Particulate Matter - 2.5 µ (PM 2.5) were noted under NAAQS limit i.e., in range of 17.5 – 28.3 µg/$m^3$ at all stations monitored. Gaseous pollutants - Nitrogen Oxide, Sulfur Dioxide and Carbon Monoxide are under NAAQS norms during collection period during January to June 2022 (Refer Tables 5.1 to 5.6 above) Lead, Ozone, Benzene ($C_6H_6$), Benzopyrene, Arsenic, Nickel and Ammonia were found below detectable level.

## 5.2 AMBIENT NOISE LEVEL MONITORING REPORT

### 5.2.1 Noise Level Data

Ambient Noise level was monitored over 24 hours' duration for Day and Nighttime as per Schedule - II of Environmental Protection Act 1986 for Industrial, Commercial, Residential and Sensitive Area (Refer Table 3.3).

Results of analysis are compiled below:

**Table 5-7: Ambient Noise Level monitoring during January to June 2022**

| Stn Code | Sampling Location | Sampling Date | Observed Value (Leq) (dB(A)) | | | | | | Limiting Standard (Leq) as per EP Act Schedule II. dB(A) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Day Time | | | Nighttime | | | | |
| | | | Max | Min | Avg | Max | Min | Avg | Day Time | Nighttime |
| N1 | Pargaon | 27.01.2022 | 45.2 | 41.8 | 43.9 | 43.9 | 42.9 | 43.3 | 55 | 45 |
| N2 | Owale | | 42.1 | 36.5 | 39 | 37.4 | 36.3 | 36.8 | 55 | 45 |
| N3 | Ulwe Node | | 64.9 | 52.1 | 62.8 | 57.1 | 52.1 | 54.6 | 65 | 55 |
| N6 | Kille Gaothan | 28.01.2022 | 58.2 | 41.2 | 54.7 | 49.6 | 41.2 | 44.7 | 55 | 45 |
| N4 | NMIA Project site | | 61.7 | 51.1 | 54.4 | 57.6 | 52.3 | 54.8 | 65 | 55 |
| N5 | Kombadbhuje (Balaji Site Office) | | 61.8 | 51.6 | 57.2 | 58.3 | 52.8 | 54.9 | 55 | 45 |
| N9 | Panvel | 29.01.2022 | 62.3 | 48.5 | 54.9 | 56.9 | 48.5 | 52.5 | 65 | 55 |
| N7 | Panchsheel | | 60 | 47.8 | 52.9 | 59.3 | 45.3 | 42.4 | 55 | 45 |
| N8 | Jui | | 57.6 | 47.8 | 52.2 | 48.8 | 41.2 | 44.4 | 55 | 45 |
| N1 | Pargaon | 21.02.2022 | 52.9 | 47.8 | 50.6 | 44.9 | 42.1 | 44.1 | 55 | 45 |
| N2 | Owale | | 49.8 | 40.4 | 43.9 | 43.1 | 41 | 41.8 | 55 | 45 |
| N3 | Ulwe Node | | 59.2 | 50.2 | 56.7 | 55.7 | 50.2 | 52.5 | 65 | 55 |
| N6 | Kille Gaothan | 22.02.2022 | 54.9 | 52.5 | 54.1 | 45.3 | 43.1 | 44.4 | 55 | 45 |
| N4 | NMIA Project site | | 54.8 | 31.5 | 46.4 | 53.8 | 49.3 | 52.2 | 65 | 55 |
| N5 | Kombadbhuje (Balaji Site Office) | | 60 | 34.7 | 49.4 | 54.9 | 52.6 | 53.8 | 65 | 55 |
| N9 | Panvel | 23.02.2022 | 62.6 | 48.9 | 55.6 | 56.3 | 48.1 | 51.8 | 65 | 55 |
| N7 | Panchsheel | | 56.2 | 48.3 | 52.2 | 53.7 | 44.1 | 42.9 | 55 | 45 |
| N8 | Jui | | 54.6 | 47.8 | 51.5 | 45.2 | 41.6 | 44.1 | 55 | 45 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| N1 | Pargaon | 21.03.2022 | 59.1 | 41 | 49.3 | 44.8 | 41 | 43.7 | 55 | 45 |
| N2 | Owale | | 55.1 | 49.2 | 53.6 | 47.3 | 43.2 | 44.8 | 55 | 45 |
| N3 | Ulwe Node | | 66.5 | 43 | 59.8 | 50.3 | 43 | 45.4 | 65 | 55 |
| N6 | Kille Gaothan | 22.03.2022 | 56.5 | 49.3 | 54.5 | 45 | 43.2 | 44 | 55 | 45 |
| N4 | NMIA Project site | | 62 | 58 | 60.1 | 54.9 | 53.2 | 54.1 | 65 | 55 |
| N5 | Kombadbhuje (Balaji Site Office) | | 56.4 | 51.3 | 54 | 54.4 | 53.1 | 53.7 | 65 | 55 |
| N9 | Panvel | 23.03.2022 | 55.6 | 42.9 | 52.7 | 49.9 | 42.9 | 46.2 | 65 | 55 |
| N7 | Panchsheel | | 58.9 | 43.1 | 54.9 | 45 | 43.1 | 44.2 | 55 | 45 |
| N8 | Jui | | 53.3 | 40.5 | 48.8 | 47.5 | 44 | 43.4 | 55 | 45 |
| N1 | Pargaon | 18.04.2022 | 43.6 | 52.8 | 46.9 | 42.9 | 48.6 | 45.4 | 55 | 45 |
| N2 | Owale | | 39.3 | 47.3 | 43.1 | 38.5 | 45 | 45 | 55 | 45 |
| N3 | Ulwe Node | | 52.1 | 67 | 65 | 52.1 | 54.9 | 53.9 | 65 | 55 |
| N6 | Kille Gaothan | 19. 04.2022 | 44.8 | 54.9 | 52.9 | 42.1 | 44.8 | 43.8 | 55 | 45 |
| N4 | NMIA Project site | | 50.8 | 54 | 52.9 | 50.4 | 52.5 | 51.3 | 65 | 55 |
| N5 | Kombadbhuje (Balaji Site Office) | | 53.1 | 60.1 | 56.9 | 52.3 | 54.9 | 53.7 | 65 | 55 |
| N9 | Panvel | 20. 04.2022 | 53.7 | 60.7 | 57.5 | 53.9 | 54.8 | 54 | 65 | 55 |
| N7 | Panchsheel | | 44.2 | 54.8 | 55 | 42.1 | 44.9 | 43.5 | 55 | 45 |
| N8 | Jui | | 44.8 | 54.9 | 48.8 | 43.2 | 44.8 | 44.1 | 55 | 45 |
| N1 | Pargaon | 16.05.2022 | 51.7 | 57.1 | 54.9 | 41.3 | 46.8 | 44.3 | 55 | 45 |
| N2 | Owale | | 48.7 | 61.1 | 54.2 | 43.1 | 46.5 | 44.9 | 55 | 45 |
| N3 | Ulwe Node | | 55.1 | 64.4 | 61.4 | 48.4 | 58.2 | 52.4 | 65 | 55 |
| N6 | Kille Gaothan | 17.05.2022 | 46.1 | 56.9 | 54.3 | 43.6 | 46.3 | 44.6 | 55 | 45 |
| N4 | NMIA Project site | | 51.6 | 54.8 | 53.1 | 51.6 | 53.4 | 52.2 | 65 | 55 |
| N5 | Kombadbhuje (Balaji Site Office) | | 50.7 | 67.9 | 57.2 | 50.7 | 57.2 | 54.8 | 65 | 55 |
| N9 | Panvel | 18. 05.2022 | 47 | 60.3 | 54.7 | 50 | 56.3 | 54.8 | 65 | 55 |
| N7 | Panchsheel | | 53.1 | 57.9 | 54.9 | 42.6 | 47.8 | 45 | 55 | 45 |
| N8 | Jui | | 45.5 | 65.4 | 52.7 | 43.1 | 51.5 | 44.8 | 55 | 45 |
| N10 | Vadghar | | 66.3 | 73.1 | 71.1 | 60.8 | 69.4 | 65.9 | 55 | 45 |
| N11 | Bhangarpada | 19.05.2022 | 60.8 | 66.4 | 62.2 | 57.6 | 61.2 | 59.3 | 55 | 45 |
| N1 | Pargaon | 13.06.2022 | 53.5 | 61.5 | 57.2 | 51.6 | 55.4 | 52.9 | 55 | 45 |
| N2 | Owale | | 49.3 | 65.3 | 58.3 | 55.1 | 59.4 | 58.6 | 55 | 45 |
| N3 | Ulwe Node | | 68.3 | 71.6 | 69.5 | 67.6 | 69 | 67.8 | 65 | 55 |
| N10 | Vadghar | | 51.8 | 60.6 | 58.2 | 51.8 | 66 | 60 | 55 | 45 |
| N6 | Kille Gaothan | 14. 06.2022 | 57.7 | 63.4 | 60.5 | 56.1 | 60.8 | 57.8 | 55 | 45 |
| N4 | NMIA Project site | | 53.1 | 58.9 | 56.3 | 51.8 | 53.5 | 53 | 65 | 55 |
| N5 | Kombadbhuje (Balaji Site Office) | | 57.7 | 69.7 | 64 | 56.7 | 62.3 | 59.4 | 55 | 55 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| N9 | Panvel | 15. 06.2022 | 53.8 | 74.5 | 60.2 | 47.8 | 53.8 | 50.6 | 65 | 55 |
| N7 | Panchsheel | | 59 | 63 | 60.2 | 58 | 60.8 | 59.4 | 55 | 45 |
| N8 | Jui | | 51.7 | 55.1 | 52.6 | 50.8 | 52.7 | 51.8 | 55 | 45 |
| N11 | Bhangarpada | | 65.5 | 72.2 | 69.3 | 62.2 | 66 | 63.8 | 55 | 45 |

### 5.2.2 Inference of Noise Data

During daytime, the average Noise level was observed in the range of 51.0 -87.9 dB(A) & Nighttime levels were observed at 41.6 – 60.2 dB(A) during sampling period. Following observations are made about average Noise levels in the monitoring carried out in different months:

- In January 2022 average Noise level exceeded the EP Act Standards during daytime and nighttime (57.7 and 54.9 dBA) at Balaji Office respectively due to high vehicular movement.
- In February 2022 average Noise level is observed under EP act standards.
- In March 2022 average Noise level is observed under EP act standards.
- In April 2022 average Noise level is observed within NAAQS standard limit.
- In May 2022 average Noise level exceeds the EP Act Standards during daytime (71.1 and 62.5 dBA) and Nighttime (65.9 and 59.3 dBA) at Vadghar and Bhangarpada respectively were higher than NAAQS limits. At other places the noise level is within NAAQS limit during day as well as nighttime.
- In June 2022 average Noise level exceeds the EP Act Standards during daytime (60.5, 64.0, 60.2, 69.3 dBA) and Nighttime (57.8,59.4, 59.4, 63.8 dBA) at Kille Gaothan, Balaji Site Office, Panchsheel Guest House and Bhangarpada respectively were higher than NAAQS limits. The Noise level only exceeds during nighttime at Jui Village (51.8 dBA). At other places the noise level is within NAAQS limit during day as well as nighttime.

## 5.3 SOIL QUALITY MONITORING REPORT

### 5.3.1 Soil Analysis Data (February and May 2022)

Data on soil analysis is compiled and presented below for the sampling period:

**Table 5-8: Soil analysis of various stations in study area during February 2022**

| Sr. No. | Locations | | Pargaon | Chinchpada | Koli | Kopar | Owale | Ulwe | NMIA Project site | Kombadbhuje | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sampling Date | | 24.02.2022 | | | | | | | | |
| 1. | pH | | 7.01 | 7. 20 | 6.98 | 7.22 | 6.99 | 7.10 | 7.01 | 7.24 | -- |
| 2. | Texture | Clay | 75 | 68 | 79 | 77 | 76 | 80 | 76 | 77 | % |
| | | Silt | 11 | 14 | 10 | 13 | 10 | 9 | 12 | 13 | |
| | | Fine Sand | 14 | 18 | 11 | 10 | 14 | 11 | 12 | 10 | |
| 3. | Conductivity | | 280.8 | 284.5 | 290.8 | 320.8 | 299.2 | 281.5 | 290.4 | 318.5 | µS/cm |
| 4. | Organic Carbon | | 0.21 | 0.32 | 0.68 | 0.60 | 0.87 | 0.72 | 0.21 | 0.88 | % |
| 5. | Available Nitrogen | | 0.0098 | 0.0090 | 0.0062 | 0.0092 | 0.0092 | 0.0092 | 0.0078 | 0.0098 | % |
| 6. | Available Phosphorus | | 40 | 43 | 38 | 38 | 48 | 38 | 32.2 | 34 | kg/ha |
| 7. | Available Potassium | | 80 | 80 | 80 | 80 | 80 | 80 | 90 | 90 | kg/ha |
| 8. | Chloride | | 72 | 58 | 68 | 72 | 60 | 72 | 42 | 52 | mg/kg |
| 9. | Sulphate as $SO_4$ | | 30 | 32 | 40 | 50 | 38 | 40 | 36 | 30 | mg/kg |
| 10. | Calcium as Ca | | 32 | 32 | 34 | 38 | 32 | 34 | 30 | 34 | meq/l |
| 11. | Magnesium as Mg | | 12 | 12 | 12 | 14 | 12 | 11 | 10 | 12 | meq/l |
| 12. | Sodium as Na | | 80 | 90 | 80 | 90 | 90 | 80 | 80 | 80 | kg/ha |
| 13. | Manganese as Mn | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 14. | Copper as Cu | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 15. | Cadmium as Cd | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 16. | Cobalt as Co | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 17. | Zinc as Zn | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 18. | Nickel as Ni | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 19. | Aluminium as Al | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 20. | Arsenic as As | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 21. | Mercury as Hg | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 22. | Chromium as Cr | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 23. | Iron as Fe | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 24. | Lead as Pb | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |

### 5.3.2 Soil Data Inference during February 2022:

It has been observed that the pH of the soil ranged from 6.98 to 7.24 indicating that the soils are slightly alkaline in nature. The soil in the study area is mostly clay. The electrical conductivity was observed to be in the range of 280.8 to 318.5 µS/cm.

The nitrogen concentrations are in the range of 0.0062 % to 0.0098 %. The phosphorous concentrations are in the range of 32.2 kg/ha to 48 kg/ha indicating that soils have less to on an average sufficient quantity of phosphorus.

The potassium concentrations range between 80 kg/ha to 90 kg/ha, which indicate that the soils have very less quantity of potassium.

**Table 5-9: Soil analysis of various stations in study area during May 2022**

| Sr. No. | Locations | | Pargaon | Chinchpada | Koli | Kopar | Ulwe | NMIA project site | Kombadbhuje | Owale | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sampling Date | | 18.05.2022 | | | | | | | | |
| 1. | pH | | 6.92 | 7.01 | 6.88 | 6.99 | 7.04 | 6.98 | 7.12 | 6.82 | -- |
| 2. | Texture | Clay | 72 | 70 | 78 | 78 | 78 | 72 | 74 | 78 | % |
| | | Silt | 12 | 14 | 10 | 12 | 10 | 14 | 14 | 12 | |
| | | Fine Sand | 16 | 16 | 12 | 10 | 12 | 14 | 12 | 10 | |
| 3. | Conductivity | | 284.5 | 289.6 | 284.8 | 312.4 | 279.5 | 292.5 | 298.5 | 268.5 | µS/cm |
| 4. | Organic Carbon | | 0.24 | 0.38 | 0.62 | 0.54 | 0.64 | 0.28 | 0.68 | 0.68 | % |
| 5. | Available Nitrogen | | 0.0084 | 0.0082 | 0.0058 | 0.0092 | 0.0087 | 0.0082 | 0.0082 | 0.0082 | % |
| 6. | Available Phosphorus | | 44 | 48 | 40 | 40 | 40 | 34.2 | 34 | 42 | kg/ha |
| 7. | Available Potassium | | 90 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | kg/ha |
| 8. | Chloride | | 74 | 62 | 58 | 64 | 62 | 38 | 52 | 54 | mg/kg |
| 9. | Sulphate as $SO_4$ | | 32 | 40 | 44 | 52 | 42 | 36 | 38 | 32 | mg/kg |
| 10. | Calcium as Ca | | 34 | 34 | 34 | 34 | 34 | 32 | 32 | 34 | meq/l |
| 11. | Magnesium as Mg | | 12 | 12 | 12 | 12 | 12 | 12 | 11 | 12 | meq/l |
| 12. | Sodium as Na | | 80 | 90 | 80 | 90 | 80 | 80 | 80 | 80 | kg/ha |
| 13. | Manganese as Mn | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 14. | Copper as Cu | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 15. | Cadmium as Cd | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 16. | Cobalt as Co | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 17. | Zinc as Zn | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 18. | Nickel as Ni | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 19. | Aluminium as Al | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 20. | Arsenic as As | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 21. | Mercury as Hg | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 22. | Chromium as Cr | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 23. | Iron as Fe | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |
| 24. | Lead as Pb | | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | mg/kg |

### 5.3.3 Soil Data Inference during May 2022:

It has been observed that the pH of the soil ranged from 6.82 to 7.14 indicating that the soils are slightly alkaline in nature. The soil in the study area is mostly clay. The electrical conductivity was observed to be in the range of 268.5 to 312.4 µS/cm.

The nitrogen concentrations are in the range of 0.0058 % to 0.0092 %. The phosphorous concentrations are in the range of 34.2 kg/ha to 48 kg/ha indicating that soils have less to on an average sufficient quantity of phosphorus.

The potassium concentrations range between 80 kg/ha to 90 kg/ha, which indicate that the soils have very less quantity of potassium.

## 5.4 GROUND WATER QUALITY ANALYSIS REPORT

### 5.4.1 GW Analysis Data during January 2022

Ground water samples were collected for 5 locations in January 2022.

**Table 5-10: Ground water analysis at various stations during January 2022**

| Sr. No. | Sampling Locations | Koli | Kopar | Pargaon | Chinchpada | Owale |
|---|---|---|---|---|---|---|
| | Sampling month | 27.01.2022 | | | | |
| 1. | Colour, Hazen | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 2. | pH@ 25°C | 7.23 | 7.36 | 7.52 | 7.71 | 7.71 |
| 3. | Turbidity, NTU | 2.3 | 2.2 | 2.1 | 2.2 | 2.4 |
| 4. | TDS, mg/l | 230 | 260 | 200 | 280 | 170 |
| 5. | NH3(as N), mg/l | < 0.56 | < 0.56 | < 0.56 | < 0.56 | < 0.5 |
| 6. | Boron, mg/l | 0.05 | 0.05 | <0.05 | 0.05 | <0.05 |
| 7. | Calcium as Ca, mg/l | 30.5 | 44.8 | 32 | 42 | 16 |
| 8. | Chlorides, mg/l | 42 | 48 | 40 | 50 | 39 |
| 9. | Fluoride, mg/l | 0.32 | 0.30 | 0.32 | 0.33 | 0.30 |
| 10. | Free Res $Cl_2$, mg/l | 0.56 | 0.60 | 0.62 | 0.65 | 0.64 |
| 11. | Iron, mg/l | 0.033 | 0.033 | 0.033 | 0.033 | 0.033 |
| 12. | Magnesium as Mg, g/l | 13.1 | 12.2 | 10.7 | 24 | 13.6 |
| 13. | Sulphate, mg/l | 40 | 53 | 38 | 68 | 28 |
| 14. | Alkalinity, mg/l | 132 | 158 | 120 | 160 | 90 |
| 15. | Hardness, mg/l | 130 | 164 | 124 | 200 | 92 |
| 16. | Odour | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable |
| 17. | Aluminum, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 18. | Detergents, mg/l | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| 19. | Barium, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 20. | Chloramines, mg/l | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 |
| 21. | Copper, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 22. | Manganese, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 23. | Mineral oil, mg/l | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 24. | Nitrate, mg/l | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |

| Sr. No. | Sampling Locations | Koli | Kopar | Pargaon | Chinchpada | Owale |
|---|---|---|---|---|---|---|
| | Sampling month | 27.01.2022 | | | | |
| 25. | Phenolic comp, mg/l | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 26. | Selenium, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 27. | Silver, mg/l | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| 28. | Sulphide, mg/l | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 29. | Zinc, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 30. | Cadmium, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 31. | Cyanide, mg/l | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 32. | Lead, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 33. | Mercury, mg/l | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 34. | Molybdenum, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 35. | Nickel, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 36. | PCB, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 37. | PAH, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 38. | Arsenic, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 39. | Chromium, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 40. | Alachlor, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 41. | Atrazine, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 42. | Aldrin, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 43. | Alpha HCH, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 44. | Beta HCH, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 45. | Butachlor, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 46. | Chlorpyriphos, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 47. | Delta HCH, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 48. | 2,4 Dichloro PAA, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 49. | DDT, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 50. | Endosulphan, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 51. | Ethion, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 52. | Lindane, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 53. | Isoproturon, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 54. | Malathion, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 55. | Methyl parathion, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 56. | Monocrotophos , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 57. | Phorate, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| | Microbiology | | | | | |
| 58. | Coliform (MPN/100 ml) | >1600 | >1600 | >1600 | >1600 | >1600 |
| 59. | E. Coli | Present | Present | Present | Present | Present |

### 5.4.2 GW Analysis Inference:

The analysis results indicate the pH range of 7.23 to 7.71 and is observed to be within the desirable limit of 6.5 to 8.5, beyond this range water will affect the mucous membrane and/or water supply system. The total hardness is in the range of 92 to 200 mg/l and is observed to be within the permissible limit of 600 mg/l at all five locations. The total hardness beyond the permissible limit causes encrustation in water supply structure and adverse effects on domestic use. The iron concentration is found to be in the range of 0.033 mg/l for all the five samples and is observed to be within the desirable limit of 1.0 mg/l at

all locations. Beyond the desirable limit taste/appearance are affected, has adverse effect on domestic uses and water supply structures, and promotes iron bacteria.
The chlorides concentration is in the range of 39 mg/l to 50 mg/l, and is observed to be within the desirable limit of 250 mg/l at all five locations. Beyond this limit, taste, corrosion and palatability are affected. The fluoride concentration is 0.30 to 0.33 mg/l, and is observed to be within the desirable limit of 1.5 mg/l at all locations, high fluoride may cause fluorosis. The TDS are in the range of 170 to 280 mg/l, and is observed to be within the desirable limit of 500 mg/l at all five locations and are also within the permissible limit of 2000 mg/l.
The ground water samples collected from five locations and are analyzed for physical, chemical and biological parameters. The chemical and physical characteristics of the analyzed ground water samples shows that the samples are potable as per IS 10500-2012. The biological characteristics of the analyzed ground water samples shows that the samples are not potable as per IS 10500- 2012.

### 5.4.3 GW Analysis Data during February 2022

Ground water samples were collected for 5 locations in February 2022. Access was not available to predefined locations; hence sampling was done at nearby and other locations within study area.

**Table 5-11: Ground water analysis at various stations during February 2022**

| Sr. No. | Sampling Locations | Panvel | Kille Gaothan | Jui | Kombadbhuje | Ulwe |
|---|---|---|---|---|---|---|
| | Sampling month | 23.02.2022 | | | | |
| **1.** | Colour, Hazen | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| **2.** | pH@ 25°C | 7.28 | 7.24 | 7.31 | 7.20 | 6.80 |
| **3.** | Turbidity, NTU | 2.2 | 2.0 | 2.1 | 2.2 | <2.0 |
| **4.** | TDS, mg/l | 220 | 210 | 260 | 210 | 182 |
| **5.** | NH3(as N), mg/l | <0.56 | <0.56 | <0.56 | <0.56 | < 0.56 |
| **6.** | Boron, mg/l | <0.05 | < 0.05 | <0.05 | <0.05 | 0.05 |
| **7.** | Calcium as Ca, mg/l | 40.8 | 32 | 44.8 | 24 | 23.2 |
| **8.** | Chlorides, mg/l | 40 | 42 | 44 | 39 | 40 |
| **9.** | Fluoride, mg/l | 0.30 | 0.32 | 0.32 | 0.30 | 0.32 |
| **10.** | Free ResCl2, mg/l | 0.56 | 0.56 | 0.56 | 0.62 | 0.64 |
| **11.** | Iron, mg/l | 0.032 | 0.032 | 0.032 | 0.033 | 0.034 |
| **12.** | Magnesium as Mg, g/l | 13.1 | 10.7 | 12.2 | 14.6 | 9.72 |
| **13.** | Sulphate, mg/l | 38 | 36 | 62 | 42 | 30 |
| **14.** | Alkalinity, mg/l | 130 | 122 | 158 | 110 | 86 |
| **15.** | Hardness, mg/l | 128 | 124 | 160 | 120 | 96 |
| **16.** | Odour | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable |
| **17.** | Aluminum, mg/l | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **18.** | Detergents, mg/l | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| **19.** | Barium, mg/l | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **20.** | Chloramines, mg/l | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 |
| **21.** | Copper, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| **22.** | Manganese, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| **23.** | Mineral oil, mg/l | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |

| Sr. No. | Sampling Locations | Panvel | Kille Gaothan | Jui | Kombadbhuje | Ulwe |
|---|---|---|---|---|---|---|
| | Sampling month | 23.02.2022 | | | | |
| **24.** | Nitrate, mg/l | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| **25.** | Phenolic comp, mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **26.** | Selenium, mg/l | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **27.** | Silver, mg/l | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| **28.** | Sulphide, mg/l | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| **29.** | Zinc, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| **30.** | Cadmium, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| **31.** | Cyanide, mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **32.** | Lead, mg/l | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **33.** | Mercury, mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **34.** | Molybdenum, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| **35.** | Nickel, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| **36.** | PCB, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| **37.** | PAH, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| **38.** | Arsenic, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| **39.** | Chromium, mg/l | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **40.** | Alachlor, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| **41.** | Atrazine, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| **42.** | Aldrin, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| **43.** | Alpha HCH, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| **44.** | Beta HCH, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| **45.** | Butachlor, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| **46.** | Chlorpyriphos, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| **47.** | Delta HCH, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| **48.** | 2,4 Dichloro PAA, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| **49.** | DDT, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| **50.** | Endosulphan, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| **51.** | Ethion, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| **52.** | Lindane, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| **53.** | Isoproturon, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| **54.** | Malathion, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| **55.** | Methyl parathion, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| **56.** | Monocrotophos , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| **57.** | Phorate, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Microbiology | | | | | | |
| **58.** | Coliform (MPN/100 ml) | >1600 | >1600 | >1600 | >1600 | >1600 |
| **59.** | E coli | Present | Present | Present | Present | Present |

### 5.4.4 GW Analysis Inference:

The analysis results indicate the pH range of 6.80 to 7.31 and is observed to be within the desirable limit of 6.5 to 8.5, beyond this range water will affect the mucous membrane and/or water supply system. The total hardness is in the range of 96 to 160 mg/l, and is observed to be within the permissible limit of 600 mg/l at all five locations. The total hardness beyond the permissible limit causes encrustation in water supply structure and adverse effects on domestic use. The iron concentration is found to be in the range of 0.032 to 0.034 mg/l for all the five samples, and is observed to be within the desirable limit of 1.0

mg/l at all locations. Beyond the desirable limit taste/appearance are affected, has adverse effect on domestic uses and water supply structures, and promotes iron bacteria.

The chlorides concentration is in the range of 39 mg/l to 44 mg/l, and is observed to be within the desirable limit of 250 mg/l at all five locations. Beyond this limit, taste, corrosion and palatability are affected. The fluoride concentration is 0.30 to 0.32 mg/l, and is observed to be within the desirable limit of 1.5 mg/l at all locations, high fluoride may cause fluorosis. The TDS are in the range of 182 to 260 mg/l, and is observed to be within the desirable limit of 500 mg/l at all five locations and are also within the permissible limit of 2000 mg/l.

The ground water samples collected from five locations and are analyzed for physical, chemical and biological parameters. The chemical and physical characteristics of the analyzed ground water samples shows that the samples are potable as per IS 10500-2012. The biological characteristics of the analyzed ground water samples shows that the samples are not potable as per IS 10500- 2012.

### 5.4.5 GW Analysis Data during March 2022

Ground water samples were collected for 4 locations in March 2022. Due to the unavailability of water in Dug Well at Koli, ground water sample could not be collected for the month of March 2022.

**Table 5-12: Ground water analysis at various stations during March 2022**

| Sr. No. | Sampling Locations | Pargaon | Koli | Chinchpada | Owale |
|---|---|---|---|---|---|
| | Sampling month | 24.03.2022 | | | |
| 1. | Colour, Hazen | 5.0 | 5.0 | 5.0 | 5.0 |
| 2. | pH@ 25°C | 7.42 | 7.18 | 7.61 | 7.65 |
| 3. | Turbidity, NTU | 2.2 | 2.4 | <2.0 | 2.1 |
| 4. | TDS, mg/l | 190 | 230 | 280 | 180 |
| 5. | NH3(as N), mg/l | <0.56 | <0.56 | <0.5 | <0.5 |
| 6. | Boron, mg/l | <0.05 | 0.05 | 0.05 | <0.05 |
| 7. | Calcium as Ca, mg/l | 38 | 32 | 48.1 | 18 |
| 8. | Chlorides, mg/l | 42 | 43 | 52 | 32 |
| 9. | Fluoride, mg/l | 0.30 | 0.30 | 0.33 | 0.32 |
| 10. | Free ResCl2, mg/l | 0.56 | 0.58 | 0.56 | 0.56 |
| 11. | Iron, mg/l | 0.033 | 0.033 | 0.033 | 0.033 |
| 12. | Magnesium as Mg, g/l | 3.9 | 13.1 | 19.4 | 11.7 |
| 13. | Sulphate, mg/l | 36 | 42.2 | 62 | 30 |
| 14. | Alkalinity, mg/l | 100 | 136 | 180 | 100 |
| 15. | Hardness, mg/l | 110 | 134 | 200 | 98 |
| 16. | Odour | Agreeable | Agreeable | Agreeable | Agreeable |
| 17. | Aluminum, mg/l | <0.01 | <0.01 | <0.01 | <0.01 |
| 18. | Detergents, mg/l | <0.1 | <0.1 | <0.1 | <0.1 |
| 19. | Barium, mg/l | <0.01 | <0.01 | <0.01 | <0.01 |
| 20. | Chloramines, mg/l | <2.0 | < 2.0 | < 2.0 | < 2.0 |
| 21. | Copper, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 22. | Manganese, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 23. | Mineral oil, mg/l | <0.5 | <0.5 | <0.5 | <0.5 |
| 24. | Nitrate, mg/l | <0.5 | <0.5 | <0.5 | <0.5 |

| Sr. No. | Sampling Locations | Pargaon | Koli | Chinchpada | Owale |
|---|---|---|---|---|---|
| | Sampling month | 24.03.2022 | | | |
| 25. | Phenolic comp, mg/l | <0.05 | <0.05 | <0.05 | <0.05 |
| 26. | Selenium, mg/l | <0.01 | <0.01 | <0.01 | <0.01 |
| 27. | Silver, mg/l | <0.1 | <0.1 | <0.1 | <0.1 |
| 28. | Sulphide, mg/l | <0.5 | <0.5 | <0.5 | <0.5 |
| 29. | Zinc, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 30. | Cadmium, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 31. | Cyanide, mg/l | <0.05 | <0.05 | <0.05 | <0.05 |
| 32. | Lead, mg/l | <0.01 | <0.01 | <0.01 | <0.01 |
| 33. | Mercury, mg/l | <0.05 | <0.05 | <0.05 | <0.05 |
| 34. | Molybdenum, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 35. | Nickel, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 36. | PCB, mg/l | < 0.0001 | < 0.01 | < 0.01 | < 0.01 |
| 37. | PAH, mg/l | < 0.0001 | < 0.01 | < 0.01 | < 0.01 |
| 38. | Arsenic, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 39. | Chromium, mg/l | <0.01 | <0.01 | <0.01 | <0.01 |
| 40. | Alachlor, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 41. | Atrazine, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 42. | Aldrin, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 43. | Alpha HCH, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 44. | Beta HCH, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 45. | Butachlor, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 46. | Chlorpyriphos, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 47. | Delta HCH, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 48. | 2,4 Dichloro PAA,µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 49. | DDT, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 50. | Endosulphan, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 51. | Ethion , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 52. | Lindane , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 53. | Isoproturon, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 54. | Malathion , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 55. | Methyl parathion, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 56. | Monocrotophos, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 57. | Phorate, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 58. | Coliform (MPN/100 ml) | >1600 | >1600 | >1600 | >1600 |
| 59. | E coli | Present | Present | Present | Present |

### 5.4.6 GW Analysis Inference:

The analysis results indicate the pH range of 7.18 to 7.65 and is observed to be within the desirable limit of 6.5 to 8.5, beyond this range water will affect the mucous membrane and/or water supply system. The total hardness is in the range of 98 to 200 mg/l, and is observed to be within the permissible limit of 600 mg/l at all five locations. The total hardness beyond the permissible limit causes encrustation in water supply structure and adverse effects on domestic use. The iron concentration is found to be in the range of 0.033 mg/l for all the five samples, and is observed to be within the desirable limit of 1.0 mg/l at all locations. Beyond the desirable limit taste/appearance are affected, has adverse effect on domestic uses and water supply structures, and promotes iron bacteria.

The chlorides concentration is in the range of 32 mg/l to 52 mg/l, and is observed to be within the desirable limit of 250 mg/l at all five locations. Beyond this limit, taste, corrosion and palatability are affected. The fluoride concentration is 0.30 to 0.33 mg/l, and is observed to be within the desirable limit of 1.5 mg/l at all locations, high fluoride may cause fluorosis. The TDS are in the range of 180 to 280 mg/l, and is observed to be within the desirable limit of 500 mg/l at all five locations and are also within the permissible limit of 2000 mg/l.

The ground water samples collected from five locations and are analyzed for physical, chemical and biological parameters. The chemical and physical characteristics of the analyzed ground water samples shows that the samples are potable as per IS 10500-2012. The biological characteristics of the analyzed ground water samples shows that the samples are not potable as per IS 10500- 2012.

### 5.4.7 GW Analysis Data during April 2022

Ground water samples were collected for 5 locations in April 2022.

**Table 5-13: Ground water analysis at various stations during April 2022**

| Sr. No. | Sampling Locations | Panvel | Kille Gaothan | Ulwe | Kombadbhuje | Jui |
|---|---|---|---|---|---|---|
| | Sampling month | 18.04.2022 | | | | |
| 1. | Colour, Hazen | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 2. | pH@ 25°C | 7.22 | 7.21 | 6.88 | 7.18 | 7.29 |
| 3. | Turbidity, NTU | 2.1 | 2.0 | <2.0 | 2.1 | 2.2 |
| 4. | TDS, mg/l | 230 | 220 | 180 | 200 | 260 |
| 5. | NH3(as N), mg/l | <0.56 | < 0.56 | < 0.56 | < 0.56 | < 0.56 |
| 6. | Boron, mg/l | <0.05 | < 0.05 | 0.05 | <0.05 | < 0.05 |
| 7. | Calcium as Ca, mg/l | 42 | 34 | 24 | 26 | 45 |
| 8. | Chlorides, mg/l | 44 | 44 | 44 | 40 | 48 |
| 9. | Fluoride, mg/l | 0.30 | 0.32 | 0.32 | 0.32 | 0.32 |
| 10. | Free ResCl2, mg/l | 0.60 | 0.56 | 0.60 | 0.60 | 0.62 |
| 11. | Iron, mg/l | 0.032 | 0.032 | 0.034 | 0.032 | 0.033 |
| 12. | Magnesium as Mg, g/l | 5.8 | 8.7 | 7.3 | 8.2 | 10.6 |
| 13. | Sulphate, mg/l | 40 | 38 | 32 | 40 | 58 |
| 14. | Alkalinity, mg/l | 132 | 120 | 90 | 100 | 150 |
| 15. | Hardness, mg/l | 130 | 122 | 94 | 100 | 158 |
| 16. | Odour | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable |
| 17. | Aluminum, mg/l | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| 18. | Detergents, mg/l | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| 19. | Barium, mg/l | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| 20. | Chloramines, mg/l | < 2.0 | < 2.0 | <2.0 | < 2.0 | < 2.0 |
| 21. | Copper, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 22. | Manganese, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 23. | Mineral oil, mg/l | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 24. | Nitrate, mg/l | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 25. | Phenolic comp, mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| 26. | Selenium, mg/l | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| 27. | Silver, mg/l | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| 28. | Sulphide, mg/l | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 29. | Zinc, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 30. | Cadmium, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 31. | Cyanide, mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |

| Sr. No. | Sampling Locations | Panvel | Kille Gaothan | Ulwe | Kombadbhuje | Jui |
|---|---|---|---|---|---|---|
| | Sampling month | 18.04.2022 | | | | |
| 32. | Lead, mg/l | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| 33. | Mercury, mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| 34. | Molybdenum, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 35. | Nickel, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 36. | PCB, mg/l | < 0.01 | < 0.01 | < 0.0001 | < 0.01 | < 0.01 |
| 37. | PAH, mg/l | < 0.01 | < 0.01 | < 0.0001 | < 0.01 | < 0.01 |
| 38. | Arsenic, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 39. | Chromium, mg/l | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| 40. | Alachlor, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 41. | Atrazine, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 42. | Aldrin, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 43. | Alpha HCH, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 44. | Beta HCH, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 45. | Butachlor, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 46. | Chlorpyriphos, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 47. | Delta HCH, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 48. | 2,4 Dichloro PAA, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 49. | DDT, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 50. | Endosulphan, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 51. | Ethion, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 52. | Lindane, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 53. | Isoproturon, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 54. | Malathion, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 55. | Methyl parathion, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 56. | Monocrotophos , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 57. | Phorate, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 58. | Coliform (MPN/100 ml) | >1600 | >1600 | >1600 | >1600 | >1600 |
| 59. | E coli | Present | Present | Present | Present | Present |

### 5.4.8 GW Analysis Inference:

The analysis results indicate the pH range of 6.88 to 7.29 and is observed to be within the desirable limit of 6.5 to 8.5, beyond this range water will affect the mucous membrane and/or water supply system. The total hardness is in the range of 94 to 158 mg/l, and is observed to be within the permissible limit of 600 mg/l at all five locations. The total hardness beyond the permissible limit causes encrustation in water supply structure and adverse effects on domestic use. The iron concentration is found to be in the range of 0.032 to 0.034 mg/l for all the five samples, and is observed to be within the desirable limit of 1.0 mg/l at all locations. Beyond the desirable limit taste/appearance are affected, has adverse effect on domestic uses and water supply structures, and promotes iron bacteria.

The chlorides concentration is in the range of 40 mg/l to 48 mg/l, and is observed to be within the desirable limit of 250 mg/l at all five locations. Beyond this limit, taste, corrosion and palatability are affected. The fluoride concentration is 0.30 to 0.32 mg/l, and is observed to be within the desirable limit of 1.5 mg/l at all locations, high fluoride may cause fluorosis.

The TDS are in the range of 180 to 260 mg/l, and is observed to be within the desirable limit of 500 mg/l at all five locations and are also within the permissible limit of 2000 mg/l.

The ground water samples collected from five locations and are analyzed for physical,chemical and biological parameters. The chemical and physical characteristics of the analyzed ground water samples shows that the samples are potable as per IS 10500-2012. The biological characteristics of the analyzed ground water samples shows that the samples are not potable as per IS 10500- 2012.

### 5.4.9 GW Analysis Data during May 2022

Ground water samples were collected for 4 locations in May 2022.

**Table 5-14: Ground water analysis at various stations during May 2022**

| Sr. No. | Sampling Locations | Pargaon | Chinchpada | Dapoli | Owale |
|---|---|---|---|---|---|
| | Sampling month | 18.05.2022 | | | |
| 1. | Colour, Hazen | 5.0 | 5.0 | 5.0 | 5.0 |
| 2. | pH@ 25°C | 7.88 | 7.24 | 7.65 | 7.36 |
| 3. | Turbidity, NTU | <2.0 | 3.3 | 4.1 | 2.2 |
| 4. | TDS, mg/l | 150 | 240 | 430 | 490 |
| 5. | NH3(as N), mg/l | < 0.56 | <0.56 | < 0.50 | <0.56 |
| 6. | Boron, mg/l | <0.05 | <0.05 | <0.05 | <0.05 |
| 7. | Calcium as Ca, mg/l | 24.8 | 40 | 59.2 | 60 |
| 8. | Chlorides, mg/l | 22 | 34 | 62 | 85 |
| 9. | Fluoride, mg/l | 0.32 | 0.32 | 0.34 | 0.30 |
| 10. | Free ResCl2, mg/l | 0.56 | 0.56 | 0.56 | 0.58 |
| 11. | Iron, mg/l | 0.090 | 0.71 | 0.083 | 0.88 |
| 12. | Magnesium as Mg, g/l | 13.9 | 19.7 | 24 | 27.4 |
| 13. | Sulphate, mg/l | 10 | 19 | 56 | 73 |
| 14. | Alkalinity, mg/l | 152 | 236 | 290 | 296 |
| 15. | Hardness, mg/l | 120 | 182 | 248 | 264 |
| 16. | Odour | Agreeable | Agreeable | Agreeable | Agreeable |
| 17. | Aluminum, mg/l | <0.01 | <0.01 | <0.01 | <0.01 |
| 18. | Detergents, mg/l | <0.1 | <0.1 | <0.1 | <0.1 |
| 19. | Barium, mg/l | <0.01 | <0.01 | <0.01 | <0.01 |
| 20. | Chloramines, mg/l | <2.0 | < 2.0 | < 2.0 | < 2.0 |
| 21. | Copper, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 22. | Manganese, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 23. | Mineral oil, mg/l | <0.5 | <0.5 | <0.5 | <0.5 |
| 24. | Nitrate, mg/l | <0.5 | <0.5 | <0.5 | <0.5 |
| 25. | Phenolic comp, mg/l | <0.05 | <0.05 | <0.05 | <0.05 |
| 26. | Selenium, mg/l | <0.01 | <0.01 | <0.01 | <0.01 |
| 27. | Silver, mg/l | <0.1 | <0.1 | <0.1 | <0.1 |
| 28. | Sulphide, mg/l | <0.5 | <0.5 | <0.5 | <0.5 |
| 29. | Zinc, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 30. | Cadmium, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 31. | Cyanide, mg/l | <0.05 | <0.05 | <0.05 | <0.05 |
| 32. | Lead, mg/l | <0.01 | <0.01 | <0.01 | <0.01 |

| Sr. No. | Sampling Locations | Pargaon | Chinchpada | Dapoli | Owale |
|---|---|---|---|---|---|
| | Sampling month | 18.05.2022 | | | |
| 33. | Mercury, mg/l | <0.05 | <0.05 | <0.05 | <0.05 |
| 34. | Molybdenum, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 35. | Nickel, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 36. | PCB, mg/l | < 0.0001 | < 0.01 | < 0.01 | < 0.01 |
| 37. | PAH, mg/l | < 0.0001 | < 0.01 | < 0.01 | < 0.01 |
| 38. | Arsenic, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 39. | Chromium, mg/l | <0.01 | <0.01 | <0.01 | <0.01 |
| 40. | Alachlor, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 41. | Atrazine, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 42. | Aldrin, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 43. | Alpha HCH, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 44. | Beta HCH, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 45. | Butachlor, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 46. | Chlorpyriphos, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 47. | Delta HCH, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 48. | 2,4 Dichloro PAA, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 49. | DDT, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 50. | Endosulphan, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 51. | Ethion, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 52. | Lindane, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 53. | Isoproturon, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 54. | Malathion, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 55. | Methyl parathion, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 56. | Monocrotophos , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 57. | Phorate, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 58. | Coliform (MPN/100 ml) | >1600 | >1600 | >1600 | >1600 |
| 59. | E coli | Present | Present | Present | Present |

### 5.4.10 GW Analysis Inference:

The analysis results indicate the pH range of 7.24 to 7.88 and is observed to be within the desirable limit of 6.5 to 8.5, beyond this range water will affect the mucous membrane and/or water supply system. The total hardness is in the range of 120 to 248 mg/l, and is observed to be within the permissible limit of 600 mg/l at all five locations. The total hardness beyond the permissible limit causes encrustation in water supply structure and adverse effects on domestic use. The iron concentration is found to be in the range of 0.071 to 0.090 mg/l for all the five samples, and is observed to be within the desirable limit of 1.0 mg/l at all locations. Beyond the desirable limit taste/appearance are affected, has adverse effect on domestic uses and water supply structures, and promotes iron bacteria.

The chlorides concentration is in the range of 22 mg/l to 85 mg/l, and is observed to be within the desirable limit of 250 mg/l at all five locations. Beyond this limit, taste, corrosion and palatability are affected. The fluoride concentration is 0.30 to 0.34 mg/l, and is observed to be within the desirable limit of 1.5 mg/l at all locations, high fluoride may cause fluorosis. The TDS are in the range of 150 to 430 mg/l, and is observed to be within the desirable limit of 500 mg/l at all five locations and are also within the permissible limit of 2000 mg/l.

The ground water samples collected from four locations and are analyzed for physical, chemical and biological parameters. The chemical and physical characteristics of the analyzed ground water samples shows that the samples are potable as per IS 10500-2012. The biological characteristics of the analyzed ground water samples shows that the samples are not potable as per IS 10500- 2012.

### 5.4.11 GW Analysis Data during June 2022

Ground water samples were collected for 5 locations in June 2022.

**Table 5-15: Ground water analysis at various stations during June 2022**

| Sr. No. | Sampling Locations | Ulwe | Kombadbhuje | Jui | Panvel | Kille Gaothan |
|---|---|---|---|---|---|---|
| | Sampling month | 16.06.2022 | | | | |
| 1. | Colour, Hazen | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 2. | pH@ 25°C | 6.92 | 7.18 | 7.29 | 7.28 | 7.18 |
| 3. | Turbidity, NTU | <2.0 | 2.1 | 2.4 | 2.0 | 2.2 |
| 4. | TDS, mg/l | 170 | 200 | 260 | 240 | 210 |
| 5. | NH3(as N), mg/l | < 0.56 | < 0.56 | < 0.56 | < 0.56 | <0.56 |
| 6. | Boron, mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| 7. | Calcium as Ca, mg/l | 25.7 | 26 | 46 | 44 | 32 |
| 8. | Chlorides, mg/l | 42 | 40 | 50 | 46 | 46 |
| 9. | Fluoride, mg/l | 0.32 | 0.32 | 0.34 | 0.38 | 0.38 |
| 10. | Free ResCl2, mg/l | 0.58 | 0.60 | 0.58 | 0.60 | 0.56 |
| 11. | Iron, mg/l | 0.032 | 0.032 | 0.033 | 0.04 | 0.032 |
| 12. | Magnesium as Mg,g/l | 7.8 | 8.2 | 11 | 4.8 | 10.6 |
| 13. | Sulphate, mg/l | 30 | 40 | 60 | 48 | 40 |
| 14. | Alkalinity, mg/l | 92 | 100 | 154 | 128 | 120 |
| 15. | Hardness, mg/l | 96 | 100 | 160 | 130 | 124 |
| 16. | Odour | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable |
| 17. | Aluminum, mg/l | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| 18. | Detergents, mg/l | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| 19. | Barium, mg/l | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| 20. | Chloramines, mg/l | <2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 |
| 21. | Copper, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 22. | Manganese, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 23. | Mineral oil, mg/l | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 24. | Nitrate, mg/l | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 25. | Phenolic comp, mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| 26. | Selenium, mg/l | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| 27. | Silver, mg/l | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| 28. | Sulphide, mg/l | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 29. | Zinc, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 30. | Cadmium, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 31. | Cyanide, mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| 32. | Lead, mg/l | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| 33. | Mercury, mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| 34. | Molybdenum, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 35. | Nickel, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 36. | PCB, mg/l | < 0.0001 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 37. | PAH, mg/l | < 0.0001 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 38. | Arsenic, mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 39. | Chromium, mg/l | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| 40. | Alachlor, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |

| Sr. No. | Sampling Locations | Ulwe | Kombadbhuje | Jui | Panvel | Kille Gaothan |
|---|---|---|---|---|---|---|
| | Sampling month | 16.06.2022 | | | | |
| 41. | Atrazine, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 42. | Aldrin, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 43. | Alpha HCH, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 44. | Beta HCH, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 45. | Butachlor, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 46. | Chlorpyriphos, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 47. | Delta HCH, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 48. | 2,4 Dichloro PAA, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 49. | DDT, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 50. | Endosulphan, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 51. | Ethion, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 52. | Lindane, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 53. | Isoproturon, µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 54. | Malathion, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 55. | Methyl parathion, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 56. | Monocrotophos , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 57. | Phorate, , µg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Microbiology | | | | | | |
| 58. | Coliform (MPN/100 ml) | >1600 | >1600 | >1600 | >1600 | >1600 |
| 59. | E coli | Present | Present | Present | Present | Present |

### 5.4.12 GW Analysis Inference:

The analysis results indicate the pH range of 6.92 to 7.29 and is observed to be within the desirable limit of 6.5 to 8.5, beyond this range water will affect the mucous membrane and/or water supply system. The total hardness is in the range of 96 to 160 mg/l, and is observed to be within the permissible limit of 600 mg/l at all five locations. The total hardness beyond the permissible limit causes encrustation in water supply structure and adverse effects on domestic use. The iron concentration is found to be in the range of 0.004 to 0.032 mg/l for all the five samples, and is observed to be within the desirable limit of 1.0 mg/l at all locations. Beyond the desirable limit taste/appearance are affected, has adverse effect on domestic uses and water supply structures, and promotes iron bacteria.

The chlorides concentration is in the range of 40 mg/l to 50 mg/l, and is observed to be within the desirable limit of 250 mg/l at all five locations. Beyond this limit, taste, corrosion and palatability are affected. The fluoride concentration is 0.32 to 0.38 mg/l, and is observed to be within the desirable limit of 1.5 mg/l at all locations, high fluoride may cause fluorosis. The TDS are in the range of 170 to 260 mg/l, and is observed to be within the desirable limit of 500 mg/l at all five locations and are also within the permissible limit of 2000 mg/l.

The ground water samples collected from four locations and are analyzed for physical, chemical and biological parameters. The chemical and physical characteristics of the analyzed ground water samples shows that the samples are potable as per IS 10500-2012. The biological characteristics of the analyzed ground water samples shows that the samples are not potable as per IS 10500- 2012.

## 5.5 MARINE WATER QUALITY ANALYSIS REPORT DURING February 2022

Surface Marine water samples were collected for different Physiochemical and Biological parameters from 10 stations on 25th and 26th February 2022. Analysis part is mentioned in subsequent sections below.


**Figure 5-1 Collection of Marine Water samples during February 2022**

### 5.5.1 Analytical Data - Physicochemical Parameters during February 2022

**Table 5-16: Marine water physicochemical analysis at various stations during February 2022**

| Sr. No. | Parameter | MW 1 | MW 2 | MW 3 | MW 4 | MW 5 | MW 6 | MW7 | MW 8 | MW9 | MW 10 | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | S | S | S | S | S | S | S | S | S | S | |
| **1.** | pH | 7.38 | 7.26 | 7.36 | 7.10 | 6.98 | 7.18 | 7.15 | 7.12 | 7.30 | 7.27 | -- |
| **2.** | Temperature | 30 | 29.0 | 28.5 | 28.0 | 28.0 | 28 | 29 | 28 | 30 | 28.4 | °C |
| **3.** | Turbidity | 6.11 | 4.3 | 5.3 | 7.01 | 7.28 | 4.68 | 4.56 | 5.85 | 25.6 | 30 | NTU |
| **4.** | Conductivity | 2800 | 35000 | 25230 | 3900 | 38552 | 28390 | 30300 | 42156 | 48900 | 34600 | µS/Cm |
| **5.** | Salinity, | 1.3 | 21.9 | 15.9 | 25.46 | 25.3 | 17.76 | 28.2 | 26.9 | 32.4 | 16.74 | ppt |
| **6.** | Iron as Fe, | 0.022 | 0.14 | 0.020 | <0.02 | <0.02 | 0.018 | 0.018 | 0.018 | <0.02 | 0.16 | mg/l |
| **7.** | Magnesium as Mg | 97.2 | 389 | 778 | 923 | 1166 | 802 | 972 | 972 | 1142 | 462 | mg/l |
| **8.** | Manganese as Mn | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | mg/l |
| **9.** | Fluoride | 0.46 | 1.06 | 1.14 | 1.12 | 1.22 | 1.35 | <0.2 | 1.32 | 1.22 | 0.36 | mg/l |
| **10.** | Sulphate | 52 | 326 | 328 | 692 | 334 | 786 | 352 | 853 | 1126 | 198 | mg/l |
| **11.** | Phenolic compound | <2.4 | <2.4 | <2.4 | <2.4 | 2.33 | 5.82 | 2.86 | 2.11 | 20.6 | <2.4 | µg/l |
| **12.** | Alkalinity | 800 | 900 | 1000 | 900 | 1500 | 800 | 900 | 1000 | 1700 | 700 | mg/l |
| **13.** | Hardness as CaCO3 | 1100 | 2400 | 3800 | 4700 | 5300 | 4800 | 5400 | 5200 | 5400 | 2600 | mg/l |
| **14.** | Zinc as Zn | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | mg/l |
| **15.** | Cadmium as Cd | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | <0.01 | <0.01 | <0.01 | 0.02 | mg/l |
| **16.** | BOD | 0.85 | 0.71 | 1.42 | 0.57 | 3.0 | 0.41 | 0.71 | 0.42 | 1.57 | 0.57 | mg/l |
| **17.** | Chloride | 750 | 8697 | 9097 | 11412 | 14446 | 14846 | 16095 | 14296 | 18444 | 5698 | mg/l |
| **18.** | DO | 1.0 | 1.0 | 1.85 | 0.71 | 3.42 | 0.80 | 0.85 | 0.42 | 1.85 | 0.85 | mg/l |
| **19.** | Total Nitrogen as N | 1.6 | 4.2 | 5.8 | 0.85 | 3.2 | 3.3 | 2.0 | 2.4 | 3.8 | 2.0 | µmol/l |
| **20.** | Phosphorus as P | 0.30 | 0.16 | 0.28 | 0.02 | 1.48 | 3.32 | 3.62 | 0.98 | 2.16 | 1.0 | µmol/l |
| **21.** | Sodium as Na | 60 | 72 | 90 | 78 | 60 | 60 | 80 | 100 | 90 | 110 | mg/l |
| **22.** | Potassium as K | 40 | 64 | 64 | 52 | 40 | 30 | 60 | 80 | 60 | 80 | mg/l |
| **23.** | Lead as Pb | <0.01 | <0.01 | <0.01 | <0.01 | 0.036 | 0.05 | <0.01 | 0.06 | 0.08 | 0.04 | mg/l |
| **24.** | Mercury as Hg | <0.001 | 0.005 | 0.006 | 0.005 | 0.005 | 0.004 | <0.001 | <0.001 | 0.005 | 0.003 | mg/l |
| **25.** | Chromium as Cr | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | mg/l |

### 5.5.2 Inference - Physicochemical Parameters during February 2022

The pH value ranged from 6.98 to 7.38 at surface slightly represents acidic to basic nature of water. Salinity was low only at MW1 due to influx of fresh water and in increasing trends in all 9 stations during collection Period of sampling as proceedings from Gadhi River to Panvel Creek.

Dissolved Oxygen level was observed low during collection of time due to seasonal variation. BOD value suggests the presence of organic matter present in water body which comes as domestic sewage discharge from surrounding areas (villages, STPs of NMMC in Nerul) and effluents from CETP at MIDC Taloja.

The concentration of Magnesium was low at MW1, MW2 and Iron were low at all stations (Refer Table 5.16).

### 5.5.3 Analytical Data - Biological Parameters during February 2022

Biological parameters viz. Phytopigments, Phytoplankton, Zooplankton, Benthos and Microbiology were analyzed, and compiled data is presented below:

**Table 5-17: Marine Water biological analysis of stations (MW1 to MW5) during February 2022**

| Parameter | MW 1 | MW 2 | MW3 | MW4 | MW5 |
|---|---|---|---|---|---|
| | S | S | S | S | S |
| **Phytoplankton** | | | | | |
| **Chlorophyll (mg/m³)** | 9.09 | 6.42 | 10.69 | 18.18 | 19.71 |
| **Pheophytin (mg/m³)** | 21.97 | 7.81 | 1.66 | 5.03 | 0.11 |
| **Population (nox10³/L)** | 301.2 | 272.0 | 294.8 | 121.6 | 126.4 |
| **Total Genera (No)** | 16 | 16 | 13 | 12 | 9 |
| **Major Genera** | *Thalassiosira (34.5%) Scenedesmus(23.2%) Euglena(5.0%) Oscillatoria (1.9%)* | *Thalassiosira (47.1%) Scenedesmus(45.6%) Navicula(2.4%) Oscillatoria (0.6%)* | *Thalassiosira (69.7%) Leptocylindrus(24.7%) Scenedesmus(2.4%) Navicula (0.5%)* | *Thalassiosira (53.9%) Leptocylindrus(38.8%) Navicula (1.3%) Pleurosigma (0.7%)* | *Leptocylindrus (76.6%) Thalassiosira(14.6%) Cyclotella (3.2%) Chaetoceros (2.5%)* |
| **Diversity Index** | 1.59 | 1.08 | 0.87 | 1.05 | 0.85 |
| **Zooplankton** | | | | | |
| **Population (no x 10³/100m³)** | 3253 | 4 | 6 | 11 | 27 |
| **Total Group (No)** | 8 | 6 | 6 | 7 | 7 |
| **Major Groups** | Copepods (98.87%) Cladocera (0.61%) Polychaete (0.23%) Decapods (0.15%) | Copepods (98.20%) Marine insect(0.99%) Medusae (0.52%) ecapods Larvae (0.12%) | Copepods (96.16%) Medusae(3.06%) Polychaetes (0.34%) Marine insects(0.24%) | Copepods(98.43%) Decapods(0.37%) Amphipods(0.37%) Polychaetes (0.26%) | Copepods (97.74%) Amphipods (2.16%) Medusae(0.06%) Marine insects(0.02%) |
| **Biomass (ml/100m³)** | 1625 | 0.2 | 0.3 | 0.2 | 6.5 |
| **Diversity Index** | 0.08 | 0.11 | 0.19 | 0.10 | 0.11 |
| **Macrobenthos** | | | | | |
| **Population (no x 10²/m²)** | 122 | 104 | 4028 | 2309 | 556 |
| **Total Group (No)** | 1 | 1 | 3 | 1 | 2 |
| **Major Groups** | Polychaete (100%) | Polychaete (100%) | Polychaete(96.6%) Bivalve(2.16%) Crabs(1.29%) | Polychaete (100%) | Polychaete (96.7%) Prawns (0.03%) |
| **Biomass (gm/m²)** | 0.15 | 0.55 | 123.61 | 43.96 | 12.29 |
| **Diversity Index** | 0.00 | 0.00 | 0.17 | 0.00 | 0.14 |
| **Microbiology** | | | | | |
| **Coliform(MPN/100 ml)** | >1600 | >1600 | >1600 | >1600 | >1600 |

**Table 5-18: Marine Water biological analysis of stations (MW6 to MW10) during February 2022**

| Parameter | MW 6 | MW 7 | MW8 | MW9 | MW10 |
|---|---|---|---|---|---|
| | S | S | S | S | S |
| **Phytoplankton** | | | | | |
| **Chlorophyll (mg/m³)** | 26.73 | 6.42 | 14.43 | 10.16 | 2.14 |
| **Pheophytin (mg/m³)** | 10.23 | 2.19 | 2.41 | 1.07 | 0.86 |
| **Population (nox10⁴/L)** | 175.2 | 64.8 | 111.2 | 168.8 | 33.6 |
| **Total Genera (No)** | 11 | 12 | 12 | 13 | 15 |
| **Major Genera** | *Leptocylindrus(50.7%) Thalassiosira(33.8%) Chaetoceros (11.0%) Cyclotella (1.4%)* | *Fragillaria(53.1%) eptocylindrus (12.3%) Skeletonema(8.6%) Nitzschia (8,6%)* | *Chaetoceros (43.9%) Leptocylindrus(23.0%) Thalassiosira (15.8%) Fragillaria 2.9%)* | *Leptocylindrus(30.3%) Chaetoceros (23.7%) Thalassiosira(12.8%) Nitzschia (10.9%)* | *Scenedesmus(35.7%) Leptocylindrus (33.3%) Thalassiosira(14.3%) Navicula2.4%)* |
| **Diversity Index** | 1.18 | 1.65 | 1.60 | 1.89 | 2.26 |
| **Zooplankton** | | | | | |
| **Population (no x 10³/100m³)** | 22 | 11 | 14 | 18 | 432 |

| Parameter | MW 6 | MW 7 | MW8 | MW9 | MW10 |
|---|---|---|---|---|---|
| | S | S | S | S | S |
| **Total Group (No)** | 6 | 6 | 9 | 9 | 5 |
| **Major Groups** | *Copepods(98.16%) Amphipods(1.76%) Medusae(0.03%_ Marine Insects (0..2%)* | Copepods (97.57%) Medusae(1.64%) Amphipods (0.655) Marine Insects(0.08%) | Copepods (95.95%) Medusae (2.16%) Amphipods(1.62%) Prawn Larvae(0.09%) | Copepods(90.83%) Medusae(8.91%) Acetes(0.01%) Lucifer(0.07%) | Copepods(98.46%) Decapod Larvae (0.58%) Polychaetes(0.39%) Marine Insects(0.39%) |
| **Biomass (ml/100m³)** | 1.3 | 2.1 | 3.7 | 3.0 | 33.3 |
| **Diversity Index** | 0.10 | 0.13 | 0.21 | 0.32 | 0.10 |
| **Macrobenthos** | | | | | |
| **Population (no x 10²/m²)** | 712 | 434 | 260 | 87 | 17 |
| **Total Group (No)** | 4 | 1 | 2 | 1 | 1 |
| **Major Groups** | Polychaete (36.5%) Amphipods (31.7%) Bivalve (26.8%) Sea anemone (4.87%) | Polychaete (100%) | Amphipod(`60%) Polychaete(40%) | Polychaete (100%) | Polychaete (100%) |
| **Biomass (gm/m²)** | 113.9 | 2.10 | 0.76 | 0.21 | 0.80 |
| **Diversity Index** | 1.23 | 0.0 | 0.67 | 0.0 | 0.0 |
| **Microbiology** | | | | | |
| **Coliform (MPN/100 ml)** | >1600 | >1600 | >1600 | >1600 | >1600 |

## 5.5.4 Inferences - Biological Parameters during February 2022

### 5.5.4.1 Phytoplankton

In February 2022, Chlorophyll ranged from 2.14 to 26.73 mg/m³ and pheophytin ranged 0.11 to 21.97 mg/m³; at surface water of all 10 stations. The **Figure 5.2** below shows graphical representation of phytopigments in different stations.

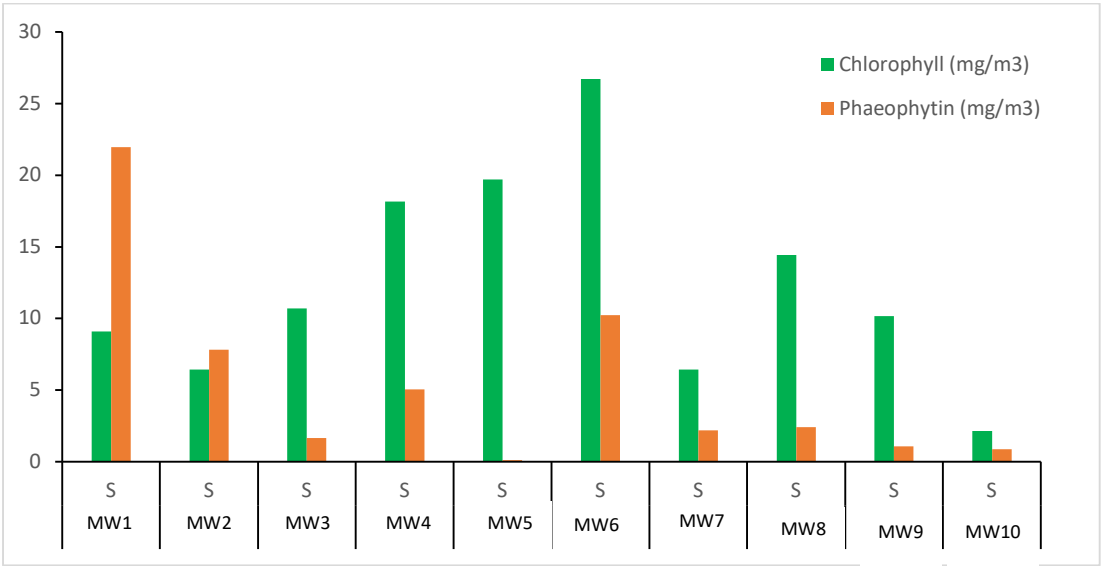



**Figure 5-2: Representation of phytopigments for February 2022**

Phytoplankton population density ranges from 33.6-301.2 x $10^3$/l at surface water of all 10 stations. Highest phytoplankton population at surface water of MW1 may be due to influx of domestic water from surrounding villages; total generic groups ranges from 9-16 nos. at surface water of all 10 stations. Maximum generic diversity 17 no. is observed at surface water of Station MW1 and MW2 respectively during February 2022 (Refer Table 5.17 and 5.18).

*Thalassiosira, Leptocylindrus, Chaetoceros* and *Navicula* are most common ones, followed by rest of observed genera like *Nitzschia, Pleurosigma, Cyclotella* and *Gyrosigma*. The other freshwater phytoplankton genera found are *Scenedesmus*, *Actinastrum, Pandorina, Anabaena, Oscillatoria and Pediastrum* in Gadhi River (MW1) and Ulwe River (MW10) respectively. Graphical representations of phytoplankton population and total genera is represented in **Figure 5.3**.

The graph below represents the population of phytoplankton is more at MW1; and less at station MW10, which represents there is discharge of sewage and domestic waste. The phytoplankton trend with respect to total number of genera is high at Station MW1 and lowest at MW5. Some of the major genera seen were photographed and shown in **Figure 5.4**.

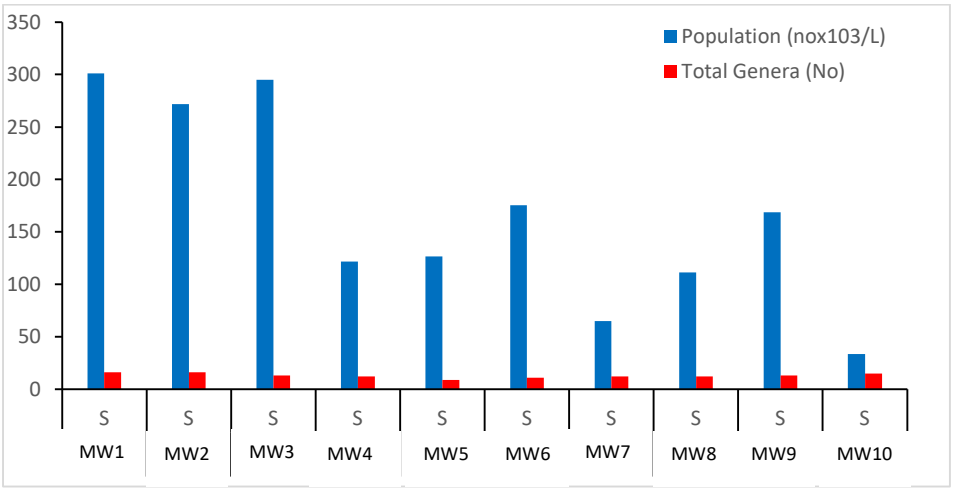
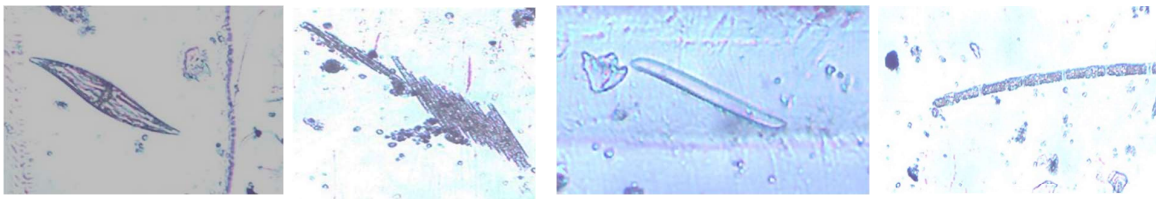



**Figure 5-3: Representation of phytoplankton population & Total genera for February 2022**



*Pleurosigma* *Fragillaria* *Gyrosigma* *Leptocylindrus*

**Figure 5-4: Phytoplankton found in samples for February 2022**

### 5.5.4.2 Zooplankton

In February 2022, the zooplankton biomass ranged from 0.2 to 1625 ml/100 $m^3$ with population density of 4 to 3253 x $10^3$/100 $m^3$ while having faunal group ranging from 5-9 nos. The zooplankton was noted with good population and group diversity. Copepods, Decapods and Medusa were common groups observed, **Figure 5.5** represents zooplankton standing stock graphically and **Figure 5.6** represents photos of peculiar zooplankton genera.

The graph below represents that average standing stock reported from all stations; MW8 shows lowest population as compared to MW1 with highest population; and MW7 shows lowest biomass and MW1 shows highest biomass, respectively.

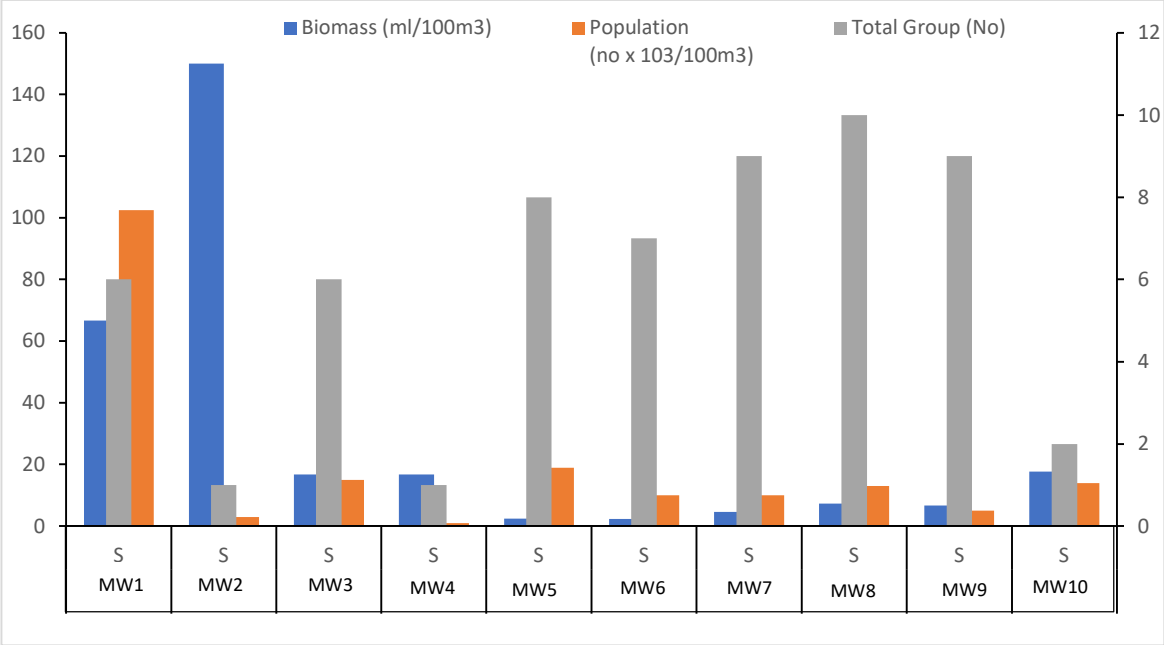



**Figure 5-5: Representation of Zooplankton Biomass, Population & Total group for February 2022**

Medusae Decapod Zoea

**Figure 5-6 Zooplankton found in samples for February 2022**

### 5.5.4.3 Macrofauna

In February 2022, macro-benthic biomass ranged from 0.15 to 123.61 gm/ $m^2$ with population ranging from 17 to 4028 (no x $10^2/m^2$). Total group ranges from 1 to 4. Low biomass noted at MW2 and high biomass at MW3. Low population were noted at MW10 and high population observed at MW3. The faunal group found were majorly Polychaete. The Figure 5.7 shows the % composition of benthic organisms for study period. Figure 5.8 shows peculiar organisms found.

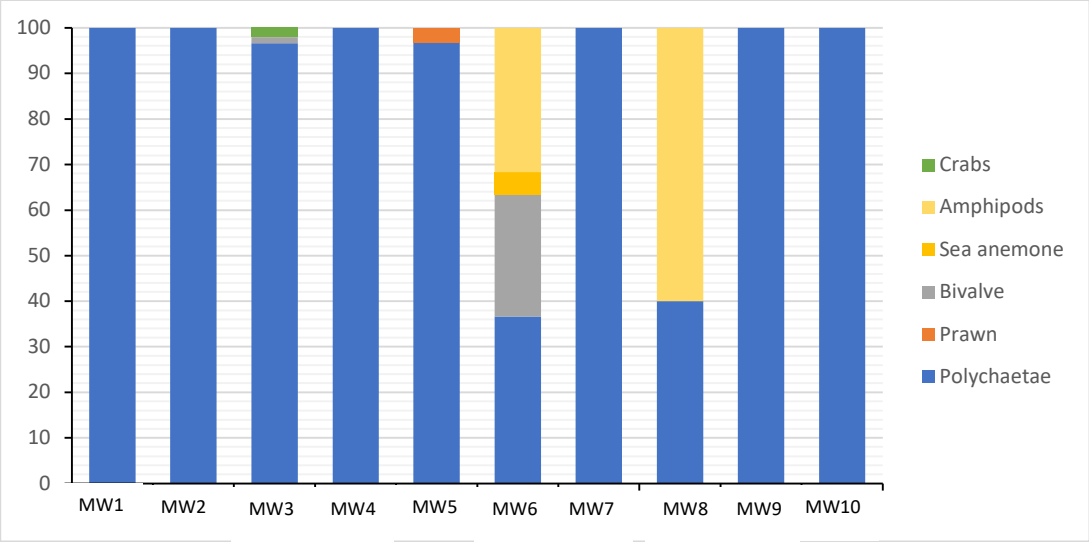



**Figure 5-7** % Composition of Benthic organisms for February 2022

**Figure 5-8 Benthic organism Found in samples for February 2022**

### 5.5.4.5 Microbiology

Coliform microbes were present at all stations in surface level. No specific trend was observed.

## 5.6 MARINE WATER QUALITY ANALYSIS REPORT DURING May 2022

Surface Marine water samples were collected for different Physiochemical and Biological parameters for 10 stations on 20th and 21st May 2022. Analysis part is mentioned in subsequent sections below.




**Figure 5-9 Collection of Marine Water samples during May 2022**

### 5.6.1 Analytical Data - Physicochemical Parameters during May 2022

**Table 5-19: Marine water physicochemical analysis at various stations during May 2022**

| Sr. No. | Parameter | MW 1 S | MW 2 S | MW 3 S | MW 4 S | MW 5 S | MW 6 S | MW 7 S | MW 8 S | MW9 S | MW 10 S | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **26.** | pH | 7.42 | 7.13 | 7.28 | 7.15 | 7.74 | 7.68 | 7.68 | 7.56 | 8.07 | 7.32 | -- |
| **27.** | Temperature | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 31 | 31 | 33 | **°C** |
| **28.** | Turbidity | 12.6 | 10.2 | 12.5 | 12.8 | 17.3 | 16.56 | 19.6 | 20.5 | 36.9 | 16.8 | **NTU** |
| **29.** | Conductivity | 3283 | 33500 | 26701 | 38560 | 43238 | 33522 | 37925 | 42746 | 48776 | 32600 | µS/Cm |
| **30.** | Salinity, | 1.47 | 18.7 | 19.7 | 27.1 | 30.2 | 27.6 | 28.2 | 33.2 | 32.8 | 16.3 | ppt |
| **31.** | Iron as Fe, | 0.26 | 0.22 | 0.022 | <0.02 | <0.02 | 0.023 | 0.28 | 0.42 | <0.02 | 0.20 | **mg/l** |
| **32.** | Magnesium as Mg | 98.4 | 412 | 778 | 978 | 1176 | 1181 | 1098 | 1103 | 1259 | 524 | **mg/l** |
| **33.** | Manganese as Mn | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | **mg/l** |
| **34.** | Fluoride | 0.36 | 0.72 | 1.14 | 1.0 | 1.06 | 1.16 | <0.2 | 1.2 | 1.0 | 0.34 | **mg/l** |
| **35.** | Sulphate | 68 | 426 | 328 | 878 | 334 | 1075 | 1152 | 1157 | 1190 | 214 | **mg/l** |
| **36.** | Phenolic compound | <2.4 | <2.4 | <2.4 | <2.4 | 2.12 | 5.93 | 2.64 | 2.05 | 18.4 | <2.4 | µg/l |
| **37.** | Alkalinity | 700 | 800 | 1200 | 840 | 1820 | 860 | 1840 | 1000 | 1840 | 800 | **mg/l** |
| **38.** | Hardness as CaCO3 | 1200 | 2600 | 4000 | 4200 | 5800 | 5800 | 5520 | 5480 | 6120 | 2800 | **mg/l** |
| **39.** | Zinc as Zn | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | **mg/l** |
| **40.** | Cadmium as Cd | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | **mg/l** |
| **41.** | BOD | 0.82 | 0.68 | 1.38 | 0.62 | 2.0 | 2.1 | 0.86 | 0.32 | 1.20 | 0.42 | **mg/l** |
| **42.** | Chloride | 840 | 10680 | 11260 | 15470 | 17195 | 15694 | 2200 | 18894 | 18694 | 9258 | **mg/l** |
| **43.** | DO | 1.2 | 1.2 | 1.85 | 0.88 | 3.42 | 0.80 | 2.1 | 0.42 | 3.3 | 0.92 | **mg/l** |
| **44.** | Total Nitrogen as N | 1.6 | 3.6 | 5.8 | 3.2 | 3.6 | 3.8 | 2.8 | 2.6 | 3.0 | 2.8 | µmol/l |
| **45.** | Phosphorus as P | 0.82 | 0.11 | 0.24 | 0.12 | 1.48 | 2.99 | 2.96 | 1.32 | 1.92 | 1.28 | µmol/l |
| **46.** | Sodium as Na | 60 | 78 | 100 | 84 | 80 | 90 | 90 | 100 | 100 | 100 | **mg/l** |
| **47.** | Potassium as K | 40 | 64 | 72 | 58 | 45 | 50 | 90 | 90 | 80 | 88 | **mg/l** |
| **48.** | Lead as Pb | <0.01 | <0.01 | <0.01 | <0.01 | 0.032 | 0.02 | <0.01 | 0.04 | 0.06 | 0.03 | **mg/l** |
| **49.** | Mercury as Hg | <0.001 | 0.004 | 0.006 | 0.004 | 0.002 | 0.004 | <0.001 | <0.001 | 0.002 | 0.002 | **mg/l** |
| **50.** | Chromium as Cr | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | **mg/l** |

### 5.6.2 Inference - Physicochemical Parameters during May 2022

The pH value ranged from 7.13 to 8.07 at surface, which shows basic nature of water. Salinity was found in increasing trend from MW1 to MW9. The salinity was observed low at station MW1 and MW10 due to influx of fresh water during collection Period of sampling.

Dissolved Oxygen level was observed low during collection of time due to seasonal variation. BOD value suggests the presence of organic matter in water body which comes as domestic sewage discharge from surrounding areas (villages, STPs of NMMC in Nerul) and effluents from CETP at MIDC Taloja.

The concentration of Magnesium was low and at MW1 and high at other stations and Iron were low (Refer Table 5.19).

### 5.6.3 Analytical Data - Biological Parameters during May 2022

Biological parameters viz. Phytoplankton, Zooplankton, Benthos and Microbiology were analyzed, and compiled data is presented below:

**Table 5-20: Marine Water biological analysis of stations (MW1 to MW5) during May 2022**

| Parameter | MW 1 | MW 2 | MW 3 | MW 4 | MW 5 |
|---|---|---|---|---|---|
| | S | S | S | S | S |
| **Phytoplankton** | | | | | |
| **Chlorophyll ($mg/m^3$)** | 4.28 | 14.97 | 13.37 | 4.28 | 12.83 |
| **Pheophytin ($mg/m^3$)** | 2.46 | 0.75 | 0.27 | 0.16 | 4.01 |
| **Population ($nox10^3/L$)** | 2302.4 | 277.2 | 147.8 | 547.2 | 205.6 |
| **Total Genera (No)** | 16 | 13 | 13 | 10 | 15 |
| **Major Genera** | *Thalassiosira (90.3%) Skeletonema (6.9%) Chaetoceros (1.0%) Leptocylindrus (0.4%)* | *Skeletonema(80.1%) Thalassiosira(13.9%) Leptocylindrus(2.3%) Chaetoceros(1.2%)* | *Thalassiosira(89.4%) Skeletonema(9.5%) Leptocylindrus(0.4%) Chaetoceros(0.2%)* | *Skeletonema(90.1%) Thalassiosira(6.1%) Chaetoceros (0.6%) Cyclotella(0.1%)* | *Skeletonema(97.3%) Thalassiosira(12.8%) Chaetoceros (2.3%) Leptocylindrus(1.2%)* |
| **Diversity Index** | 0.43 | 0.74 | 0.40 | 0.35 | 0.84 |
| **Zooplankton** | | | | | |
| **Population (no x $10^3/100m^3$)** | 102.5 | 3 | 15 | 1 | 19 |
| **Total Group (No)** | 6 | 1 | 6 | 1 | 8 |
| **Major Groups** | Copepods (89.4%) Gastropods (4.1%) Fish Larvae (2.4%) Polychaete (1.6%) | Copepods (100%) | Copepods (55.6%) Gastropods (11.1%) Lamellibranch (11.1%) Medusae (11.1%) | Gastropods (100%) | Copepods (97.3%) Medusae (2.5%) Foraminiferans (0.06%) Amphipods (0.04% |
| **Biomass ($ml/100m^3$)** | 66.7 | 150 | 16.7 | 16.7 | 2.5 |
| **Diversity Index** | 0.49 | 0.0 | 1.38 | 0.0 | 0.13 |
| **Macrobenthos** | | | | | |
| **Population (no x $10^2/m^2$)** | 3872 | 399 | 347 | 17 | 295 |
| **Total Group (No)** | 1 | 1 | 1 | 1 | 2 |
| **Major Groups** | Polychaete (100%) | Polychaete (100%) | Polychaete (100%) | Polychaete (100%) | Bivalve (82.4%) Polychaete(17.6%) |
| **Biomass ($gm/m^2$)** | 82.80 | 1.61 | 7.35 | 0.07 | 10.2 |
| **Diversity Index** | 0.0 | 0.0 | 0.0 | 0.0 | 0.47 |
| **Microbiology** | | | | | |
| **Coliform (MPN/100 ml)** | >1600 | >1600 | >1600 | >1600 | >1600 |

**Table 5-21: Marine Water biological analysis of stations (MW6 to MW10) during May 2022**

| Parameter | MW 6 | MW 7 | MW 8 | MW 9 | MW 10 |
|---|---|---|---|---|---|
| | S | S | S | S | S |
| **Phytoplankton** | | | | | |
| **Chlorophyll ($mg/m^3$)** | 8.55 | 12.83 | 8.02 | 3.74 | 6.42 |
| **Pheophytin ($mg/m^3$)** | 3.80 | 2.89 | 3.96 | 3.37 | 0.32 |
| **Population ($nox10^3/L$)** | 240.0 | 349.6 | 293.6 | 559.2 | 20.8 |
| **Total Genera (No)** | 13 | 12 | 10 | 15 | 13 |
| **Major Genera** | *Skeletonema (77.6%) Thalassiosira (16.3%) Cyclotella (2.0%) Navicula (0.7%)* | *Skeletonema (92.2%) Thalassiosira (4.1%) Chaetoceros (1.1%) Leptocylindrus (0.7%)* | *Skeletonema(91.3%) Thalassiosira(6.0%) Pleurosigma(0.5%) Biddulphia (0.5%)* | *Skeletonema(93.7%) Thalassiosira(3.9%) Cyclotella (0.4%) Pleurosigma (0.5%)* | *Thalassiosira(30.8%) Oscillatoria (15.4%) Bacteriastrum (11.5%) Nitzschia (7.7%)* |

| Parameter | MW 6 | MW 7 | MW 8 | MW 9 | MW 10 |
|---|---|---|---|---|---|
| | S | S | S | S | S |
| **Diversity Index** | 0.79 | 0.40 | 0.41 | 0.34 | 2.13 |
| **Zooplankton** | | | | | |
| **Population (no x $0^3$/100$m^3$)** | 10 | 10 | 13 | 5 | 14 |
| **Total Group (No)** | 7 | 9 | 10 | 9 | 2 |
| **Major Groups** | Copepods (85.5%) Medusae (13.3%) Gastropods (0.43%) ecapods larvae (0.21%) | Ctenophora (83.4%) Medusae (14.8%) Decapods (0.9%) Gastropods (0.5%) | Copepods (74.7%) Medusae (17.8%) Decapods (6.4%) Gastropods (0.5%) | Copepods (71.8%) Medusae (21.4%) Decapods (5.5%) Gastropods (0.5%) | Copepods Fish Eggs |
| **Biomass (ml/100$m^3$)** | 2.4 | 4.6 | 7.3 | 6.7 | 17.7 |
| **Diversity Index** | 0.45 | 0.53 | 0.76 | 0.80 | 0.47 |
| **Macrobenthos** | | | | | |
| **Population (no x $10^2$/$m^2$)** | 590 | 156 | 530 | 382 | 17 |
| **Total Group (No)** | 3 | 3 | 1 | 2 | 1 |
| **Major Groups** | Bivalve (61.8%) Polychaete (32.4%) Sea anemone (5.9%) | Polychaete (77.8%) Sea anemone (11.1%) Bivalve (11.1%) | Polychaete (100%) | Polychaete (90.9%) Prawn (9.1%) | Polychaete (100%) |
| **Biomass (gm/$m^2$)** | 27.45 | 45 | 0.74 | 1 | 0.74 |
| **Diversity Index** | 0.83 | 0.68 | 0.00 | 0.30 | 0.0 |
| **Microbiology** | | | | | |
| **Coliform (MPN/100 ml)** | >1600 | >1600 | >1600 | >1600 | >1600 |

## 5.6.4 Inferences - Biological Parameters during May 2022

### 5.6.4.1 Phytoplankton

In May 2022, Chlorophyll ranged from 3.74 to 14.97 mg/$m^3$ and pheophytin ranged 0.16 to 4.01 mg/$m^3$ at surface water of all 10 stations. The **Figure 5.10** below shows graphical representation of phytopigments at different stations.

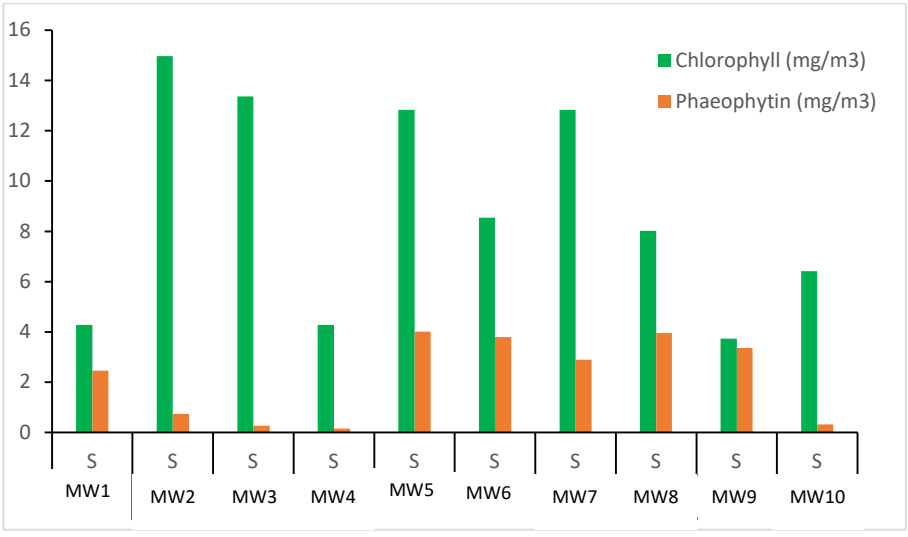



**Figure 5-10: Representation of phytopigments for May 2022**

The phytoplankton population ranged from 20.8 to 2302.2 (no x $10^3$/l) with highest population noted at Station MW1 and Lowest at Station MW10. Total generic groups range from 10-16

nos. at surface water of all 10 stations. Maximum generic diversity 16 no. is observed at surface water of Station MW1during May 2022 (Refer Table 5.20 and 5.21).

*Leptocylindrus, Thalassiosira, Skeletonema and Chaetoceros* are most common ones, followed by rest of observed genera like *Navicula, Pleurosigma*, *and Cyclotella*. The other freshwater phytoplankton genera found are *Scenedesmus*, *Agmenellum, Oscillatoria, Cosmarium and Pediastrum* in Gadhi River (MW1) and Ulwe River (MW10) respectively. *Pleurosigma*, *Navicula and Thalassiosira* are common Genera noted in all stations. Graphical representations of phytoplankton population and total genera is represented in **Figure 5.11**.

The graph below represents the population of phytoplankton is more at MW1; and less at station W 10, probably due discharge of sewage and domestic waste. The phytoplankton trend with respect to total number of genera is high at Station MW1 and low at station MW7 respectively. Some of the major genera seen were photographed and shown in **Figure 5.11**.

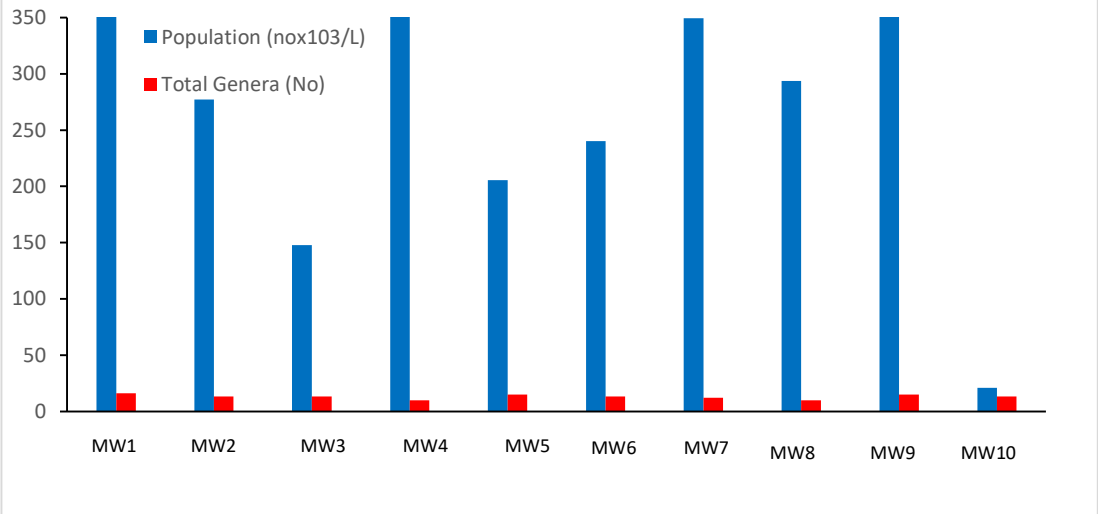
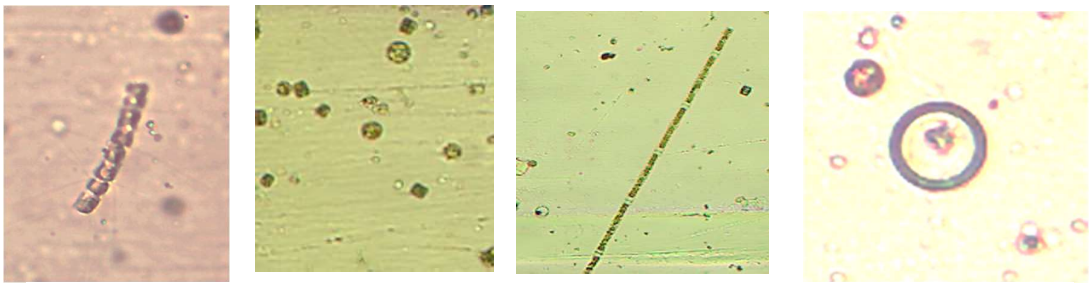



**Figure 5-11: Representation of phytoplankton population & Total genera for May 2022**



*Chaetoceros* *Thalassiosira* *Leptocylindrus* *Cyclotella*

**Figure 5-12: Phytoplankton found in samples for June 2022**

### 5.6.4.2 Zooplankton

In May 2022, the zooplankton biomass ranged from 2.4 to 150 ml/100 $m^3$ with population density of 1 to 102.5 no x $10^3$/100$m^3$ while having faunal group ranging from 1-10 nos. The zooplankton was noted with good population and group diversity. Copepods, Gastropods, Polychaetes & Medusae were common groups observed, **Figure 5.13** represents zooplankton standing stock graphically and **Figure 5.14** represents photos of peculiar zooplankton found in marine water body.

The graph below represents that average standing stock reported from all stations; Station 7 and 9 shows lowest population as compared to Station 10 with highest population; and Station 7 and 8 shows lowest biomass and Station 2 shows highest biomass, respectively.

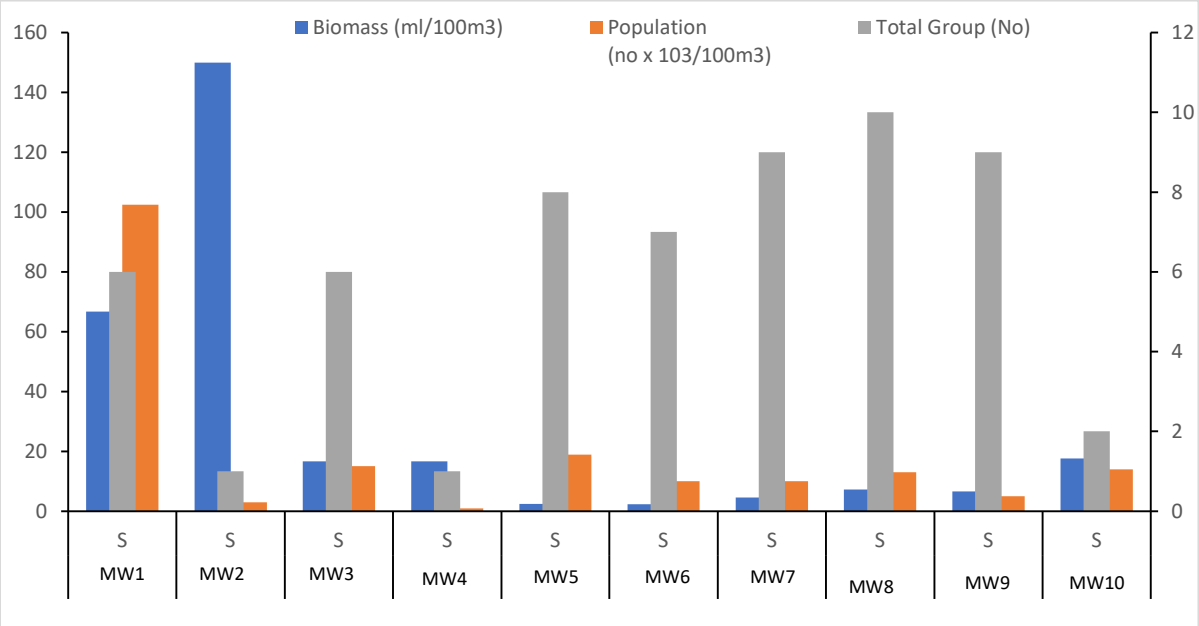



**Figure 5-13: Representations of Zooplankton Biomass, Population & Total group for May 2022**


**Figure 5-14: Zooplankton found in samples for May 2022**

### 5.6.4.3 Macrofauna

In May 2022, macro-benthic biomass ranged from 0.07to 82.8 gm/ $m^2$ with population ranging from 17 to 3872 (no x $10^2$/$m^2$). Total group ranges from 1 to 3. Lowest biomass was

noted at MW4 and high biomass at MW1. Similarly lowest population were noted at MW4, and high population observed at MW1. The faunal group found were majorly Polychaetes. The % composition and peculiar Benthic organism is shown in Figure 5.15 and 5.16 respectively.

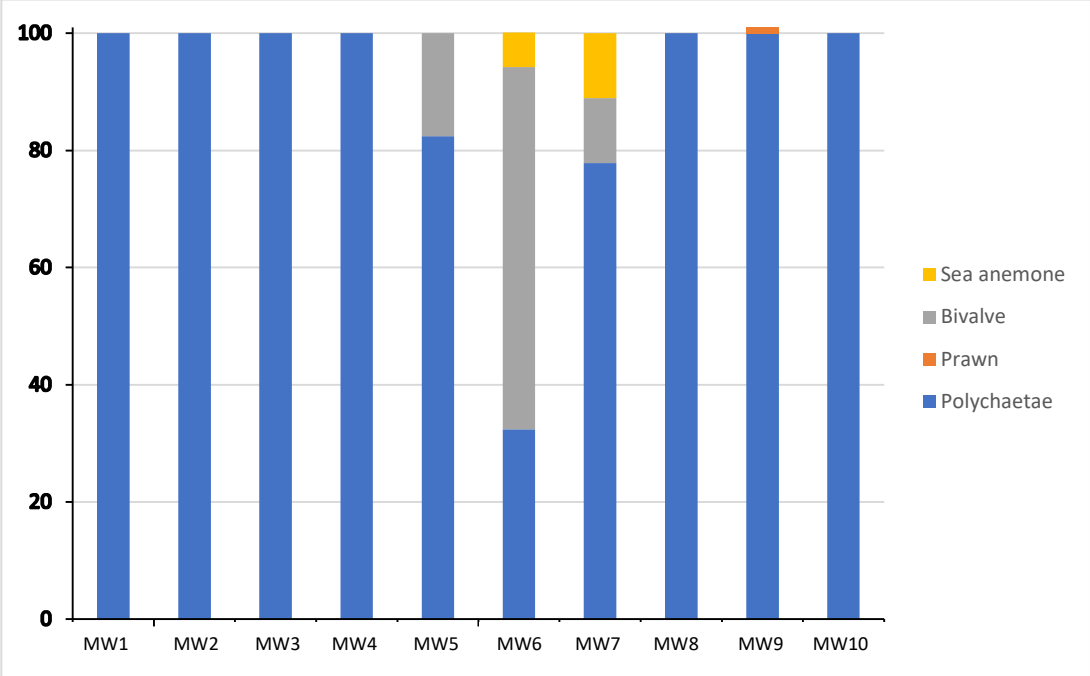



**Figure 5-15: % composition of Benthic organisms for May 2022**

Polychaete

**Figure 5-16: Benthic organism found in samples for May 2022**

### 5.6.4.5 Microbiology

Coliform microbes were present at all stations in surface level. No specific trend was observed.

## 6. CONCLUSIONS & RECOMMENDATIONS

Based on the study of activities planned during pre-development works and on the basis of the environmental baseline monitoring results, certain issues are identified, and steps taken to mitigate the environmental impacts. These mitigation measures need to be under constant watch through continuous vigilance, auditing and monitoring of air quality:

### 6.1 Ambient Air Quality

### 6.1.1 Observations

As can be seen from analysis data, **Table 5.1 to 5.6**, the ambient air monitoring results are within NAAQS limit during sampling period of January to June 2022.

### 6.1.2 NMIA Pre – development/Construction Phase Activities and impacts on Air Quality:

Construction activities at NMIA during pre-development works which contribute to pollution of ambient air include:

- demolition of hill and excavation of large quantity of material like murum and rock which is being utilized within site and balance taken to fill up nearby areas.
- Controlled blasting to demolish the hill
- Rehabilitation and re-settlement of nearly 3000 households in 7 villages within NMIA site is in progress and about 96% works is completed. This activity results in generation of traffic
- Demolition of structures vacated results in dust emissions
- Plying of trucks, dumpers, ripper dozer, excavators etc. for handling of materials
- Operation of DG sets used for site offices

The air gets polluted by activities like excavation, land filling, controlled blasting, construction, material handling and transportation during construction phase due to traffic and high dust levels.

Currently, the site is levelled to + 5.5m AMSL. The hillock on the site is only partially cleared. Most of the villagers have been rehabilitated but about 89 PAP structures yet exist in Ganeshpuri village. The land for the project will be developed further by demolishing the hillock and raising the level to + 8.5m AMSL. This activity is expected to take place further for one more year, before actual construction work will start for the project. Thus, impacts during the construction phase will be similar to the ones seen above.

### 6.1.3 Mitigation Measures Taken and Proposed:

Contractors to be engaged by NMIAL have to take up following mitigation measures to ensure minimal impacts on ambient air quality:

- Use temporary screens of tin or fabric to create barriers against dust.
- Provision of water sprinkling at the construction site and along roads for dust suppression.
- Wheel wash system on roads leading out of site to ensure that truck tyres do not spew out dust.
- Cover Trucks carrying earth, sand or stone with tarpaulin to avoid spillage. Avoid overloading of such trucks.
- Provide workers working in high dust areas and on earth moving machineries with face masks/goggles for their protection.
- Use high tech equipment for controlled (delayed) blasting with proper blast pattern along with cover on rock surface being excavated which will generate minimal noise as well as dust.
- The blasting is being undertaken under guidance of Indian Institute of Technology (IIT) previously known as Indian School of Mines, Dhanbad) and M/s Deeptec who guide regarding appropriate operation control, blast design, quantity of explosives, blasting pattern, watering of blasting area etc.
- Maintain construction machinery and equipment in good working condition with PUC Certification for all transport vehicles used. Vehicles & construction equipment which do not meet vehicular pollution standards are not allowed within construction site.

  It is proposed to reinforce the same through continuous vigilance, auditing and monitoring of air quality.

## 6.2 Ambient Noise:

### 6.2.1 Observations from Data:

Ambient Noise levels exceed the limits prescribed under Schedule II of Environmental Protection Act 1986 for various locations including Kille Gaothan Guest House, Panchsheel Guest House and Bhangarpada due to heavy vehicular movement during sampling period of January to June 2022. (Refer Table 5.7).

### 6.2.2 NMIA Pre- Development/Construction Phase Activities and impacts on Ambient Noise Levels:

Construction activities at NMIA during pre-development works which contribute to ambient noise include:

- demolition of hill and excavation of large quantity of material like murum and rock which is being utilized within site and balance taken to fill up nearby areas.
- Controlled blasting to demolish the hill

- Rehabilitation and re-settlement of nearly 3000 households in 7 villages within NMIA site is in progress and about 96 % works is completed. This activity results in generation of traffic
- Demolition of structures vacated results in noise generation
- Plying of trucks, dumpers, ripper dozer, excavators, wheel loaders etc. for handling and re-handling of excavated material handling of materials
- Operation of DG sets used for site offices

Currently, the site is levelled to + 5.5m AMSL. The hillock on the site is only partially cleared. Most of the villagers have been rehabilitated but about 89 PAP structures yet exist in Ganeshpuri village. The land for the project will be developed further by demolishing the hillock and raising the level to + 8.5m AMSL. This activity is expected to take place further for one more year, before actual construction work will start for the project. Thus, impacts on noise levels during the construction phase will be similar to the ones seen above.

### 6.2.3 Mitigation Measures Proposed:

Contractors engaged by NMIAL will take up following mitigation measures to ensure minimal impacts on ambient noise levels:

- Use of temporary screens of tin to create barriers against noise propagation in active construction areas.
- Workers working in high noise areas and on earth moving machineries are provided with earmuffs/ear plugs for their protection
- Trucks and construction machinery used on site to be well maintained to ensure low noise generation. Norms of Noise levels for Construction machinery as specified under EP Act should be strictly followed.
- High tech equipments are used for controlled (delayed) blasting with proper blast pattern along with cover on rock surface being excavated which will generate minimal noise.
- The blasting is being undertaken under guidance of Indian Institute of Technology (IIT) previously known as Indian School of Mines, Dhanbad) and M/s Deeptec who guide regarding appropriate operation control, blast design, quantity of explosives, blasting pattern, watering of blasting area, prevention of fly rock etc.
- construction activities are not carried out in nighttime
- construction machineries and DG sets used are provided with silencers
- DG sets used should conform to EP Act norms for air pollution and noise
- Before controlled blasting the nearby populace is informed, so that they can go to a safe place away from the project site

## 6.3 Soil

### 6.3.1 Observations from Data:

Land use at NMIA site prior to pre-development works included agriculture, vacant land and inter- tidal area (partially under mangrove cover). Soil is fertile and can support vegetation on the basis of studies during January and June 2022 (Refer Table 5.8 and 5.9).

### 6.3.2 NMIA Pre – Development Activities and impacts anticipated on soil:

Construction activities at NMIA during pre-development works include:

- demolition of hill which will generate of material like murum and rock which will be utilized within site and balance will be taken to fill up nearby areas
- Site level is currently low and will be being increased to + 8.5 m AMSL by using excavated material.

The soil will get affected by above activities.

### 6.3.3 Mitigation measure proposed:

Contractors engaged by NMIAL for pre-development works have been asked to take up following mitigation measures to ensure minimal impacts on land environment:

- removal of existing topsoil within site by excavating and storing the same for future use.
- Such excavated soil should be stored separately and used as final top layer after landfilling is completed-particularly in areas of proposed green belt development

## 6.4 Ground Water:

### 6.4.1 Observations from Data:

On the basis of studies ground water quality was poor and fails to meet IS 10500:2012 norms at number of locations. In the villages near site, Ground water table is high and mostly open dug wells are seen in rural areas (Refer Table 5.10 to 5.15).

### 6.4.2 NMIA Pre – Development/Construction Phase Activities & likely impacts on Ground Water Quality:

Construction activities at NMIA during pre-development works include:

- demolition of hill which will generate of material like murum and rock which will be utilized within site and balance will be taken to fill up nearby areas
- Site level is currently low and will be increased to +8.5m AMSL by using excavated material.

The ground water quality will get affected by above activities.

### 6.4.3 Mitigation Measures for Rehabilitated Settlements:

NMIAL needs to make adequate and clean piped water supply available for people to be accommodated in Rehabilitated settlements.

## 6.5 Marine Water:

### 6.5.1 Observations from Data:

On the basis of studies marine water quality was moderate, may be due to hindrances.

### 6.5.2 NMIA Pre- Development/Construction Phase Activities and likely impacts on Marine Water Quality:

Construction activities at NMIA during pre-development works include:

- demolition of hill which will generate of material like murum and rock which will be utilized within site and balance will be taken to fill up nearby areas.
- Site is currently levelled by CIDCO to + 5.5m AMSL and level will be increased to +8.5m AMSL by using excavated material.
- The area of the site is adjacent to Panvel creek which shows saline influence. Hence, utmost care has to be taken to ensure that marine water quality is not affected due to land development and construction activities at airport site

### 6.5.3 Mitigation Measures for protection of Marine Water Quality:

Mitigation measures proposed by NMIA during land development/construction phase are as follows:

- landfilling in areas inundated during high tide, should be done taking care that there is no disposal of debris in inter tidal area, nor any water way is obstructed
- for excavated areas and freshly filled up areas, proper garland drains leading to settlement basins followed by filter bunds are provided so that rainwater does not carryover the loose excavated material into marine areas.
- polyelectrolytes are used to help settle loose suspended material in the settlement basins.

# Annexure-III

## Consent to Establish (CTE) granted to NMIA by MPCB dated June 15, 2022.

## for

## Phase I & II (20 MPPA & Cargo Capacity 0.57 MTPA)

# MAHARASHTRA POLLUTION CONTROL BOARD

**Tel: 24010706/24010437**
**Fax: 24023516**
**Website: http://mpcb.gov.in**
**Email: cac-cell@mpcb.gov.in**

**Kalpataru Point, 2nd and 4th floor, Opp. Cine Planet Cinema, Near Sion Circle, Sion (E), Mumbai-400022**

**RED/L.S.I (R23)**
**No:- Format1.0/CAC/UAN No.MPCB-CONSENT-0000128221/CE/2206000673**

**Date: 15/06/2022**

**To,**
**Navi Mumbai International Airport Pvt. Ltd., Villages Vadghar (Chinchpada), Kopar, Pargaon (Kohli), Pargaon-Dungi, Owale (Upper and Lower Owale + Waghivali Wada), Ulwe (Ulwe + Ganeshpuri), Targhar (Targhar + Kombadbhuje), Waghivali-Khar, Tal. Panvel, Dist. Raigad.**

Your Service is Our Duty

**Sub: Grant consent to establish for revised construction built up area, under RED category.**

**Ref:**
1. Previous Environment & CRZ Clearance accorded vide dated 22.11.2010.
2. Previous Consent to Establish granted by Board vide dated 05.10.2021.
3. Revalidation of Environment & CRZ Clearance accorded vide dated 20.12.2017 which is transferred vide dated 17.08.2020.
4. Revalidation of Environment & CRZ Clearance accorded vide 28.11.2021
5. Minutes of 3rd CAC meeting held on 24.05.2022.

Your application No.MPCB-CONSENT-0000128221 Dated 23.12.2021

For: grant of Consent to Establish under Section 25 of the Water (Prevention & Control of Pollution) Act, 1974 & under Section 21 of the Air (Prevention & Control of Pollution) Act, 1981 and Authorization under Rule 6 of the Hazardous & Other Wastes (Management & Transboundary Movement) Rules 2016 is considered and the consent is hereby granted subject to the following terms and conditions and as detailed in the schedule I, II, III & IV annexed to this order:

1. **The consent to establish is granted for a period up to 05/10/2026**
2. **The capital investment of the project is Rs.19647 Crs. (As per undertaking submitted by pp Existing - 16250 + Expansion - 3397. Total CI - 19647)**
3. Construction of Airport of Phase-I & II with passenger capacity of 20 MPPA and cargo capacity of 0.57 MTPA., on total plot area of 1,16,00,000 Sq. Mtr., i.e. 1160 Ha & Construction BUA 6,27,335.678 Sq. mtr., for land development of Terminal Building, Terminal Hotel, Reserved housing & Apartments for staff of AAI, CISF Barracks, Control Tower ATC Building, South runway (3.7 Kms), Air Cargo Building, access roads, associated apron, taxi way, parking area, MLCP, Fuel Farm, area. Drainage system, Airport maintenance hangers, Compound wall, Security fence & Utilities such as power supply, water supply & sanitation STP, Solid waste management facility.

4. **Conditions under Water (P&CP), 1974 Act for discharge of effluent:**

| Sr No | Description | Permitted (in CMD) | Standards to | Disposal Path |
|---|---|---|---|---|
| **1.** | Trade effluent | 400 | As per Schedule-I | The overflow of ETP outlet will be further treated in STP |
| **2.** | Domestic effluent | 4210 | As per Schedule-I | 60% Recycle for secondary purposes & remaining on land for gardening |

5. **Conditions under Air (P& CP) Act, 1981 for air emissions:**

| Sr No. | Stack No. | Description of stack / source | Number of Stack | Standards to be achieved |
|---|---|---|---|---|
| 1 | S-1 to S-2 | DG Set (14 x 880 KVA)-12,320 KVA | 2 | As per Schedule -II |

6. **Non-Hazardous Wastes:**

| Sr No | Type of Waste | Quantity | UoM | Treatment | Disposal |
|---|---|---|---|---|---|
| 1 | Food Waste & Garbage from Terminal & PTB | 7.671 | Ton/D | Bio-gas plant for Bio-gas generation followed by composting facility | The waste generated from Biogas will be used as manure |
| 2 | Waste from Flight Catering Facilities | 2.192 | Ton/D | Bio-gas plant for Bio-gas generation followed by composting facility | The waste generated from Biogas will be used as manure |
| 3 | Cargo Handling Waste | 5.000 | Ton/D | Segregation | Sale to authorized vendor for further treatment & disposal |
| 4 | Waste from Aircraft Maintenance | 3.557 | Ton/D | Segregation | Sale to authorized vendor for further treatment & disposal |
| 5 | Waste from GSE Workshop | 0.356 | Ton/D | Segregation | Sale to authorized vendor for further treatment & disposal |
| 6 | STP Sludge | 3.335 | Ton/D | Drying | Used as manure for gardening |
| 7 | Other Solid Waste | 5.750 | Ton/D | Segregation | Sale to authorized vendor for further treatment & disposal |

7. **Conditions under Hazardous & Other Wastes (M & T M) Rules 2016 for treatment and disposal of hazardous waste:**

| Sr No | Category No./ Type | Quantity | UoM | Treatment | Disposal |
|---|---|---|---|---|---|
| 1 | 5.1 Used or spent oil | 10 | Ton/Y | Recycle | Sale to authorised party |
| 2 | 3.3 Sludge and filters contaminated with oil | 2 | Ton/Y | Incineration | CHWTSDF |
| 3 | 5.2 Wastes or residues containing oil | 310 | Ton/D | Incineration | CHWTSDF |
| 4 | 21.1 Process wastes, residues and sludges | 47 | Ton/Y | Recycle | CHWTSDF |
| 5 | 33.1 Empty barrels /containers /liners contaminated with hazardous chemicals /wastes | 5 | Ton/Y | Recycle | CHWTSDF |

8. **Conditions under Batteries (Management & Handling) Rules, 2001:**

| Sr No | Type of Waste | Quantity | UoM | Disposal Path |
|---|---|---|---|---|
| 1 | Battery Waste | 10.00 | Ton/Y | Authorized Re-processer. |

**Specific Conditions for used Batteries:**

i. The applicant shall ensure that used batteries are not disposed of in any manner other than by depositing with the authorized dealer/ manufacturer/ registered recycler/ importer/ re-conditioner or at the designated collection center.

ii. The applicant shall file half-yearly return in Form VIII to the M.P.C. Board.

iii. Bulk consumers to their user units may auction used batteries to registered recyclers only.

9. **Conditions under E-Waste Management:**

| Sr No | Type of Waste | Quantity | UoM | Disposal Path |
|---|---|---|---|---|
| 1 | E-waste | 25.00 | Ton/Y | Authorized Re-processer. |

10. **Treatment and Disposal of Biomedical Waste generated to CBMWTSDF:**

| Sr.No | Category | Type of Waste | Quantity not to exceed (Kg/M) | Segregation Color coding | Treatment & Disposal |
|---|---|---|---|---|---|
| 1 | Yellow | a) Soiled Waste | 500.00 | Yellow colored non-chlorinated plastic bags or containers | CBMWTSDF |

11. The Board reserves the right to review, amend, suspend, revoke this consent and the same shall be binding on the industry.

12. This consent should not be construed as exemption from obtaining necessary NOC/ permission from any other Government authorities.

13. PP shall comply with the conditions stipulated in EC/CRZ clearance & consent.

14. PP shall provided STP of adequate capacity to achieve the consented parameter BOD - 10 mg/l.

15. PP shall provide separate treatment facility for the treatment of wastewater generated from the aircraft maintenance hangers including for the contaminated surface runoff from the airport area containing oils, grease, etc.
16. The treated effluent shall be 60% recycled for secondary purposes such as toilet flushing, air conditioning, cooling tower makeup, firefighting, etc., and remaining shall be utilized on land for gardening with water metering system.
17. PP shall provide organic waste digester followed by composting facility/bio-digester followed by composting facility for the treatment of biodegradable waste.
18. PP shall carryout carbon audit & submit the report.
19. PP shall submit the plan for plastic recycling before 1st Operate.
20. PP shall submit the management plan towards the disposal of cargo waste disposal.
21. PP shall submit the plan/commitment towards adoption of E-Vehicle policy.
22. PP shall submit BG of Rs. 25.0 Lakh towards compliance of EC & consent conditions.
23. PP shall comply with revalidation of Environment Clearance conditions obtained on 28.11.2021
24. This consent is issued with the overriding effect to earlier consider isssued vide No.:-Format1.0/CAC/UAN No.0000100222/CE-2110000162 dated 05.10.2021
25. This consent is issued pursuant to the decision of the 3rd Consent Appraisal Committee Meeting held on 24.05.2022.
26. The applicant shall obtain Consent to Operate from Maharashtra Pollution Control Board before actual commencement of the Unit/Activity.

**Received Consent fee of -**

| Sr.No | Amount(Rs.) | Transaction/DR.No. | Date | Transaction Type |
|---|---|---|---|---|
| 1 | 6794000.00 | MPCB-DR-9776 | 13/01/2022 | RTGS |

**Copy to:**

1. Regional Officer, MPCB, Raigad and Sub-Regional Officer, MPCB, Raigad I

- They are directed to ensure the compliance of the consent conditions.

2. Chief Accounts Officer, MPCB,Sion, Mumbai
3. CAC Desk - for record & updation purposes.

## SCHEDULE-I

**Terms & conditions for compliance of Water Pollution Control:**

1. A] As per your application, you have proposed to provide ETP comprising primary treatment of capacity 400 CMD to treat the effluent generated to the tune of 400 CMD. This primary treated effluent further treated in STP of combine capacity 5500 CMD.

   B] The Applicant shall operate the effluent treatment plant (ETP) to treat the trade effluent so as to achieve the following standards prescribed by the Board or under EP Act, 1986 and Rules made there under from time to time, whichever is stringent:

| Sr.No | Parameters | Limiting concentration not to exceed in mg/l, except for pH |
|---|---|---|
| (1) | pH | 6.0 -8.5 |
| (2) | BOD (3 days 27°C) | 10 |
| (3) | COD | 50 |
| (4) | TSS | 20 |
| (5) | Oil & Grease | 10 |
| (6) | TDS | 2100 |
| (7) | Chloride | 600 |
| (8) | Sulphate | 1000 |

   C] The treated effluent shall be 60% recycled for secondary purposes such as toilet flushing, air conditioning, cooling tower makeup, firefighting, etc., and remaining shall be discharged on land for gardening within premise after confirming above standards. In no case, effluent shall find its way outside premises.

2. A] As per your application, you have proposed to provide 2 Nos of Sewage Treatment Plants of designed capacity 4500 CMD & 1000 CMD with SBR technology for the treatment of 4210 CMD of sewage.

   B] Industry shall comply prescribed standards & disposal path as prescribed at Sr. No. 1 B & C of schedule I.

3. The Board reserves its rights to review plans, specifications or other data relating to plant setup for the treatment of waterworks for the purification there of & the system for the disposal of sewage or trade effluent or in connection with the grant of any consent conditions. The Applicant shall obtain prior consent of the Board to take steps to establish the unit or establish any treatment and disposal system or an extension or addition thereto.

4. The industry shall ensure replacement of pollution control system or its parts after expiry of its expected life as defined by manufacturer so as to ensure the compliance of standards and safety of the operation thereof.
5. The Applicant shall comply with the provisions of the Water (Prevention & Control of Pollution) Act, 1974 and as amended, by installing water meters and other provisions as contained in the said act:

| Sr. No. | Purpose for water consumed | Water consumption quantity (CMD) |
|---|---|---|
| 1. | Industrial Cooling, spraying in mine pits or boiler feed | 1972.00 |
| 2. | Domestic purpose | 4880.00 |
| 3. | Processing whereby water gets polluted & pollutants are easily biodegradable | 430.00 |
| 4. | Processing whereby water gets polluted & pollutants are not easily biodegradable and are toxic | 0.00 |
| 5. | Gardening | 0 |

6. The Applicant shall provide Specific Water Pollution control system as per the conditions of EP Act, 1986 and rule made there under from time to time/ Environmental Clearance/ CREP guidelines.

## SCHEDULE-II

**Terms & conditions for compliance of Air Pollution Control:**

1. As per your application, you have proposed to provide the Air pollution control (APC) system and also to erect following stack (s) to observe the following fuel pattern:

| Stack No. | Source | APC System provided/proposed | Stack Height(in mtr) | Type of Fuel | Sulphur Content(in %) | Pollutant | Standard |
|---|---|---|---|---|---|---|---|
| S-1 to S-2 | DG Set (14 x 880 KVA) | Stack | 6.00 | HSD 135 Kg/Hr | 1.0 | SO2 | 64.8 Kg/Day |

2. The Applicant shall provide Specific Air Pollution control equipments as per the conditions of EP Act, 1986 and rule made there under from time to time/ Environmental Clearance / CREP guidelines.
3. The Applicant shall obtain necessary prior permission for providing additional control equipment with necessary specifications and operation thereof or alteration or replacement/alteration well before its life come to an end or erection of new pollution control equipment.
4. The Board reserves its rights to vary all or any of the condition in the consent, if due to any technological improvement or otherwise such variation (including the change of any control equipment, other in whole or in part is necessary).

## SCHEDULE-III

**Details of Bank Guarantees:**

| Sr. No. | Consent (C2E/ C2O /C2R) | Amt of BG Imposed | Submission Period | Purpose of BG | Compliance Period | Validity Date |
|---|---|---|---|---|---|---|
| 1 | C2E | Rs. 25.0 Lakh | 15 days/To be extended | Towards compliance of EC & consent conditions | 31.05.2026 | 30.11.2026 |

**The above Bank Guarantee(s) shall be submitted by the applicant in favour of Regional Officer at the respective Regional Office within 15 days from the date of issue of Consent.**

**BG Forfeiture History**

| Srno. | Consent (C2E/C2O/C2R) | Amount of BG imposed | Submission Period | Purpose of BG | Amount of BG Forfeiture | Reason of BG Forfeiture |
|---|---|---|---|---|---|---|
| NA | | | | | | |

**BG Return details**

| Srno. | Consent (C2E/C2O/C2R) | BG imposed | Purpose of BG | Amount of BG Returned |
|---|---|---|---|---|
| NA | | | | |

## SCHEDULE-IV

**General Conditions:**

1. Consumers or bulk consumers of electrical and electronic equipment listed in Schedule I shall ensure that e-waste generated by them is channelised through collection centre or dealer of authorised producer or dismantler or recycler or through the designated take back service provider of the producer to authorised dismantler or recycler
2. Bulk consumers of electrical and electronic equipment listed in Schedule I shall maintain records of e-waste generated by them in Form-2 and make such records available for scrutiny by the concerned State Pollution Control Board
3. Consumers or bulk consumers of electrical and electronic equipment listed in Schedule I shall ensure that such end-of-life electrical and electronic equipment are not admixed with e-waste containing radioactive material as covered under the provisions of the Atomic Energy Act, 1962 (33 of 1962) and rules made there under;
4. Bulk consumers of electrical and electronic equipment listed in Schedule I shall file annual returns in Form-3, to the concerned State Pollution Control Board on or before the 30th day of June following the financial year to which that return relates. In case of the bulk consumer with multiple offices in a State, one annual return combining information from all the offices shall be filed to the concerned State Pollution Control Board on or before the 30th day of June following the financial year to which that return relates.

5. Specific Conditions for storage, Handling and Disposal of Waste from Electrical & Electronic equipment (WEEE):

    1. **Collection of WEEE** - The applicant must provide appropriate and dedicated vehicles duly identified as per the norms for transportation of Hazardous Waste. The applicant shall obtain all the required permits for transportation of WEEE from competent authority. The applicant shall ensure the safe transport of the WEEE without any spillage during transportation.

       **Storage for disassembled parts:** The applicant must provide appropriate storage for disassembled spare parts from WEEE. Some spare parts (e.g. motors and compressors) will contain oil and/or other fluids. Such part must be appropriately segregated and stored in containers that are secured such that oil and other fluids cannot escape from them. These containers must be stored on an area with an area with an impermeable surface and a sealed drainage system.

    2. **Storage for other components and residues:**Other components and residues arising from the treatment of WEEE will need to be contained following their removal for disposal or recovery. Where they contain hazardous substances they should be stored on impermeable surface and in appropriate containers or bays with weatherproof covering. Containers should be clearly labelled to identify their contents and must be secured so that liquids, including rain water cannot enter them. Components should be segregated having regard to their eventual destinations and the compatibility of the component types. All batteries should be handled and stored having regard to the potential fire risk associated with team.

    3. **Balances :** WEEE Guidelines also requires that sites for handling of WEEE have “balances to measure the weight of the segregated waste’. The objective is to ensure that a record of weights can be maintained of WEEE entering a facility and components and materials leaving each site (together with their destinations). The nature of the weighing equipment should be appropriate for the type and quantity of WEEE being processed.

    4. Plastic, which cannot be recycled and is hazardous in nature, is recommended to be land filled in nearby CHWTSDF.

    5. Ferrous and nonferrous metal recycling facilities fall under the purview of existing environmental regulations for air, water, noise, land and soil pollution and generation of hazardous waste and the same should be followed.

    6. CFCS should be either reused or incinerated in common hazardous waste Incineration facilities at CHWTSDF.

    7. Waste Oil should be either reused or incinerated in common hazardous waste incineration facilities.

    8. PCB's containing capacitors shall be incinerated in common hazardous waste incineration facilities at CHWTSDF.

    9. Mercury recovery and lead recycling facilities from batteries fall under the Hazardous & Other Wastes (M & TM) Rules, 2016.

    10. Existing environmental regulations for air; water; noise, land and soil pollution and generation of hazardous waste and the same should be followed. In case Mercury or lead recovery is very low, they can be temporarily stored at e-waste recycling facility and later disposed in TSDF.

    11. The industry shall maintain records of the e-waste purchased, processed in Form-2 and shall file annual returns of its activities of previous year in Form-3 as per Rules 11(9) & 13(3)(vii) of the E-Waste(M) Rules, 2016; on or before 30th day of June of every year.

6. The Energy source for lighting purpose shall preferably be LED based

7. The PP shall harvest rainwater from roof tops of the buildings and storm water drains to recharge the ground water and utilize the same for different industrial applications within the plant
8. Conditions for D.G. Set
   a) Noise from the D.G. Set should be controlled by providing an acoustic enclosure or by treating the room acoustically.
   b) Industry should provide acoustic enclosure for control of noise. The acoustic enclosure/ acoustic treatment of the room should be designed for minimum 25 dB (A) insertion loss or for meeting the ambient noise standards, whichever is on higher side. A suitable exhaust muffler with insertion loss of 25 dB (A) shall also be provided. The measurement of insertion loss will be done at different points at 0.5 meters from acoustic enclosure/room and then average.
   c) Industry should make efforts to bring down noise level due to DG set, outside industrial premises, within ambient noise requirements by proper sitting and control measures.
   d) Installation of DG Set must be strictly in compliance with recommendations of DG Set manufacturer.
   e) A proper routine and preventive maintenance procedure for DG set should be set and followed in consultation with the DG manufacturer which would help to prevent noise levels of DG set from deteriorating with use.
   f) D.G. Set shall be operated only in case of power failure.
   g) The applicant should not cause any nuisance in the surrounding area due to operation of D.G. Set.
   h) The applicant shall comply with the notification of MoEFCC, India on Environment (Protection) second Amendment Rules vide GSR 371(E) dated 17.05.2002 and its amendments regarding noise limit for generator sets run with diesel.
9. The applicant shall maintain good housekeeping.
10. The non-hazardous solid waste arising in the factory premises, sweepings, etc. be disposed of scientifically so as not to cause any nuisance / pollution. The applicant shall take necessary permissions from civic authorities for disposal of solid waste.
11. The applicant shall not change or alter the quantity, quality, the rate of discharge, temperature or the mode of the effluent/emissions or hazardous wastes or control equipments provided for without previous written permission of the Board. The industry will not carry out any activity, for which this consent has not been granted/without prior consent of the Board.
12. The industry shall ensure that fugitive emissions from the activity are controlled so as to maintain clean and safe environment in and around the factory premises.
13. The industry shall submit quarterly statement in respect of industries obligation towards consent and pollution control compliance's duly supported with documentary evidences (format can downloaded from MPCB official site).
14. The industry shall submit official e-mail address and any change will be duly informed to the MPCB.
15. The industry shall achieve the National Ambient Air Quality standards prescribed vide Government of India, Notification No. B-29016/20/90/PCI-L dated. 18.11.2009 as amended.
16. The Board reserves its rights to review plans, specifications or other data relating to plant setup for the treatment of waterworks for the purification thereof & the system for the disposal of sewage or trade effluent or in connection with the grant of any consent conditions. The Applicant shall obtain prior consent of the Board to take steps to establish the unit or establish any treatment and disposal system or an extension or addition thereto.
17. The industry shall ensure replacement of pollution control system or its parts after expiry of its expected life as defined by manufacturer so as to ensure the compliance of standards and safety of the operation thereof.
18. The PP shall provide personal protection equipment as per norms of Factory Act

19. Industry should monitor effluent quality, stack emissions and ambient air quality monthly/quarterly.
20. Whenever due to any accident or other unforeseen act or even, such emissions occur or is apprehended to occur in excess of standards laid down, such information shall be forthwith Reported to Board, concerned Police Station, office of Directorate of Health Services, Department of Explosives, Inspectorate of Factories and Local Body. In case of failure of pollution control equipments, the production process connected to it shall be stopped.
21. The applicant shall provide an alternate electric power source sufficient to operate all pollution control facilities installed to maintain compliance with the terms and conditions of the consent. In the absence, the applicant shall stop, reduce or otherwise, control production to abide by terms and conditions of this consent.
22. The industry shall recycle/reprocess/reuse/recover Hazardous Waste as per the provision contain in the Hazardous and Other Wastes (M & TM) Rules 2016, which can be recycled /processed /reused /recovered and only waste which has to be incinerated shall go to incineration and waste which can be used for land filling and cannot be recycled/reprocessed etc. should go for that purpose, in order to reduce load on incineration and landfill site/environment.
23. An inspection book shall be opened and made available to the Board's officers during their visit to the applicant.
24. Industry shall strictly comply with the Water (P&CP) Act, 1974, Air (P&CP) Act, 1981 and Environmental Protection Act, 1986 and industry specific standard under EP Rules 1986 which are available on MPCB website (www.mpcb.gov.in).
25. Separate drainage system shall be provided for collection of trade and sewage effluents. Terminal manholes shall be provided at the end of the collection system with arrangement for measuring the flow. No effluent shall be admitted in the pipes/sewers downstream of the terminal manholes. No effluent shall find its way other than in designed and provided collection system.
26. Neither storm water nor discharge from other premises shall be allowed to mix with the effluents from the factory.
27. The industry should not cause any nuisance in surrounding area.
28. The industry shall take adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standard in respect of noise to less than 75 dB (A) during day time and 70 dB (A) during night time. Day time is reckoned in between 6 a.m. and 10 p.m. and night time is reckoned between 10 p.m. and 6 a.m.
29. The industry shall create the Environmental Cell by appointing an Environmental Engineer, Chemist and Agriculture expert for looking after day to day activities related to Environment and irrigation field where treated effluent is used for irrigation.
30. The applicant shall provide ports in the chimney/(s) and facilities such as ladder, platform etc. for monitoring the air emissions and the same shall be open for inspection to/and for use of the Board's Staff. The chimney(s) vents attached to various sources of emission shall be designated by numbers such as S-1, S-2, etc. and these shall be painted/ displayed to facilitate identification.
31. The industry should comply with the Hazardous and Other Wastes (M & TM) Rules, 2016 and submit the Annual Returns as per Rule 6(5) & 20(2) of Hazardous and Other Wastes (M & TM) Rules, 2016 for the preceding year April to March in Form-IV by 30th June of every year.

32. The applicant shall install a separate meter showing the consumption of energy for operation of domestic and industrial effluent treatment plants and air pollution control system. A register showing consumption of chemicals used for treatment shall be maintained.
33. The applicant shall bring minimum 33% of the available open land under green coverage/ plantation. The applicant shall submit a yearly statement by 30th September every year on available open plot area, number of trees surviving as on 31st March of the year and number of trees planted by September end.
34. The Board reserves its rights to review plans, specifications or other data relating to plant setup for the treatment of waterworks for the purification thereof & the system for the disposal of sewage or trade effluent or in connection with the grant of any consent conditions.
35. The firm shall submit to this office, the 30th day of September every year, the Environment Statement Report for the financial year ending 31st March in the prescribed FORM-V as per the provisions of Rule 14 of the Environment (Protection) (second Amendment) Rules, 1992.
36. The Applicant shall obtain necessary prior permission for providing additional control equipment with necessary specifications and operation thereof or alteration or replacement/alteration well before its life come to an end or erection of new pollution control equipment.
37. The Board reserves its rights to vary all or any of the condition in the consent, if due to any technological improvement or otherwise such variation (including the change of any control equipment, other in whole or in part is necessary).
38. The applicant shall provide facility for collection of environmental samples and samples of trade and sewage effluents, air emissions and hazardous waste to the Board staff at the terminal or designated points and shall pay to the Board for the services rendered in this behalf.

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This certificate is digitally & electronically signed.

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