adani

Power

Ref: APL/EMD/EC/MoEFCC/202/11/22
Date- 21/11/2022

To,

**Additional Principal Chief Conservator of Forest**
**Ministry of Environment, Forest and Climate Change**
Integrated Regional Office (Near Kishan Circle)
Aranya Bhavan, Fourth Floor, Room No 407
Sector 10A, Gandhinagar, Gujarat 382010

**Sub: Six Monthly Compliance Status report of Environment Clearances for Phase I, II & III along with Environmental Monitoring reports – reg.**

Ref: Env. Clearance letter **J-13011/7/2007-IA-II (T)** dated- 13th August'2007
Letter No. **J-13011/1/2008-IA-II (T)** dated, 21st October'2008 and
Letter No. **J-13012/126/2008-IA-II (T)** dated, 20th May'2010 & Corrigendum dated 01/06/2011.
Transfer of EC from Adani Power Ltd. to Adani Power (Mundra) Ltd. dated 13.04.2018.

Dear Sir,

With reference to above subject, please find enclosed herewith Half yearly Environment Clearances (EC) compliance status report along with environmental monitoring results like Ambient Air Quality, Noise level, Water Quality, Soil, Met. data, Terrestrial Ecology & Marine Biology, CSR Report, Fly Ash, Green belt development report etc. for the period of **April'2022 to September'2022** in soft (**e-mail**).

This is for your kind information & record please.

Thanking You,
Yours faithfully,
for **Adani Power (Mundra) Limited**

(**Santosh Kumar Singh**)
**Authorized Signatory**
**Encl**: as above

**CC:** Member Secretary
**Central Pollution control Board**
Parivesh Bhavan, East Arjun Nagar
Kendriya Paryavaran Bhawan
New Delhi- 110 032.

Member Secretary,
**Gujarat Pollution Control Board**
Paryavaran Bhawan, Sector -10 A
Gandhinagar-382 010

The Regional Officer,
**Gujarat Pollution Control Board**
Kandla Port Trust Building (KPT)
Gandhidham – Kutchh 370 201

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Adani Corporate House
Shantigram, S G Highway
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Gujarat, India
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# SIX MONTHLY COMPLIANCE REPORT OF ENVIRONMENTAL CLEARANCE (EC)

**For**

## 4620 (4×330+5×660) MW THERMAL POWER PLANT PHASE - I, II & III

At

## MUNDRA TALUKA, KUTCHH DISTRICT GUJARAT

*Submitted to:*

**Western Regional Office**
**Ministry of Environment, Forest & Climate Change,**
**Central Pollution Control Board, New Delhi &**
**Gujarat Pollution Control Board, Gandhinagar**


*Submitted By:*

**Environment Management Department**

**Adani Power (Mundra) Limited**

**Tunda & Wandh Village,**

**Mundra Taluka, Kutchh District, Gujarat**

**PERIOD: April'2022 – September'2022**

# Contents

ADANI POWER (MUNDRA) LIMITED

**INTRODUCTION**

Adani Power (Mundra) Limited (APMuL) is located at village: Siracha & Tunda, Taluka Mundra, District Kutchh in Gujarat.

APMuL has been granted Environmental Clearances from Ministry of Environment, Forest & Climate Change, Consent to Establish (CTE) and Consent to Operate (CTO) from Gujarat Pollution Control Board for Phase I, II & III and has also obtained all necessary statutory / mandatory clearance.

Adani Power Limited, Mundra (APL Mundra) has been restructured and the Mundra Thermal Power Plant has been demerged and transferred to Adani Power (Mundra) Ltd.

Consequent to this De-Merger of 4620 MW Thermal Power Plant, undertaking now vests with Adani Power (Mundra) Limited from 1st January 2018. Ministry of Environment, Forest & Climate Change (MoEF&CC) has Transferred the Environmental Clearances (EC) to Adani Power (Mundra) Limited on 13.04.2018.

Adani Power (Mundra) Limited has commissioned the first supercritical 660 MW unit in the country. Mundra is also the World's First supercritical technology project to have received 'Clean Development Mechanism (CDM) Project' certification from United Nations Framework Convention on Climate Change (UNFCCC).

**We have implemented the Environment Management System (EMS) ISO 14001:2015**

**ADANI POWER (MUNDRA) LIMITED, MUNDRA**

# Compliance status on Environment Clearance

## For 660 MW (2x330) TPP Phase – I

Vide letter No.J-13011/7/2007-IA-II (T) dated 13/08/07

| Sr. No. | Conditions | Status |
|---|---|---|
| 3-(i) | No activities in CRZ area will be taken up without prior requisite clearance under the provisions of the CRZ Notification, 1991. | CRZ Clearance obtained from MoEF&CC vide letter No. 10 - 94/2007- IA - III dated 29th May' 2008.<br>However, the facility for Sea water intake and outfall were not developed by Adani Power Ltd. The CRZ clearance has not been acted upon and the validity of 5 years under the CRZ Notification, 1991 is over.<br>Presently there is no any CRZ clearance with Adani Power (Mundra) Limited.<br>NIO suggested to develop integrated intake and outfall facility in place of multiple intakes and outfalls. This integrated intake & outfall has been approved by MoEF&CC under the clearance for Waterfront Development proposed by APSEZL.<br>APMuL is using this integrated intake and outfall facilities. |
| (ii) | The seawater intake structure shall be so designed to ensure that the continuity of free flow of water in the two arms of Kotdi Creek is not hampered. | The integrated Intake channel developed by APSEZ is away from Kotdi Creek. The outfall crosses Kotdi Creek at one place, for which aqueduct has been provided so that the treated effluent does not mix with water in the Creek and does not Interfere with free flow of water in the two arms of Kotdi Creek. |
| (iii) | The recommendations made in the NIO report shall be effectively implemented in the project cycle. | Subsequent to NIO's recommendations, integrated intake & outfall facilities are developed by APSEZ and approved from MoEFCC New Delhi. |
| (iv) | It shall be ensured that the mangroves are not adversely affected due to the project. | The Thermal Power Plant is located well beyond the CRZ area and there are no mangroves at the plant site. |
| (v) | The temperature of discharged water shall be continuously monitored to ensure that it does not exceed the prescribed limit of | The temperature of discharge water and the Intake water is monitored on daily basis. |

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| | 7°C above the ambient temperature of receiving waters at any point of time. | Differential temperature is well within the Stipulated limits. Please refer **Annexure V** |
| (vi) | Space provision shall be made for installation of FGD of requisite efficiency of removal of SO2, if required at later stage. | Space has been provided for FGD for future requirement. FGD installation is in progress in compliance with the CPCB directions vide letter No.: B- 33014/07/2017-18/IPC-II/TPP/152872, dated 11/12/2017. |
| (vii) | The total land requirement shall not be exceed 228 Ha for all the activities/facilities relating to the proposed power project. | The project has undergone two expansions. The total area has changed and the same has been approved by MoEF&CC. The total area for all three phases is 452.79 ha. |
| (viii) | Coal with ash content not exceeding 8% and sulphur content not exceeding 0.69% shall be used as fuel | Being followed.<br>The coal is imported from Indonesia and South Africa. The ash content in coal is below 8% and sulphur content below 0.3%. The Ash content report is being sent to MoEF&CC, Regional office on quarterly basis. Ash content report is enclosed as **Annexure- VII.** |
| (ix) | Rainwater harvesting should be adopted. Central Groundwater Authority/Board shall be consulted for finalization of appropriate rainwater harvesting structure within a period of three months from the date of clearance | Rainwater harvesting (RWH) scheme has been submitted to Regional Office, CGWB, Ahmedabad.<br>We have adopted the scheme and developed rainwater collection & groundwater recharging facilities at three locations within plant premises. |
| (x) | A bi -flue stack of 220 m height with exit velocity of at least 22 m/s shall be provided with continuous monitoring system. | Complied.<br>A Bi - flue stack of 220-meter height is provided. Online analyzers for PM, SO2, NOX have been provided & maintained and calibration is being done on regular basis, exit velocity is more than 22 m/s. RTDMS commissioned for gas analyzer. |
| (xi) | High efficiency Electrostatic precipitator (ESPs) having efficiency of 99.9% shall be installed so as to ensure that particulate emissions do not exceed 100 mg/$Nm^3$. | Complied,<br>ESP with efficiency of 99.9% installed in both the units to meet permissible norm for particulate emissions less than 50 mg/$Nm^3$. (As we have received renewed "Consent to Operate" (CTO). Please refer **Annexure – I** |

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| (xii) | Fly ash shall be collected in dry form and its 100 % utilization shall be ensured from the day of commissioning of the plant. In case of emergency, the utilized ash may be disposed in the ash pond through High Concentration Slurry Disposal (HCSD) system. | Complied.<br>Ash Generation & utilization details from April'22 to September'22 attached as Annexure**- VII.** |
| (xiii) | Regular monitoring of ground water quality including heavy metals shall be undertaken around ash dyke and project area to ascertain the change, if any, in the water quality due to leaching of contaminants from ash disposal area. | Four nos. of Bore well establish around the ash dyke & Ground water quality is being monitored on regular basis. Ground water analyses report enclose as **Annexure VIII.** |
| (xiv) | Noise level shall be limited up to 75 dB (A). For People working in high noise area, protective devices such as earplugs etc. shall be provided. | Noise level monitoring is being carried out on regular basis inside the plant locations & monitoring values are well within stipulated limits. Please refer **Annexure- I.**<br>We are providing necessary PPE's like ear-muff and ear plug to all employee & workers. Occupational Health & Safety Management System as ISO ISO 45001:2018 implemented. |
| (xv) | A greenbelt shall be developed all around the plant boundary and ash dyke covering an area of at least 88.2 Ha. | Green belt / plantation being developed in 142.37 Ha (Out of total 452 Ha Land for all three phases). Green belt/plantation is enclosed as **Annexure VI.** |
| (xvi) | First aid and sanitation arrangements shall be made for the drivers and contract labor during construction phase. | Complied.<br>First aid and sanitation ware provided for driver and contract labour during construction phase. |
| (xvii) | Regular monitoring of the air quality shall be carried out in and around the power plant and records shall be maintained. The location of the monitoring stations and frequency of monitoring shall be finalized in consultation with State Pollution Control Board. Six monthly reports shall be submitted to this Ministry. | Being Complied.<br>The regular Environmental Monitoring is being carried out in & around plant premises and reports<br>are being submitted on monthly basis to GPCB regional office, Bhuj.<br>Online continuous AAQ Monitoring systems has been installed in consultation with GPCB and also established five AAQM locations in & around the plant with frequency of twice in a week, monitoring is being carried out by third party. Monitoring |

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| | | reports are enclosed as **Annexure I.**<br>Online Continuous AAQ results are enclosed as **Annexure - IV**<br>Last Six Monthly compliance report was submitted for the period of October' 21 to March' 22 had been submitted vide letter no. APL/EMD/EC/ MoEFCC/271/05/22 Dated: 25.05.2022 |
| (xviii) | For controlling fugitive dust, regular sprinkling of water in coal handling area and other vulnerable areas of the plant shall be ensured. | Being Complied.<br>Regular water sprinkling is being done to control the fugitive dust in CHP area and all other areas. An addition mechanical sweeping machine have been deployed for cleaning the road.<br>To control and minimize the fugitive air pollution at coal handling plant, dust extraction system has been provided in all the transfer towers as well as crusher house. Desalinated water is being used for dust suppression system.<br>Windshield is also provided at coal stack yard area.<br>Close conveyor system for Coal transportation is provided.<br>Integrated Ash silo system (Ash transfer by Numeric system in pipe) is in place for ash handling. |
| (xix) | The project proponent should advertise within seven day of Environment clearance, in at least two newspapers widely circulated in the region around the project, one of which should be in vernacular language of the locality concerned, informing that the project has been accorded environmental clearance and copies of clearance latter are available with State Pollution Control Board/Committee and may also seen in the Website of Ministry of Environment and Forest in the - http://envfor.nic.in | Complied<br>Published in Two News paper |
| (xx) | A separate environment-monitoring cell | Complied. |

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| | with suitable qualified staff should be set up for implementation of the stipulated environmental safeguards. | We have established separate environmental management cell with well qualified staff to carry out regular surveillance for implementation of stipulated environmental safeguards and full fledge Environment Lab for Air & Water has been established.<br>**Environment Management System as per EMS**<br>**ISO 14001: 2015 & Water Efficiency Management System (ISO 46001:2019) implemented.** |
| (xxi) | Half yearly report on the status of implementation of conditions and environmental safeguards should be submitted to this Ministry, the Regional Office, CPCB and SPCB. | Six monthly compliance report accordance to the Environmental clearance granted by MoEF&CC is being submitted to MoEF&CC, CPCB & GPCB regularly.<br>Compliance status report updated on company's website.<br>Last compliance report was submitted for the period of October'2021 to March'22 had been submitted vide letter no. APL/EMD/EC/MoEFCC/ 271/05/22 Dated: 25.05.2022. |
| (xxii) | Regional Office of the Ministry of Environment & Forests located at Bhopal will monitor the implementation of the stipulated conditions. A complete set of documents including Environmental Impact Assessment report, Environment Management Plan and additional information/ clarifications submitted to this ministry subsequently should be forwarded to the Regional Office for their use during monitoring. | Being followed<br>All necessary information forwarded to the MoEF&CC Regional Office, Bhopal on regular basis. |
| (xxiii) | Separate funds should be allocated for implementation of environmental protection measures along with item-wise break-up. These cost should be included as part of the project cost. The funds earmarked for the environment protection measures should not be diverted for other purposes and year- wise expenditure | Being complied.<br>Separate funds allocated for environmental protection measures.<br>Expenditure details from April '2022 to September' 2022 F.Y. 2022-23 is enclosed as **Annexure X.** |

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| | should be reported to the Ministry. | |
| (xxiv) | Full cooperation should be extended to the Scientists/Officers from the Ministry and its Regional Office at Bhopal/ the CPCB/ the SPCB during monitoring of the project. | Noted<br>Full co-operation shall be extended to the Authority |

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**ADANI POWER (MUNDRA) LIMITED, MUNDRA**

# Compliance status on Environment Clearance

## For 1980 MW (2x330 + 2x660) TPP Phase – II

Vide letter No. J-13011/1/2008-IA-II (T) dated 21/10/08)

| Sr. No. | Conditions | Status |
|---|---|---|
| 3-(i) | The changes/ modification made in the scope of phase - I of the project should be get incorporated formally in the environmental clearance already granted. | Noted<br>Changes in Phase-I communicated to MoEF&CC |
| (ii) | Prior CRZ clearance under the provisions of CRZ Notification, 1991 for the activities to be taken up in the CRZ area as applicable to this project, shall be obtained. | CRZ Clearance obtained from MoEF&CC vide letter No. 10 - 94/2007- IA - III dated 29th May' 2008.<br>However, the facility for Sea water intake and outfall were not developed by Adani Power Ltd. The CRZ clearance has not been acted upon and the validity of 5 years under the CRZ Notification, 1991 is over.<br>**Presently there is no CRZ clearance available with Adani Power (Mundra) Limited.**<br>NIO suggested to develop integrated intake and outfall facility in place of multiple intakes and outfalls. This integrated intake & outfall has been approved by MoEF&CC under the clearance for Waterfront Development proposed by APSEZL. APMuL is using this integrated intake and outfall facilities. |
| (iii) | Regular monitoring of the thermal discharges into the sea shall be carried out and records maintained. The temperature changes, if any, in the sea water within the impact zone due to the project shall be carried out. Based on the same, necessary safeguard measures as may be required to protect the aquatic flora and fauna shall be taken. It shall be ensured that discharge temperature does not exceed the prescribed limits of 7°C above the ambient temperature of receiving waters at any point of time. | Being complied<br>The temperature of discharge water and the intake water is monitored on daily basis.<br><br>Differential temperatures are well within the stipulated limits. Please refer **Annexure V.**<br><br>Regular third-party marine monitoring also being carried out, monitoring report enclosed for the period of April'22 to Sept'22 Please refer **Annexure – III** |
| (iv) | The recommendations made in the report of NIO relating to intake and outfall shall be implemented. | NIO suggested/recommended to develop integrated intake and outfall facility in place of multiple intake and outfall. This integrated |

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| | | intake & outfall has been approved by MoEF under the clearance for Waterfront Development proposed by APSEZL. APMuL is using this integrated intake and outfall facility. |
| (v) | The sulphur content in the coal to be used both for Phase–I and Phase-II shall not exceed 0.3 %. | Being followed<br>The coal is imported from Indonesia and South Africa. It is ensured that sulphur content in coal below 0.3%. |
| (vi) | Appropriate measures shall be adopted to reduce the emissions of $SO_2$. It shall also be ensured that at no point of time the ground level concentration of $SO_2$ in the impact zone exceeds the prescribed limit. The proponent shall also provide, additional corrective measures as may be deemed necessary shall be taken. | Being Complied.<br>The regular monitoring is being carried out in & around the plant premises.<br>We have already installed online continuous monitoring system in all stacks.<br>At no point of time, the ground level concentration of $SO_2$ has exceeded the permissible limits. |
| (vii) | Continuous meteorological data shall be collected at site for at least three years. Based on the data so collected, air quality modeling prediction shall be carried out. The results so obtained shall be analyzed and based on the same, additional corrective measures as may be deemed necessary shall be taken. | Complied.<br><br>Continuous meteorological stations installed within plant premises; Details of metrological data observation enclosed as **Annexure I.** |
| (viii) | Two bi-flue stacks of 275 m height each for 2 X 330MW and 2 X 660 MW units shall be provided with continuous online monitoring equipments for $SO_2$, NOx and Particulate. Exit velocity of Flue gases shall not be less than 22.27 m/sec for 2 X 330MW stack and 22.97 m/sec for 2 X 660 MW units. | Complied<br>Two bi-flue stacks 275 meters has been provided in all four boilers (2x330 MW + 2x660 MW) and online continuous emission monitoring system (CEMS) installed for PM, SOx & NOx. Exit velocity is more than 23 m/sec & records are being maintained. Please refer **Annexure I.**<br>Regular stack emission monitoring is also being carried out by third party laboratory. |
| (ix) | High efficiency electrostatic precipitators (ESP's) shall be installed to ensure that particulate emission does not exceed 50 mg/ $Nm^3$ | Complied<br>Highly efficient Electrostatic Precipitator (ESPs) has been provided to each boiler to maintain particulate emission less than 50 mg/$Nm^3$. Please refer **Annexure I.** |
| (x) | The seawater intake structure shall be so designed to ensure that the continuity of free flow of water in the two arms of Kotdi creek is not hampered | The integrated Intake channel developed by APSEZ is away from Kotdi Creek.<br><br>The outfall channel Crosses Kotdi Creek at one place, for which aqueduct has been |

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| | | provided so that the treated effluent does not mix with Creek water and does not Interfere with free flow of water in the two arms of Kotdi Creek. |
| (xi) | It shall be ensured that the mangroves are not adversely affected due to the project. | The Thermal Power Plant is located well beyond the CRZ area and there are no mangroves at the plant site. |
| (xii) | Cooling towers with closed cycle system shall be installed COC of at least 1.5 shall be maintained. | Being Complied<br>COC of 1.5 is being maintained |
| (xiii) | Space provision shall be made for installation of FGD of requisite efficiency of removal of SO2, If required at later stage. | Noted<br>Space for FGD has been provided in the plant as per the guidelines of CPCB vide letter No. B-33014/07/2017/IPC-II/TPP/15872 dated 11.12.2017. However, as per MoEFCC Notification date 5th September 2022, Mundra TPP is falling under Category "C" Non- retiring TPPs and the timelines for compliance of $SO_2$ emission is up to December'2026. Accordingly, the work is under progress for compliance as per CPCB direction. |
| (xiv) | The total land requirement shall not exceed 254.49 ha for all the activities/ facilities relating to Phase - I and Phase - II of the proposed power project. | Noted<br>The project has undergone two expansions.<br>The total area has changed and the same has been approved by MoEF&CC. The total area for all three Phases is 452.79 ha. |
| (xv) | Rainwater harvesting should be adopted. Central Groundwater Authority/Board shall be consulted for finalization of appropriate rainwater harvesting structures within a period of three months form the date of clearance. | Rainwater Harvesting (RWH) scheme has been submitted to RO, CGWB, Ahmedabad.<br>We have adopted the scheme and developed rainwater collection & groundwater recharging facilities at three locations within plant premises. |
| (xvi) | Fly ash shall be collected in dry form and its 100 % utilization shall be ensured from the day of the commissioning of the plant. In case of emergency, the utilized ash may be disposed in the ash pond through High Concentration Slurry Disposal (HCSD) system and bottom ash in conventional slurry mode. | Being Complied<br>Ash Generation & utilization details from April'2022 to September'2022 is enclosed as **Annexure VII.** |
| (xvii) | Adequate safety measures shall be provided in the plant area to check/ minimize spontaneous fires in coal yard, especially during summer season. Copy of these | Water sprinkler system and Hydrant system in operation to minimize spontaneous fires in coal yard. |

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| | measures with full details along with plant layout location shall be submitted to the ministry as well as to the Regional Office of the Ministry of Bhopal. | |
| (xviii) | Storage facilities for auxiliary liquid fuel such as LDO and HFO/LSHS shall be made in the plant area where risk is minimum to the storage facilities Disaster management Plan shall be prepared to meet any eventuality in case of accident taking place. Mock drills shall be conducted regularly and based on the same, modifications required, if any shall be incorporated in the DMP. Sulphur content in the liquid fuel will not exceed 0.5 %. | The LDO and HFO / LSHS are stored in designated location and minimum risk area.<br><br>Emergency Management Plan (EMP) has been prepared & Mock Drill is being conducted on regular interval.<br><br>Occupational Health & Safety Management System as ISO 45001:2018 implemented. |
| (xix) | Noise levels emanating from turbines shall be limited to 75 dBA. For people working in the high noise area, requisite personal protective equipment like earplugs/earmuffs etc. Shall be provided. Workers engaged in noisy areas such as turbine area, air compressors etc shall be periodically examined to maintain audiometric record and for treatment for any hearing loss including shifting to non - noisy/less noisy areas. | Regular noise level monitoring is being carried out inside the plant locations & monitoring values are well within limits. Please refer **Annexure- I.**<br><br>We are providing necessary PPE's like earmuff and ear plug to all employees & workers.<br><br>Occupational Health & Safety Management System as ISO 45001:2018 implemented. |
| (xx) | Regular monitoring of ground water quality including heavy metals shall be undertaken around ash dyke and the project area to ascertain the change, if any, in the water quality due to leaching of contaminants from ash disposal area. | Being complied<br>Four nos. of Bore well establish around the ash dyke & Ground water quality is being monitored on regular basis. Please refer monitoring report in **Annexure-VIII.** |
| (xxi) | A greenbelt shall be developed all around the plant boundary and ash dyke covering and area of at least 98.2 ha. | Complied.<br>Green belt / plantation being developed in 142.37 Ha. (Out of total 452.79 Ha Land for all three phases)<br>Green belt / plantation is enclosed as **Annexure VI.** |
| (xxii) | First aid and sanitation arrangements shall be made for the drivers and contract labour during construction phase. | Complied.<br>First aid and sanitation were provided for driver and contract labour during construction phase. |
| (xxiii) | Regular monitoring of ground level concentration of $SO_2$, NOx, Hg, SPM and | Being Complied<br>The regular Environmental Monitoring is |

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| | RSPM shall be carried out in the impact zone and records maintained. If at any stage these levels are found to exceed the prescribed limits, necessary control measures shall be provided immediately. The location of the monitoring stations and frequency of monitoring shall be decided in consultation with SPCB. Periodic reports shall be submitted to the Regional Office of this Ministry. | being carried out in & around plant premises and reports are submitted to MoEF&CC, CPCB & GPCB. Please refer **Annexure- I**<br><br>Online continuous monitoring systems Installed in consultation with GPCB. AAQM monitoring in and around also being done by third party twice in a week. Please refer **Annexure – IV** |
| (xxiv) | 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, creche etc. The housing may be in the form of temporary structures to be removed after the completion of the project. | Complied<br>Proper housing and infrastructure facilities were provided to labors during the construction.<br><br>The temporary facilities have been removed after the completion of project. |
| (xxv) | The project proponent shall advertise in at least two local newspapers widely circulated in the region around the project, one of which shall be in the vernacular language of the locality concerned within seven days form the date of this clearance letter, informing that the project has been accorded environmental clearance and copies of clearance letter are available with the State Pollution Control Board/ Committee and may also be seen at website of the Ministry of Environment and Forests http://envfor.nic.in | Complied |
| (xxvi) | A separate environment management cell with qualified staff shall be set up for implementation of the stipulated environment safeguards. | We have established separate environmental monitoring cell with well-qualified staff to carry out regular surveillance for implementation of stipulated environmental safeguards and full fledge Environment Lab accredited with NABL ISO/IEC 17025:2017 for Air, Water & Noise including marine biology as well as terrestrial ecology regularly.<br>**Environment Management System as per EMS ISO 14001: 2015 Water Efficiency Management System (ISO 46001:2019) implemented.**<br>Terrestrial monitoring report enclosed as **Annexure -II** and Marine monitoring Report is |

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| | | enclosed as **Annexure – III.** |
| (xxvii) | Half yearly on the status of implementation of stipulated condition and environmental safeguards shall be submitted to this Ministry/Regional office /CPCB/SPCB. | Six monthly compliance report accordance to the Environmental clearance granted by MoEFCC being submitted to MoEFCC, CPCB & GPCB.<br>Last compliance report was submitted for the period of October' 21 to March' 22 had been submitted vide letter no. APL/EMD/EC/MoEFCC/271/05/22 Dated: 25.05.2022. |
| (xxviii) | Regional office of the Ministry of Environment & Forest located at Bhopal will monitor the implementation of the stipulated conditions. A complete set of documents including Environmental Impact Assessment - Report and environment Management Plant along with the additional information submitted from time to time shall be forwarded to the Regional office for their use during monitoring. | Being followed<br><br>All necessary documents already submitted to MoEF&CC, Regional Office Bhopal.<br><br>Addition information being forwarded time to time MoEF&CC, Regional Office Bhopal. |
| (xxix) | Separate funds shall be allocated for implementation of environmental protection measures along with item wise break up. These cost shall be included as part of the project cost. The funds earmarked for the environment protection measures shall not be diverted for other purposes and year wise expenditure shall not be diverted for other purposes and year wise expenditure should be reported to the Ministry. | Being followed<br>Separate funds allocated for environmental protection measures.<br>Expenditure details from April'22 to March'2022 (F.Y. 2022-23) is enclosed as **Annexure-X.** |
| (xxx) | The project authorities shall inform the Regional office as well as the Ministry regarding the date of financial closure and final approval of the project by the concerned authorities and the dates of start of land development work and commissioning of plant. | Complied |
| (xxxi) | Full cooperation shall be extended to the Scientists/Officers from the Ministry /Regional Office of the Ministry at Bhopal/the CPCB/ the SPCB who would be monitoring the compliance of environmental status. | Noted<br>Full co-operation shall be extended to mentioned authority. |

**ADANI POWER (MUNDRA) LIMITED, MUNDRA**

# Compliance status on Environment Clearance

**For 1980 MW (3x660) TPP Phase – III**

Vide letter No. J-13012/126/2008-IA.II (T) dated 20.05.10

| Sr. No. | Specific Conditions | Status |
|---|---|---|
| A -(i) | Phase – I and Phase – II projects shall be run purely on imported coal. Phase- III project shall be run on 70 % domestic and 30 % imported coal. | Phase - I & II: Already commissioned being operated on imported coal.<br>Phase-III: Domestic Coal Linkage for 70 % quantity granted by Ministry of Coal.<br>Operational on blended coal. |
| (ii) | In case source of fuel supply is to be changed for Phase- I and Phase- II at a later stage, the project proponent shall intimate the Ministry well in advance along with necessary requisite documents for its concurrence for allowing the change. | Noted.<br>Change in the source of fuel supply for power plant will be intimated to the Ministry well in advance along with necessary requisite documents for its concurrence for allowing the change. |
| (iii) | The project proponent shall examine in detail the possibility to adopting NIOT technology for desalination of sea water through Low temperature Thermal Desalination (LTTD) process. In case the same is not feasible detailed explanation shall be submitted. | Complied.<br>The desalination plant is already commissioned. The LTTD process is not feasible at Mundra, and report already submitted to RO, MoEF&CC, Bhopal |
| (iv) | Marine biology shall not be disturbed in the Kotdi Creek and Gulf of Tunda due to any activity arising from the operation of power plant. Continuous monitoring of the marine biology in the area shall be undertaken and assessed for any changes beyond the natural variability identified and records maintained and submitted to the Ministry from time to time. | Complied.<br>The integrated intake channel developed by APSEZL is away from Kotdi Creek, which is used by APMuL also. The integrated outfall developed by APSEZL and being used by APL, crosses Kotdi Creek, through aqueduct without mixing with Kotdi Creek and without causing any obstruction to free flow. Marine biology monitoring is being monitored on regular basis. Monitoring report prepared by third party is enclosed as **Annexure – III**. |
| (v) | A comprehensive marine biological quality monitoring programme and mitigation measures shall be prepared and submitted within six months to the Ministry for immediate implementation. | Being Complied.<br>A comprehensive marine biological quality monitoring report is prepared and implementation. Report being submitted to MoEF&CC. Monitoring report is enclosed as **Annexure – III**. |
| (vi) | A dedicated Environment Management Cell with suitable qualified personnel constituting of marine Biologist and an | A dedicated Environment Management cell has been set up with qualified staff Including marine biologist and an |

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| | ecologist shall be set up under the control of a Senior Executive, who will report directly to the head of the Organization. | ecologist.<br>The head of the Environment Management Cell reports to the Station Head at Mundra.<br>We have full-fledged Environment Lab accredited with NABL ISO/IEC 17025:2017 to carry out in-house environmental monitoring.<br>**Environment Management System as per EMS ISO 14001: 2015 & Water Efficiency Management System (ISO 46001:2019) implemented.** |
| (vii) | The project proponent shall not be hamper the vocation of the fishing community in the area and it shall be ensured that local fishing community shall be allowed to carry out their vocation in the creek. | The power plant is located at a site, which is away from the fishing areas. Adani Power (Mundra) Ltd. uses the marine facilities such as intake channel and outfall channel, developed by APSEZ Ltd., which is not hampering the vocation of fishing community.<br>Our CSR activities enhance infrastructure & essential nets to fishermen communities for the betterment of their vocation in the area.<br>Please refer **Annexure XI.** |
| (viii) | The project proponent shall adopt the fishing communities displaced/ affected by the power plant and in particular those residing in and around Zarpara, Kotdi, Navinal, and Tragadi for their overall socio-economic development. | No fishing community is displaced by the power plant. The fishing community is being supported by the CSR activities of the company, being implemented through **Adani Foundation.**<br>The CSR report is enclosed as **Annexure – XI.** |
| (ix) | An endowment of Fisherman Welfare Fund shall be created not only to enhance their quality of life through creation of facilities for fish landing platforms/ fishing harbour/cold storage, but also to provide relief in case of emergency situations such as missing of fisherman on duty due to rough seas, tropical cyclone and storms etc. | APMuL provided adequate funds for creation,<br>maintenance and support of facilities such as sanitation facilities, support schools, approach roads, cycle to school going children, fish lending sheds etc. as well as support for purchasing various essential materials like nets, cycle, iceboxes, anchors, weighing scales, other fishing equipment's etc. All these activities are undertaken as a part of CSR, being implemented through Adani Foundation.<br>Adani Foundation has also established "**Adani Vidya Mandir"** a school focusing on education of fisherman's children. Refer |

| | | **Annexure XI.** |
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| (x) | Suitable screens (in stages) shall be placed across intake channel to prevent entrainment of life forms including eggs, larvae, juvenile fish, plankton etc. during extraction of sea water. | Being complied.<br>Suitably designed screen systems have been provided in the intake system. |
| (xi) | No ground water shall be extracted for use in operation of the power plant even in lean season. | Being Complied.<br>There is no extraction of Ground water for use in operation of the power plant. |
| (xii) | No water bodies including natural drainage system in the area shall be disturbed due to activities associated with the setting up/operation of the power plant. | Being Complied.<br>No ground water bodies/natural drainage will be disturbed. |
| (xiii) | FGD shall be provided for Phase- III units. | Complied.<br>Sea water based FGD has been provided. |
| (xiv) | The system with COC of at least 1.3 shall be designed since the sea water has high TDS. | Being complied.<br>COC of least 1.3 is being maintained |
| (xv) | Additional soil for leveling of the proposed site shall be generated within the sites (to the extent possible) so that natural drainage system of the area is protected and improved. | Complied.<br>For leveling the site, the maximum additional soil has been generated within the site itself and maintained natural drainage system of the area. |
| (xvi) | High Efficiency Electrostatic Precipitator (ESPs) shall be installed to ensure that particulate emission does not exceed 50 mg/Nm$^3$. | Complied,<br>High efficient Electrostatic Precipitator (ESPs) has been provided to each boiler to maintain particulate emission less than 50 mg/Nm$^3$.<br>Please refer **Annexure-I** |
| (xvii) | Adequate dust extraction system such as cyclones/beg filters and water spray system in dusty areas such as in coal handling and ash handling points, transfer areas and other vulnerable dusty areas shall be provided. | Water spraying system is provided in coal handling area and dust extraction system provided in coal transfer & other vulnerable dusty area.<br>Closed conveyor system for Coal transportation is provided.<br>Wind shield around coal stack has been provided. Integrated Ash silo system (Ash transfer by pneumatic system through pipeline) is in place for ash handling at single place and frequently water sprinkling is being done in the area. |

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| (xviii) | Utilization of 100 % Fly Ash generated for Phase-III shall be made from day one of operation of the plant. Status of implementation shall be reported to the regional office of the Ministry from time to time. | Being complied<br>Ash Generation & utilization details from Apr'2022 to Sept' 2022 is enclosed as **Annexure- VII.** |
| (xix) | Fly ash shall be collected in dry form and storage facility (silos) shall be provided. Unutilized fly ash shall be disposed off in the ash pond in the form of slurry form. Mercury and other heavy metals (As, Hg, Cr, Pb etc.) will be monitored in the bottom ash as also in the effluents emanating from the existing ash pond. No ash shall be disposed off in low lying area. | Being followed<br><br>Fly Ash is collected in dry form and storage silos have been provided. Unutilized ash is wet conditioned for disposal in Ash Dyke. Mercury and heavy metals are periodically monitored in the ash. No ash from Phase III Units is disposed off in low-lying area. |
| (xx) | Ash pond shall be lined with HDP/LDP lining or any other suitable impermeable media such that no leachate takes place at any point of time. Adequate safety measures shall also be implemented to protect the ash dyke from getting breached. | Ash dyke is provided with LDPE Lining. Safety measures are in place to prevent breaching of the dyke. |
| (xxi) | For disposal of Bottom Ash in abandoned mines (if proposed to be undertaken) if shall be ensured that the bottom and sides of the mined-out areas are adequately lined with clay before Bottom Ash is filled up. The project proponent shall inform the State Pollution Control Board well in advance before undertaking the activity. | No mines in the near by area. |
| (xxii) | There should not be any contamination of soil, ground and surface waters (Canals & village pond) with sea water in and around the project sites. In other wards necessary preventive measures for spillage from pipelines, such as lining of guard pond used for the treatment of outfall and intake should be adopted. This is just because the areas around the projects boundaries fertile agriculture and used for paddy cultivation. | Being complied.<br>The Sea water is used within the plant premises only and in closed circuit. There is no contamination of soil, ground and surface water. There are no agricultural lands on see ward side of the power plant. |
| (xxiii) | To absorb the ground level pollutants, to | Being complied. |

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| | act buffer against strong winds arising out of tropical cyclones/ storms, to reduce heat load and ameliorate environment, there is a need for shelterbelts/greenbelts/tree cover along the coastline, bunds around marshy areas, roadsides, around the project protected monuments, forts, waste places, School Campuses and other vacant lots. Coconut plantations can be developed along the coastline and near villages, school and forts. Stands of Casuariana should also be developed on some dunes and along coasts. Bamboos, Neem and other native trees should be planted in and around at the villages. | Green belt / plantation developed in 142.37 Ha (Out of total 452.79 Ha Land for all three phases). Afforestation has been undertaken by APSEZL and Adani Foundation. Please refer **Annexure – VI** |
| (xxiv) | The above suggest Green Belt shall consist of 3 tires of plantation as cited above and largely comprising of native species around the power plant and at least 100 m width shall be raised. Wherever 100 m width is not feasible a 50 m width shall be raised and adequate justification shall be submitted to the regional office of the Ministry. Tree density shall not less than 2500 per ha with survival rate not less than 70 %. | Being complied.<br>Green belt Being developed in & around plant area.<br>We have well established Horticulture Department which has started large scale plantation/ Green Belt developed in and around the plant. |
| (xxv) | To meet the expenditure of these plantations and their management, a common Green Endowment fund should be created by the project proponents out of EMP budgets the interest earned out of it should be used for the development and management of green cover of the area. | APMuL has internal department of Horticulture for developing greenbelt/landscaping of our APMuL premises and its surrounding area. APMuL has separate fund for such development. |
| (xxvi) | No wastewater should be discharged onto channel systems, backwaters, marshy areas and seas without treatment. The outfall should be first treated in guard pond and then discharge into deep sea (12 to 15 m depth). Similarly, the intake should be from deep sea to avoid aggregation of fish. The brine that comes out from desalinization plants should not be | The wastewater is treated and disposed off through Outfall Channel, as recommended by NIO and approved by MoEF&CC. |

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| | discharged into sea. | |
| (xxvii) | The treated effluents conforming to the prescribed standards only shall be re circulated and reused within the plant (as may be required). Arrangements shall be made that effluent and storm water do not get mixed. | Desalination wastewater is treated and utilized for dust suppression, CHP make up, etc. effluent stream and storm water drainage are isolated to prevent any mixing. |
| (xxviii) | The project proponent shall identify and develop new fodder farm/grazing land (Gaucher land) Firm financial commitment along with details for development of fodder farm/grazing land shall be submitted within three months to the Regional Office of the Ministry. | Fodder support is provided to various needy villages so as to facilitate the farmers and cattle owners in the time of need when fodder is highly expensive and in short supply, CSR report enclosed as **Annexure XI**. |
| (xxix) | The project proponent shall prepare an action plan to be submitted within three months to the Ministry for regeneration of mangroves in the area and shall specify the financial commitments for the same. | Mangrove plantation plan along with regeneration plan submitted to MoEF&CC.<br>To enhance the marine biodiversity, till date Adani group has carried out mangrove afforestation in more than 2800 ha. Area across the coast of Gujarat. |
| (xxx) | The water containing brine shall be discharged only after cooling at ambient temperature in a guard pond such that the same meets the average salinity of sea water. | Being complied<br>The wastewater is treated and disposed off through Outfall Channel, as recommended by NIO and approved by MoEF&CC |
| (xxxi) | The project proponent shall set up single teacher school in every village in the study area so that village boy and girls do not have to walk long distances. The project proponent shall also explore the feasibility of providing cycles to school going children/students to address school dropouts. Report to this effect shall be submitted to the Regional Office of the Ministry from time to time. | All school of the surrounding villages adopted for development by Adani Foundation, CSR activities being done by Adani Foundation.<br><br>CSR Progress Report for Apr'22 to Sept'22 (FY 2022-23) is enclosed as **Annexure – XI.** |
| (xxxii) | Action plan for R&R (If applicable) with compensation package of the project affected persons be submitted and implemented as per prevalent R&R policy within three months from the date of issue of this letter. | Not applicable. |
| (xxxiii) | An amount of Rs. 36.0 Crores shall be earmarked as one-time capital cost for | Complied.<br>A separate budget earmarked for CSR activities. CSR study report already |

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| | CSR programme. Subsequently a recurring expenditure of Rs. 7.20 Crores per annum shall be earmarked as recurring expenditure for CSR activities. Details of the activities to be undertaken shall be submitted within one month along with road map for implementation. | submitted to ministry. CSR activities being carried out by Adani Foundation. |
| (xxxiv) | While identifying CSR programme the company shall conduct need-based assessment for the nearby villages to study economic measures with action plan which can help in upliftment of poor section of society. Income generating projects consistent with the traditional skills of the people besides development of fodder farm, fruit bearing orchrds, vocational training etc, can form a part of such programme. Company shall provide separate budget for community development activities and income generating programmes. This will be in addition to vocational training for individuals imparted to take up self employment and jobs. In addition, a special scheme for upliftment of SC/ST's and mariginalised population in the study area out of CSR programme shall be formulated and submitted to the Ministry within six months along with firm commitment of implementation. The scheme shall have an in-built monitoring mechanism. | Need based Assessment Study for development of CSR plan completed by VIKSAT, Ahmedabad. Report already submitted to MoEF&CC.<br><br>Need based plan implementation is being started nearby villages; individuals who are economically weak to undertake some economic activity that would help them achieve sustainable livelihood and financial independence.<br><br>Please Refer **Annexure XI.** |
| (xxxv) | If shall be ensured that in-built monitoring mechanism for the schemes identified is in place and annual social audit shall be got done from the nearest government institute of repute in the region. The project proponent shall also submit the status of implementation of the scheme from time to time. | Being complied<br>Audit is being conducted by Indian Institute of Social Welfare and Business Management (IISWBM) of university of Kolkata. Final Social Audit Report is awaited from IISWBM.<br>**Implementation of Social Accountability 8000** ISO SA8000:2014 is on progress. |
| **B** | **General Conditions:** | **Status** |
| (i) | A sewage treatment plant shall be provided (as applicable) and the treated sewage shall be used for raising greenbelt/plantation. | Sewage Treatment Plants (STP) installed within the plant and treated water being utilizing/recycle within the plant remises for plantation and green belt development. |

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| (ii) | Rainwater harvesting should be adopted. Central Groundwater Authority/ Board shall be consulted for finalization of appropriate rainwater harvesting technology within a period of three months from the date of clearance and details shall be furnished. | Being Complied.<br>Rainwater Harvesting (RWH) scheme has been submitted to RO, CGWB, Ahmedabad. We have adopted the scheme and developed rainwater collection & groundwater recharge facilities at three locations within plant premises. |
| (iii) | Adequate safety measures shall be provided in the plant area to check/minimize spontaneous fires in coal yard, especially during summer season. Copy of these measures with full details along with location plant layout shall be submitted to the Ministry as well as to the Regional Office of the Ministry. | Proper fire fighting and fire hydrant system has been provided in the coal stack yard.<br>**Occupational Health & Safety Management System as** ISO 45001:2018 **implemented.** |
| (iv) | Storage facilities for auxiliary liquid fuel such as LDO and /HFO /LSHS shall be made in the plant area in consultation with department of Explosives, Nagpur. Sulphur content in the liquid fuel will not exceed 0.5 %. Disaster Management Plan shall be prepared to meet any eventuality in case of an accident taking place due to storage of oil. | The LDO and HFO/LSHS properly stored in minimum risk area. A Disaster management plan will be prepared covering the all the eventualities in case of accident due to storage of oil. On site plan has already been made and implemented.<br>Disaster management Plan has already been prepared and implemented.<br>**Occupational Health & Safety Management system as** ISO 45001:2018 **implemented.** |
| (v) | Regular monitoring of ground water level shall be carried out be establishing a network of existing wells and constructing new piezometers. Monitoring around the ash pond area shall be carried out particularly for heavy metals (Hg, Cr, As, Pb) and records maintained and submitted to the Regional Office of this Ministry. The data so obtained should be compared with the baseline data so as to ensure that the ground water quality is not adversely affected due to the project. | Being Complied<br><br>Four nos. of Borewell establish around the ash dyke & Ground water quality monitored on regular basis by third party and periodic report being submitted to the MoEF&CC.<br>Please refer **Annexure VIII.** |
| (vi) | First aid and Sanitation arrangement shall be made for the drivers and other contract workers during construction phase. | Complied<br>First aid and sanitation was provided for driver and contract labour during construction. |
| (vii) | Noise levels emanating from turbines | Being complied<br>Necessary action has been taken to |

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| | shall be so controlled such that the noise in the work zone shall be limited to 75 dBA. For people working in the high noise area, requisite personal protective equipment like earplugs/earmuffs etc. shall be provided. Workers engaged in noisy areas such as turbine area, air compressors etc shall be periodically examined to maintain audiometric record and for treatment for any hearing loss including shifting to non noisy/less noisy areas. | maintain noise level 75dB (A). The working personals provided with appropriate personal protective equipment and periodic audiometric check up is being carried out and records are maintained.<br><br>Regular noise level monitoring is being carried out inside the plant locations & monitoring values are well within limits. Please refer **Annexure- I.**<br>**Occupational Health & Safety Management System as** ISO 45001:2018 **implemented.** |
| (viii) | Regular monitoring of ground level concentration of $SO_2$, NOx, $PM_{2.5}$ & $PM_{10}$ and Hg shall be carried out in the impact zone and records maintained. If at any stage these levels are found to exceed the prescribed limits, necessary control measures shall be provided immediately. The location of the monitoring stations and frequency of monitoring shall be decided in consultation with SPCB. Periodic reports shall be submitted to the Regional Office of this Ministry. The data shall also be put on the website of the company. | Being complied.<br>Regular monitoring of PM10, PM2.5, SO2, NOX and Hg is being carried out by third party consultant as well as in house and records are maintained.<br>Online Continuous Ambient Air Quality Monitoring System has been installed at three various locations within the plant premises. Monitoring result is available & within the permissible limits.<br>Monitoring reports being submitted to regional office of the MoEF&CC, CPCB and GPCB periodically. Please refer **Annexure - I** |
| (ix) | Provision shall be made for the 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. | The temporary facilities removed after the Completion of project. |
| (x) | The project proponent shall advertise in at least two local newspapers widely circulated in the region around the project, one of which shall be in the vernacular language of the locality concerned within seven days from the date of this clearance letter, informing that the project has been accorded | Complied.<br>Advertisement published in the local newspaper. |

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| | environmental clearance and copies of clearance letter are available with the State Pollution Control Board/Committee and may also be seen at Website of the Ministry of Environment and Forests at http://envfor.nic.in | |
| (xi) | A copy of the clearance letter shall be sent by the proponent to concern Panchayat, Zila Parisad /Municipal Corporation, urban local Body and the Local NGO, if any, from whom suggestions/representations, if any, received while processing the proposal: The clearance letter shall also be put on the website of the Company by the proponent. | Complied. |
| (xii) | A separate Environment Management cell with qualified staff shall be set up for implementation of the stipulated environment safeguards. | We have established separate environmental monitoring cell with well qualified staff to carry out regular surveillance for implementation of stipulated environmental safeguards and full-fledged Environment Lab accredited with NABL ISO/IEC 17025:2017 to carry out in-house monitoring of Air, Water & Noise as well as terrestrial & marine ecology regularly.<br>**Environment Management System as per EMS ISO 14001: 2015 & Water Efficiency Management System (ISO 46001:2019) implemented.**<br>Terrestrial monitoring report enclosed as **Annexure – II** and Marine monitoring Report is enclosed as **Annexure – III.** |
| (xiii) | 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 SPCB. The criteria pollutant levels namely; SPM, RSPM ($PM_{2.5}$, & $PM_{10}$), $SO_2$, $NO_X$ (ambient levels as well as stack emissions) shall be displayed at a convenient location near the main gate of the company in the | Six monthly Environmental Clearance compliance status report is regularly submitted to MoEF&CC, CPCB and SPCB. The same is sent by email also.<br>Compliance status updated on Company's website.<br>Regular monitoring of $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_X$ and Hg is being carried out by third party and records are maintained.<br>Please refer **Annexure I.**<br>Display board is already installed in main gate. |

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| | public domain. | |
| (xiv) | The project proponent shall also submit six monthly reports on the status of compliance of the stipulated environmental clearance conditions including results of monitored data (both in hard copies as well by e-mail) to the respective Regional Office of MOEF, the respective Zonal office of CPCB and SPCB. | Being Complied<br>Half yearly compliance report is regularly submitted to MoEF, CPCB & SPCB. The same is sent by email also.<br>Compliance status updated on Company's website.<br>Last compliance report was submitted for the period of October'2021 to March 22 had been submitted vide letter no. APL/EMD/EC/MoEFCC /271/05/22 Dated: 25.05.2022. |
| (xv) | The environment 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 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 the Ministry by e-mail. | Being complied,<br>Regular environment statement is being submitted to the Gujarat Pollution Control Board (GPCB).<br>Please refer **Annexure IX.** |
| (xvi) | The project proponent shall submit six monthly reports on the status of the implementation of the stipulated environmental safeguards to the ministry of Environment and Forests, its Regional Office, Central Pollution Control Board and State Pollution Control Board. The project proponent shall upload the status of compliance of the environment of the environmental clearance conditions on their website and update the same periodically and simultaneously send the same by e-mail to the Regional Office, Ministry of Environment and Forests. | Six monthly Environmental Clearance compliance status report is regularly submitted to MoEF&CC, CPCB and SPCB. The same is sent by email also.<br>Compliance status updated on Company's website. |
| (xvii) | Regional Office of Ministry of Environment and Forest will monitor the implementation of the stipulated conditions. A complete set of documents including Environment Impact | Being Complied.<br>Display board already installed in main gate. |

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| | Assessment Report and Environment Management Plan along with the additional information submitted from time to time shall be forwarded to the regional office for their use during monitoring. Project proponent will upload the compliance status in their website and update the same from time to time at least six monthly basis. Criteria pollutants levels including NOx (from stack & ambient air) shall be displayed at the main gate of the power plant. | |
| (xviii) | Separate funds allocated for implementation of environmental protection measures along with item wise breakup. This cost shall be included as part of the project cost. The funds earmarked for the environment protection measures shall not be diverted for other purposes and year wise expenditure should be reported to the Ministry. | Being Complied.<br>Separate funds allocated for environmental protection measures.<br>Expenditures details F.Y. 2021-22 is enclosed as **Annexure-X.** |
| (xix) | The project authorities shall inform the Regional Office as well as the Ministry regarding the date of financial closure and final approval of the project by the Concerned authorities and the dates of start of land development work and commissioning of plant. | Complied |
| (xx) | Full cooperation shall be extended to the scientists/ officers from the Ministry/Regional office of the Ministry at Bangalore/CPCB/ the SPCB who would be monitoring the compliance of environmental status. | Noted,<br>Full co-operation shall be extended to mentioned authority always. |

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adani Power

# ENVIRONMENTAL MONITORING REPORT

## AMBIENT AIR QUALITY, STACK EMISSION, WATER QUALITY AND NOISE MONITORING

**Period: April 2022- June 2022**

**For**


**At**
**Tunda & Siracha,**
**Tal. Mundra, Dist.: Kutch.**
**KUTCH, GUJARAT – 370 435**

**Prepared By**

UniStar Environment & Research Labs Pvt. Ltd.

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| QUALITY CONTROL | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Name of Publication** | Environmental Quality Monitoring Report for the Quarter April 2022- June 2022 | | | | | | |
| **Project Number** | 03 | **Report No.** | UERL/ENV/APR/ 04-06/ 2022 | **Version** | 1 | **Released** | July 2022 |
| **Project Coordinator** | Mr. Bhavin Patel | | | | | | |
| **Prepared By** | Miss. Shweta A. Rana | | | | | | |
| **Checked By** | Mr. Jaivik Tandel | | | | | | |
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**FOR**
**UniStar Environment and**
**Research Labs Pvt. Ltd.**


**Mr. Jaivik Tandel**
**(Authorized By)**

## CONTENTS

## LIST OF GRAPHS

## EXECUTIVE SUMMARY

Adani Power (Mundra) Limited (APMuL) has total generation capacity of 4620MW in phased manner at Mundra Thermal (coal Based) Power Plant near Village Tunda in Mundra, District Kutch, and Gujarat. The phased wise development being undertaken for ultimate capacity of power plant is shown below.

- First Phase : 2 x 330 MW
- Second Phase : 2 x 330 MW + 2 x 660 MW
- Third Phase : 3 x 660 MW

The Thermal Power Plant is located near Village Tunda, Mundra Taluka in Kutch District. The Site is closed to the sea, making cooling water perennially available for the power plant. The Power Plant is based on supercritical technology using imported coal.

All three phase of the power plant is operational and as the part of the compliance to the statutory requirement, M/s. Adani Power(Mundra) Limited has entrusted the environmental quality monitoring study for the area surrounding the power plant. Adani Power (Mundra) Limited Implemented ISO-14001:2015 Environment Management System (EMS) and Accreditation of NABL in Environmental Laboratory (ISO/IEC 17025:2017) vide Certificate No. TC-5215.

Various environmental parameters have been monitored during the period of April 2022 to June 2022.The detail of the environmental parameters along with frequency of monitoring is shown in subsequent sections.

## 1. ENVIRONMENTAL PARAMETERS

| Sr. No. | Environmental Indices | Parameter | No. of Location and Monitoring. | Frequency of Sampling |
|---|---|---|---|---|
| 1. | Ambient Air Quality | $PM_{10}$, $PM_{2.5}$, Sulphur Dioxide and Nitrogen Dioxide | Three Location | Twice a week |
| 2. | Ambient Air Quality | $PM_{10}$, $PM_{2.5}$, Sulphur Dioxide, Nitrogen Dioxide, Ozone and Mercury | Two Location | Once in a month |
| 3. | Stack Monitoring | PM, Sulphur Dioxide, Oxide of Nitrogen and Hg | Nine Location | Once in a month |
| 4. | Meteorological Monitoring | Wind rose, Wind speed, Wind direction, Rainfall, Temperature, Relative Humidity | One location | Round the clock |
| 5. | Surrounding Villages Ground Water Analysis | Colour, Odour, Taste, Turbidity, Dissolved Solids, pH value, Total Hardness, Calcium, Boron, Copper, Iron, Manganese, Chloride, Sulphate, Nitrate, Fluoride, Phenolic Compounds, Mercury, Cadmium, Selenium, Arsenic, Cyanide, Lead, Zinc, Anionic Detergents as MBAS, Chromium Cr+6, Mineral Oil, MPN Index for Coliform Bacteria per 100 ml, Residual Free Chlorine, Aluminium, Alkalinity, Magnesium as Mg, Escherichia Coli in 250 ml. | Five Location | Once in Quarter |
| 6. | Effluent Water Sample | pH, Temperature, colour, SS, O & G, BOD3, COD, Chlorides, TDS, Sulphates, Ammonical Nitrogen, % Sodium, Sodium Absorption Ratio, Sulphides, Total Chromium, Hexavalent Chromium, Copper, Lead, Zinc, Free available chlorine, Phosphate, Iron | Four Location | Once in a month / Quarter |
| 7. | STP Water Analysis | pH, Residual Chlorine, SS, BOD, COD, Faecal coliform | Three Location | Once in month/ Quarter |
| 8. | Borwell water Near Ash Dyke Area | pH @ 25 ° C, Conductivity (µS), Chloride as $Cl^-$ Salinity (ppt), Total Dissolved Solids, Carbonate as CaCO3, Bicarbonate as CaCO3, Mercury as Hg,Arsenic as As, Lead as Pb, Chromium as Cr, Cadmium as Cd. | Four Location | Once in a Quarter |
| 9. | Surrounding Villages Soil Analysis | Magnesium as Mg %, Molybdenium as Mo in ppm, Phosphorus as P %, Calcium as Ca %, Zinc as Zn, Manganese as Mn, Potassium as K%, Nitrogen as N%, Iron as Fe%, Copper as Cu, Boron as B, Sulphurin %, Chloride as Cl%. | Five Location | Once in Six Month |
| 10. | Noise Level Monitoring | Noise level monitoring in dB(A) | 10 Location | Once in a Quarter |
| 11. | Cooling tower | pH @ 25 ° C, Free available chlorine, Zinc as Zn, Hexavalent Chromium, Total Chromium, Phosphate | 09 Location | Once in a Quarter |

## 1.1 AMBIENT AIR QUALITY

The scenario of the Ambient Air Quality in the study region has been assessed through a network of 5locations of Ambient Air Quality Monitoring. The design of monitoring network in the air quality surveillance program was based on the following considerations.

- Topography / Terrain of the study area.
- Human Settlements
- Wind pattern
- Health status
- Representation of regional Background levels.
- Accessibility of monitoring site.
- Resource availability.

Pre-calibrated Respirable Dust Samplers ($PM_{10}$) & Fine Dust Samplers ($PM_{2.5}$) have been used for monitoring the existing AAQM Status. Maximum, Minimum, Average, Standard Deviation and percentile have been computed from the raw data collected at all individual sampling stations to represents the Ambient Air Quality Status.

The significant parameters viz., $PM_{10}$, $PM_{2.5}$, Sulphur Dioxide ($SO_2$) and Nitrogen Dioxides ($NO_2$) and Mercury were monitored within the study area of 10 km from the site.

## 1.2 FLUE GAS MONITORING

All three phases of the Thermal Power Plant is in operation. The flue gas emission from stack attached to individual boiler is monitored once in month during the monitoring period.

## 1.3 WATER QUALITY MONITORING

The water quality parameters as per IS: 10500 for water resource within the study area have been used for describing the water environment and assessing the impacts on it.

Groundwater samples of nearby villages were collected at five locations the parameters of prime importance selected under physicochemical characteristics were estimated to describe the baseline environmental status of the water resources during the monitoring period. Four bore well samples surrounding the ash dyke area were collected during the month of May 2022 along with outfall water sample.

## 1.4 AMBIENT NOISE LEVEL MONITORING

The Ambient Noise levels within the plant premises were relocated at a different location (10 nos.) For the implementation of effective noise control programs.

## 1.5 MICROMETEOROLOGY

Meteorological parameters are important factors in the study of Air Pollution. The Transport and diffusion of the pollutants in the atmosphere are governed by meteorological factors.

Primary / Basic Meteorological Parameters

- Wind Velocity
- Wind Direction

Since the dispersion and diffusion of pollutants mainly depend on the above factors hence these factors are considered as primary meteorological parameters.

Secondary Meteorological Parameters

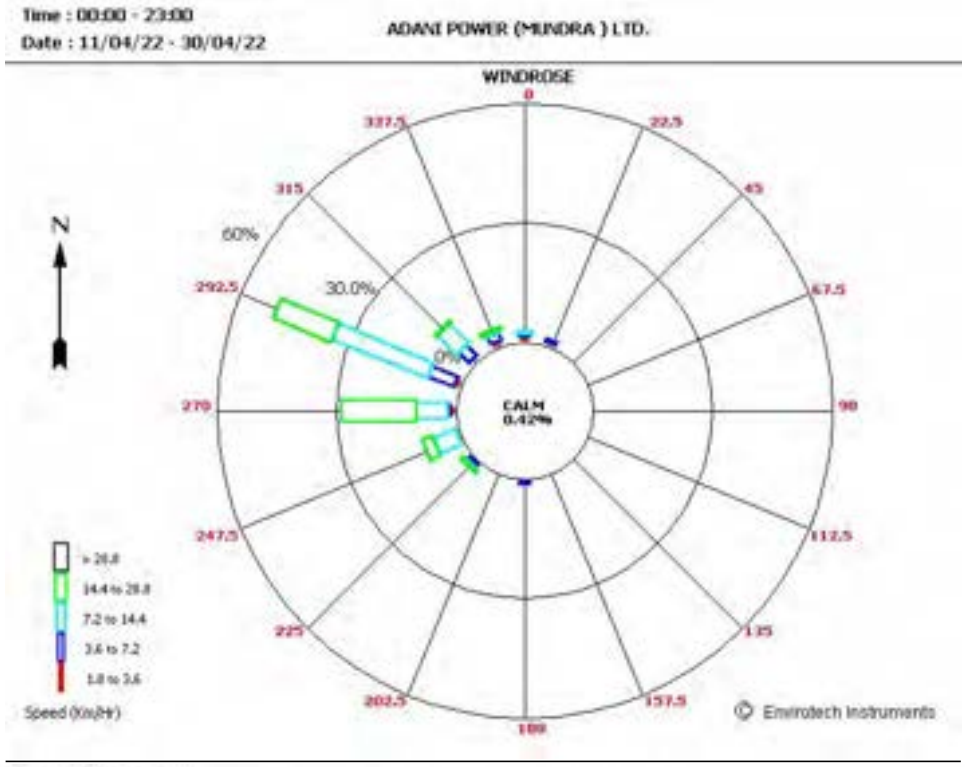
- Relative Humidity
- Ambient Temperature

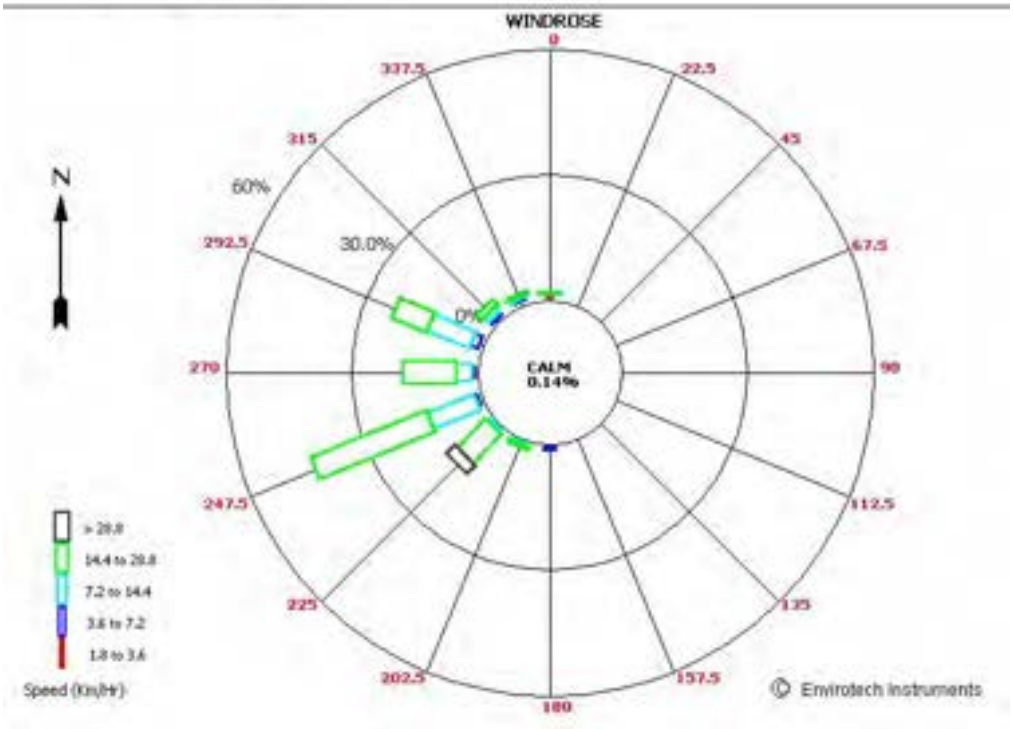
The above-said factors are considered as secondary factors since these factors control the dispersion of the pollutant indirectly by affecting the primary factors.

### 1.5.1 Wind Rose Diagram

| | | | | | |
|---|---|---|---|---|---|
| Project | : | **Adani Power (Mundra) Limited (APMuL)** | **Period** | **:** | April 2022 to June 2022 |
| Location | : | **Village – Tunda, Dist. - Kutch** | | | |
| **April 2022** | | | | | |
| **Wind Direction** | | | **WNW** | | |
| **Average Wind Speed** | | | **11.3 km/hr** | | |
| | | | | | |
| **May 2022** | | | | | |
| **Wind Direction** | | | **WSW** | | |
| **Average Wind Speed** | | | **16.7 km/hr** | | |
| | | | | | |
| **June 2022** | | | | | |
| **Wind Direction** | | | **WSW** | | |
| **Average Wind Speed** | | | **14.0 km/hr** | | |
| | | | | | |

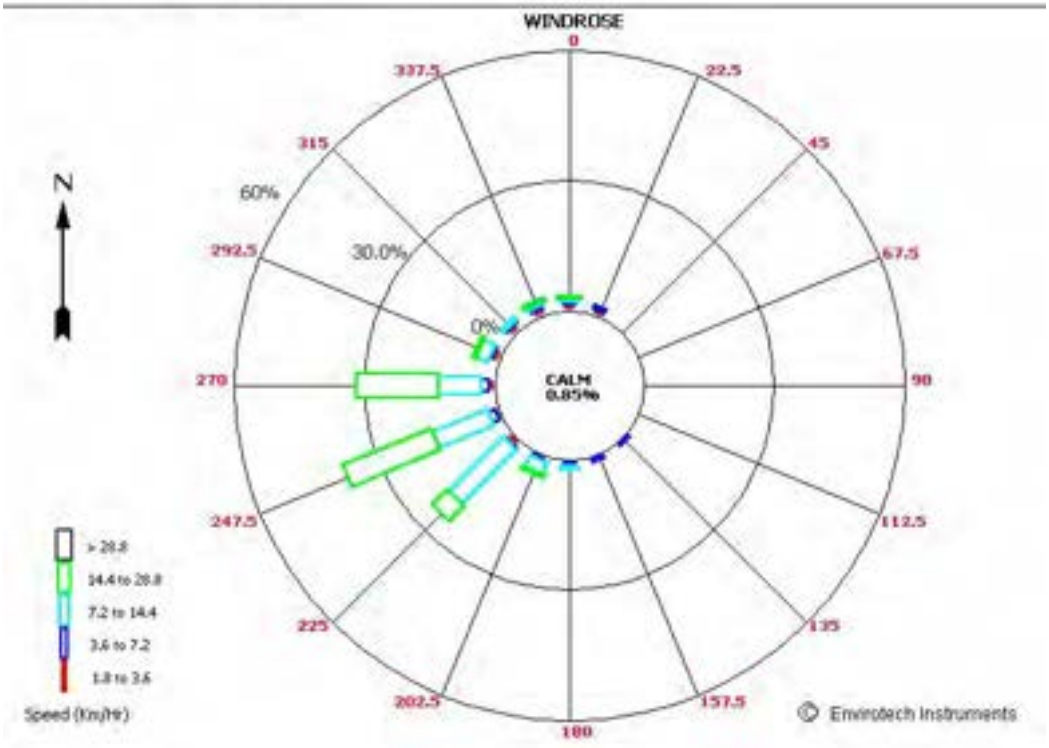
**ADANI POWER (MUNDRA) LIMITED – MUNDRA WINDROSE FOR THE SEASON OF Apr. to June 2022**



Time : 00:00 - 23:00
Date : 01/06/22 - 30/06/22

ADANI POWER (MUNDRA) LIMITED



# 2 SCOPE & METHODOLOGY ADOPTED FOR ENVIRONMENTAL MONITORING

## 2.1 Introduction

The scope of the study includes detailed characterization of various environmental like air, water and noise within an area of 10 km radius in and around the power plant area at 20 MLD Plant, Shantiniketan-1 and surrounding villages named as Siracha, Wandh and Kandagara of Dist. Kutch.

The above-mentioned environmental components were monitored at the study area and frequency of monitoring, number of samples along with methodology is as shown in below table.

## 2.2 Scope and Methodology for Monitoring of Various Environmental Attributes

| Sr. No | Environmental Attributes | Sampling Locations | Sampling Parameters | Sampling Frequency | Total No of samples | Methodology |
|---|---|---|---|---|---|---|
| **1** | Ambient Air Quality | 3 | $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_2$ | Twice a week (24 hourly Samples) | 72 | IS : 5182 & Reference APHA(AIR) |
| **2** | Ambient Air Quality | 5 | $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_2$, $O_3$, Mercury | Once in month (24 hourly Samples) | 15 | IS : 5182 & Reference APHA(AIR) |
| **2** | Flue Gas Stack Analysis | Unit 1 to 9 Boiler | PM, $SO_2$, NOx | Once in month | 27 | As per IS : 11255 |
| **3** | Surrounding Villages Ground Water Analysis | 5 water sample | Test specification as per IS : 10500 - 1991 | Once in Quarter | 5 | AS per APHA Method |
| **4** | Water Quality of Outfall for APMuL | 1 | As per CTO | Once in month | 3 | As Per APHA Method |
| **5** | STP Outlet | 1 | As per CTO | Once in month | 3 | As Per APHA Method |
| **6** | Bore well water Near Ash Dyke Area | 4 | Test specification as per IS : 10500 - 1991 | Once in Quarter | 4 | As Per APHA Method |
| **7** | Cooling Tower Blow down Water Sample | 9 | As per CTO | Once in Quarter | 9 | As Per APHA Method |
| **8** | Condensate Cooling Tower Water Sample | 9 | As per CTO | Once in Quarter | 9 | As Per APHA Method |
| **9** | Boiler Blow down Water Sample | 9 | As per CTO | Once in Quarter | 9 | As Per APHA Method |

# 3 ENVIRONMENAT AIR QUALITY AND FLUE GAS MONITORING

The principle objective of the ambient air quality was to assess the existing levels of the air pollution as well as the regional background concentration in the plant area. Air pollution forms important and critical factors to study the environmental issues in the study areas. Thus, air quality has to be frequently monitored to know the extent of pollution due to power plant activity and other ancillary activities. Details are provided in Section 3.1.1.

Flue gas monitoring analysis has been conducted by UniStar Environment and Research Labs Pvt. Ltd. Details are provided in Section 3.2.

## 3.1 Ambient Air Monitoring Data

### 3.1.1 Details of Ambient Air Quality Monitoring Stations

The detail of the ambient air monitoring locations including the distance from the project site with direction is as shown below.

| S.No. | Code | Name of sampling location | Distance |
|---|---|---|---|
| **1** | A - 1 | Nr.20 MLD Plant | 1.2 Km |
| **2** | A - 2 | Nr. Shantiniketan-1 | 0.8 Km |
| **3** | A - 3 | Kandagara Village | 3.2 km (NW) |
| **4** | A - 4 | Siracha Village | 2.6 km (NE) |
| **5** | A - 5 | Wandh Village | 2.0 km (SW) |

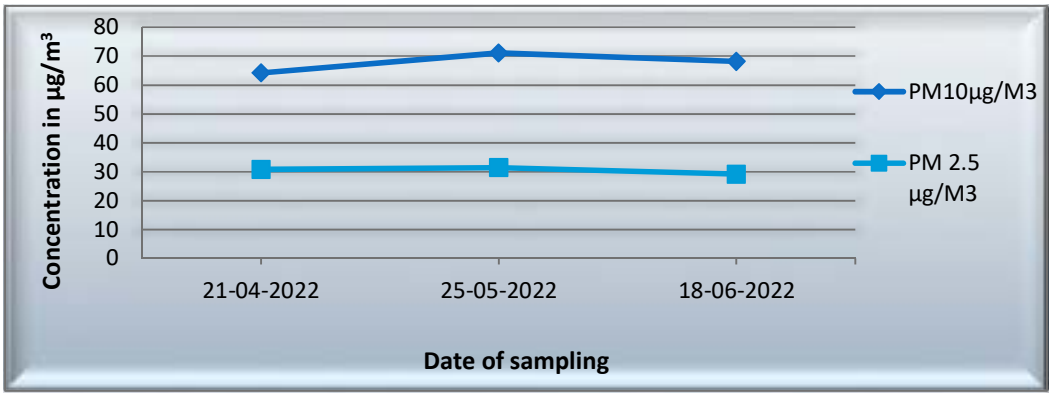
### 3.1.2 Location: Nr.20 MLD Plant

The Sampling station was located in the core zone in Company premises. The Respirable Dust Sampler ($PM_{10}$) & ($PM_{2.5}$) Sampler were placed at a height of 3 m above the ground level. Assess present pollution level the observed levels of $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_2$ and $O_3$ collected during monitoring period (April 2022- June 2022) are as follows:

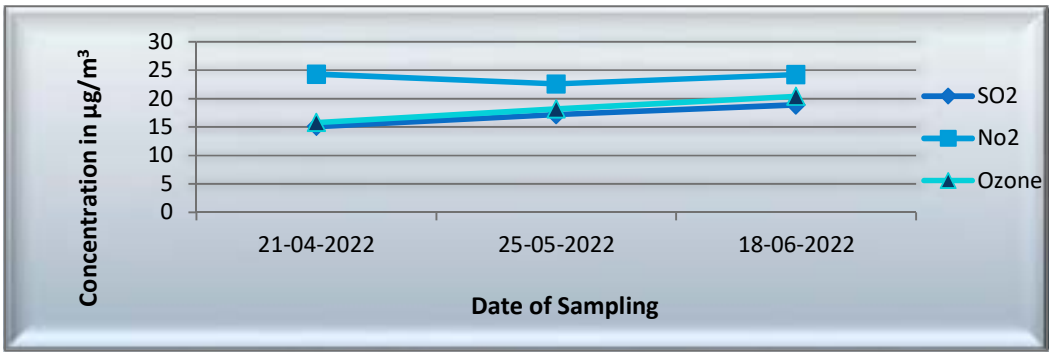
| Observations | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | $NO_2$ | $O_3$ |
|---|---|---|---|---|---|
| **Maximum Value** | **71.1** | **31.4** | **18.9** | **24.3** | **20.4** |
| **Minimum Value** | **64.2** | **29.2** | **15.1** | **22.6** | **15.8** |
| **Average Value** | **67.8** | **30.5** | **17.1** | **23.7** | **18.1** |
| **Standard Deviation** | **3.5** | **1.1** | **1.9** | **1.0** | **2.3** |
| **Permissible Limits** | **100** | **60** | **80** | **80** | **100** |

Units: $\mu g/m^3$

**Graph 1 : Particulate Matter Level Nr.20 MLD Plant**




**Graph 2: SO2, NO2 and $O_3$ Nr.20 MLD Plant**



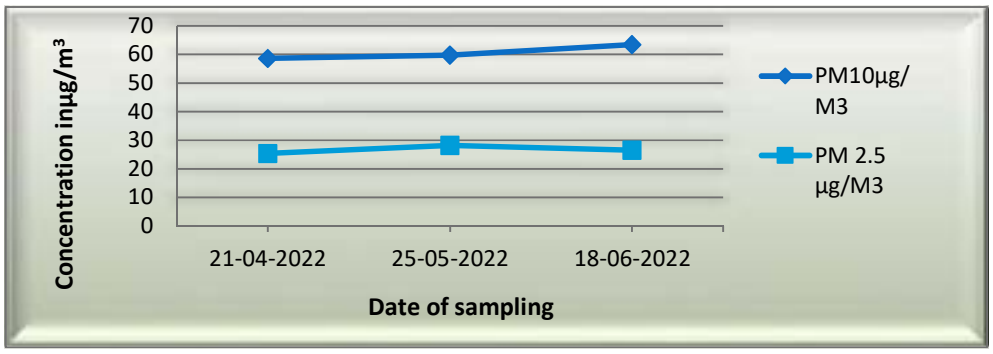
### 3.1.3 Location: Nr. Shantiniketan-1

The Sampling station was located in the core zone in company premises. The Respirable Dust Sampler$PM_{10}$ & $PM_{2.5}$Sampler were placed at a height of 3 m above the ground level. The observed levels of $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_2$ and $O_3$ collected during monitoring period (April 2022- June 2022) are as follows

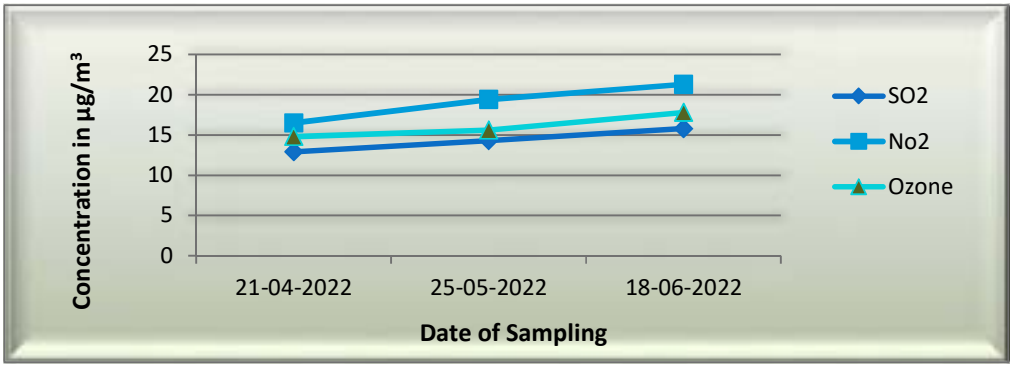
| Observations | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | $NO_2$ | $O_3$ |
|---|---|---|---|---|---|
| **Maximum Value** | **63.4** | **28.2** | **15.8** | **21.3** | **17.8** |
| **Minimum Value** | **58.6** | **25.4** | **12.9** | **16.5** | **14.8** |
| **Average Value** | **60.6** | **26.7** | **14.3** | **19.1** | **16.0** |
| **Standard Deviation** | **2.5** | **1.4** | **1.5** | **2.4** | **1.5** |
| **Permissible Limits** | **100** | **60** | **80** | **80** | **100** |

Units: $\mu g/m^3$

**Graph 3: Particulate Matter Level Nr. Shantiniketan-1**




**Graph 4 : SO2, NO2 and $O_3$ Nr. Shantiniketan-1**



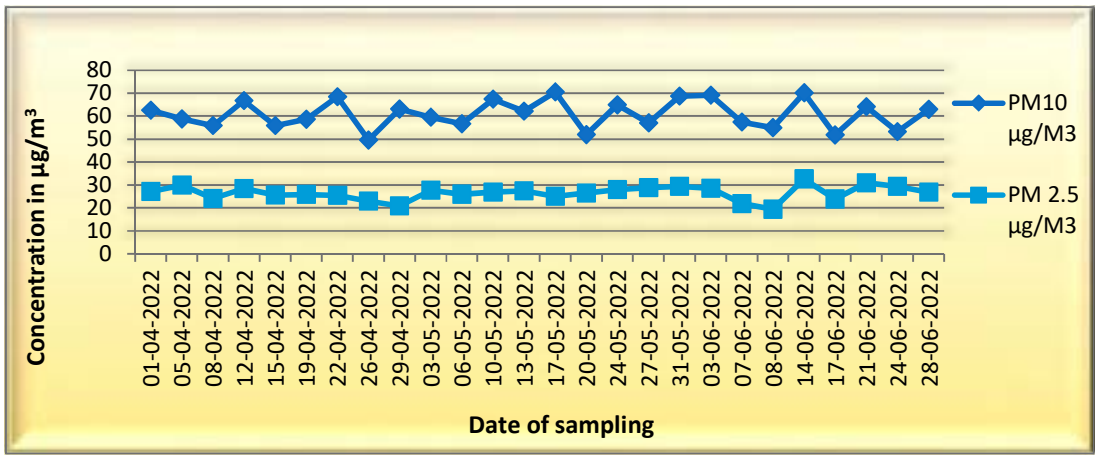
### 3.1.4 Location: Kandagara Village

The Sampling station was located in the core zone. The Station is located at about 3 km away in Northwest Direction from the Company premises. The Respirable Dust Sampler ($PM_{10}$) & $PM_{2.5}$Sampler were placed at a height of 2.5 m above the ground level. The observed levels of $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_2$ and $O_3$ collected during the monitoring period (April 2022- June 2022) are as follows.

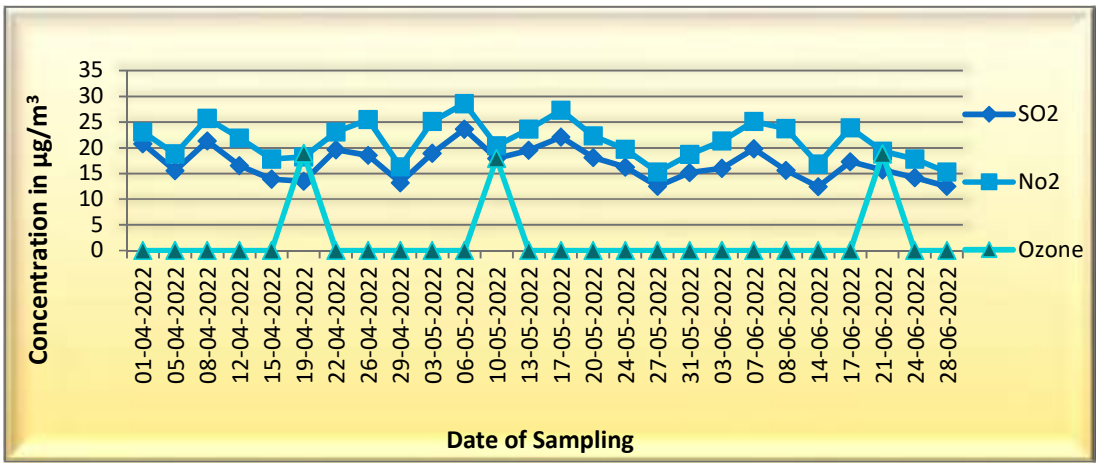
| Observations | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | $NO_2$ | $O_3$ |
|---|---|---|---|---|---|
| **Maximum Value** | **70.5** | **32.6** | **23.6** | **28.6** | **18.9** |
| **Minimum Value** | **49.6** | **19.4** | **12.4** | **15.3** | **17.9** |
| **Average Value** | **60.8** | **26.5** | **16.9** | **21.3** | **18.4** |
| **Standard Deviation** | **6.2** | **3.1** | **3.1** | **3.8** | **0.7** |
| **Permissible Limits** | **100** | **60** | **80** | **80** | **100** |

Units: µg/$m^3$

**Graph 5: Particulate Matter Level Kandagara Village**




**Graph 6 : SO2, NO2 and $O_3$ Level Kandagara Village**



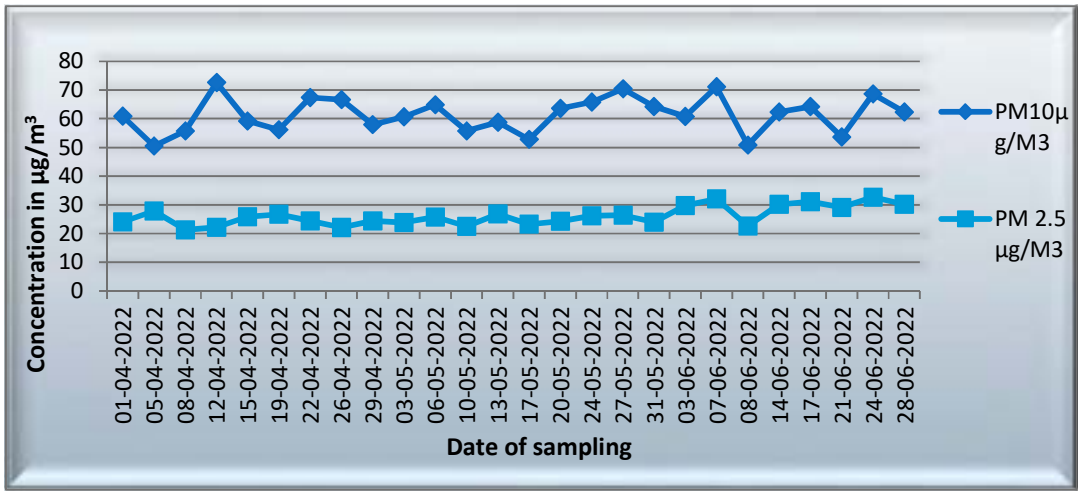
### 3.1.5 Location: Siracha Village

The Sampling station was located in the Siracha village. The Station is located at about 3.5 km away in Northwest Direction from the core zone area. The Respirable Dust Sampler & $PM_{2.5}$ was placed at a height of 3.0 m above the ground level. The observed levels of $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_2$ and $O_3$ collected during the monitoring period (April 2022- June 2022) are as follows.

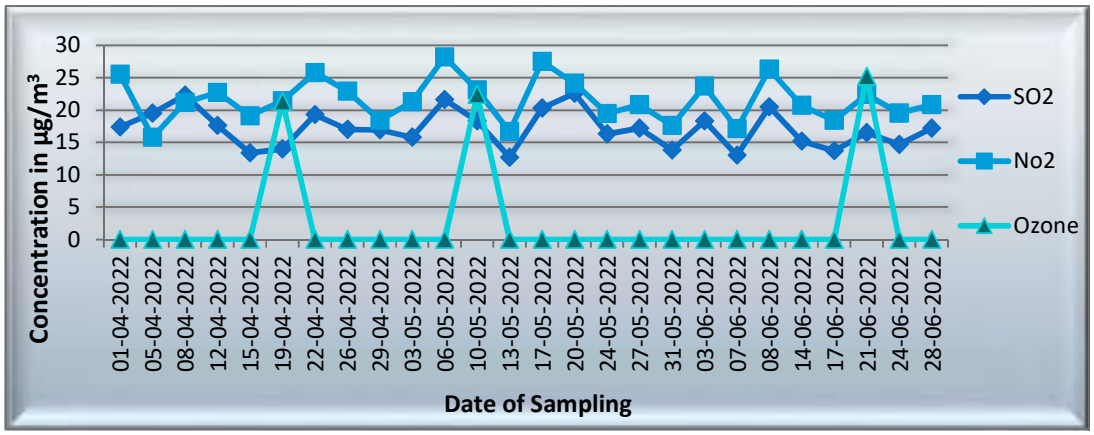
| Observations | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | $NO_2$ | $O_3$ |
|---|---|---|---|---|---|
| Maximum Value | 72.6 | 32.7 | 22.6 | 28.2 | 22.4 |
| Minimum Value | 50.5 | 21.3 | 12.7 | 15.8 | 21.3 |
| Average Value | 61.5 | 26.2 | 17.1 | 21.6 | 21.8 |
| Standard Deviation | 6.2 | 3.3 | 2.9 | 3.4 | 0.7 |
| Permissible Limits | 100 | 60 | 80 | 80 | 100 |

Units: µg/m$^3$

**Graph 7 : Particulate Matter Level Siracha Village**




**Graph 8 : $SO_2$, $NO_2$ and $O_3$ Level Siracha Village**



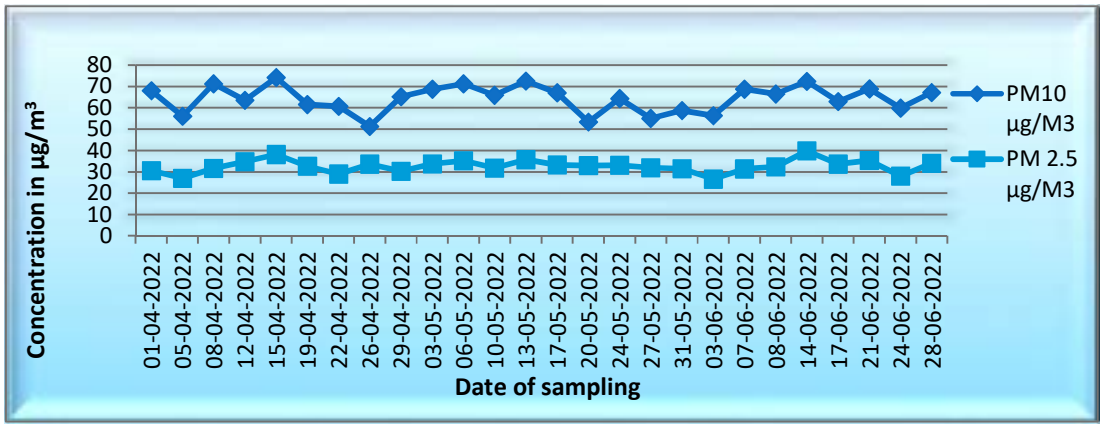
### 3.1.6 Location: Wandh Village

The Sampling station was located in the core zone in Wandh village. The Station is located at about 3.0 km away in Southwest Direction from the Company premises. The Respirable Dust Sampler Was placed at a height of 3.0 m above the ground level. The observed levels of $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_2$ and $O_3$ collected during the monitoring period (April 2022- June 2022) are as follows.

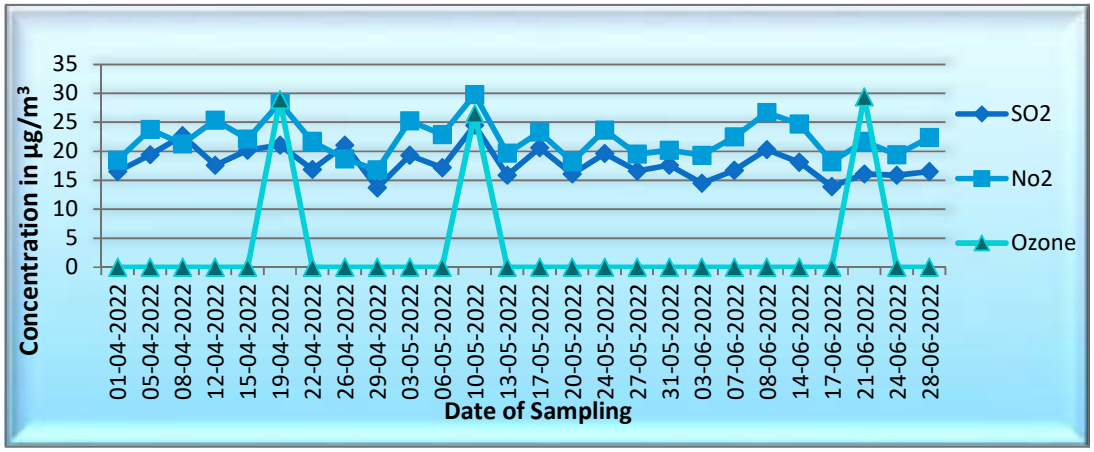
| Observations | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | $NO_2$ | $O_3$ |
|---|---|---|---|---|---|
| Maximum Value | **74.2** | **39.8** | **24.5** | **29.8** | **28.9** |
| Minimum Value | **51.3** | **26.6** | **13.7** | **16.8** | **26.5** |
| Average Value | **64.3** | **32.6** | **18.0** | **22.1** | **27.7** |
| Standard Deviation | **6.4** | **3.1** | **2.7** | **3.3** | **1.6** |
| Permissible Limits | **100** | **60** | **80** | **80** | **100** |

Units: $\mu g/m^3$

**Graph 9 : Particulate Matter Level Wandh Village**




**Graph 10 : $SO_2$, $NO_2$ and $O_3$ Level Wandh Village**



### 3.1.7 Ambient Air Quality Monitoring (Parameters- Mercury & Ozone)

| Location | April -2022 | | | May-2022 | | | June-2022 | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Date** | **Ozone (O3) µg/m3** | **Mercury (Hg) µg/m3** | **Date** | **Ozone (O3) µg/m3** | **Mercury (Hg) µg/m3** | **Date** | **Ozone (O3) µg/m3** | **Mercury (Hg) µg/m3** |
| Village Kandagara | **19.04.22** | 18.9 | BDL | **10.05.22** | 17.9 | BDL | **21.06.22** | 18.8 | BDL |
| Village Wandh | **19.04.22** | 28.9 | BDL | **10.05.22** | 26.5 | BDL | **21.06.22** | 29.4 | BDL |
| Village Siracha | **19.04.22** | 21.3 | BDL | **10.05.22** | 22.4 | BDL | **21.06.22** | 25.2 | BDL |
| Nr. 20 MLD Plant | **21.04.22** | 15.8 | BDL | **25.05.22** | 18.4 | BDL | **18.06.22** | 20.4 | BDL |
| Nr. Shantiniketan-1 | **21.04.22** | 14.8 | BDL | **25.05.22** | 15.6 | BDL | **18.06.22** | 17.8 | BDL |
| Remark**: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.** | | | | | | | | | |
| Analysis Method Reference : | | | | | | | | | |
| **Hg : AAS by VGA Method -3112 B APHA 22 Edition : BDL Limit** Hg **: 2 ppb** | | | | | | | | | |
| **$O_3$ : IS - 5182 (part 9) 2009 Ozone BDL limit: 5 µg/m$^3$** | | | | | | | | | |

### 3.2 Flue Gas Monitoring Data

Stack monitoring has been carried out by UniStar environment & Research Pvt. Ltd.

| Date | Location | PM in mg/Nm$^3$ | $SO_2$ in mg/Nm$^3$ | $NO_x$ in mg/Nm$^3$ |
|---|---|---|---|---|
| **18-04-2022** | Boiler (Unit - 1) | 31.8 | 528.9 | 248.9 |
| **04-05-2022** | Boiler (Unit - 1) | 30.2 | 548.6 | 248.6 |
| **18-04-2022** | Boiler (Unit - 2) | 33.4 | 542.6 | 271.4 |
| **04-05-2022** | Boiler (Unit - 2) | 31.5 | 536.4 | 252.4 |
| **22-04-2022** | Boiler (Unit - 3) | 41.3 | 512.7 | 276.9 |
| **09-05-2022** | Boiler (Unit - 3) | 39.2 | 513.6 | 268.7 |
| **22-04-2022** | Boiler (Unit - 4) | 37.8 | 501.3 | 264.7 |
| **09-05-2022** | Boiler (Unit - 4) | 30.3 | 502.6 | 276.4 |
| **27-04-2022** | Boiler (Unit - 5) | 36.7 | 484.9 | 289.4 |
| **25-05-2022** | Boiler (Unit - 5) | 37.4 | 514.8 | 285.6 |
| **20-06-2022** | Boiler (Unit - 5) | 32.1 | 468.9 | 274.8 |
| **27-04-2022** | Boiler (Unit - 6) | 38.9 | 506.4 | 272.6 |
| **31-05-2022** | Boiler (Unit - 6) | 35.7 | 522.4 | 255.3 |
| **24-06-2022** | Boiler (Unit -6) | 37.2 | 512.7 | 282.5 |
| **13-05-2022** | Boiler (Unit - 7) | 34.8 | 184.3 | 261.4 |
| **09-06-2022** | Boiler (Unit - 7) | 38.6 | 168.9 | 255.7 |
| **14-06-2022** | Boiler (Unit -8) | 34.7 | 185.6 | 263.3 |
| **31-05-2022** | Boiler (Unit - 9) | 33.1 | 156.3 | 244.6 |
| **09-06-2022** | Boiler (Unit - 9) | 35.4 | 164.9 | 270.4 |
| Permissible Limits | | **50** | **<500 MWH-600**<br>**>500 MWH-200** | **450** |

## 3.3 Ground Water Quality Monitoring

**3.3.1 Location: Tunda Village Water Sample** **DATE: 27/05/2022**

| Sr. No. | Parameter | Unit | Results | Desirable Limits | Permissible limit in the absence of alternate source |
|---|---|---|---|---|---|
| **1** | pH @ 25 | - | 7.65 | 6.5 – 8.5 | 6.5 – 8.5 |
| **2** | Color | Pt-Co | 10 | 5 | 15 |
| **3** | Odor | mg/L | Agreeable | Unobjectionable | Unobjectionable |
| **4** | Taste | mg/L | Agreeable | Agreeable | Agreeable |
| **5** | Turbidity(NTU) | mg/L | BDL(MDL:0.1) | 1 NTU | 5 NTU |
| **6** | Total Hardness as $CaCO_3$ | mg/L | 147.3 | 200 mg/lit. | 600 mg/lit. |
| **7** | Calcium as Ca | mg/L | 32.9 | 75 mg/lit. | 200 mg/lit. |
| **8** | Magnesium as Mg | mg/L | 17.1 | 30 mg/lit. | 100 mg/lit. |
| **9** | Total Dissolved Solids | mg/L | 1560 | 500 mg/lit. | 2000 mg/lit. |
| **10** | Total Alkalinity | mg/L | 387.6 | 200 mg/lit. | 600 mg/lit. |
| **11** | Chloride as $Cl^-$ | mg/L | 523.4 | 250 mg/lit. | 1000 mg/lit. |
| **12** | Sulphate as $SO_4^{-2}$ | mg/L | 172.2 | 200 mg/lit. | 400 mg/lit. |
| **13** | Nitrate as $NO_3$ | mg/L | 4.4 | 45 mg/lit. | 45 mg/lit. |
| **14** | Copper as Cu | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 1.5 mg/lit. |
| **15** | Manganese as Mn | mg/L | BDL(MDL:0.1) | 0.1 mg/lit. | 0.3 mg/lit. |
| **16** | Iron as Fe | mg/L | BDL(MDL:0.1) | 0.3 mg/lit. | 0.3 mg/lit. |
| **17** | Residual Free Chlorine | mg/L | 0.30 | 0.2 mg/lit. | 1.0 mg/lit. |
| **18** | Fluoride as F | mg/L | 0.74 | 1.0 mg/lit. | 1.5 mg/lit. |
| **19** | Zinc as Zn | mg/L | BDL(MDL:0.05) | 5 mg/lit. | 15 mg/lit. |
| **20** | Phenolic Compound | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.002 mg/lit. |
| **21** | Mercury as Hg | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.001 mg/lit. |
| **22** | Cadmium as Cd | mg/L | BDL(MDL:0.003) | 0.003 mg/lit. | 0.003 mg/lit. |
| **23** | Selenium as Se | mg/L | N.D. | 0.01 mg/lit. | 0.01 mg/lit. |
| **24** | Arsenic as as | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | 0.05 mg/lit. |
| **25** | Cyanide as CN | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **26** | Lead as Pb | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | 0.01 mg/lit. |
| **27** | Anionic Detergent | mg/L | N.D. | 0.2 mg/lit. | 1.0 mg/lit. |
| **28** | Hexavalent Chromium | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **29** | Mineral Oil | mg/L | N.D. | 0.5 mg/lit. | 0.5 mg/lit. |
| **30** | Aluminum as Al | mg/L | BDL(MDL:0.003) | 0.03 mg/lit. | 0.2 mg/lit. |
| **31** | Boron as B | mg/L | BDL(MDL:0.5) | 0.5 mg/lit. | 1 mg/lit. |
| **32** | Total Chromium as Cr | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **33** | Total Coliform | (CFU/100 ml) | Absent | Absent | Absent |
| **34** | E. coli | (CFU/100 ml) | Absent | Absent | Absent |
| **35** | Total Bacterial Count | (CFU/ml) | 14 | 100 CFU/ml | 100 CFU/ml |
| **Note: BDL= Below Detection Limit. N.D. = Not Detected** | | | | | |

**3.3.2 Location: Kandagra Village Water Sample** **DATE: 26/02/2022**

| Sr. No. | Parameter | Unit | Results | Desirable Limits | Permissible limit in the absence of alternate source |
|---|---|---|---|---|---|
| **1** | pH @ 25 | - | 7.52 | 6.5 – 8.5 | 6.5 – 8.5 |
| **2** | Color | Pt-Co | 10 | 5 | 15 |
| **3** | Odor | mg/L | Agreeable | Unobjectionable | Unobjectionable |
| **4** | Taste | mg/L | Agreeable | Agreeable | Agreeable |
| **5** | Turbidity(NTU) | mg/L | BDL(MDL:0.1) | 1 NTU | 5 NTU |
| **6** | Total Hardness as $CaCO_3$ | mg/L | 158.9 | 200 mg/lit. | 600 mg/lit. |
| **7** | Calcium as Ca | mg/L | 36.2 | 75 mg/lit. | 200 mg/lit. |
| **8** | Magnesium as Mg | mg/L | 27.0 | 30 mg/lit. | 100 mg/lit. |
| **9** | Total Dissolved Solids | mg/L | 1510 | 500 mg/lit. | 2000 mg/lit. |
| **10** | Total Alkalinity | mg/L | 402.1 | 200 mg/lit. | 600 mg/lit. |
| **11** | Chloride as $Cl^-$ | mg/L | 407.3 | 250 mg/lit. | 1000 mg/lit. |
| **12** | Sulphate as $SO_4^{-2}$ | mg/L | 145.6 | 200 mg/lit. | 400 mg/lit. |
| **13** | Nitrate as $NO_3$ | mg/L | 3.7 | 45 mg/lit. | 45 mg/lit. |
| **14** | Copper as Cu | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 1.5 mg/lit. |
| **15** | Manganese as Mn | mg/L | BDL(MDL:0.1) | 0.1 mg/lit. | 0.3 mg/lit. |
| **16** | Iron as Fe | mg/L | BDL(MDL:0.1) | 0.3 mg/lit. | 0.3 mg/lit. |
| **17** | Residual Free Chlorine | mg/L | 0.38 | 0.2 mg/lit. | 1.0 mg/lit. |
| **18** | Fluoride as F | mg/L | 0.86 | 1.0 mg/lit. | 1.5 mg/lit. |
| **19** | Zinc as Zn | mg/L | BDL(MDL:0.05) | 5 mg/lit. | 15 mg/lit. |
| **20** | Phenolic Compound | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.002 mg/lit. |
| **21** | Mercury as Hg | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.001 mg/lit. |
| **22** | Cadmium as Cd | mg/L | BDL(MDL:0.003) | 0.003 mg/lit. | N.D.(MDL:0.001) |
| **23** | Selenium as Se | mg/L | N.D. | 0.01 mg/lit. | N.D. |
| **24** | Arsenic as as | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | N.D.(MDL:0.01) |
| **25** | Cyanide as CN | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | N.D. |
| **26** | Lead as Pb | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | N.D.(MDL:0.003) |
| **27** | Anionic Detergent | mg/L | N.D. | 0.2 mg/lit. | N.D. |
| **28** | Hexavalent Chromium | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | N.D.(MDL:0.1) |
| **29** | Mineral Oil | mg/L | N.D. | 0.5 mg/lit. | N.D. |
| **30** | Aluminum as Al | mg/L | BDL(MDL:0.003) | 0.03 mg/lit. | N.D. |
| **31** | Boron as B | mg/L | BDL(MDL:0.5) | 0.5 mg/lit. | N.D. |
| **32** | Total Chromium as Cr | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | N.D.(MDL:0.001) |
| **33** | Total Coliform | (CFU/100 ml) | Absent | Absent | Absent |
| **34** | E. coli | (CFU/100 ml) | Absent | Absent | Absent |
| **35** | Total Bacterial Count | (CFU/ml) | 12 | 100 CFU/ml | 100 CFU/ml |
| **Note: BDL= Below Detection Limit. N.D. = Not Detected** | | | | | |

**3.3.3Location: Siracha Village Water Sample** **DATE: 26/02/2022**

| Sr. No. | Parameter | Unit | Results | Desirable Limits | Permissible limit in the absence of alternate source |
|---|---|---|---|---|---|
| **1** | pH @ 25 | - | 7.35 | 6.5 – 8.5 | 6.5 – 8.5 |
| **2** | Color | Pt-Co | 10 | 5 | 15 |
| **3** | Odour | mg/L | Agreeable | Unobjectionable | Unobjectionable |
| **4** | Taste | mg/L | Agreeable | Agreeable | Agreeable |
| **5** | Turbidity(NTU) | mg/L | BDL(MDL:0.1) | 1 NTU | 5 NTU |
| **6** | Total Hardness as $CaCO_3$ | mg/L | 346.9 | 200 mg/lit. | 600 mg/lit. |
| **7** | Calcium as Ca | mg/L | 65.8 | 75 mg/lit. | 200 mg/lit. |
| **8** | Magnesium as Mg | mg/L | 48.5 | 30 mg/lit. | 100 mg/lit. |
| **9** | Total Dissolved Solids | mg/L | 1490 | 500 mg/lit. | 2000 mg/lit. |
| **10** | Total Alkalinity | mg/L | 416.3 | 200 mg/lit. | 600 mg/lit. |
| **11** | Chloride as $Cl^-$ | mg/L | 397.4 | 250 mg/lit. | 1000 mg/lit. |
| **12** | Sulphate as $SO_4^{-2}$ | mg/L | 201.2 | 200 mg/lit. | 400 mg/lit. |
| **13** | Nitrate as $NO_3$ | mg/L | 4.1 | 45 mg/lit. | 45 mg/lit. |
| **14** | Copper as Cu | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 1.5 mg/lit. |
| **15** | Manganese as Mn | mg/L | BDL(MDL:0.1) | 0.1 mg/lit. | 0.3 mg/lit. |
| **16** | Iron as Fe | mg/L | BDL(MDL:0.1) | 0.3 mg/lit. | 0.3 mg/lit. |
| **17** | Residual Free Chlorine | mg/L | 0.38 | 0.2 mg/lit. | 1.0 mg/lit. |
| **18** | Fluoride as F | mg/L | 0.71 | 1.0 mg/lit. | 1.5 mg/lit. |
| **19** | Zinc as Zn | mg/L | BDL(MDL:0.05) | 5 mg/lit. | 15 mg/lit. |
| **20** | Phenolic Compound | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.002 mg/lit. |
| **21** | Mercury as Hg | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.001 mg/lit. |
| **22** | Cadmium as Cd | mg/L | BDL(MDL:0.003) | 0.003 mg/lit. | 0.003 mg/lit. |
| **23** | Selenium as Se | mg/L | N.D. | 0.01 mg/lit. | 0.01 mg/lit. |
| **24** | Arsenic as as | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | 0.05 mg/lit. |
| **25** | Cyanide as CN | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **26** | Lead as Pb | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | 0.01 mg/lit. |
| **27** | Anionic Detergent | mg/L | N.D. | 0.2 mg/lit. | 1.0 mg/lit. |
| **28** | Hexavalent Chromium | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **29** | Mineral Oil | mg/L | N.D. | 0.5 mg/lit. | 0.5 mg/lit. |
| **30** | Aluminum as Al | mg/L | BDL(MDL:0.003) | 0.03 mg/lit. | 0.2 mg/lit. |
| **31** | Boron as B | mg/L | BDL(MDL:0.5) | 0.5 mg/lit. | 1 mg/lit. |
| **32** | Total Chromium as Cr | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **33** | Total Coliform | (CFU/100 ml) | Absent | Absent | Absent |
| **34** | E. coli | (CFU/100 ml) | Absent | Absent | Absent |
| **35** | Total Bacterial Count | (CFU/ml) | 10 | 100 CFU/ml | 100 CFU/ml |

Note: BDL= Below Detection Limit. N.D. = Not Detected

**3.3.4 Location: Navinal Village Water Sample** **DATE: 26/02/2022**

| Sr. No. | Parameter | Unit | Results | Desirable Limits | Permissible limit in the absence of alternate source |
|---|---|---|---|---|---|
| **1** | pH @ 25 | - | 7.52 | 6.5 – 8.5 | 6.5 – 8.5 |
| **2** | Colour | Pt-Co | 10 | 5 | 15 |
| **3** | Odour | mg/L | Agreeable | Unobjectionable | Unobjectionable |
| **4** | Taste | mg/L | Agreeable | Agreeable | Agreeable |
| **5** | Turbidity(NTU) | mg/L | BDL(MDL:0.1) | 1 NTU | 5 NTU |
| **6** | Total Hardness as $CaCO_3$ | mg/L | 176.7 | 200 mg/lit. | 600 mg/lit. |
| **7** | Calcium as Ca | mg/L | 41.9 | 75 mg/lit. | 200 mg/lit. |
| **8** | Magnesium as Mg | mg/L | 18.8 | 30 mg/lit. | 100 mg/lit. |
| **9** | Total Dissolved Solids | mg/L | 1430 | 500 mg/lit. | 2000 mg/lit. |
| **10** | Total Alkalinity | mg/L | 252.6 | 200 mg/lit. | 600 mg/lit. |
| **11** | Chloride as $Cl^-$ | mg/L | 417.5 | 250 mg/lit. | 1000 mg/lit. |
| **12** | Sulphate as $SO_4^{-2}$ | mg/L | 125.2 | 200 mg/lit. | 400 mg/lit. |
| **13** | Nitrate as $NO_3$ | mg/L | 2.7 | 45 mg/lit. | 45 mg/lit. |
| **14** | Copper as Cu | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 1.5 mg/lit. |
| **15** | Manganese as Mn | mg/L | BDL(MDL:0.1) | 0.1 mg/lit. | 0.3 mg/lit. |
| **16** | Iron as Fe | mg/L | BDL(MDL:0.1) | 0.3 mg/lit. | 0.3 mg/lit. |
| **17** | Residual Free Chlorine | mg/L | 0.32 | 0.2 mg/lit. | 1.0 mg/lit. |
| **18** | Fluoride as F | mg/L | 0.63 | 1.0 mg/lit. | 1.5 mg/lit. |
| **19** | Zinc as Zn | mg/L | BDL(MDL:0.05) | 5 mg/lit. | 15 mg/lit. |
| **20** | Phenolic Compound | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.002 mg/lit. |
| **21** | Mercury as Hg | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.001 mg/lit. |
| **22** | Cadmium as Cd | mg/L | BDL(MDL:0.003) | 0.003 mg/lit. | 0.003 mg/lit. |
| **23** | Selenium as Se | mg/L | N.D. | 0.01 mg/lit. | 0.01 mg/lit. |
| **24** | Arsenic as as | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | 0.05 mg/lit. |
| **25** | Cyanide as CN | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **26** | Lead as Pb | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | 0.01 mg/lit. |
| **27** | Anionic Detergent | mg/L | N.D. | 0.2 mg/lit. | 1.0 mg/lit. |
| **28** | Hexavalent Chromium | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **29** | Mineral Oil | mg/L | N.D. | 0.5 mg/lit. | 0.5 mg/lit. |
| **30** | Aluminum as Al | mg/L | BDL(MDL:0.003) | 0.03 mg/lit. | 0.2 mg/lit. |
| **31** | Boron as B | mg/L | BDL(MDL:0.5) | 0.5 mg/lit. | 1 mg/lit. |
| **32** | Total Chromium as Cr | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **33** | Total Coliform | (CFU/100 ml) | Absent | Absent | Absent |
| **34** | E. coli | (CFU/100 ml) | Absent | Absent | Absent |
| **35** | Total Bacterial Count | (CFU/ml) | 10 | 100 CFU/ml | 100 CFU/ml |

Note: BDL= Below Detection Limit. N.D. = Not Detected

**3.3.5Location: Desalpur Village Water Sample** **DATE: 26/02/2022**

| Sr. No. | Parameter | Unit | Results | Desirable Limits | Permissible limit in the absence of alternate source |
|---|---|---|---|---|---|
| **1** | pH @ 25 | - | 7.65 | 6.5 – 8.5 | 6.5 – 8.5 |
| **2** | Color | Pt-Co | 10 | 5 | 15 |
| **3** | Odor | mg/L | Agreeable | Unobjectionable | Unobjectionable |
| **4** | Taste | mg/L | Agreeable | Agreeable | Agreeable |
| **5** | Turbidity(NTU) | mg/L | BDL(MDL:0.1) | 1 NTU | 5 NTU |
| **6** | Total Hardness as $CaCO_3$ | mg/L | 191.4 | 200 mg/lit. | 600 mg/lit. |
| **7** | Calcium as Ca | mg/L | 36.6 | 75 mg/lit. | 200 mg/lit. |
| **8** | Magnesium as Mg | mg/L | 23.3 | 30 mg/lit. | 100 mg/lit. |
| **9** | Total Dissolved Solids | mg/L | 1420 | 500 mg/lit. | 2000 mg/lit. |
| **10** | Total Alkalinity | mg/L | 394.2 | 200 mg/lit. | 600 mg/lit. |
| **11** | Chloride as $Cl^-$ | mg/L | 432.0 | 250 mg/lit. | 1000 mg/lit. |
| **12** | Sulphate as $SO_4^{-2}$ | mg/L | 162.3 | 200 mg/lit. | 400 mg/lit. |
| **13** | Nitrate as $NO_3$ | mg/L | 3.7 | 45 mg/lit. | 45 mg/lit. |
| **14** | Copper as Cu | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 1.5 mg/lit. |
| **15** | Manganese as Mn | mg/L | BDL(MDL:0.1) | 0.1 mg/lit. | 0.3 mg/lit. |
| **16** | Iron as Fe | mg/L | BDL(MDL:0.1) | 0.3 mg/lit. | 0.3 mg/lit. |
| **17** | Residual Free Chlorine | mg/L | 0.31 | 0.2 mg/lit. | 1.0 mg/lit. |
| **18** | Fluoride as F | mg/L | 0.52 | 1.0 mg/lit. | 1.5 mg/lit. |
| **19** | Zinc as Zn | mg/L | BDL(MDL:0.05) | 5 mg/lit. | 15 mg/lit. |
| **20** | Phenolic Compound | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.002 mg/lit. |
| **21** | Mercury as Hg | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.001 mg/lit. |
| **22** | Cadmium as Cd | mg/L | BDL(MDL:0.003) | 0.003 mg/lit. | 0.003 mg/lit. |
| **23** | Selenium as Se | mg/L | N.D. | 0.01 mg/lit. | 0.01 mg/lit. |
| **24** | Arsenic as as | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | 0.05 mg/lit. |
| **25** | Cyanide as CN | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **26** | Lead as Pb | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | 0.01 mg/lit. |
| **27** | Anionic Detergent | mg/L | N.D. | 0.2 mg/lit. | 1.0 mg/lit. |
| **28** | Hexavalent Chromium | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **29** | Mineral Oil | mg/L | N.D. | 0.5 mg/lit. | 0.5 mg/lit. |
| **30** | Aluminum as Al | mg/L | BDL(MDL:0.003) | 0.03 mg/lit. | 0.2 mg/lit. |
| **31** | Boron as B | mg/L | BDL(MDL:0.5) | 0.5 mg/lit. | 1 mg/lit. |
| **32** | Total Chromium as Cr | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **33** | Total Coliform | (CFU/100 ml) | Absent | Absent | Absent |
| **34** | E. coli | (CFU/100 ml) | Absent | Absent | Absent |
| **35** | Total Bacterial Count | (CFU/ml) | 14 | 100 CFU/ml | 100 CFU/ml |

Note: Colour = 1(10) = 10 APHA, BDL= Below Detection Limit. N.D. = Not Detected

## 3.4 Water Quality Monitoring – Plant area

### 3.4.1 Location: Outfall Channel

| Sr. No. | Parameter | Unit | Date of sampling | |
|---|---|---|---|---|
| | | | **16/04/2021** | **23/06/2021** |
| **1** | pH @ 25 | -- | 8.16 | 8.16 |
| **2** | Temperature | $^0$C (Intake) | 28.5 | 30.0 |
| | | $^0$C (Outfall) | 31.0 | 32.0 |
| | | $^0$C (Differential) | 2.5 | 2.0 |
| **3** | Color | Pt. CO. Scale | 10 | 10 |
| **4** | Total Suspended Solids | mg/L | 24 | 22 |
| **5** | Oil & Grease | mg/L | BDL(MDL:2.0) | BDL(MDL:2.0) |
| **6** | Ammonical Nitrogen | mg/L | BDL(MDL:2.0) | BDL(MDL:2.0) |
| **7** | Sulphide as S-2 | mg/L | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **8** | Total Chromium | mg/L | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **9** | Hexavalent Chromium as Cr+6 | mg/L | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **10** | Phosphate as $PO_4$ | mg/L | 0.21 | 0.27 |
| **11** | Lead as Pb | mg/L | 0.038 | 0.032 |
| **12** | Copper as Cu | mg/L | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **13** | Zinc as Zn | mg/L | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **14** | Iron (as Fe) | mg/L | 0.124 | 0.117 |
| **15** | Chemical Oxygen Demand(COD) | mg/L | 40.3 | 16.0 |
| **16** | Biochemical Oxygen Demand (BOD) | mg/L | 12 | 4 |

### 3.4.2 Location: STP Outlet Water Sample;

| Sr. No. | Parameter | Unit | SPCB Limit | Date of sampling | | |
|---|---|---|---|---|---|---|
| | | | | **16/04/2022** | **25/05/2022** | **15/06/2022** |
| **1** | pH @ 25 ° C | -- | **6.5-8.5** | 7.39 | 7.48 | 7.26 |
| **2** | Total Suspended Solids | mg/L | **30** | 18 | 14 | 22 |
| **3** | Residual Chlorine | mg/L | **0.5 Min.** | 0.69 | 0.60 | 0.80 |
| **4** | Biochemical Oxygen Demand (BOD) | mg/L | **20** | 17 | 13 | 14 |
| **5** | Fecal Coliform | CFU/100ml | **<1000** | 34 | 30 | 28 |

**3.4.3 Location: ETP Outlet Water Sample;**

| S.N | Parameter | Unit | SPCB Limit | Date of sampling | | |
|---|---|---|---|---|---|---|
| | | | | **16/04/2022** | **25/05/2022** | **06/06/2022** |
| **1** | pH @ 25 | -- | **6.5 – 8.5** | 7.17 | 7.22 | 7.17 |
| **2** | Temperature | ° C | **40 Max.** | 30 | 32 | 30 |
| **3** | Color | Pt. CO. Scale | **100 Max.** | 15 | 10 | 10 |
| **4** | Total Suspended Solids | mg/L | **100 Max.** | 14 | 08 | 12 |
| **5** | Oil & Grease | mg/L | **10 Max.** | BDL(MDL:2.0) | BDL(MDL:2.0) | BDL(MDL:2.0) |
| **6** | Chemical Oxygen Demand (COD) | mg/L | **100 Max.** | 33.2 | 46.5 | 28.1 |
| **7** | Biochemical Oxygen Demand (BOD) | mg/L | **30 Max.** | 10 | 1.8 | 7 |
| **8** | Chloride as $Cl^-$ | mg/L | **600 Max.** | 387.6 | 395.8 | 364.8 |
| **9** | Total Dissolved Solids | mg/L | **2100 Max.** | 1786 | 1802 | 1764 |
| **10** | Sulphate as $SO_4$ | mg/L | **1000 Max.** | 169.8 | 185.8 | 124.6 |
| **11** | Ammonical Nitrogen | mg/L | **50 Max.** | BDL(MDL:2.0) | BDL(MDL:2.0) | BDL(MDL:2.0) |
| **12** | % Sodium(Na) | mg/L | **60 Max.** | 47.1 | 45.2 | 43.2 |
| **13** | Sodium Absorption Ratio(SAR) | mg/L | **26 Max.** | 2.1 | 1.62 | 2.60 |
| **14** | Sulphide as $S^{-2}$ | mg/L | **02 Max.** | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **15** | Total Chromium | mg/L | **02 Max.** | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **16** | Hexavalent Chromium as Cr+6 | mg/L | **0.1 Max.** | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **17** | Phosphate as $PO_4$ | mg/L | **5.0 Max.** | 0.34 | 0.28 | 0.24 |
| **18** | Copper as Cu | mg/L | **03 Max.** | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **19** | Lead as Pb | mg/L | **0.1 Max.** | BDL(MDL:0.01) | BDL(MDL:0.01) | BDL(MDL:0.01) |
| **20** | Zinc as Zn | mg/L | **05 Max.** | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **21** | Residual Free Chlorine | mg/L | **0.5 Max.** | BDL(MDL:0.2) | BDL(MDL:0.2) | BDL(MDL:0.2) |
| **22** | Iron (as Fe) | mg/L | **1.0 Max.** | BDL(MDL:0.1) | BDL(MDL:0.1) | BDL(MDL:0.1) |

**Note: N.D.** = Not Detected, **MDL** = Minimum Detection Limit

**3.4.4 Location: Bore-well – 1 to 4 (Nr. Emergency Ash Pond)** **Date: 27/05/2022**

| Sr.No. | Parameter | Unit | Results | | | |
|---|---|---|---|---|---|---|
| | | | **Borewell-1** | **Borewell-2** | **Borewell-3** | **Borewell-4** |
| **1** | pH @ 25 ° C | - | 7.72 | 7.49 | 7.62 | 7.57 |
| **2** | Conductivity (µS) | - | 16690 | 17790 | 15430 | 16530 |
| **3** | Total Dissolved Solids | mg/L | 10830 | 12248 | 10220 | 10990 |
| **4** | Chloride as $Cl^-$ | mg/L | 4719.6 | 4641.1 | 4721.5 | 4773.2 |
| **5** | Carbonate as CaCO3 | mg/L | 27.2 | 32.9 | 34.4 | 38.7 |
| **6** | Bicarbonate as CaCO3 | mg/L | 198.1 | 238.8 | 174.8 | 194.8 |
| **7** | Total Alkalinity | mg/L | 382.9 | 406.8 | 362.9 | 401.1 |
| **8** | Calcium as Ca | mg/L | 348.4 | 364.2 | 311.2 | 359.4 |
| **9** | Magnesium as Mg | mg/L | 215.6 | 187.5 | 189.8 | 172 |
| **10** | Sodium as Na | mg/L | 1660 | 2074 | 1350.4 | 1764 |
| **11** | Potassium as K | mg/L | 71.2 | 132.4 | 103.1 | 95.6 |
| **12** | Sulphate as SO4-2 | mg/L | 540.2 | 824.5 | 694.5 | 798 |
| **13** | Nitrate as NO3 | mg/L | 21.2 | 31.6 | 25.1 | 26.7 |
| **14** | Phosphate as $PO_4$ | mg/L | 2.9 | 3.5 | 2.6 | 2.3 |
| **15** | Fluoride as F | mg/L | 2.9 | 2.8 | 2.9 | 2.4 |
| **16** | Mercury as Hg | mg/L | BDL(MDL:0.001) | BDL(MDL:0.01) | BDL(MDL:0.01) | BDL(MDL:0.01) |
| **17** | Arsenic as As | mg/L | BDL(MDL:0.01) | BDL(MDL:0.01) | BDL(MDL:0.01) | BDL(MDL:0.01) |
| **18** | Lead as Pb | mg/L | BDL(MDL:0.01) | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **19** | Chromium as Cr | mg/L | BDL(MDL:0.05) | BDL(MDL:0.003) | BDL(MDL:0.003) | BDL(MDL:0.003) |
| **20** | Cadmium as Cd | mg/L | BDL(MDL:0.003) | BDL(MDL:0.1) | BDL(MDL:0.1) | BDL(MDL:0.1) |
| **21** | Iron (as Fe) | mg/L | BDL(MDL:0.1) | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **22** | Zinc (as Zn) | mg/L | BDL(MDL:0.05) | BDL(MDL:0.1) | BDL(MDL:0.1) | BDL(MDL:0.1) |
| **23** | Cobalt as Co | mg/L | BDL(MDL:0.1) | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **24** | Copper as Cu | mg/L | BDL(MDL:0.05) | BDL(MDL:0.1) | BDL(MDL:0.1) | BDL(MDL:0.1) |
| **25** | Manganese as Mn | mg/L | BDL(MDL:0.1) | BDL(MDL:0.02) | BDL(MDL:0.02) | BDL(MDL:0.02) |
| **26** | Nickel as Ni | mg/L | BDL(MDL:0.02) | BDL(MDL:0.001) | BDL(MDL:0.001) | BDL(MDL:0.001) |
| **27** | Salinity | ppt | 8.35 | 8.20 | 7.99 | 8.08 |
| **28** | Barium as Ba | mg/L | N.D. | N.D. | N.D. | N.D. |

**Note: N.D.** = Not Detected, **MDL** = Minimum Detection Limit

### 3.4.5 Location: Cooling Tower Blow down Water Sample

| S.No. | Parameter | Unit | Limit | Results | | |
|---|---|---|---|---|---|---|
| | | | | **Unit-1** | **Unit-2** | **Unit-3** |
| | Date of Sampling → | | | **16/04/2022** | **16/04/2022** | **16/04/2022** |
| **1** | pH @ 25 ° C | -- | - | 7.78 | 7.82 | 7.72 |
| **2** | Free available Chlorine | ° C | Min. 0.5 | 0.69 | 0.74 | 0.71 |
| **3** | Zinc as Zn | Pt. CO. Scale | 1.0 | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **4** | Hexavalent Chromium as Cr+6 | mg/L | 0.1 | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **5** | Total Chromium as Cr | mg/L | 0.2 | 0.063 | 0.069 | 0.064 |
| **6** | Phosphate as P | mg/L | 5.0 | 0.31 | 0.45 | 0.36 |

| S.No. | Parameter | Unit | Limit | Results | | |
|---|---|---|---|---|---|---|
| | | | | **Unit-4** | **Unit-5** | **Unit-6** |
| | Date of Sampling → | | | **16/04/2022** | **16/04/2022** | **16/04/2022** |
| **1** | pH @ 25 ° C | -- | - | 7.88 | 7.83 | 7.89 |
| **2** | Free available Chlorine | ° C | Min. 0.5 | 0.72 | 0.67 | 0.68 |
| **3** | Zinc as Zn | Pt. CO. Scale | 1.0 | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **4** | Hexavalent Chromium as Cr+6 | mg/L | 0.1 | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **5** | Total Chromium as Cr | mg/L | 0.2 | 0.067 | 0.065 | 0.063 |
| **6** | Phosphate as P | mg/L | 5.0 | 0.46 | 0.41 | 0.37 |

| 3.4.6 Location: Condensate Cooling Tower Water Sample | | | | | | |
|---|---|---|---|---|---|---|
| S.No. | Parameter | Unit | Limit | Results | | |
| | | | | Unit-1 | Unit-2 | Unit-3 |
| Date of Sampling ⟹ | | | | 16/04/2022 | 16/04/2022 | 16/04/2022 |
| 1 | pH @ 25 ° C | -- | 6.5 to 8.5 | 7.86 | 7.89 | 7.86 |
| 2 | Temperature $^0$C ( Inlet) | $^0$C | -- | 30.0 | 29.5 | 29.5 |
| | Temperature $^0$C ( Outlet) | $^0$C | -- | 31.5 | 31.5 | 31.0 |
| | Temperature $^0$C ( Differential) | $^0$C | 7 | 1.5 | 2.0 | 1.5 |
| 3 | Free available Chlorine | mg/L | Min 0.5 | 0.78 | 0.79 | 0.85 |

| | | | | | | |
|---|---|---|---|---|---|---|
| S.No. | Parameter | Unit | Limit | Results | | |
| | | | | Unit-4 | Unit-5 | Unit-6 |
| Date of Sampling ⟹ | | | | 16/04/2022 | 16/04/2022 | 16/04/2022 |
| 1 | pH @ 25 ° C | -- | 6.5 to 8.5 | 7.91 | 7.86 | 7.98 |
| 2 | Temperature $^0$C ( Inlet) | $^0$C | -- | 29.5 | 30.0 | 29.5 |
| | Temperature $^0$C ( Outlet) | $^0$C | -- | 31.5 | 31.5 | 31.5 |
| | Temperature $^0$C ( Differential) | $^0$C | 7 | 2.0 | 1.5 | 2.0 |
| 3 | Free available Chlorine | mg/L | Min 0.5 | 0.74 | 0.86 | 0.83 |

| 3.4.7 Location: Boiler Blow Down Water Sample | | | | | | DATE: 16/04/2022 |
|---|---|---|---|---|---|---|
| **Parameter** | **Unit** | **Limit** | **Results** | | | |
| | | | **Unit -1** | **Unit -2** | **Unit -3** | **Unit -4** |
| **Total Suspended Solids** | mg/L | **100** | BDL(MDL:4.0) | BDL(MDL:4.0) | BDL(MDL:4.0) | BDL(MDL:4.0) |
| **Oil & Grease** | mg/L | **10** | BDL(MDL:2.0) | BDL(MDL:2.0) | BDL(MDL:2.0) | BDL(MDL:2.0) |
| **Total Copper as Cu** | mg/L | **1.0** | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **Total Iron (as Fe)** | mg/L | **1.0** | BDL(MDL:0.1) | BDL(MDL:0.1) | BDL(MDL:0.1) | BDL(MDL:0.1) |

## 3.5 Soil Quality Monitoring: Date: 27/05/2022

| **Locations of soil sampling** ⇨ | | | **Kandagra** | **Tunda** | **Desalpur** | **Siracha** | **Navinal** |
|---|---|---|---|---|---|---|---|
| **Sr. No.** | **Parameter** | **Unit** | **Results** | | | | |
| **1** | Magnesium as Mg | % | 0.0056 | 0.0038 | 0.0057 | 0.0049 | 0.0086 |
| **2** | Molybdenum as Mo | % | N.D. | N.D. | N.D. | N.D. | N.D. |
| **3** | Phosphorous as P | % | 0.314 | 0.3411 | 0.2272 | 0.2884 | 0.2336 |
| **4** | Calcium as Ca | % | 0.043 | 0.022 | 0.015 | 0.029 | 0.016 |
| **5** | Zinc as Zn | % | 0.008 | 0.0018 | 0.0032 | 0.0025 | 0.0021 |
| **6** | Manganese as Mn | % | 0.022 | 0.023 | 0.0291 | 0.028 | 0.0254 |
| **7** | Potassium as K | % | 0.0054 | 0.0037 | 0.0040 | 0.0021 | 0.0032 |
| **8** | Nitrogen as N | % | 0.0071 | 0.0076 | 0.0092 | 0.0065 | 0.0085 |
| **9** | Iron as Fe | % | 0.345 | 0.471 | 0.4461 | 0.761 | 1.1436 |
| **10** | Copper as Cu | % | 0.0014 | 0.0004 | 0.0009 | 0.0003 | 0.0004 |
| **11** | Boron as B | % | N.D. | N.D. | N.D. | N.D. | N.D. |
| **12** | Sulphur | % | 0.0057 | 0.0078 | 0.0047 | 0.0072 | 0.0081 |
| **13** | Chlorides as Cl | % | 0.0062 | 0.0159 | 0.0158 | 0.0579 | 0.039 |
| Note: N.D. = **Not Detected,** | | | | | | | |

## 4 AMBIENT NOISE LEVEL MONITORING

The main objective of noise monitoring in the study area is to establish the baseline noise levels and assess the impact of the total noise generated by the operation activities around it. Noise monitoring has been conducted at 10 locations within the periphery of industry premises.

**Date of Monitoring: 18-19.04.2022**

**Result**

| Sr. No. | Location | Noise Level dB(A) | | | |
|---|---|---|---|---|---|
| | | Sampling Time | Day Time dB(A) 06 am - 10 pm | Sampling Time | Night Time dB(A) 10 pm - 06 am |
| | | | Limit 75 dB(A) | | Limit 70 dB(A) |
| 1. | Nr. LDO Pump House | 10:45 am - 13:30 pm | 61.1 | 22:45 pm - 00:35 am | 59.4 |
| 2. | Nr. 20 MLD Plant | | 65.5 | | 60.1 |
| 3. | Nr. Pump House | | 62.3 | | 61.2 |
| 4. | Nr. Coal Handling plant | | 64.6 | | 57.2 |
| 5. | Nr. Gate No.4 | | 56.9 | | 55.2 |
| 6. | Nr. Integrated Ash Silo | | 63.7 | | 57.8 |
| 7. | Nr. Main Gate | | 62.4 | | 59.9 |
| 8. | Nr. APCH Building | | 58.3 | | 56.2 |
| 9. | Nr. Shantiniketan-I | | 56.2 | | 55.5 |
| 10. | Nr. OHC Building | | 62.5 | | 56.0 |

**Remark: Calibrated instruments were used during monitoring of above identified sample.**

**Date of Monitoring: 19.05.2022**

**Result**

| Sr. No. | Location | Noise Level dB(A) | | | |
|---|---|---|---|---|---|
| | | Sampling Time | Day Time dB(A) 06 am - 10 pm | Sampling Time | Night Time dB(A) 10 pm - 06 am |
| | | | Limit 75 dB(A) | | Limit 70 dB(A) |
| 1. | Nr. LDO Pump House | 10:45 am - 12:30 pm | 62.4 | 22:30 pm - 00:45 am | 61.2 |
| 2. | Nr. 20 MLD Plant | | 63.4 | | 61.3 |
| 3. | Nr. Pump House | | 64.2 | | 60.0 |
| 4. | Nr. Coal Handling plant | | 65.4 | | 61.1 |
| 5. | Nr. Gate No.4 | | 58.0 | | 56.9 |
| 6. | Nr. Integrated Ash Silo | | 62.6 | | 61.5 |
| 7. | Nr. Main Gate | | 61.5 | | 59.9 |
| 8. | Nr. APCH Building | | 60.8 | | 55.8 |
| 9. | Nr. Shantiniketan-I | | 55.5 | | 52.3 |
| 10. | Nr. OHC Building | | 57.3 | | 54.0 |

**Remark:** Calibrated instruments were used during monitoring of above identified sample.

**Date of Monitoring: 16.06.2022**

**Result**

| Sr. No. | Location | Noise Level dB(A) | | | |
|---|---|---|---|---|---|
| | | Sampling Time | Day Time dB(A) 06 am - 10 pm<br>Limit 75 dB(A) | Sampling Time | Night Time dB(A) 10 pm - 06 am<br>Limit 70 dB(A) |
| 1. | Nr. LDO Pump House | 11:00 am - 12:45 pm | 63.2 | 22:45 pm - 00:15 am | 61.4 |
| 2. | Nr. 20 MLD Plant | | 64.6 | | 60.1 |
| 3. | Nr. Pump House | | 60.5 | | 58.4 |
| 4. | Nr. Coal Handling plant | | 63.9 | | 60.3 |
| 5. | Nr. Gate No.4 | | 55.5 | | 54.2 |
| 6. | Nr. Integrated Ash Silo | | 65.4 | | 63.5 |
| 7. | Nr. Main Gate | | 61.0 | | 58.1 |
| 8. | Nr. APCH Building | | 59.7 | | 56.2 |
| 9. | Nr. Shantiniketan-I | | 58.6 | | 55.7 |
| 10. | Nr. OHC Building | | 57.1 | | 55.5 |

**Remark:** Calibrated instruments were used during monitoring of above identified sample.

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adani
Power

# ENVIRONMENTAL MONITORING REPORT

## AMBIENT AIR QUALITY, STACK EMISSION, WATER QUALITY AND NOISE MONITORING

**Period: July 2022- September 2022**

**For**


**At**
**Tunda & Siracha,**
**Tal. Mundra, Dist.: Kutch.**
**KUTCH, GUJARAT – 370 435**

**Prepared By**

UniStar
Environment & Research Labs Pvt. Ltd.

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| QUALITY CONTROL | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Name of Publication** | Environmental Quality Monitoring Report for the Quarter July 2022- September 2022 | | | | | | |
| **Project Number** | 03 | **Report No.** | UERL/ENV/APR/ 07-09/ 2022 | **Version** | 1 | **Released** | October 2022 |
| **Project Coordinator** | Mr. Bhavin Patel | | | | | | |
| **Prepared By** | Miss. Shweta A. Rana | | | | | | |
| **Checked By** | Mr. Jaivik Tandel | | | | | | |
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**FOR**
**UniStar Environment and Research Labs Pvt. Ltd.**

**Mr. Jaivik Tandel**
**(Authorized By)**

## CONTENTS

## LIST OF GRAPHS

## EXECUTIVE SUMMARY

Adani Power (Mundra) Limited (APMuL) has total generation capacity of 4620MW in phased manner at Mundra Thermal (coal Based) Power Plant near Village Tunda in Mundra, District Kutch, and Gujarat. The phased wise development being undertaken for ultimate capacity of power plant is shown below.

- First Phase : 2 x 330 MW
- Second Phase : 2 x 330 MW + 2 x 660 MW
- Third Phase : 3 x 660 MW

The Thermal Power Plant is located near Village Tunda, Mundra Taluka in Kutch District. The Site is closed to the sea, making cooling water perennially available for the power plant. The Power Plant is based on supercritical technology using imported coal.

All three phase of the power plant is operational and as the part of the compliance to the statutory requirement, M/s. Adani Power(Mundra) Limited has entrusted the environmental quality monitoring study for the area surrounding the power plant. Adani Power (Mundra) Limited Implemented ISO-14001:2015 Environment Management System (EMS) and Accreditation of NABL in Environmental Laboratory (ISO/IEC 17025:2017) vide Certificate No. TC-5215.

Various environmental parameters have been monitored during the period of July 2022 to September 2022.The detail of the environmental parameters along with frequency of monitoring is shown in subsequent sections.

## 1. ENVIRONMENTAL PARAMETERS

| Sr. No. | Environmental Indices | Parameter | No. of Location and Monitoring. | Frequency of Sampling |
|---|---|---|---|---|
| 1. | Ambient Air Quality | $PM_{10}$, $PM_{2.5}$, Sulphur Dioxide and Nitrogen Dioxide | Three Location | Twice a week |
| 2. | Ambient Air Quality | $PM_{10}$, $PM_{2.5}$, Sulphur Dioxide, Nitrogen Dioxide, Ozone and Mercury | Two Location | Once in a month |
| 3. | Stack Monitoring | PM, Sulphur Dioxide, Oxide of Nitrogen and Hg | Nine Location | Once in a month |
| 4. | Meteorological Monitoring | Wind rose, Wind speed, Wind direction, Rainfall, Temperature, Relative Humidity | One location | Round the clock |
| 5. | Surrounding Villages Ground Water Analysis | Colour, Odour, Taste, Turbidity, Dissolved Solids, pH value, Total Hardness, Calcium, Boron, Copper, Iron, Manganese, Chloride, Sulphate, Nitrate, Fluoride, Phenolic Compounds, Mercury, Cadmium, Selenium, Arsenic, Cyanide, Lead, Zinc, Anionic Detergents as MBAS, Chromium Cr+6, Mineral Oil, MPN Index for Coliform Bacteria per 100 ml, Residual Free Chlorine, Aluminium, Alkalinity, Magnesium as Mg, Escherichia Coli in 250 ml. | Five Location | Once in Quarter |
| 6. | Effluent Water Sample | pH, Temperature, colour, SS, O & G, BOD3, COD, Chlorides, TDS, Sulphates, Ammonical Nitrogen, % Sodium, Sodium Absorption Ratio, Sulphides, Total Chromium, Hexavalent Chromium, Copper, Lead, Zinc, Free available chlorine, Phosphate, Iron | Four Location | Once in a month / Quarter |
| 7. | STP Water Analysis | pH, Residual Chlorine, SS, BOD, COD, Faecal coliform | Three Location | Once in month/ Quarter |
| 8. | Borwell water Near Ash Dyke Area | pH @ 25 ° C, Conductivity (µS), Chloride as $Cl^-$ Salinity (ppt), Total Dissolved Solids, Carbonate as CaCO3, Bicarbonate as CaCO3, Mercury as Hg,Arsenic as As, Lead as Pb, Chromium as Cr, Cadmium as Cd. | Four Location | Once in a Quarter |
| 9. | Surrounding Villages Soil Analysis | Magnesium as Mg %, Molybdenium as Mo in ppm, Phosphorus as P %, Calcium as Ca %, Zinc as Zn, Manganese as Mn, Potassium as K%, Nitrogen as N%, Iron as Fe%, Copper as Cu, Boron as B, Sulphurin %, Chloride as Cl%. | Five Location | Once in Six Month |
| 10. | Noise Level Monitoring | Noise level monitoring in dB(A) | 10 Location | Once in a Quarter |
| 11. | Cooling tower | pH @ 25 ° C, Free available chlorine, Zinc as Zn, Hexavalent Chromium, Total Chromium, Phosphate | 09 Location | Once in a Quarter |

### 1.1 AMBIENT AIR QUALITY

The scenario of the Ambient Air Quality in the study region has been assessed through a network of 5locations of Ambient Air Quality Monitoring. The design of monitoring network in the air quality surveillance program was based on the following considerations.

- Topography / Terrain of the study area.
- Human Settlements
- Wind pattern
- Health status
- Representation of regional Background levels.
- Accessibility of monitoring site.
- Resource availability.

Pre-calibrated Respirable Dust Samplers ($PM_{10}$) & Fine Dust Samplers ($PM_{2.5}$) have been used for monitoring the existing AAQM Status. Maximum, Minimum, Average, Standard Deviation and percentile have been computed from the raw data collected at all individual sampling stations to represents the Ambient Air Quality Status.

The significant parameters viz., $PM_{10}$, $PM_{2.5}$, Sulphur Dioxide ($SO_2$) and Nitrogen Dioxides ($NO_2$) and Mercury were monitored within the study area of 10 km from the site.

### 1.2 FLUE GAS MONITORING

All three phases of the Thermal Power Plant is in operation. The flue gas emission from stack attached to individual boiler is monitored once in month during the monitoring period.

### 1.3 WATER QUALITY MONITORING

The water quality parameters as per IS: 10500 for water resource within the study area have been used for describing the water environment and assessing the impacts on it.

Groundwater samples of nearby villages were collected at five locations the parameters of prime importance selected under physicochemical characteristics were estimated to describe the baseline environmental status of the water resources during the monitoring period. Four bore well samples surrounding the ash dyke area were collected during the month of August 2022 along with outfall water sample.

### 1.4 AMBIENT NOISE LEVEL MONITORING

The Ambient Noise levels within the plant premises were relocated at a different location (10 nos.) For the implementation of effective noise control programs.

## 1.5 MICROMETEOROLOGY

Meteorological parameters are important factors in the study of Air Pollution. The Transport and diffusion of the pollutants in the atmosphere are governed by meteorological factors.

Primary / Basic Meteorological Parameters

- Wind Velocity
- Wind Direction

Since the dispersion and diffusion of pollutants mainly depend on the above factors hence these factors are considered as primary meteorological parameters.

Secondary Meteorological Parameters

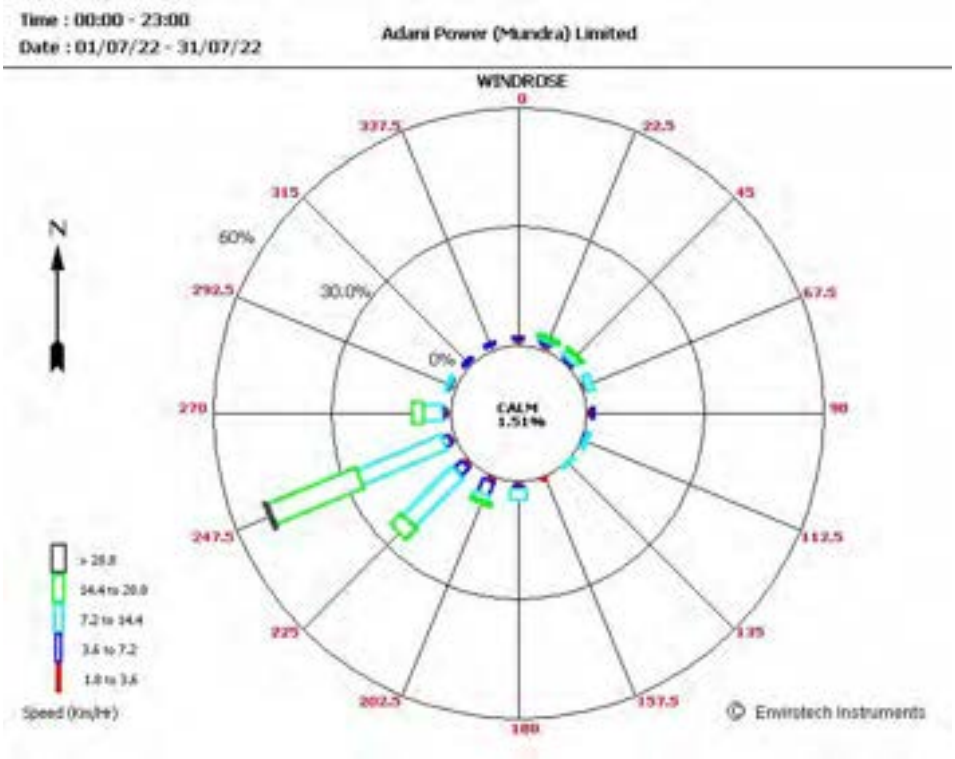
- Relative Humidity
- Ambient Temperature

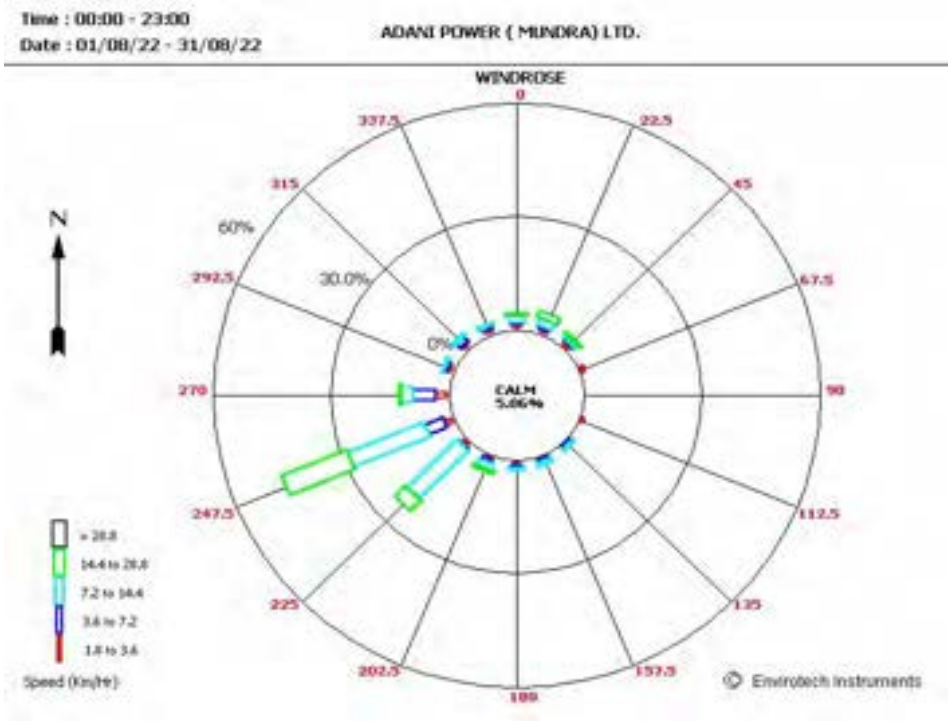
The above-said factors are considered as secondary factors since these factors control the dispersion of the pollutant indirectly by affecting the primary factors.

### 1.5.1 Wind Rose Diagram

| | | | | | |
|---|---|---|---|---|---|
| Project | : | **Adani Power (Mundra) Limited (APMuL)** | **Period** | **:** | July 2022 to September 2022 |
| Location | : | **Village – Tunda, Dist. - Kutch** | | | |
| **July 2022** | | | | | |
| **Wind Direction** | | **WSW** | | | |
| **Average Wind Speed** | | **12.2 km/hr** | | | |
| | | | | | |
| **August 2022** | | | | | |
| **Wind Direction** | | **WSW** | | | |
| **Average Wind Speed** | | **10.5 km/hr** | | | |
| | | | | | |
| **September 2022** | | | | | |
| **Wind Direction** | | **WSW** | | | |
| **Average Wind Speed** | | **8.8 km/hr** | | | |
| | | | | | |

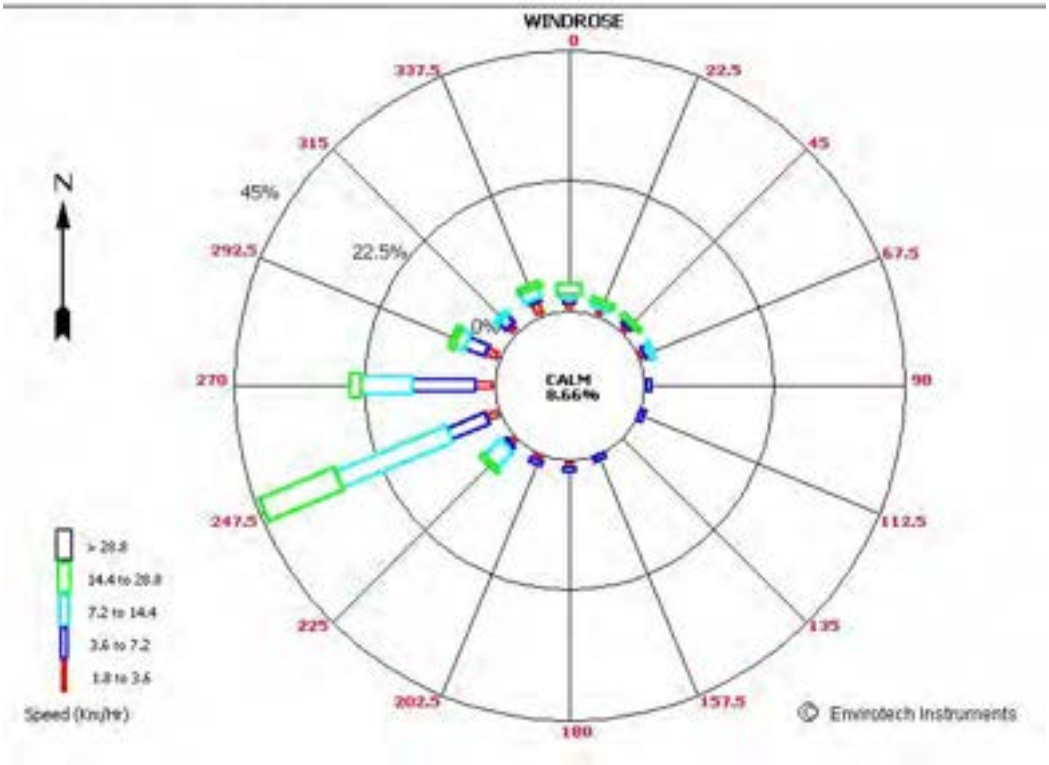
**ADANI POWER (MNDRA) LIMITEMUNDRA WINDROSE FOR THE SEASON OF Apr. to June 2022**



Time : 00:00 - 23:00
Date : 01/09/22 - 30/09/22

ADANI POWER (MUNDRA) LIMITED



# 2 SCOPE & METHODOLOGY ADOPTED FOR ENVIRONMENTAL MONITORING

## 2.1 Introduction

The scope of the study includes detailed characterization of various environmental like air, water and noise within an area of 10 km radius in and around the power plant area at 20 MLD Plant, Shantiniketan-1 and surrounding villages named as Siracha, Wandh and Kandagara of Dist. Kutch.

The above-mentioned environmental components were monitored at the study area and frequency of monitoring, number of samples along with methodology is as shown in below table.

## 2.2 Scope and Methodology for Monitoring of Various Environmental Attributes

| Sr. No | Environmental Attributes | Sampling Locations | Sampling Parameters | Sampling Frequency | Total No of samples | Methodology |
|---|---|---|---|---|---|---|
| **1** | Ambient Air Quality | 3 | $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_2$ | Twice a week (24 hourly Samples) | 72 | IS : 5182 & Reference APHA(AIR) |
| **2** | Ambient Air Quality | 5 | $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_2$, $O_3$, Mercury | Once in month (24 hourly Samples) | 15 | IS : 5182 & Reference APHA(AIR) |
| **2** | Flue Gas Stack Analysis | Unit 1 to 9 Boiler | PM, $SO_2$, NOx | Once in month | 27 | As per IS : 11255 |
| **3** | Surrounding Villages Ground Water Analysis | 5 water sample | Test specification as per IS : 10500 - 1991 | Once in Quarter | 5 | AS per APHA Method |
| **4** | Water Quality of Outfall for APMuL | 1 | As per CTO | Once in month | 3 | As Per APHA Method |
| **5** | STP Outlet | 1 | As per CTO | Once in month | 3 | As Per APHA Method |
| **6** | Bore well water Near Ash Dyke Area | 4 | Test specification as per IS : 10500 - 1991 | Once in Quarter | 4 | As Per APHA Method |
| **7** | Cooling Tower Blow down Water Sample | 9 | As per CTO | Once in Quarter | 9 | As Per APHA Method |
| **8** | Condensate Cooling Tower Water Sample | 9 | As per CTO | Once in Quarter | 9 | As Per APHA Method |
| **9** | Boiler Blow down Water Sample | 9 | As per CTO | Once in Quarter | 9 | As Per APHA Method |

# 3 ENVIRONMENAT AIR QUALITY AND FLUE GAS MONITORING

The principle objective of the ambient air quality was to assess the existing levels of the air pollution as well as the regional background concentration in the plant area. Air pollution forms important and critical factors to study the environmental issues in the study areas. Thus, air quality has to be frequently monitored to know the extent of pollution due to power plant activity and other ancillary activities. Details are provided in Section 3.1.1.

Flue gas monitoring analysis has been conducted by UniStar Environment and Research Labs Pvt. Ltd. Details are provided in Section 3.2.

## 3.1 Ambient Air Monitoring Data

### 3.1.1 Details of Ambient Air Quality Monitoring Stations

The detail of the ambient air monitoring locations including the distance from the project site with direction is as shown below.

| S.No. | Code | Name of sampling location | Distance |
|---|---|---|---|
| **1** | A - 1 | Nr.20 MLD Plant | 1.2 Km |
| **2** | A - 2 | Nr. Shantiniketan-1 | 0.8 Km |
| **3** | A - 3 | Kandagara Village | 3.2 km (NW) |
| **4** | A - 4 | Siracha Village | 2.6 km (NE) |
| **5** | A - 5 | Wandh Village | 2.0 km (SW) |

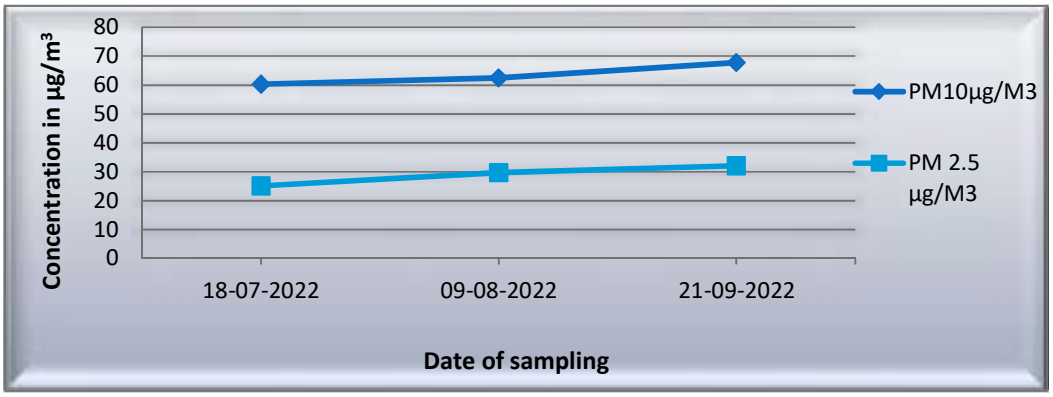
### 3.1.2 Location: Nr.20 MLD Plant

The Sampling station was located in the core zone in Company premises. The Respirable Dust Sampler ($PM_{10}$) & ($PM_{2.5}$) Sampler were placed at a height of 3 m above the ground level. Assess present pollution level the observed levels of $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_2$ and $O_3$ collected during monitoring period (July 2022- September 2022) are as follows:

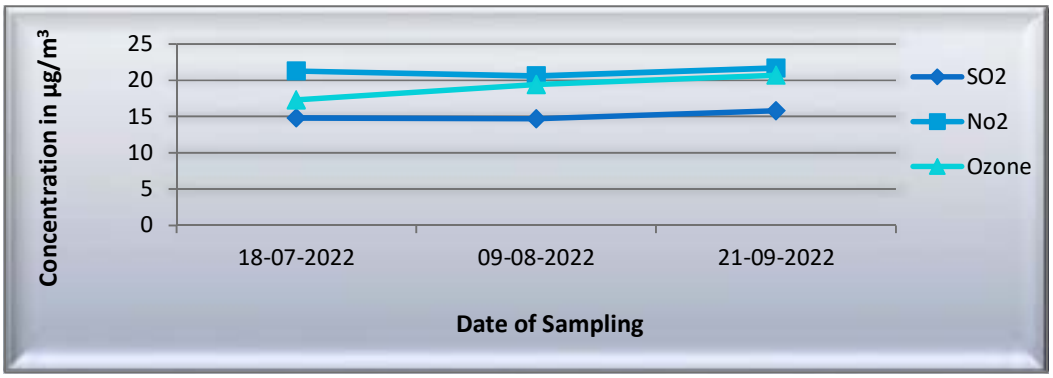
| Observations | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | $NO_2$ | $O_3$ |
|---|---|---|---|---|---|
| **Maximum Value** | **67.8** | **32.1** | **15.8** | **21.7** | **20.7** |
| **Minimum Value** | **60.3** | **25.1** | **14.7** | **20.6** | **17.3** |
| **Average Value** | **63.5** | **29.0** | **15.1** | **21.2** | **19.1** |
| **Standard Deviation** | **3.9** | **3.6** | **0.6** | **0.6** | **1.7** |
| **Permissible Limits** | **100** | **60** | **80** | **80** | **100** |

Units: $\mu g/m^3$

**Graph 1 : Particulate Matter Level Nr.20 MLD Plant**




**Graph 2: SO2, NO2 and $O_3$ Nr.20 MLD Plant**



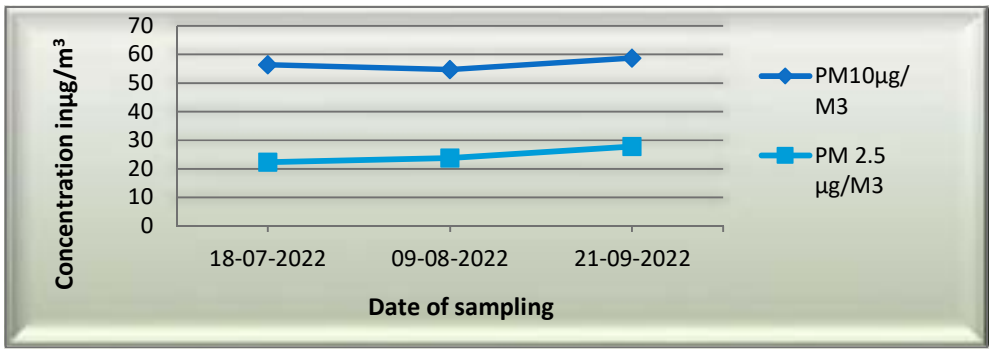
### 3.1.3 Location: Nr. Shantiniketan-1

The Sampling station was located in the core zone in company premises. The Respirable Dust Sampler$PM_{10}$ & $PM_{2.5}$Sampler were placed at a height of 3 m above the ground level. The observed levels of $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_2$ and $O_3$ collected during monitoring period (July 2022- September 2022) are as follows

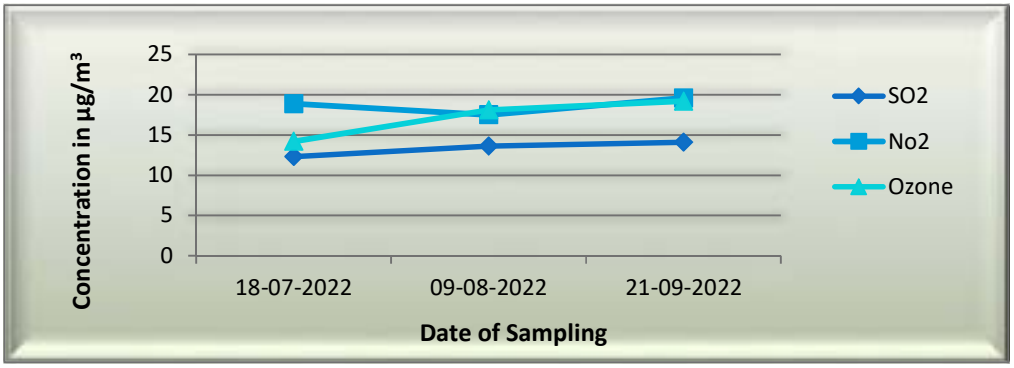
| Observations | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | $NO_2$ | $O_3$ |
|---|---|---|---|---|---|
| **Maximum Value** | **58.7** | **27.8** | **14.1** | **19.6** | **19.2** |
| **Minimum Value** | **54.7** | **22.3** | **12.3** | **17.5** | **14.2** |
| **Average Value** | **56.6** | **24.6** | **13.3** | **18.7** | **17.1** |
| **Standard Deviation** | **2.0** | **2.8** | **0.9** | **1.1** | **2.6** |
| **Permissible Limits** | **100** | **60** | **80** | **80** | **100** |

Units: $\mu g/m^3$

**Graph 3: Particulate Matter Level Nr. Shantiniketan-1**




**Graph 4 : SO2, NO2 and $O_3$ Nr. Shantiniketan-1**



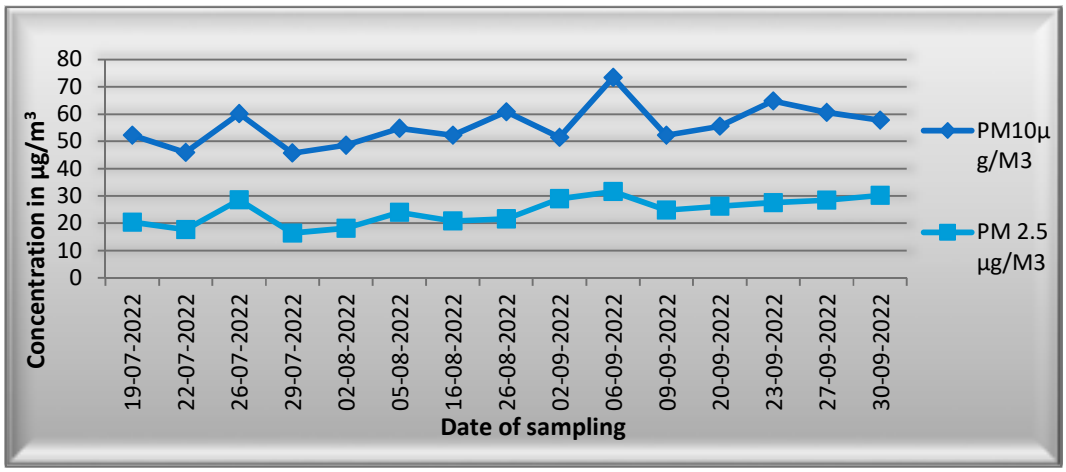
### 3.1.4 Location: Kandagara Village

The Sampling station was located in the core zone. The Station is located at about 3 km away in Northwest Direction from the Company premises. The Respirable Dust Sampler ($PM_{10}$) & $PM_{2.5}$Sampler were placed at a height of 2.5 m above the ground level. The observed levels of $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_2$ and $O_3$ collected during the monitoring period (July 2022-September 2022) are as follows.

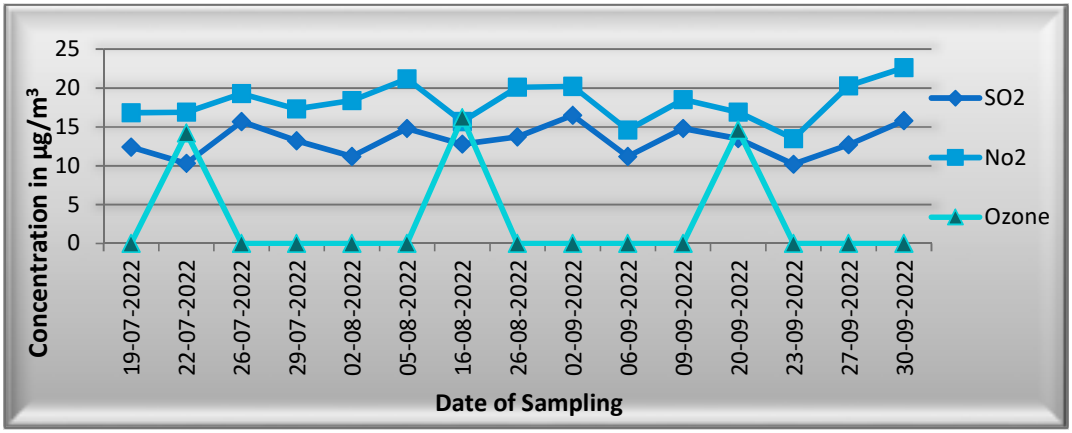
| Observations | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | $NO_2$ | $O_3$ |
|---|---|---|---|---|---|
| **Maximum Value** | **73.4** | **31.6** | **16.5** | **22.6** | **16.2** |
| **Minimum Value** | **45.7** | **16.4** | **10.2** | **13.5** | **14.2** |
| **Average Value** | **55.8** | **24.3** | **13.3** | **18.2** | **15** |
| **Standard Deviation** | **7.4** | **4.9** | **2.0** | **2.5** | **1.0** |
| **Permissible Limits** | **100** | **60** | **80** | **80** | **100** |

Units: $\mu g/m^3$

**Graph 5: Particulate Matter Level Kandagara Village**




**Graph 6 : SO2, NO2 and $O_3$ Level Kandagara Village**



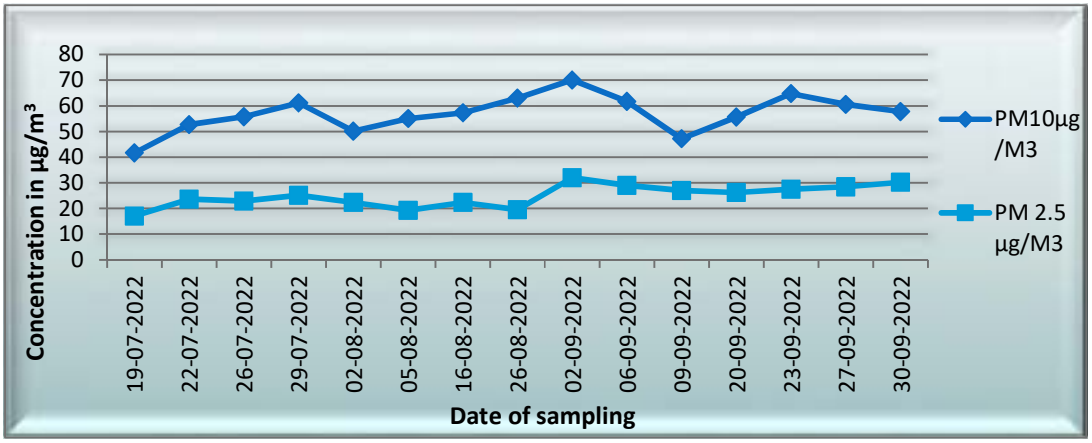
### 3.1.5 Location: Siracha Village

The Sampling station was located in the Siracha village. The Station is located at about 3.5 km away in Northwest Direction from the core zone area. The Respirable Dust Sampler & $PM_{2.5}$ was placed at a height of 3.0 m above the ground level. The observed levels of $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_2$ and $O_3$ collected during the monitoring period (July 2022- September 2022) are as follows.

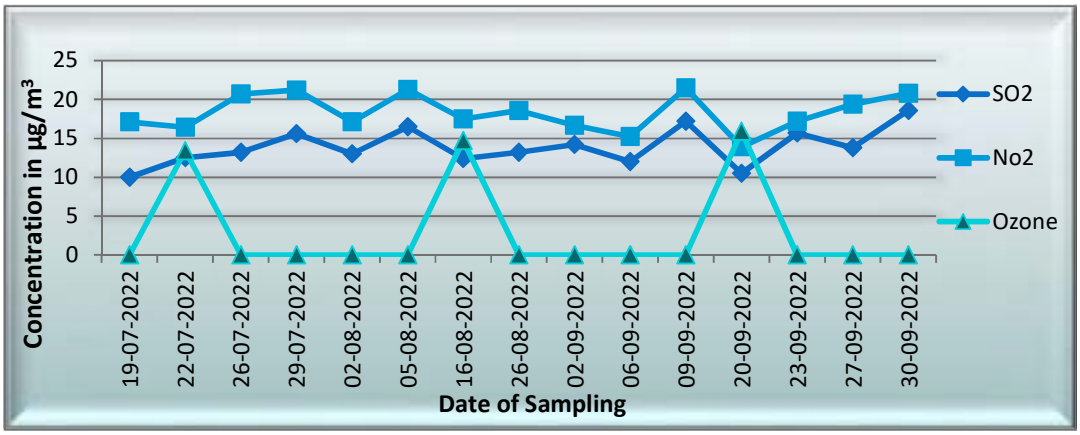
| Observations | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | $NO_2$ | $O_3$ |
|---|---|---|---|---|---|
| Maximum Value | 70.1 | 32 | 18.6 | 21.5 | 15.9 |
| Minimum Value | 41.7 | 17.1 | 10 | 13.9 | 13.4 |
| Average Value | 57.0 | 24.9 | 13.9 | 18.3 | 14.6 |
| Standard Deviation | 7.2 | 4.3 | 2.4 | 2.4 | 1.2 |
| Permissible Limits | 100 | 60 | 80 | 80 | 100 |

Units: µg/m$^3$

**Graph 7 : Particulate Matter Level Siracha Village**




**Graph 8 : $SO_2$, $NO_2$ and $O_3$ Level Siracha Village**



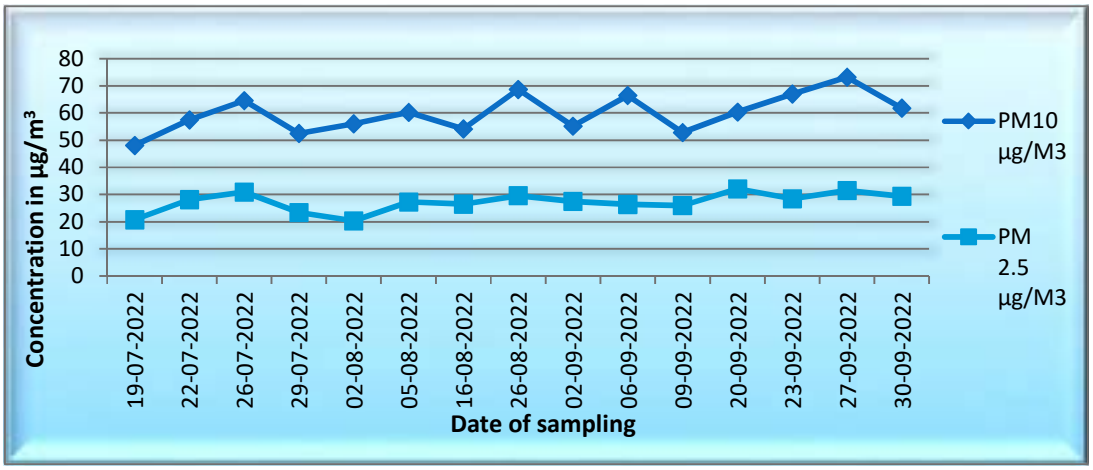
### 3.1.6 Location: Wandh Village

The Sampling station was located in the core zone in Wandh village. The Station is located at about 3.0 km away in Southwest Direction from the Company premises. The Respirable Dust Sampler Was placed at a height of 3.0 m above the ground level. The observed levels of $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_2$ and $O_3$ collected during the monitoring period (July 2022- September 2022) are as follows.

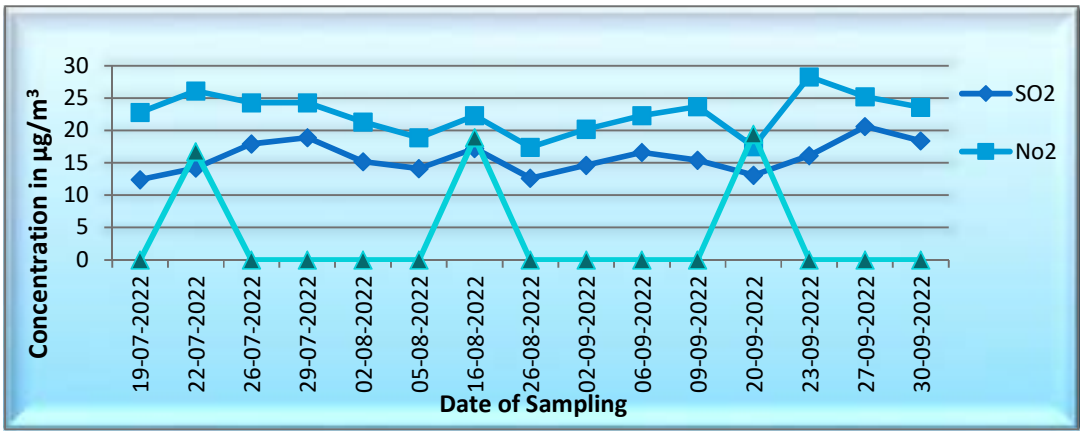
| Observations | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | $NO_2$ | $O_3$ |
|---|---|---|---|---|---|
| Maximum Value | **73.2** | **32.1** | **20.6** | **28.3** | **19.4** |
| Minimum Value | **48.1** | **20.3** | **12.4** | **17.4** | **16.7** |
| Average Value | **59.9** | **27.2** | **15.8** | **22.5** | **18.3** |
| Standard Deviation | **7.0** | **3.6** | **2.4** | **3.1** | **1.4** |
| Permissible Limits | **100** | **60** | **80** | **80** | **100** |

Units: $\mu g/m^3$

**Graph 9 : Particulate Matter Level Wandh Village**




**Graph 10 : $SO_2$, $NO_2$ and $O_3$ Level Wandh Village**



### 3.1.7 Ambient Air Quality Monitoring (Parameters- Mercury & Ozone)

| Location | July-2022 | | | August-2022 | | | September-2022 | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Date** | **Ozone (O3) µg/m3** | **Mercury (Hg) µg/m3** | **Date** | **Ozone (O3) µg/m3** | **Mercury (Hg) µg/m3** | **Date** | **Ozone (O3) µg/m3** | **Mercury (Hg) µg/m3** |
| Village Kandagara | **22.07.22** | 14.2 | BDL | **16.08.22** | 16.2 | BDL | **20.09.22** | 14.6 | BDL |
| Village Wandh | **22.07.22** | 16.7 | BDL | **16.08.22** | 18.9 | BDL | **20.09.22** | 19.4 | BDL |
| Village Siracha | **22.07.22** | 13.4 | BDL | **16.08.22** | 14.7 | BDL | **20.09.22** | 15.9 | BDL |
| Nr. 20 MLD Plant | **18.07.22** | 17.3 | BDL | **09.08.22** | 19.4 | BDL | **21.09.22** | 20.7 | BDL |
| Nr. Shantiniketan-1 | **18.07.22** | 14.2 | BDL | **09.08.22** | 18.1 | BDL | **21.09.22** | 19.2 | BDL |
| Remark: **Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.** | | | | | | | | | |
| Analysis Method Reference : | | | | | | | | | |
| **Hg : AAS by VGA Method -3112 B APHA 22 Edition : BDL Limit** Hg **: 2 ppb** | | | | | | | | | |
| **$O_3$ : IS - 5182 (part 9) 2009 Ozone BDL limit: 5 µg/$m^3$** | | | | | | | | | |

### 3.2 Flue Gas Monitoring Data

Stack monitoring has been carried out by UniStar environment & Research Pvt. Ltd.

| Date | Location | PM in mg/Nm$^3$ | $SO_2$ in mg/Nm$^3$ | $NO_x$ in mg/Nm$^3$ |
|---|---|---|---|---|
| **05-09-2022** | Boiler (Unit - 1) | 33.6 | 562.4 | 234.6 |
| **05-09-2022** | Boiler (Unit - 2) | 30.1 | 535.9 | 243.7 |
| **30-09-2022** | Boiler (Unit - 3) | 32.1 | 556.9 | 256.4 |
| **31-08-2022** | Boiler (Unit - 4) | 35.1 | 539.7 | 261.3 |
| **07-09-2022** | Boiler (Unit - 4) | 37.2 | 544.8 | 242.7 |
| **30-08-2022** | Boiler (Unit - 5) | 34.7 | 442.6 | 286.4 |
| **06-09-2022** | Boiler (Unit - 5) | 35.4 | 455.6 | 258.9 |
| **04-08-2022** | Boiler (Unit - 6) | 37.1 | 408.6 | 291.8 |
| **06-09-2022** | Boiler (Unit -6) | 39.8 | 476.6 | 289.7 |
| **14-07-2022** | Boiler (Unit - 7) | 33.2 | 165.7 | 252.4 |
| **14-07-2022** | Boiler (Unit - 8) | 37 | 179.2 | 263.6 |
| **08-08-2022** | Boiler (Unit - 8) | 29.4 | 176.4 | 269.7 |
| **29-08-2022** | Boiler (Unit - 9) | 31.6 | 161.8 | 274.8 |
| **12-09-2022** | Boiler (Unit - 9) | 30.4 | 162.4 | 268.9 |
| Permissible Limits | | **50** | **<500 MWH-600**<br>**>500 MWH-200** | **450** |

## 3.3 Ground Water Quality Monitoring

**3.3.1 Location: Tunda Village Water Sample** **DATE: 23/08/2022**

| Sr. No. | Parameter | Unit | Results | Desirable Limits | Permissible limit in the absence of alternate source |
|---|---|---|---|---|---|
| **1** | pH @ 25 | -- | 7.54 | 6.5 – 8.5 | 6.5 – 8.5 |
| **2** | Color | Pt-Co | 10 | 5 | 15 |
| **3** | Odor | mg/L | Agreeable | Unobjectionable | Unobjectionable |
| **4** | Taste | mg/L | Agreeable | Agreeable | Agreeable |
| **5** | Turbidity(NTU) | mg/L | BDL(MDL:0.1) | 1 NTU | 5 NTU |
| **6** | Total Hardness as $CaCO_3$ | mg/L | 119.4 | 200 mg/lit. | 600 mg/lit. |
| **7** | Calcium as Ca | mg/L | 25.2 | 75 mg/lit. | 200 mg/lit. |
| **8** | Magnesium as Mg | mg/L | 16.2 | 30 mg/lit. | 100 mg/lit. |
| **9** | Total Dissolved Solids | mg/L | 1204 | 500 mg/lit. | 2000 mg/lit. |
| **10** | Total Alkalinity | mg/L | 369 | 200 mg/lit. | 600 mg/lit. |
| **11** | Chloride as $Cl^-$ | mg/L | 490.7 | 250 mg/lit. | 1000 mg/lit. |
| **12** | Sulphate as $SO_4^{-2}$ | mg/L | 144.8 | 200 mg/lit. | 400 mg/lit. |
| **13** | Nitrate as $NO_3$ | mg/L | 3.9 | 45 mg/lit. | 45 mg/lit. |
| **14** | Copper as Cu | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 1.5 mg/lit. |
| **15** | Manganese as Mn | mg/L | BDL(MDL:0.1) | 0.1 mg/lit. | 0.3 mg/lit. |
| **16** | Iron as Fe | mg/L | BDL(MDL:0.1) | 0.3 mg/lit. | 0.3 mg/lit. |
| **17** | Residual Free Chlorine | mg/L | 0.24 | 0.2 mg/lit. | 1.0 mg/lit. |
| **18** | Fluoride as F | mg/L | 0.52 | 1.0 mg/lit. | 1.5 mg/lit. |
| **19** | Zinc as Zn | mg/L | BDL(MDL:0.05) | 5 mg/lit. | 15 mg/lit. |
| **20** | Phenolic Compound | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.002 mg/lit. |
| **21** | Mercury as Hg | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.001 mg/lit. |
| **22** | Cadmium as Cd | mg/L | BDL(MDL:0.003) | 0.003 mg/lit. | 0.003 mg/lit. |
| **23** | Selenium as Se | mg/L | N.D. | 0.01 mg/lit. | 0.01 mg/lit. |
| **24** | Arsenic as as | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | 0.05 mg/lit. |
| **25** | Cyanide as CN | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **26** | Lead as Pb | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | 0.01 mg/lit. |
| **27** | Anionic Detergent | mg/L | N.D. | 0.2 mg/lit. | 1.0 mg/lit. |
| **28** | Hexavalent Chromium | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **29** | Mineral Oil | mg/L | N.D. | 0.5 mg/lit. | 0.5 mg/lit. |
| **30** | Aluminum as Al | mg/L | BDL(MDL:0.003) | 0.03 mg/lit. | 0.2 mg/lit. |
| **31** | Boron as B | mg/L | BDL(MDL:0.5) | 0.5 mg/lit. | 1 mg/lit. |
| **32** | Total Chromium as Cr | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **33** | Total Coliform | (CFU/100 ml) | Absent | Absent | Absent |
| **34** | E. coli | (CFU/100 ml) | Absent | Absent | Absent |
| **35** | Total Bacterial Count | (CFU/ml) | 10 | 100 CFU/ml | 100 CFU/ml |
| **Note: BDL= Below Detection Limit. N.D. = Not Detected** | | | | | |

**3.3.2 Location: Kandagra Village Water Sample** **DATE: 23/08/2022**

| Sr. No. | Parameter | Unit | Results | Desirable Limits | Permissible limit in the absence of alternate source |
|---|---|---|---|---|---|
| **1** | pH @ 25 | - | 7.43 | 6.5 – 8.5 | 6.5 – 8.5 |
| **2** | Color | Pt-Co | 10 | 5 | 15 |
| **3** | Odor | mg/L | Agreeable | Unobjectionable | Unobjectionable |
| **4** | Taste | mg/L | Agreeable | Agreeable | Agreeable |
| **5** | Turbidity(NTU) | mg/L | BDL(MDL:0.1) | 1 NTU | 5 NTU |
| **6** | Total Hardness as $CaCO_3$ | mg/L | 115.6 | 200 mg/lit. | 600 mg/lit. |
| **7** | Calcium as Ca | mg/L | 22.5 | 75 mg/lit. | 200 mg/lit. |
| **8** | Magnesium as Mg | mg/L | 15.7 | 30 mg/lit. | 100 mg/lit. |
| **9** | Total Dissolved Solids | mg/L | 1170 | 500 mg/lit. | 2000 mg/lit. |
| **10** | Total Alkalinity | mg/L | 369 | 200 mg/lit. | 600 mg/lit. |
| **11** | Chloride as $Cl^-$ | mg/L | 345.8 | 250 mg/lit. | 1000 mg/lit. |
| **12** | Sulphate as $SO_4^{-2}$ | mg/L | 121.5 | 200 mg/lit. | 400 mg/lit. |
| **13** | Nitrate as $NO_3$ | mg/L | 3 | 45 mg/lit. | 45 mg/lit. |
| **14** | Copper as Cu | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 1.5 mg/lit. |
| **15** | Manganese as Mn | mg/L | BDL(MDL:0.1) | 0.1 mg/lit. | 0.3 mg/lit. |
| **16** | Iron as Fe | mg/L | BDL(MDL:0.1) | 0.3 mg/lit. | 0.3 mg/lit. |
| **17** | Residual Free Chlorine | mg/L | 0.32 | 0.2 mg/lit. | 1.0 mg/lit. |
| **18** | Fluoride as F | mg/L | 0.61 | 1.0 mg/lit. | 1.5 mg/lit. |
| **19** | Zinc as Zn | mg/L | BDL(MDL:0.05) | 5 mg/lit. | 15 mg/lit. |
| **20** | Phenolic Compound | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.002 mg/lit. |
| **21** | Mercury as Hg | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.001 mg/lit. |
| **22** | Cadmium as Cd | mg/L | BDL(MDL:0.003) | 0.003 mg/lit. | N.D.(MDL:0.001) |
| **23** | Selenium as Se | mg/L | N.D. | 0.01 mg/lit. | N.D. |
| **24** | Arsenic as as | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | N.D.(MDL:0.01) |
| **25** | Cyanide as CN | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | N.D. |
| **26** | Lead as Pb | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | N.D.(MDL:0.003) |
| **27** | Anionic Detergent | mg/L | N.D. | 0.2 mg/lit. | N.D. |
| **28** | Hexavalent Chromium | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | N.D.(MDL:0.1) |
| **29** | Mineral Oil | mg/L | N.D. | 0.5 mg/lit. | N.D. |
| **30** | Aluminum as Al | mg/L | BDL(MDL:0.003) | 0.03 mg/lit. | N.D. |
| **31** | Boron as B | mg/L | BDL(MDL:0.5) | 0.5 mg/lit. | N.D. |
| **32** | Total Chromium as Cr | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | N.D.(MDL:0.001) |
| **33** | Total Coliform | (CFU/100 ml) | Absent | Absent | Absent |
| **34** | E. coli | (CFU/100 ml) | Absent | Absent | Absent |
| **35** | Total Bacterial Count | (CFU/ml) | 08 | 100 CFU/ml | 100 CFU/ml |
| **Note: BDL= Below Detection Limit. N.D. = Not Detected** | | | | | |

**3.3.3Location: Siracha Village Water Sample** **DATE: 23/08/2022**

| Sr. No. | Parameter | Unit | Results | Desirable Limits | Permissible limit in the absence of alternate source |
|---|---|---|---|---|---|
| **1** | pH @ 25 | - | 7.29 | 6.5 – 8.5 | 6.5 – 8.5 |
| **2** | Color | Pt-Co | 10 | 5 | 15 |
| **3** | Odour | mg/L | Agreeable | Unobjectionable | Unobjectionable |
| **4** | Taste | mg/L | Agreeable | Agreeable | Agreeable |
| **5** | Turbidity(NTU) | mg/L | BDL(MDL:0.1) | 1 NTU | 5 NTU |
| **6** | Total Hardness as $CaCO_3$ | mg/L | 300.3 | 200 mg/lit. | 600 mg/lit. |
| **7** | Calcium as Ca | mg/L | 44.2 | 75 mg/lit. | 200 mg/lit. |
| **8** | Magnesium as Mg | mg/L | 45 | 30 mg/lit. | 100 mg/lit. |
| **9** | Total Dissolved Solids | mg/L | 1120 | 500 mg/lit. | 2000 mg/lit. |
| **10** | Total Alkalinity | mg/L | 349.5 | 200 mg/lit. | 600 mg/lit. |
| **11** | Chloride as $Cl^-$ | mg/L | 341.6 | 250 mg/lit. | 1000 mg/lit. |
| **12** | Sulphate as $SO_4^{-2}$ | mg/L | 176.4 | 200 mg/lit. | 400 mg/lit. |
| **13** | Nitrate as $NO_3$ | mg/L | 3.2 | 45 mg/lit. | 45 mg/lit. |
| **14** | Copper as Cu | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 1.5 mg/lit. |
| **15** | Manganese as Mn | mg/L | BDL(MDL:0.1) | 0.1 mg/lit. | 0.3 mg/lit. |
| **16** | Iron as Fe | mg/L | BDL(MDL:0.1) | 0.3 mg/lit. | 0.3 mg/lit. |
| **17** | Residual Free Chlorine | mg/L | 0.3 | 0.2 mg/lit. | 1.0 mg/lit. |
| **18** | Fluoride as F | mg/L | 0.55 | 1.0 mg/lit. | 1.5 mg/lit. |
| **19** | Zinc as Zn | mg/L | BDL(MDL:0.05) | 5 mg/lit. | 15 mg/lit. |
| **20** | Phenolic Compound | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.002 mg/lit. |
| **21** | Mercury as Hg | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.001 mg/lit. |
| **22** | Cadmium as Cd | mg/L | BDL(MDL:0.003) | 0.003 mg/lit. | 0.003 mg/lit. |
| **23** | Selenium as Se | mg/L | N.D. | 0.01 mg/lit. | 0.01 mg/lit. |
| **24** | Arsenic as as | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | 0.05 mg/lit. |
| **25** | Cyanide as CN | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **26** | Lead as Pb | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | 0.01 mg/lit. |
| **27** | Anionic Detergent | mg/L | N.D. | 0.2 mg/lit. | 1.0 mg/lit. |
| **28** | Hexavalent Chromium | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **29** | Mineral Oil | mg/L | N.D. | 0.5 mg/lit. | 0.5 mg/lit. |
| **30** | Aluminum as Al | mg/L | BDL(MDL:0.003) | 0.03 mg/lit. | 0.2 mg/lit. |
| **31** | Boron as B | mg/L | BDL(MDL:0.5) | 0.5 mg/lit. | 1 mg/lit. |
| **32** | Total Chromium as Cr | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **33** | Total Coliform | (CFU/100 ml) | Absent | Absent | Absent |
| **34** | E. coli | (CFU/100 ml) | Absent | Absent | Absent |
| **35** | Total Bacterial Count | (CFU/ml) | 14 | 100 CFU/ml | 100 CFU/ml |

Note: BDL= Below Detection Limit. N.D. = Not Detected

**3.3.4 Location: Navinal Village Water Sample** **DATE: 23/08/2022**

| Sr. No. | Parameter | Unit | Results | Desirable Limits | Permissible limit in the absence of alternate source |
|---|---|---|---|---|---|
| **1** | pH @ 25 | - | 7.47 | 6.5 – 8.5 | 6.5 – 8.5 |
| **2** | Colour | Pt-Co | 10 | 5 | 15 |
| **3** | Odour | mg/L | Agreeable | Unobjectionable | Unobjectionable |
| **4** | Taste | mg/L | Agreeable | Agreeable | Agreeable |
| **5** | Turbidity(NTU) | mg/L | BDL(MDL:0.1) | 1 NTU | 5 NTU |
| **6** | Total Hardness as $CaCO_3$ | mg/L | 166.4 | 200 mg/lit. | 600 mg/lit. |
| **7** | Calcium as Ca | mg/L | 37.5 | 75 mg/lit. | 200 mg/lit. |
| **8** | Magnesium as Mg | mg/L | 17.7 | 30 mg/lit. | 100 mg/lit. |
| **9** | Total Dissolved Solids | mg/L | 1108 | 500 mg/lit. | 2000 mg/lit. |
| **10** | Total Alkalinity | mg/L | 240.9 | 200 mg/lit. | 600 mg/lit. |
| **11** | Chloride as $Cl^-$ | mg/L | 381.7 | 250 mg/lit. | 1000 mg/lit. |
| **12** | Sulphate as $SO_4^{-2}$ | mg/L | 114.6 | 200 mg/lit. | 400 mg/lit. |
| **13** | Nitrate as $NO_3$ | mg/L | 2.1 | 45 mg/lit. | 45 mg/lit. |
| **14** | Copper as Cu | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 1.5 mg/lit. |
| **15** | Manganese as Mn | mg/L | BDL(MDL:0.1) | 0.1 mg/lit. | 0.3 mg/lit. |
| **16** | Iron as Fe | mg/L | BDL(MDL:0.1) | 0.3 mg/lit. | 0.3 mg/lit. |
| **17** | Residual Free Chlorine | mg/L | 0.30 | 0.2 mg/lit. | 1.0 mg/lit. |
| **18** | Fluoride as F | mg/L | 0.54 | 1.0 mg/lit. | 1.5 mg/lit. |
| **19** | Zinc as Zn | mg/L | BDL(MDL:0.05) | 5 mg/lit. | 15 mg/lit. |
| **20** | Phenolic Compound | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.002 mg/lit. |
| **21** | Mercury as Hg | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.001 mg/lit. |
| **22** | Cadmium as Cd | mg/L | BDL(MDL:0.003) | 0.003 mg/lit. | 0.003 mg/lit. |
| **23** | Selenium as Se | mg/L | N.D. | 0.01 mg/lit. | 0.01 mg/lit. |
| **24** | Arsenic as as | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | 0.05 mg/lit. |
| **25** | Cyanide as CN | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **26** | Lead as Pb | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | 0.01 mg/lit. |
| **27** | Anionic Detergent | mg/L | N.D. | 0.2 mg/lit. | 1.0 mg/lit. |
| **28** | Hexavalent Chromium | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **29** | Mineral Oil | mg/L | N.D. | 0.5 mg/lit. | 0.5 mg/lit. |
| **30** | Aluminum as Al | mg/L | BDL(MDL:0.003) | 0.03 mg/lit. | 0.2 mg/lit. |
| **31** | Boron as B | mg/L | BDL(MDL:0.5) | 0.5 mg/lit. | 1 mg/lit. |
| **32** | Total Chromium as Cr | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **33** | Total Coliform | (CFU/100 ml) | Absent | Absent | Absent |
| **34** | E. coli | (CFU/100 ml) | Absent | Absent | Absent |
| **35** | Total Bacterial Count | (CFU/ml) | 08 | 100 CFU/ml | 100 CFU/ml |

Note: BDL= Below Detection Limit. N.D. = Not Detected

**3.3.5Location: Desalpur Village Water Sample** **DATE: 23/08/2022**

| Sr. No. | Parameter | Unit | Results | Desirable Limits | Permissible limit in the absence of alternate source |
|---|---|---|---|---|---|
| **1** | pH @ 25 | - | 7.55 | 6.5 – 8.5 | 6.5 – 8.5 |
| **2** | Color | Pt-Co | 10 | 5 | 15 |
| **3** | Odor | mg/L | Agreeable | Unobjectionable | Unobjectionable |
| **4** | Taste | mg/L | Agreeable | Agreeable | Agreeable |
| **5** | Turbidity(NTU) | mg/L | BDL(MDL:0.1) | 1 NTU | 5 NTU |
| **6** | Total Hardness as $CaCO_3$ | mg/L | 148.9 | 200 mg/lit. | 600 mg/lit. |
| **7** | Calcium as Ca | mg/L | 30.3 | 75 mg/lit. | 200 mg/lit. |
| **8** | Magnesium as Mg | mg/L | 20.3 | 30 mg/lit. | 100 mg/lit. |
| **9** | Total Dissolved Solids | mg/L | 1076 | 500 mg/lit. | 2000 mg/lit. |
| **10** | Total Alkalinity | mg/L | 304.1 | 200 mg/lit. | 600 mg/lit. |
| **11** | Chloride as $Cl^-$ | mg/L | 361 | 250 mg/lit. | 1000 mg/lit. |
| **12** | Sulphate as $SO_4^{-2}$ | mg/L | 114 | 200 mg/lit. | 400 mg/lit. |
| **13** | Nitrate as $NO_3$ | mg/L | 2.7 | 45 mg/lit. | 45 mg/lit. |
| **14** | Copper as Cu | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 1.5 mg/lit. |
| **15** | Manganese as Mn | mg/L | BDL(MDL:0.1) | 0.1 mg/lit. | 0.3 mg/lit. |
| **16** | Iron as Fe | mg/L | BDL(MDL:0.1) | 0.3 mg/lit. | 0.3 mg/lit. |
| **17** | Residual Free Chlorine | mg/L | 0.29 | 0.2 mg/lit. | 1.0 mg/lit. |
| **18** | Fluoride as F | mg/L | 0.48 | 1.0 mg/lit. | 1.5 mg/lit. |
| **19** | Zinc as Zn | mg/L | BDL(MDL:0.05) | 5 mg/lit. | 15 mg/lit. |
| **20** | Phenolic Compound | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.002 mg/lit. |
| **21** | Mercury as Hg | mg/L | BDL(MDL:0.001) | 0.001 mg/lit. | 0.001 mg/lit. |
| **22** | Cadmium as Cd | mg/L | BDL(MDL:0.003) | 0.003 mg/lit. | 0.003 mg/lit. |
| **23** | Selenium as Se | mg/L | N.D. | 0.01 mg/lit. | 0.01 mg/lit. |
| **24** | Arsenic as as | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | 0.05 mg/lit. |
| **25** | Cyanide as CN | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **26** | Lead as Pb | mg/L | BDL(MDL:0.01) | 0.01 mg/lit. | 0.01 mg/lit. |
| **27** | Anionic Detergent | mg/L | N.D. | 0.2 mg/lit. | 1.0 mg/lit. |
| **28** | Hexavalent Chromium | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **29** | Mineral Oil | mg/L | N.D. | 0.5 mg/lit. | 0.5 mg/lit. |
| **30** | Aluminum as Al | mg/L | BDL(MDL:0.003) | 0.03 mg/lit. | 0.2 mg/lit. |
| **31** | Boron as B | mg/L | BDL(MDL:0.5) | 0.5 mg/lit. | 1 mg/lit. |
| **32** | Total Chromium as Cr | mg/L | BDL(MDL:0.05) | 0.05 mg/lit. | 0.05 mg/lit. |
| **33** | Total Coliform | (CFU/100 ml) | Absent | Absent | Absent |
| **34** | E. coli | (CFU/100 ml) | Absent | Absent | Absent |
| **35** | Total Bacterial Count | (CFU/ml) | 12 | 100 CFU/ml | 100 CFU/ml |

Note: Colour = 1(10) = 10 APHA, BDL= Below Detection Limit. N.D. = Not Detected

## 3.4 Water Quality Monitoring – Plant area

### 3.4.1 Location: Outfall Channel

| Sr. No. | Parameter | Unit | Date of sampling | | |
|---|---|---|---|---|---|
| | | | **04/07/2022** | **10/08/2022** | **09/09/2022** |
| **1** | pH @ 25 | -- | 7.96 | 7.71 | 7.56 |
| **2** | Temperature | $^0$C (Intake) | 31.0 | 30.0 | 30.0 |
| | | $^0$C (Outfall) | 34.5 | 32.0 | 32.0 |
| | | $^0$C (Differential) | 3.5 | 2.0 | 2.0 |
| **3** | Color | Pt. CO. Scale | 10 | 10 | 10 |
| **4** | Total Suspended Solids | mg/L | 18 | 18 | 12 |
| **5** | Oil & Grease | mg/L | BDL(MDL:2.0) | BDL(MDL:2.0) | BDL(MDL:2.0) |
| **6** | Ammonical Nitrogen | mg/L | BDL(MDL:2.0) | BDL(MDL:2.0) | BDL(MDL:2.0) |
| **7** | Sulphide as S-2 | mg/L | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **8** | Total Chromium | mg/L | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **9** | Hexavalent Chromium as Cr+6 | mg/L | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **10** | Phosphate as $PO_4$ | mg/L | 0.24 | 0.27 | 0.16 |
| **11** | Lead as Pb | mg/L | 0.027 | 0.032 | 0.016 |
| **12** | Copper as Cu | mg/L | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **13** | Zinc as Zn | mg/L | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **14** | Iron (as Fe) | mg/L | 0.105 | 0.117 | 0.105 |
| **15** | Chemical Oxygen Demand(COD) | mg/L | 30.5 | 16.0 | 48.0 |
| **16** | Biochemical Oxygen Demand (BOD) | mg/L | 12.0 | 4 | 13 |

### 3.4.2 Location: STP Outlet Water Sample;

| Sr. No. | Parameter | Unit | SPCB Limit | Date of sampling | | |
|---|---|---|---|---|---|---|
| | | | | **04/07/2022** | **10/08/2022** | **09/09/2022** |
| **1** | pH @ 25 ° C | -- | **6.5-8.5** | 7.18 | 7.22 | 7.16 |
| **2** | Total Suspended Solids | mg/L | **30** | 16 | 22 | 16 |
| **3** | Residual Chlorine | mg/L | **0.5 Min.** | 0.65 | 0.60 | 0.95 |
| **4** | Biochemical Oxygen Demand (BOD) | mg/L | **20** | 17 | 13 | 17 |
| **5** | Fecal Coliform | CFU/100ml | **<1000** | 24 | 28 | 32 |

**3.4.3 Location: ETP Outlet Water Sample;**

| S.N | Parameter | Unit | SPCB Limit | Date of sampling | | |
|---|---|---|---|---|---|---|
| | | | | **04/07/2022** | **10/08/2022** | **09/09/2022** |
| **1** | pH @ 25 | -- | **6.5 – 8.5** | 7.08 | 7.13 | 7.06 |
| **2** | Temperature | ° C | **40 Max.** | 29 | 30 | 30 |
| **3** | Color | Pt. CO. Scale | **100 Max.** | 10 | 10 | 10 |
| **4** | Total Suspended Solids | mg/L | **100 Max.** | 08 | 14 | 08 |
| **5** | Oil & Grease | mg/L | **10 Max.** | BDL(MDL:2.0) | BDL(MDL:2.0) | BDL(MDL:2.0) |
| **6** | Chemical Oxygen Demand (COD) | mg/L | **100 Max.** | 20.4 | 15.9 | 20.0 |
| **7** | Biochemical Oxygen Demand (BOD) | mg/L | **30 Max.** | 6 | 4 | 5 |
| **8** | Chloride as $Cl^-$ | mg/L | **600 Max.** | 328.8 | 302.1 | 277.8 |
| **9** | Total Dissolved Solids | mg/L | **2100 Max.** | 1690 | 1730 | 1680 |
| **10** | Sulphate as $SO_4$ | mg/L | **1000 Max.** | 102.4 | 118.4 | 98.4 |
| **11** | Ammonical Nitrogen | mg/L | **50 Max.** | BDL(MDL:2.0) | BDL(MDL:2.0) | BDL(MDL:2.0) |
| **12** | % Sodium(Na) | mg/L | **60 Max.** | 48.3 | 39.4 | 32.2 |
| **13** | Sodium Absorption Ratio(SAR) | mg/L | **26 Max.** | 2.00 | 1.55 | 0.95 |
| **14** | Sulphide as $S^{-2}$ | mg/L | **02 Max.** | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **15** | Total Chromium | mg/L | **02 Max.** | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **16** | Hexavalent Chromium as Cr+6 | mg/L | **0.1 Max.** | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **17** | Phosphate as $PO_4$ | mg/L | **5.0 Max.** | 0.22 | 0.28 | 0.22 |
| **18** | Copper as Cu | mg/L | **03 Max.** | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **19** | Lead as Pb | mg/L | **0.1 Max.** | BDL(MDL:0.01) | BDL(MDL:0.01) | BDL(MDL:0.01) |
| **20** | Zinc as Zn | mg/L | **05 Max.** | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **21** | Residual Free Chlorine | mg/L | **0.5 Max.** | BDL(MDL:0.2) | BDL(MDL:0.2) | BDL(MDL:0.2) |
| **22** | Iron (as Fe) | mg/L | **1.0 Max.** | BDL(MDL:0.1) | BDL(MDL:0.1) | BDL(MDL:0.1) |

**Note: N.D.** = Not Detected, **MDL** = Minimum Detection Limit

**3.4.4 Location: Bore-well – 1 to 4 (Nr. Emergency Ash Pond)** **Date: 24/08/2022**

| Sr.No. | Parameter | Unit | Results | | | |
|---|---|---|---|---|---|---|
| | | | **Borewell-1** | **Borewell-2** | **Borewell-3** | **Borewell-4** |
| **1** | pH @ 25 ° C | - | 7.64 | 7.41 | 7.49 | 7.48 |
| **2** | Conductivity (µS) | - | 15124 | 16288 | 15108 | 15798 |
| **3** | Total Dissolved Solids | mg/L | 9680 | 10424 | 9670 | 10110 |
| **4** | Chloride as $Cl^-$ | mg/L | 4208.6 | 4384.6 | 4129 | 4323.2 |
| **5** | Carbonate as CaCO3 | mg/L | 24.6 | 23.3 | 30.8 | 26.9 |
| **6** | Bicarbonate as CaCO3 | mg/L | 175 | 188 | 162.6 | 155.1 |
| **7** | Total Alkalinity | mg/L | 358.8 | 365.3 | 343.4 | 379.3 |
| **8** | Calcium as Ca | mg/L | 329.3 | 312.1 | 298.5 | 341.8 |
| **9** | Magnesium as Mg | mg/L | 172.40 | 182.70 | 152.7 | 141.5 |
| **10** | Sodium as Na | mg/L | 1440 | 1906 | 1310.4 | 1476 |
| **11** | Potassium as K | mg/L | 64 | 101 | 89.6 | 80.1 |
| **12** | Sulphate as SO4-2 | mg/L | 501 | 757 | 640 | 626.3 |
| **13** | Nitrate as NO3 | mg/L | 19.6 | 24.1 | 23.3 | 24.8 |
| **14** | Phosphate as $PO_4$ | mg/L | 2.10 | 2.84 | 2.0 | 2.1 |
| **15** | Fluoride as F | mg/L | 2.40 | 2.30 | 2.2 | 2.3 |
| **16** | Mercury as Hg | mg/L | BDL(MDL:0.001) | BDL(MDL:0.01) | BDL(MDL:0.01) | BDL(MDL:0.01) |
| **17** | Arsenic as As | mg/L | BDL(MDL:0.01) | BDL(MDL:0.01) | BDL(MDL:0.01) | BDL(MDL:0.01) |
| **18** | Lead as Pb | mg/L | BDL(MDL:0.01) | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **19** | Chromium as Cr | mg/L | BDL(MDL:0.05) | BDL(MDL:0.003) | BDL(MDL:0.003) | BDL(MDL:0.003) |
| **20** | Cadmium as Cd | mg/L | BDL(MDL:0.003) | BDL(MDL:0.1) | BDL(MDL:0.1) | BDL(MDL:0.1) |
| **21** | Iron (as Fe) | mg/L | BDL(MDL:0.1) | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **22** | Zinc (as Zn) | mg/L | BDL(MDL:0.05) | BDL(MDL:0.1) | BDL(MDL:0.1) | BDL(MDL:0.1) |
| **23** | Cobalt as Co | mg/L | BDL(MDL:0.1) | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **24** | Copper as Cu | mg/L | BDL(MDL:0.05) | BDL(MDL:0.1) | BDL(MDL:0.1) | BDL(MDL:0.1) |
| **25** | Manganese as Mn | mg/L | BDL(MDL:0.1) | BDL(MDL:0.02) | BDL(MDL:0.02) | BDL(MDL:0.02) |
| **26** | Nickel as Ni | mg/L | BDL(MDL:0.02) | BDL(MDL:0.001) | BDL(MDL:0.001) | BDL(MDL:0.001) |
| **27** | Salinity | ppt | 7.60 | 7.9 | 7.46 | 7.81 |
| **28** | Barium as Ba | mg/L | N.D. | N.D. | N.D. | N.D. |

**Note: N.D.** = Not Detected, **MDL** = Minimum Detection Limit

### 3.4.5 Location: Cooling Tower Blow down Water Sample

| S.No. | Parameter | Unit | Limit | Results | | |
|---|---|---|---|---|---|---|
| | | | | **Unit-1** | **Unit-2** | **Unit-4** |
| Date of Sampling → | | | | **09/09/2022** | **09/09/2022** | **09/09/2022** |
| **1** | pH @ 25 ° C | -- | - | 7.76 | 7.93 | 7.71 |
| **2** | Free available Chlorine | ° C | Min. 0.5 | 0.70 | 0.85 | 0.75 |
| **3** | Zinc as Zn | Pt. CO. Scale | 1.0 | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **4** | Hexavalent Chromium as Cr+6 | mg/L | 0.1 | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **5** | Total Chromium as Cr | mg/L | 0.2 | 0.054 | 0.061 | 0.072 |
| **6** | Phosphate as P | mg/L | 5.0 | 0.36 | 0.40 | 0.51 |

| S.No. | Parameter | Unit | Limit | Results | | |
|---|---|---|---|---|---|---|
| | | | | **Unit-5** | **Unit-6** | **Unit-9** |
| Date of Sampling → | | | | **09/09/2022** | **09/09/2022** | **09/09/2022** |
| **1** | pH @ 25 ° C | -- | - | 7.64 | 7.77 | 8.12 |
| **2** | Free available Chlorine | ° C | Min. 0.5 | 0.65 | 0.90 | 0.80 |
| **3** | Zinc as Zn | Pt. CO. Scale | 1.0 | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **4** | Hexavalent Chromium as Cr+6 | mg/L | 0.1 | BDL(MDL:0.05) | BDL(MDL:0.05) | BDL(MDL:0.05) |
| **5** | Total Chromium as Cr | mg/L | 0.2 | 0.053 | 0.058 | 0.069 |
| **6** | Phosphate as P | mg/L | 5.0 | 0.32 | 0.37 | 0.44 |

| 3.4.6 Location: Condensate Cooling Tower Water Sample | | | | | | |
|---|---|---|---|---|---|---|
| S.No. | Parameter | Unit | Limit | Results | | |
| | | | | Unit-1 | Unit-2 | Unit-4 |
| Date of Sampling ⟹ | | | | 09/09/2022 | 09/09/2022 | 09/09/2022 |
| 1 | pH @ 25 ° C | -- | 6.5 to 8.5 | 7.72 | 7.77 | 7.69 |
| 2 | Temperature $^0$C ( Inlet) | $^0$C | -- | 29.5 | 28.5 | 29.0 |
| | Temperature $^0$C ( Outlet) | $^0$C | -- | 31.0 | 30.5 | 31.0 |
| | Temperature $^0$C ( Differential) | $^0$C | 7 | 1.5 | 2.0 | 2.0 |
| 3 | Free available Chlorine | mg/L | Min 0.5 | 0.82 | 0.70 | 0.80 |

| | | | | | | |
|---|---|---|---|---|---|---|
| S.No. | Parameter | Unit | Limit | Results | | |
| | | | | Unit-5 | Unit-6 | Unit-9 |
| Date of Sampling ⟹ | | | | 09/09/2022 | 09/09/2022 | 09/09/2022 |
| 1 | pH @ 25 ° C | -- | 6.5 to 8.5 | 7.82 | 7.81 | 7.79 |
| 2 | Temperature $^0$C ( Inlet) | $^0$C | -- | 30.0 | 29.0 | 29.0 |
| | Temperature $^0$C ( Outlet) | $^0$C | -- | 31.0 | 30.5 | 31.0 |
| | Temperature $^0$C ( Differential) | $^0$C | 7 | 1.0 | 1.5 | 2.0 |
| 3 | Free available Chlorine | mg/L | Min 0.5 | 0.95 | 0.60 | 0.95 |

## 4 AMBIENT NOISE LEVEL MONITORING

The main objective of noise monitoring in the study area is to establish the baseline noise levels and assess the impact of the total noise generated by the operation activities around it. Noise monitoring has been conducted at 10 locations within the periphery of industry premises.

**Date of Monitoring: 07-08.07.2022**

**Result**

| Sr. No. | Location | Noise Level dB(A) | | | |
|---|---|---|---|---|---|
| | | Sampling Time | Day Time dB(A) 06 am - 10 pm | Sampling Time | Night Time dB(A) 10 pm - 06 am |
| | | | Limit 75 dB(A) | | Limit 70 dB(A) |
| 1. | Nr. LDO Pump House | 11:50 am - 12:35 pm | 63.9 | 22:50 pm - 00:20 am | 60.4 |
| 2. | Nr. 20 MLD Plant | | 63.6 | | 61.1 |
| 3. | Nr. Pump House | | 66.7 | | 63.4 |
| 4. | Nr. Coal Handling plant | | 61.2 | | 58.1 |
| 5. | Nr. Gate No.4 | | 59.0 | | 54.7 |
| 6. | Nr. Integrated Ash Silo | | 63.4 | | 59.9 |
| 7. | Nr. Main Gate | | 55.7 | | 53.3 |
| 8. | Nr. APCH Building | | 54.9 | | 52.7 |
| 9. | Nr. Shantiniketan-I | | 54.1 | | 51.5 |
| 10. | Nr. OHC Building | | 54.3 | | 52.9 |

**Remark: Calibrated instruments were used during monitoring of above identified sample.**

**Date of Monitoring: 24-25.08.2022**

**Result**

| Sr. No. | Location | Noise Level dB(A) | | | |
|---|---|---|---|---|---|
| | | Sampling Time | Day Time dB(A) 06 am - 10 pm | Sampling Time | Night Time dB(A) 10 pm - 06 am |
| | | | Limit 75 dB(A) | | Limit 70 dB(A) |
| 1. | Nr. LDO Pump House | 11:05 am - 12:45 pm | 64.0 | 22:40 pm - 00:30 am | 60.0 |
| 2. | Nr. 20 MLD Plant | | 63.9 | | 60.4 |
| 3. | Nr. Pump House | | 66.9 | | 62.7 |
| 4. | Nr. Coal Handling plant | | 62.9 | | 59.0 |
| 5. | Nr. Gate No.4 | | 55.0 | | 49.6 |
| 6. | Nr. Integrated Ash Silo | | 62.5 | | 58.6 |
| 7. | Nr. Main Gate | | 58.8 | | 57.7 |
| 8. | Nr. APCH Building | | 56.3 | | 52.1 |
| 9. | Nr. Shantiniketan-I | | 54.1 | | 52.7 |
| 10. | Nr. OHC Building | | 54.6 | | 53.2 |

**Remark:** Calibrated instruments were used during monitoring of above identified sample.

**Date of Monitoring: 23-24.09.2022**

**Result**

| Sr. No. | Location | Noise Level dB(A) | | | |
|---|---|---|---|---|---|
| | | Sampling Time | Day Time dB(A) 06 am - 10 pm | Sampling Time | Night Time dB(A) 10 pm - 06 am |
| | | | Limit 75 dB(A) | | Limit 70 dB(A) |
| 1. | Nr. LDO Pump House | 11:25 am - 13:25 pm | 62.4 | 22:30 pm - 00:20 am | 59.4 |
| 2. | Nr. 20 MLD Plant | | 62.2 | | 60.7 |
| 3. | Nr. Pump House | | 60.6 | | 58.3 |
| 4. | Nr. Coal Handling plant | | 66.1 | | 60.6 |
| 5. | Nr. Gate No.4 | | 59.9 | | 55.9 |
| 6. | Nr. Integrated Ash Silo | | 63.6 | | 58.5 |
| 7. | Nr. Main Gate | | 63.2 | | 54.9 |
| 8. | Nr. APCH Building | | 59.8 | | 56.3 |
| 9. | Nr. Shantiniketan-I | | 59.2 | | 52.5 |
| 10. | Nr. OHC Building | | 58.0 | | 52.7 |

**Remark:** Calibrated instruments were used during monitoring of above identified sample.

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adani Power

**Adani Power (Mundra) Limited, Mundra**

Continues Environment Monitoring System Reports (Apr'2022 TO Sep'2022)

| | Unit 1 | | | Unit 2 | | | Unit 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| Date | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) | PM mg/Nm3 (Avg) | SOx mg/Nm$^3$ (Avg) | NOx mg/Nm3 (Avg) | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) |
| 1-Apr-22 | 25.4 | 541.8 | 281.9 | 26.4 | 512.2 | 284.2 | 25.0 | 473.4 | 237.8 |
| 2-Apr-22 | 25.7 | 544.5 | 282.0 | 26.8 | 510.7 | 286.1 | 25.1 | 473.4 | 241.5 |
| 3-Apr-22 | 26.6 | 547.2 | 282.1 | 27.5 | 497.4 | 302.3 | 26.5 | 449.3 | 222.0 |
| 4-Apr-22 | 27.9 | 548.1 | 282.2 | 27.7 | 504.2 | 278.6 | 27.1 | 476.8 | 244.6 |
| 5-Apr-22 | 32.6 | 550.3 | 282.5 | 30.9 | 531.6 | 231.6 | 32.8 | 499.4 | 257.6 |
| 6-Apr-22 | 30.3 | 532.5 | 258.5 | 29.3 | 496.5 | 229.6 | 30.8 | 501.2 | 258.6 |
| 7-Apr-22 | 28.8 | 520.0 | 225.0 | 28.8 | 508.7 | 222.9 | 31.5 | 487.6 | 241.8 |
| 8-Apr-22 | 27.5 | 521.0 | 227.9 | 28.9 | 497.4 | 240.6 | 29.9 | 471.2 | 249.0 |
| 9-Apr-22 | 27.5 | 519.6 | 226.8 | 28.4 | 511.6 | 212.8 | 27.6 | 468.9 | 250.5 |
| 10-Apr-22 | 28.3 | 520.5 | 229.4 | 28.2 | 539.6 | 185.6 | 30.6 | 469.9 | 258.5 |
| 11-Apr-22 | 36.3 | 517.9 | 222.8 | 32.4 | 534.0 | 187.6 | 37.6 | 454.6 | 255.5 |
| 12-Apr-22 | 35.8 | 519.4 | 227.1 | 32.6 | 529.2 | 204.2 | 37.3 | 456.7 | 247.6 |
| 13-Apr-22 | 34.9 | 526.0 | 230.1 | 31.7 | 514.1 | 229.6 | 36.6 | 470.7 | 255.7 |
| 14-Apr-22 | 28.9 | 425.9 | 280.1 | 28.5 | 513.5 | 229.5 | 32.4 | 456.7 | 245.0 |
| 15-Apr-22 | 27.2 | 516.1 | 285.0 | 27.6 | 514.4 | 228.2 | 30.6 | 470.6 | 258.5 |
| 16-Apr-22 | 28.0 | 503.7 | 236.9 | 28.5 | 513.7 | 229.2 | 33.5 | 478.0 | 264.7 |
| 17-Apr-22 | 26.1 | 518.6 | 286.5 | 27.0 | 513.7 | 230.2 | 29.1 | 454.0 | 253.8 |
| 18-Apr-22 | 30.6 | 529.3 | 315.9 | 30.1 | 516.0 | 227.9 | 35.2 | 447.4 | 240.7 |
| 19-Apr-22 | 33.1 | 520.9 | 226.0 | 31.6 | 514.9 | 227.8 | 38.4 | 464.2 | 247.7 |
| 20-Apr-22 | 30.7 | 522.2 | 227.7 | 30.2 | 513.4 | 228.8 | 34.6 | 457.5 | 243.2 |
| 21-Apr-22 | 32.1 | 522.4 | 228.0 | 31.2 | 513.2 | 229.3 | 37.4 | 460.8 | 241.0 |
| 22-Apr-22 | 31.9 | 520.7 | 225.8 | 31.4 | 513.3 | 228.7 | 39.3 | 486.0 | 258.7 |
| 23-Apr-22 | 32.0 | 521.2 | 226.5 | 32.7 | 513.2 | 230.7 | 39.4 | 473.0 | 244.6 |
| 24-Apr-22 | 27.8 | 522.1 | 211.9 | 27.9 | 513.3 | 230.6 | 31.8 | 489.4 | 259.1 |
| 25-Apr-22 | 27.6 | 521.7 | 137.4 | 27.4 | 509.1 | 230.8 | 31.4 | 478.1 | 260.0 |
| 26-Apr-22 | 29.5 | 520.2 | 226.0 | 29.2 | 513.7 | 229.5 | 35.8 | 447.2 | 230.5 |
| 27-Apr-22 | 32.2 | 522.3 | 227.2 | 32.0 | 510.2 | 232.0 | 37.3 | 475.8 | 249.7 |
| 28-Apr-22 | 33.2 | 522.6 | 228.2 | 31.6 | 512.6 | 230.3 | 37.3 | 448.9 | 237.3 |
| 29-Apr-22 | 29.4 | 522.4 | 226.0 | 30.1 | 511.4 | 231.5 | 33.2 | 470.1 | 251.4 |
| 30-Apr-22 | 26.5 | 411.7 | 155.6 | 26.5 | 512.5 | 230.8 | 30.7 | 462.2 | 246.0 |
| 1-May-22 | 26.1 | 523.3 | 228.6 | 26.7 | 513.2 | 230.7 | 31.0 | 465.6 | 241.3 |
| 2-May-22 | 27.6 | 522.1 | 227.7 | 27.7 | 511.4 | 231.7 | 32.7 | 459.8 | 237.8 |
| 3-May-22 | 27.0 | 519.6 | 226.8 | 27.5 | 512.0 | 229.5 | 33.6 | 465.1 | 237.6 |
| 4-May-22 | 27.1 | 522.8 | 228.9 | 28.2 | 512.1 | 229.8 | 32.1 | 468.3 | 246.0 |
| 5-May-22 | 28.3 | 521.2 | 228.5 | 29.0 | 510.9 | 231.6 | 35.0 | 475.7 | 249.3 |
| 6-May-22 | 28.2 | 520.8 | 226.4 | 28.6 | 512.9 | 231.1 | 32.1 | 473.7 | 242.5 |
| 7-May-22 | 27.3 | 520.6 | 223.2 | 27.5 | 513.8 | 230.3 | 30.3 | 475.7 | 245.6 |
| 8-May-22 | 26.9 | 523.3 | 226.0 | 27.3 | 513.4 | 230.8 | 31.9 | 483.5 | 248.1 |
| 9-May-22 | 27.8 | 521.4 | 226.5 | 28.0 | 510.4 | 227.6 | 35.4 | 476.7 | 244.2 |
| 10-May-22 | 31.6 | 520.7 | 224.8 | 30.5 | 511.9 | 229.8 | 37.4 | 459.9 | 235.6 |
| 11-May-22 | 28.9 | 523.2 | 227.4 | 28.6 | 512.1 | 231.1 | 33.7 | 466.1 | 246.3 |
| 12-May-22 | 27.7 | 371.8 | 160.0 | 22.1 | 428.7 | 194.9 | 30.6 | 407.7 | 226.3 |
| 13-May-22 | | | | | | | 24.5 | 415.5 | 208.7 |
| 14-May-22 | | | | | | | | | |
| 15-May-22 | | | | | | | | | |
| 16-May-22 | | | | | | | | | |
| 17-May-22 | | | | | | | | | |
| 18-May-22 | | | | | | | | | |
| 19-May-22 | | | | | | | | | |
| 20-May-22 | | | | | | | | | |
| 21-May-22 | | | | | | | | | |
| 22-May-22 | | | | | | | | | |
| 23-May-22 | | | | | | | | | |
| 24-May-22 | | | | | | | | | |
| 25-May-22 | | | | | | | | | |
| 26-May-22 | | | | | | | | | |
| 27-May-22 | | | | | | | | | |
| 28-May-22 | | | | | | | | | |
| 29-May-22 | | | | | | | | | |
| 30-May-22 | | | | | | | | | |
| 31-May-22 | | | | | | | | | |
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**Note : Blank coloum -Unit is in shutdown**

**Adani Power (Mundra) Limited, Mundra**

Continues Environment Monitoring System Reports (Apr'2022 TO Sep'2022)

| | Unit 1 | | | Unit 2 | | | Unit 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| Date | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) | PM mg/Nm3 (Avg) | SOx $mg/Nm^3$ (Avg) | NOx mg/Nm3 (Avg) | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) |
| 1-Jun-22 | | | | | | | | | |
| 2-Jun-22 | | | | | | | | | |
| 3-Jun-22 | | | | | | | | | |
| 4-Jun-22 | | | | | | | | | |
| 5-Jun-22 | | | | | | | | | |
| 6-Jun-22 | | | | | | | | | |
| 7-Jun-22 | | | | | | | | | |
| 8-Jun-22 | | | | | | | | | |
| 9-Jun-22 | | | | | | | | | |
| 10-Jun-22 | | | | | | | | | |
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| 26-Jun-22 | | | | | | | | | |
| 27-Jun-22 | | | | | | | | | |
| 28-Jun-22 | | | | | | | | | |
| 29-Jun-22 | | | | | | | | | |
| 30-Jun-22 | | | | | | | | | |
| 1-Jul-22 | | | | | | | | | |
| 2-Jul-22 | | | | | | | | | |
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| 8-Jul-22 | | | | | | | | | |
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| 30-Jul-22 | | | | | | | | | |
| 31-Jul-22 | | | | | | | | | |
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**Adani Power (Mundra) Limited, Mundra**

Continues Environment Monitoring System Reports (Apr'2022 TO Sep'2022)

| | Unit 1 | | | Unit 2 | | | Unit 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| Date | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) | PM mg/Nm3 (Avg) | SOx $mg/Nm^3$ (Avg) | NOx mg/Nm3 (Avg) | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) |
| 1-Aug-22 | | | | | | | | | |
| 2-Aug-22 | | | | | | | | | |
| 3-Aug-22 | | | | | | | | | |
| 4-Aug-22 | | | | | | | | | |
| 5-Aug-22 | | | | | | | | | |
| 6-Aug-22 | | | | | | | | | |
| 7-Aug-22 | | | | | | | | | |
| 8-Aug-22 | | | | | | | | | |
| 9-Aug-22 | | | | | | | | | |
| 10-Aug-22 | | | | | | | | | |
| 11-Aug-22 | | | | | | | | | |
| 12-Aug-22 | | | | | | | | | |
| 13-Aug-22 | | | | | | | | | |
| 14-Aug-22 | | | | | | | | | |
| 15-Aug-22 | | | | | | | | | |
| 16-Aug-22 | | | | | | | | | |
| 17-Aug-22 | | | | | | | | | |
| 18-Aug-22 | | | | | | | | | |
| 19-Aug-22 | | | | | | | | | |
| 20-Aug-22 | | | | | | | | | |
| 21-Aug-22 | | | | | | | | | |
| 22-Aug-22 | | | | | | | | | |
| 23-Aug-22 | | | | | | | | | |
| 24-Aug-22 | | | | | | | | | |
| 25-Aug-22 | | | | | | | | | |
| 26-Aug-22 | | | | | | | | | |
| 27-Aug-22 | | | | | | | | | |
| 28-Aug-22 | | | | | | | | | |
| 29-Aug-22 | | | | | | | | | |
| 30-Aug-22 | 22.5 | 293.1 | 125.1 | | | | | | |
| 31-Aug-22 | 30.1 | 508.8 | 214.5 | 21.4 | 333.9 | 166.7 | | | |
| 1-Sep-22 | 29.9 | 506.0 | 215.3 | 28.0 | 509.5 | 221.5 | | | |
| 2-Sep-22 | 29.5 | 516.3 | 215.4 | 27.3 | 508.7 | 222.0 | | | |
| 3-Sep-22 | 30.6 | 530.4 | 220.7 | 27.0 | 510.9 | 219.4 | | | |
| 4-Sep-22 | 32.0 | 525.1 | 193.3 | 26.7 | 510.0 | 220.0 | | | |
| 5-Sep-22 | 31.2 | 541.2 | 218.2 | 26.8 | 508.6 | 221.6 | | | |
| 6-Sep-22 | 30.9 | 541.1 | 218.5 | 28.2 | 508.8 | 220.6 | | | |
| 7-Sep-22 | 31.0 | 554.3 | 218.0 | 29.9 | 509.0 | 221.9 | | | |
| 8-Sep-22 | 31.2 | 547.7 | 217.9 | 29.5 | 509.7 | 221.6 | | | |
| 9-Sep-22 | 31.0 | 567.8 | 218.0 | 28.2 | 509.4 | 220.9 | | | |
| 10-Sep-22 | 30.7 | 523.5 | 215.9 | 22.4 | 507.2 | 221.5 | | | |
| 11-Sep-22 | | | | | | | | | |
| 12-Sep-22 | | | | | | | | | |
| 13-Sep-22 | | | | | | | | | |
| 14-Sep-22 | | | | | | | | | |
| 15-Sep-22 | | | | | | | | | |
| 16-Sep-22 | | | | | | | | | |
| 17-Sep-22 | | | | | | | | | |
| 18-Sep-22 | | | | | | | | | |
| 19-Sep-22 | | | | | | | | | |
| 20-Sep-22 | | | | | | | | | |
| 21-Sep-22 | | | | | | | | | |
| 22-Sep-22 | | | | | | | | | |
| 23-Sep-22 | | | | | | | | | |
| 24-Sep-22 | | | | | | | | | |
| 25-Sep-22 | | | | | | | | | |
| 26-Sep-22 | | | | | | | | | |
| 27-Sep-22 | | | | | | | | | |
| 28-Sep-22 | | | | | | | | | |
| 29-Sep-22 | | | | | | | | | |
| 30-Sep-22 | | | | | | | | | |

**Note : Blank coloum -Unit is in shutdown**

adani Power

**Adani Power (Mundra) Limited, Mundra**

Continues Environment Monitoring System Reports (Apr'2022 TO Sep'2022)

| | Unit 4 | | | Unit 5 | | | Unit 6 | | |
|---|---|---|---|---|---|---|---|---|---|
| Date | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) |
| 1-Apr-22 | 31.0 | 488.9 | 240.0 | 31.0 | 438.4 | 256.2 | 32.7 | 481.9 | 239.3 |
| 2-Apr-22 | 32.0 | 498.3 | 245.3 | 32.0 | 448.9 | 258.1 | 34.5 | 482.3 | 252.9 |
| 3-Apr-22 | 31.8 | 496.0 | 240.3 | 31.4 | 448.1 | 265.7 | 34.4 | 485.8 | 245.1 |
| 4-Apr-22 | 33.3 | 495.2 | 244.7 | 33.0 | 453.2 | 259.8 | 34.4 | 487.5 | 247.1 |
| 5-Apr-22 | 35.4 | 502.4 | 245.8 | 33.7 | 470.6 | 281.5 | 37.6 | 502.9 | 268.9 |
| 6-Apr-22 | 33.9 | 501.0 | 245.9 | 33.6 | 464.7 | 268.7 | 35.7 | 495.0 | 255.2 |
| 7-Apr-22 | 33.5 | 495.4 | 239.9 | 31.6 | 454.2 | 274.0 | 34.0 | 488.4 | 247.3 |
| 8-Apr-22 | 34.6 | 489.1 | 239.9 | 32.3 | 455.2 | 269.2 | 35.0 | 484.1 | 251.2 |
| 9-Apr-22 | 34.0 | 475.8 | 238.3 | 33.2 | 463.9 | 270.0 | 36.1 | 488.3 | 262.3 |
| 10-Apr-22 | 35.3 | 472.8 | 240.4 | 32.8 | 461.1 | 269.7 | 35.1 | 488.6 | 255.5 |
| 11-Apr-22 | 37.5 | 467.9 | 230.5 | 34.0 | 479.3 | 289.4 | 36.3 | 496.5 | 268.1 |
| 12-Apr-22 | 36.9 | 468.4 | 234.8 | 34.8 | 480.4 | 284.2 | 35.8 | 493.8 | 253.1 |
| 13-Apr-22 | 37.2 | 471.0 | 241.9 | 34.5 | 479.6 | 283.7 | 36.2 | 494.4 | 273.1 |
| 14-Apr-22 | 35.0 | 465.0 | 242.4 | 33.1 | 456.5 | 269.3 | 36.4 | 496.3 | 255.9 |
| 15-Apr-22 | 33.2 | 457.1 | 237.2 | 31.7 | 448.2 | 264.9 | 34.3 | 495.6 | 250.1 |
| 16-Apr-22 | 31.6 | 472.1 | 247.6 | 31.9 | 449.9 | 264.7 | 33.6 | 492.0 | 247.0 |
| 17-Apr-22 | 32.8 | 464.5 | 242.9 | 30.6 | 443.2 | 265.6 | 33.1 | 484.3 | 237.2 |
| 18-Apr-22 | 35.9 | 466.2 | 238.4 | 34.1 | 475.6 | 283.2 | 36.1 | 498.8 | 255.1 |
| 19-Apr-22 | 37.3 | 471.3 | 246.2 | 33.9 | 475.8 | 285.0 | 35.8 | 498.9 | 254.8 |
| 20-Apr-22 | 35.5 | 470.5 | 245.7 | 33.7 | 463.8 | 276.4 | 35.7 | 497.7 | 253.0 |
| 21-Apr-22 | 36.2 | 469.3 | 241.8 | 35.2 | 484.0 | 289.1 | 36.4 | 501.2 | 275.1 |
| 22-Apr-22 | 35.8 | 462.9 | 239.8 | 34.4 | 478.2 | 282.0 | 35.5 | 492.2 | 284.4 |
| 23-Apr-22 | 36.9 | 457.6 | 238.3 | 34.5 | 481.0 | 289.5 | 31.2 | 444.3 | 236.4 |
| 24-Apr-22 | 33.9 | 453.8 | 235.6 | 31.9 | 451.1 | 268.4 | 33.6 | 484.5 | 260.9 |
| 25-Apr-22 | 33.3 | 456.7 | 238.2 | 32.0 | 450.0 | 263.6 | 34.6 | 490.7 | 253.6 |
| 26-Apr-22 | 34.8 | 471.3 | 244.0 | 34.0 | 471.6 | 278.7 | 36.6 | 501.6 | 262.6 |
| 27-Apr-22 | 36.7 | 452.1 | 233.6 | 34.2 | 476.4 | 281.3 | 35.9 | 502.0 | 257.8 |
| 28-Apr-22 | 36.6 | 458.4 | 237.9 | 34.5 | 479.9 | 287.6 | 36.9 | 502.8 | 274.4 |
| 29-Apr-22 | 35.2 | 469.2 | 247.0 | 33.0 | 459.4 | 269.9 | 35.8 | 496.2 | 258.5 |
| 30-Apr-22 | 33.4 | 474.5 | 249.2 | 31.3 | 441.9 | 259.5 | 32.9 | 485.1 | 239.1 |
| 1-May-22 | 32.9 | 470.1 | 247.9 | 31.3 | 429.7 | 244.7 | 32.8 | 481.6 | 235.5 |
| 2-May-22 | 34.3 | 462.8 | 239.8 | 32.4 | 458.9 | 272.3 | 34.3 | 485.6 | 242.4 |
| 3-May-22 | 32.2 | 466.5 | 241.5 | 30.9 | 449.7 | 266.4 | 33.1 | 476.8 | 228.5 |
| 4-May-22 | 33.0 | 459.5 | 238.5 | 32.1 | 442.3 | 258.6 | 35.5 | 483.9 | 239.4 |
| 5-May-22 | 34.8 | 473.2 | 246.4 | 33.5 | 464.2 | 272.1 | 35.5 | 493.6 | 249.9 |
| 6-May-22 | 33.7 | 453.5 | 237.0 | 33.3 | 458.9 | 266.3 | 35.4 | 492.8 | 248.6 |
| 7-May-22 | 31.0 | 465.1 | 243.4 | 31.7 | 433.1 | 252.8 | 33.1 | 482.4 | 236.0 |
| 8-May-22 | 30.4 | 465.4 | 243.6 | 31.4 | 439.5 | 258.2 | 33.5 | 480.4 | 234.7 |
| 9-May-22 | 24.6 | 352.3 | 183.8 | 31.9 | 449.7 | 265.5 | 33.9 | 491.0 | 247.0 |
| 10-May-22 | | | | 33.5 | 466.3 | 275.5 | 36.2 | 499.5 | 256.2 |
| 11-May-22 | | | | 32.7 | 449.2 | 255.4 | 35.8 | 494.2 | 252.4 |
| 12-May-22 | | | | 31.6 | 423.6 | 241.8 | 33.6 | 480.7 | 235.0 |
| 13-May-22 | | | | 22.4 | 279.9 | 160.2 | 32.3 | 479.0 | 231.0 |
| 14-May-22 | | | | | | | 33.5 | 481.4 | 233.4 |
| 15-May-22 | | | | | | | 32.0 | 476.1 | 227.2 |
| 16-May-22 | | | | | | | 32.3 | 474.4 | 225.2 |
| 17-May-22 | | | | | | | 32.9 | 480.9 | 235.0 |
| 18-May-22 | | | | | | | 35.4 | 494.7 | 251.8 |
| 19-May-22 | | | | | | | 35.3 | 492.5 | 249.6 |
| 20-May-22 | | | | 21.4 | 278.6 | 164.4 | 32.6 | 481.2 | 234.5 |
| 21-May-22 | | | | 30.5 | 429.5 | 252.1 | 26.3 | 390.8 | 220.8 |
| 22-May-22 | | | | 30.8 | 425.5 | 249.7 | | | |
| 23-May-22 | | | | 31.9 | 439.0 | 254.6 | | | |
| 24-May-22 | | | | 31.5 | 444.0 | 263.3 | | | |
| 25-May-22 | | | | 34.0 | 471.8 | 273.8 | | | |
| 26-May-22 | | | | 32.2 | 443.8 | 255.6 | | | |
| 27-May-22 | | | | 28.5 | 325.3 | 231.4 | | | |
| 28-May-22 | | | | | | | | | |
| 29-May-22 | | | | | | | | | |
| 30-May-22 | | | | | | | 27.8 | 480.9 | 191.3 |
| 31-May-22 | | | | 31.2 | 436.6 | 254.1 | 33.0 | 482.2 | 237.7 |

**Note : Blank coloum -Unit is in shutdown**

adani Power

**Adani Power (Mundra) Limited, Mundra**

Continues Environment Monitoring System Reports (Apr'2022 TO Sep'2022)

| | Unit 4 | | | Unit 5 | | | Unit 6 | | |
|---|---|---|---|---|---|---|---|---|---|
| Date | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) |
| 1-Jun-22 | | | | 31.2 | 429.4 | 250.6 | 33.4 | 485.2 | 239.1 |
| 2-Jun-22 | | | | 31.4 | 438.0 | 249.1 | 34.8 | 487.8 | 246.7 |
| 3-Jun-22 | | | | 31.4 | 431.1 | 253.5 | 32.7 | 485.6 | 240.4 |
| 4-Jun-22 | | | | 31.2 | 428.4 | 245.2 | 32.9 | 479.8 | 235.1 |
| 5-Jun-22 | | | | 30.6 | 426.3 | 246.9 | 32.7 | 475.9 | 230.3 |
| 6-Jun-22 | | | | 32.9 | 442.0 | 243.3 | 34.3 | 484.6 | 243.4 |
| 7-Jun-22 | | | | 32.8 | 450.0 | 252.6 | 35.4 | 489.1 | 256.5 |
| 8-Jun-22 | | | | 32.0 | 440.2 | 252.4 | 33.7 | 484.4 | 249.8 |
| 9-Jun-22 | | | | 31.3 | 436.0 | 250.2 | 32.5 | 482.1 | 235.1 |
| 10-Jun-22 | | | | 32.1 | 448.7 | 261.5 | 35.5 | 490.2 | 246.4 |
| 11-Jun-22 | | | | 31.4 | 449.4 | 260.9 | 34.5 | 487.8 | 249.5 |
| 12-Jun-22 | | | | 32.4 | 439.3 | 240.5 | 32.8 | 480.4 | 234.3 |
| 13-Jun-22 | | | | 33.5 | 455.8 | 256.3 | 34.0 | 485.1 | 245.2 |
| 14-Jun-22 | | | | 31.7 | 439.1 | 245.4 | 32.8 | 482.2 | 238.8 |
| 15-Jun-22 | | | | 31.4 | 435.4 | 246.5 | 33.6 | 482.7 | 236.8 |
| 16-Jun-22 | | | | 30.6 | 434.4 | 248.8 | 32.3 | 481.3 | 233.9 |
| 17-Jun-22 | | | | 31.8 | 443.1 | 258.7 | 35.0 | 480.9 | 240.4 |
| 18-Jun-22 | | | | 32.6 | 446.7 | 249.5 | 35.0 | 487.8 | 250.4 |
| 19-Jun-22 | | | | 31.9 | 444.5 | 258.4 | 26.5 | 383.9 | 232.1 |
| 20-Jun-22 | | | | 30.9 | 432.8 | 249.7 | | | |
| 21-Jun-22 | | | | 32.4 | 444.2 | 253.6 | | | |
| 22-Jun-22 | | | | 34.5 | 476.8 | 282.5 | | | |
| 23-Jun-22 | | | | 32.1 | 448.1 | 258.2 | 27.6 | 411.1 | 196.8 |
| 24-Jun-22 | | | | 32.1 | 440.7 | 253.6 | 34.2 | 493.1 | 255.3 |
| 25-Jun-22 | | | | 32.2 | 451.6 | 266.6 | 35.7 | 493.8 | 251.2 |
| 26-Jun-22 | | | | 31.8 | 431.0 | 244.4 | 34.4 | 489.0 | 250.0 |
| 27-Jun-22 | | | | 31.5 | 434.1 | 254.6 | 34.0 | 491.1 | 246.4 |
| 28-Jun-22 | | | | 31.2 | 434.7 | 247.6 | 34.8 | 480.4 | 239.5 |
| 29-Jun-22 | | | | 30.3 | 411.1 | 250.5 | 34.8 | 472.5 | 250.1 |
| 30-Jun-22 | | | | 30.8 | 406.0 | 244.3 | 32.3 | 459.2 | 259.8 |
| 1-Jul-22 | | | | 22.7 | 281.1 | 165.9 | 29.9 | 431.0 | 251.3 |
| 2-Jul-22 | | | | | | | | | |
| 3-Jul-22 | | | | | | | | | |
| 4-Jul-22 | | | | | | | | | |
| 5-Jul-22 | | | | | | | | | |
| 6-Jul-22 | | | | | | | | | |
| 7-Jul-22 | | | | | | | | | |
| 8-Jul-22 | | | | | | | | | |
| 9-Jul-22 | | | | | | | | | |
| 10-Jul-22 | | | | | | | | | |
| 11-Jul-22 | | | | | | | | | |
| 12-Jul-22 | | | | | | | | | |
| 13-Jul-22 | | | | | | | | | |
| 14-Jul-22 | | | | | | | | | |
| 15-Jul-22 | | | | | | | | | |
| 16-Jul-22 | | | | | | | | | |
| 17-Jul-22 | | | | | | | | | |
| 18-Jul-22 | | | | | | | | | |
| 19-Jul-22 | | | | | | | | | |
| 20-Jul-22 | | | | | | | | | |
| 21-Jul-22 | | | | | | | | | |
| 22-Jul-22 | | | | | | | | | |
| 23-Jul-22 | | | | | | | | | |
| 24-Jul-22 | | | | | | | | | |
| 25-Jul-22 | | | | | | | | | |
| 26-Jul-22 | | | | | | | | | |
| 27-Jul-22 | | | | | | | | | |
| 28-Jul-22 | | | | | | | | | |
| 29-Jul-22 | | | | | | | | | |
| 30-Jul-22 | | | | | | | | | |
| 31-Jul-22 | | | | | | | | | |
| | | | | | | | | | |

adani Power

**Adani Power (Mundra) Limited, Mundra**

Continues Environment Monitoring System Reports (Apr'2022 TO Sep'2022)

| | Unit 4 | | | Unit 5 | | | Unit 6 | | |
|---|---|---|---|---|---|---|---|---|---|
| Date | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) |
| 1-Aug-22 | | | | | | | | | |
| 2-Aug-22 | | | | | | | | | |
| 3-Aug-22 | | | | | | | 29.9 | 274.8 | 237.1 |
| 4-Aug-22 | | | | | | | 33.4 | 300.8 | 283.0 |
| 5-Aug-22 | | | | | | | 31.7 | 303.6 | 284.2 |
| 6-Aug-22 | | | | | | | 32.0 | 304.8 | 282.0 |
| 7-Aug-22 | | | | | | | 32.3 | 295.6 | 287.6 |
| 8-Aug-22 | | | | | | | 32.7 | 416.0 | 274.8 |
| 9-Aug-22 | | | | | | | | | |
| 10-Aug-22 | | | | | | | | | |
| 11-Aug-22 | | | | | | | | | |
| 12-Aug-22 | | | | | | | | | |
| 13-Aug-22 | | | | | | | | | |
| 14-Aug-22 | | | | | | | | | |
| 15-Aug-22 | | | | | | | | | |
| 16-Aug-22 | | | | | | | | | |
| 17-Aug-22 | | | | | | | | | |
| 18-Aug-22 | | | | | | | | | |
| 19-Aug-22 | | | | | | | | | |
| 20-Aug-22 | | | | | | | | | |
| 21-Aug-22 | | | | | | | | | |
| 22-Aug-22 | | | | | | | | | |
| 23-Aug-22 | | | | | | | | | |
| 24-Aug-22 | | | | | | | | | |
| 25-Aug-22 | | | | | | | | | |
| 26-Aug-22 | | | | | | | | | |
| 27-Aug-22 | | | | | | | | | |
| 28-Aug-22 | | | | | | | 27.2 | 560.5 | 197.5 |
| 29-Aug-22 | | | | | | | 34.7 | 578.8 | 282.8 |
| 30-Aug-22 | 28.5 | 428.5 | 193.3 | 28.3 | 350.5 | 210.3 | 35.2 | 441.7 | 281.1 |
| 31-Aug-22 | 32.2 | 514.5 | 231.7 | 31.3 | 406.5 | 245.1 | 35.0 | 448.6 | 277.6 |
| 1-Sep-22 | 32.7 | 515.6 | 225.8 | 32.8 | 419.7 | 244.7 | 27.9 | 360.0 | 222.1 |
| 2-Sep-22 | 31.0 | 515.5 | 230.3 | 30.9 | 409.4 | 250.3 | 35.1 | 456.3 | 273.0 |
| 3-Sep-22 | 31.0 | 522.1 | 230.7 | 31.5 | 412.4 | 246.6 | 34.9 | 449.9 | 276.3 |
| 4-Sep-22 | 30.7 | 518.3 | 226.0 | 30.7 | 384.6 | 240.3 | 32.1 | 442.9 | 280.5 |
| 5-Sep-22 | 30.9 | 513.9 | 226.2 | 31.0 | 370.5 | 232.9 | 32.2 | 433.7 | 281.2 |
| 6-Sep-22 | 32.8 | 513.4 | 226.6 | 32.5 | 413.1 | 240.3 | 35.9 | 446.4 | 279.0 |
| 7-Sep-22 | 33.7 | 522.8 | 233.5 | 32.7 | 407.1 | 243.6 | 35.7 | 440.8 | 281.0 |
| 8-Sep-22 | 33.3 | 518.8 | 224.7 | 31.9 | 378.5 | 228.8 | 34.6 | 446.0 | 278.1 |
| 9-Sep-22 | 33.2 | 533.2 | 236.8 | 31.1 | 390.9 | 237.1 | 33.3 | 436.7 | 282.2 |
| 10-Sep-22 | 33.4 | 527.5 | 231.0 | 31.7 | 400.9 | 240.1 | 33.4 | 437.4 | 281.0 |
| 11-Sep-22 | 31.9 | 530.3 | 228.6 | 30.4 | 372.3 | 233.7 | 32.8 | 439.1 | 281.0 |
| 12-Sep-22 | 27.1 | 525.3 | 230.2 | 30.6 | 365.0 | 229.3 | 31.7 | 432.9 | 272.3 |
| 13-Sep-22 | 26.7 | 512.4 | 221.7 | 31.0 | 378.6 | 230.9 | 32.3 | 427.5 | 273.6 |
| 14-Sep-22 | 27.6 | 505.0 | 224.4 | 27.5 | 391.6 | 215.7 | 32.1 | 430.0 | 273.1 |
| 15-Sep-22 | | | | | | | | | |
| 16-Sep-22 | | | | | | | | | |
| 17-Sep-22 | | | | | | | | | |
| 18-Sep-22 | | | | | | | | | |
| 19-Sep-22 | | | | | | | | | |
| 20-Sep-22 | | | | | | | | | |
| 21-Sep-22 | | | | 27.4 | 298.9 | 215.4 | 33.6 | 443.3 | 271.9 |
| 22-Sep-22 | | | | 29.9 | 340.7 | 245.3 | 32.3 | 416.8 | 267.7 |
| 23-Sep-22 | | | | 30.5 | 399.4 | 240.7 | 31.7 | 393.9 | 262.4 |
| 24-Sep-22 | | | | 31.3 | 393.8 | 235.1 | 32.1 | 391.7 | 258.9 |
| 25-Sep-22 | | | | 30.5 | 403.5 | 242.5 | 31.5 | 361.0 | 252.5 |
| 26-Sep-22 | | | | 32.1 | 399.2 | 238.2 | 33.6 | 419.8 | 269.8 |
| 27-Sep-22 | | | | 30.3 | 359.3 | 227.4 | 32.4 | 422.8 | 268.8 |
| 28-Sep-22 | | | | 31.1 | 404.4 | 240.5 | 32.3 | 423.0 | 280.1 |
| 29-Sep-22 | | | | 31.2 | 381.4 | 233.5 | 32.6 | 414.5 | 266.0 |
| 30-Sep-22 | | | | 31.0 | 403.6 | 237.5 | 32.2 | 424.6 | 266.0 |

**Note : Blank coloum -Unit is in shutdown**

adani Power

**Adani Power (Mundra) Limited, Mundra**

Continues Environment Monitoring System Reports (Apr'2022 TO Sep'2022)

| | Unit 7 | | | Unit 8 | | | Unit 9 | | |
|---|---|---|---|---|---|---|---|---|---|
| Date | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) |
| 1-Apr-22 | | | | | | | | | |
| 2-Apr-22 | | | | | | | | | |
| 3-Apr-22 | | | | | | | | | |
| 4-Apr-22 | | | | | | | | | |
| 5-Apr-22 | | | | | | | | | |
| 6-Apr-22 | | | | | | | | | |
| 7-Apr-22 | | | | | | | | | |
| 8-Apr-22 | | | | | | | | | |
| 9-Apr-22 | | | | | | | | | |
| 10-Apr-22 | | | | | | | | | |
| 11-Apr-22 | | | | | | | | | |
| 12-Apr-22 | | | | | | | | | |
| 13-Apr-22 | | | | | | | | | |
| 14-Apr-22 | | | | | | | | | |
| 15-Apr-22 | | | | | | | | | |
| 16-Apr-22 | | | | | | | | | |
| 17-Apr-22 | | | | | | | | | |
| 18-Apr-22 | | | | | | | | | |
| 19-Apr-22 | | | | | | | | | |
| 20-Apr-22 | | | | | | | | | |
| 21-Apr-22 | | | | | | | | | |
| 22-Apr-22 | | | | | | | | | |
| 23-Apr-22 | | | | | | | | | |
| 24-Apr-22 | | | | | | | | | |
| 25-Apr-22 | | | | | | | | | |
| 26-Apr-22 | | | | | | | | | |
| 27-Apr-22 | | | | | | | | | |
| 28-Apr-22 | | | | | | | | | |
| 29-Apr-22 | | | | | | | | | |
| 30-Apr-22 | | | | | | | | | |
| 1-May-22 | | | | | | | | | |
| 2-May-22 | | | | | | | | | |
| 3-May-22 | | | | | | | | | |
| 4-May-22 | | | | | | | | | |
| 5-May-22 | | | | | | | | | |
| 6-May-22 | | | | | | | | | |
| 7-May-22 | | | | | | | | | |
| 8-May-22 | | | | | | | | | |
| 9-May-22 | | | | | | | | | |
| 10-May-22 | 22.2 | 121.9 | 159.4 | | | | | | |
| 11-May-22 | 34.2 | 173.6 | 249.7 | | | | | | |
| 12-May-22 | 34.0 | 173.5 | 248.5 | | | | | | |
| 13-May-22 | 32.4 | 168.7 | 235.6 | | | | | | |
| 14-May-22 | 30.8 | 164.4 | 226.0 | | | | | | |
| 15-May-22 | 30.1 | 161.5 | 222.4 | | | | | | |
| 16-May-22 | 31.6 | 167.7 | 229.7 | | | | | | |
| 17-May-22 | 33.0 | 171.4 | 237.5 | | | | | | |
| 18-May-22 | 34.2 | 172.9 | 247.9 | | | | | | |
| 19-May-22 | 34.8 | 177.8 | 255.9 | | | | | | |
| 20-May-22 | 34.3 | 161.3 | 251.2 | | | | | | |
| 21-May-22 | 28.8 | 144.6 | 215.6 | | | | | | |
| 22-May-22 | 28.7 | 144.9 | 215.8 | | | | | | |
| 23-May-22 | 29.1 | 146.3 | 217.6 | | | | | | |
| 24-May-22 | 29.2 | 146.1 | 219.6 | | | | | | |
| 25-May-22 | 34.1 | 158.9 | 242.4 | | | | | | |
| 26-May-22 | 32.2 | 154.9 | 230.9 | | | | | | |
| 27-May-22 | 30.9 | 153.6 | 227.0 | | | | | | |
| 28-May-22 | 31.3 | 151.4 | 228.7 | | | | | | |
| 29-May-22 | 31.9 | 153.1 | 223.6 | | | | | | |
| 30-May-22 | 32.3 | 155.0 | 229.7 | | | | 31.0 | 161.2 | 192.0 |
| 31-May-22 | 32.7 | 155.0 | 232.2 | | | | 30.1 | 147.6 | 232.6 |
| | | | | | | | | | |

**Note : Blank coloum -Unit is in shutdown**

adani Power

**Adani Power (Mundra) Limited, Mundra**

Continues Environment Monitoring System Reports (Apr'2022 TO Sep'2022)

| | Unit 7 | | | Unit 8 | | | Unit 9 | | |
|---|---|---|---|---|---|---|---|---|---|
| Date | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) |
| 1-Jun-22 | 35.5 | 158.2 | 235.2 | | | | 32.0 | 156.0 | 242.9 |
| 2-Jun-22 | 35.2 | 158.6 | 235.2 | | | | 32.7 | 165.5 | 254.9 |
| 3-Jun-22 | 36.4 | 162.6 | 247.1 | | | | 32.9 | 163.5 | 251.5 |
| 4-Jun-22 | 33.4 | 155.7 | 236.7 | | | | 33.8 | 170.2 | 259.5 |
| 5-Jun-22 | 32.4 | 154.7 | 226.9 | | | | 30.5 | 155.3 | 245.9 |
| 6-Jun-22 | 34.2 | 160.1 | 235.8 | | | | 34.3 | 171.2 | 260.1 |
| 7-Jun-22 | 34.3 | 156.7 | 237.1 | | | | 33.3 | 163.8 | 253.8 |
| 8-Jun-22 | 33.4 | 157.4 | 232.0 | | | | 32.9 | 163.9 | 252.6 |
| 9-Jun-22 | 34.5 | 159.6 | 239.8 | | | | 32.1 | 158.2 | 244.5 |
| 10-Jun-22 | 35.9 | 161.8 | 242.7 | | | | 34.0 | 168.5 | 257.8 |
| 11-Jun-22 | 34.3 | 157.6 | 238.4 | 26.2 | 158.5 | 211.1 | 34.2 | 167.6 | 259.0 |
| 12-Jun-22 | 33.5 | 156.6 | 227.6 | 30.4 | 179.7 | 225.9 | 33.6 | 156.7 | 244.7 |
| 13-Jun-22 | 36.4 | 162.3 | 246.6 | 32.0 | 183.2 | 240.4 | 36.5 | 177.9 | 268.5 |
| 14-Jun-22 | 35.7 | 162.6 | 249.6 | 32.2 | 183.3 | 242.0 | 35.9 | 181.1 | 270.1 |
| 15-Jun-22 | 34.7 | 158.8 | 238.0 | 31.0 | 181.2 | 232.4 | 35.1 | 179.7 | 267.3 |
| 16-Jun-22 | 34.3 | 156.5 | 240.2 | 33.2 | 183.0 | 229.2 | 32.9 | 166.7 | 254.4 |
| 17-Jun-22 | 35.2 | 159.3 | 234.0 | 35.5 | 185.7 | 236.4 | 32.2 | 165.6 | 251.9 |
| 18-Jun-22 | 33.0 | 153.7 | 227.4 | 36.4 | 184.9 | 217.0 | 30.8 | 154.1 | 240.8 |
| 19-Jun-22 | 32.6 | 155.0 | 228.7 | 35.4 | 184.3 | 222.6 | 30.2 | 124.1 | 236.0 |
| 20-Jun-22 | 31.2 | 153.6 | 226.6 | 31.8 | 180.2 | 216.8 | | | |
| 21-Jun-22 | 32.5 | 156.0 | 235.6 | 32.4 | 181.1 | 219.2 | | | |
| 22-Jun-22 | 32.6 | 160.0 | 239.9 | 33.9 | 183.8 | 232.7 | | | |
| 23-Jun-22 | 32.8 | 163.2 | 249.9 | 35.2 | 186.9 | 246.3 | | | |
| 24-Jun-22 | 32.5 | 163.7 | 248.9 | 34.4 | 185.6 | 239.1 | | | |
| 25-Jun-22 | 32.3 | 162.9 | 247.3 | 34.5 | 185.8 | 239.2 | | | |
| 26-Jun-22 | 32.4 | 162.7 | 248.6 | 35.2 | 186.1 | 241.4 | | | |
| 27-Jun-22 | 32.8 | 163.5 | 252.9 | 35.0 | 186.5 | 243.5 | | | |
| 28-Jun-22 | 32.4 | 163.5 | 246.4 | 35.3 | 181.3 | 245.3 | | | |
| 29-Jun-22 | 32.7 | 163.4 | 242.7 | 34.7 | 175.9 | 241.1 | | | |
| 30-Jun-22 | 29.1 | 162.9 | 222.0 | 31.3 | 175.0 | 228.7 | | | |
| 1-Jul-22 | 30.1 | 163.5 | 224.1 | 31.4 | 177.3 | 232.5 | | | |
| 2-Jul-22 | 32.2 | 162.6 | 236.6 | 34.2 | 175.5 | 237.8 | | | |
| 3-Jul-22 | 32.3 | 164.7 | 235.8 | 34.2 | 175.1 | 242.7 | | | |
| 4-Jul-22 | 32.7 | 162.9 | 236.0 | 36.0 | 175.8 | 240.5 | | | |
| 5-Jul-22 | 33.2 | 164.0 | 249.2 | 34.8 | 175.8 | 242.1 | | | |
| 6-Jul-22 | 32.9 | 163.6 | 247.1 | 35.1 | 175.7 | 241.6 | | | |
| 7-Jul-22 | 32.8 | 164.6 | 242.3 | 35.4 | 175.9 | 244.8 | | | |
| 8-Jul-22 | 32.8 | 164.3 | 243.4 | 34.8 | 176.5 | 240.5 | | | |
| 9-Jul-22 | 31.9 | 164.1 | 226.5 | 35.1 | 177.2 | 239.3 | | | |
| 10-Jul-22 | 30.0 | 163.1 | 224.7 | 32.0 | 176.6 | 238.7 | | | |
| 11-Jul-22 | 32.1 | 163.6 | 234.5 | 34.1 | 176.4 | 246.9 | | | |
| 12-Jul-22 | 31.7 | 162.6 | 231.9 | 34.0 | 177.0 | 244.7 | | | |
| 13-Jul-22 | 31.6 | 165.0 | 225.4 | 34.0 | 176.6 | 246.3 | | | |
| 14-Jul-22 | 31.9 | 162.6 | 227.5 | 33.3 | 176.9 | 239.7 | | | |
| 15-Jul-22 | 32.4 | 164.4 | 228.3 | 32.2 | 177.3 | 239.8 | | | |
| 16-Jul-22 | 31.9 | 163.8 | 224.9 | 31.8 | 177.8 | 235.0 | | | |
| 17-Jul-22 | 28.5 | 164.2 | 216.7 | 30.2 | 177.6 | 236.4 | | | |
| 18-Jul-22 | 32.4 | 164.2 | 235.4 | 33.3 | 179.6 | 241.6 | | | |
| 19-Jul-22 | 32.6 | 163.0 | 234.1 | 33.4 | 177.2 | 240.1 | | | |
| 20-Jul-22 | 31.7 | 163.9 | 230.0 | 31.6 | 176.8 | 234.4 | | | |
| 21-Jul-22 | 28.4 | 136.6 | 184.5 | 29.6 | 176.9 | 229.3 | | | |
| 22-Jul-22 | | | | 29.8 | 177.0 | 231.3 | | | |
| 23-Jul-22 | | | | 26.5 | 172.8 | 196.0 | | | |
| 24-Jul-22 | | | | 26.2 | 169.8 | 184.0 | | | |
| 25-Jul-22 | | | | 26.5 | 172.8 | 198.5 | | | |
| 26-Jul-22 | | | | 27.0 | 178.2 | 221.3 | | | |
| 27-Jul-22 | | | | 26.3 | 172.6 | 198.6 | | | |
| 28-Jul-22 | | | | 26.6 | 175.0 | 203.9 | | | |
| 29-Jul-22 | | | | 26.7 | 173.9 | 201.6 | | | |
| 30-Jul-22 | | | | 26.4 | 173.5 | 197.6 | | | |
| 31-Jul-22 | | | | 26.6 | 173.3 | 201.0 | | | |
| | | | | | | | | | |

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**Adani Power (Mundra) Limited, Mundra**

Continues Environment Monitoring System Reports (Apr'2022 TO Sep'2022)

| | Unit 7 | | | Unit 8 | | | Unit 9 | | |
|---|---|---|---|---|---|---|---|---|---|
| Date | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) | PM mg/Nm3 (Avg) | SOx mg/Nm3 (Avg) | NOx mg/Nm3 (Avg) |
| 1-Aug-22 | | | | 26.6 | 172.4 | 196.1 | 30.6 | 159.6 | 218.8 |
| 2-Aug-22 | | | | 26.9 | 172.0 | 239.2 | 31.0 | 157.3 | 241.4 |
| 3-Aug-22 | | | | 26.8 | 172.3 | 271.3 | 31.5 | 156.9 | 265.0 |
| 4-Aug-22 | | | | 26.4 | 171.7 | 264.7 | 31.1 | 152.4 | 254.7 |
| 5-Aug-22 | | | | 26.3 | 170.8 | 263.1 | 31.7 | 153.9 | 261.9 |
| 6-Aug-22 | | | | 26.3 | 170.8 | 261.4 | 31.3 | 155.0 | 260.7 |
| 7-Aug-22 | | | | 26.5 | 171.9 | 267.0 | 30.5 | 139.9 | 237.3 |
| 8-Aug-22 | | | | 26.5 | 171.9 | 265.1 | | | |
| 9-Aug-22 | | | | 26.3 | 168.5 | 249.5 | | | |
| 10-Aug-22 | | | | 26.7 | 169.7 | 253.8 | | | |
| 11-Aug-22 | | | | 26.1 | 269.3 | 255.2 | | | |
| 12-Aug-22 | | | | 26.2 | 391.9 | 267.5 | | | |
| 13-Aug-22 | | | | 25.8 | 167.7 | 254.7 | | | |
| 14-Aug-22 | | | | 25.6 | 167.9 | 255.1 | | | |
| 15-Aug-22 | | | | 25.7 | 168.5 | 257.6 | | | |
| 16-Aug-22 | | | | 25.5 | 168.0 | 255.4 | | | |
| 17-Aug-22 | | | | 25.8 | 168.8 | 260.3 | | | |
| 18-Aug-22 | | | | 25.7 | 168.2 | 257.2 | | | |
| 19-Aug-22 | | | | 25.7 | 172.6 | 260.2 | | | |
| 20-Aug-22 | | | | 25.7 | 171.6 | 259.5 | | | |
| 21-Aug-22 | | | | | | | | | |
| 22-Aug-22 | | | | | | | | | |
| 23-Aug-22 | | | | | | | | | |
| 24-Aug-22 | | | | | | | | | |
| 25-Aug-22 | | | | | | | | | |
| 26-Aug-22 | | | | | | | | | |
| 27-Aug-22 | | | | | | | | | |
| 28-Aug-22 | | | | | | | | | |
| 29-Aug-22 | | | | | | | 28.4 | 152.7 | 266.9 |
| 30-Aug-22 | | | | | | | 29.5 | 149.0 | 265.9 |
| 31-Aug-22 | | | | | | | 29.4 | 154.0 | 267.5 |
| 1-Sep-22 | | | | | | | 29.7 | 153.0 | 267.7 |
| 2-Sep-22 | | | | | | | 30.1 | 155.2 | 271.1 |
| 3-Sep-22 | | | | | | | 29.9 | 153.3 | 266.9 |
| 4-Sep-22 | | | | | | | 26.1 | 139.7 | 239.6 |
| 5-Sep-22 | | | | | | | 26.9 | 141.3 | 247.2 |
| 6-Sep-22 | | | | | | | 28.5 | 151.7 | 266.6 |
| 7-Sep-22 | | | | | | | 29.9 | 152.4 | 265.3 |
| 8-Sep-22 | | | | | | | 29.1 | 149.1 | 256.9 |
| 9-Sep-22 | | | | | | | 26.9 | 141.2 | 246.9 |
| 10-Sep-22 | | | | | | | | | |
| 11-Sep-22 | | | | | | | | | |
| 12-Sep-22 | | | | | | | | | |
| 13-Sep-22 | | | | | | | | | |
| 14-Sep-22 | | | | | | | | | |
| 15-Sep-22 | | | | | | | | | |
| 16-Sep-22 | | | | | | | | | |
| 17-Sep-22 | | | | | | | | | |
| 18-Sep-22 | | | | | | | | | |
| 19-Sep-22 | | | | | | | | | |
| 20-Sep-22 | | | | | | | | | |
| 21-Sep-22 | | | | | | | | | |
| 22-Sep-22 | | | | | | | | | |
| 23-Sep-22 | | | | | | | | | |
| 24-Sep-22 | | | | | | | | | |
| 25-Sep-22 | | | | | | | | | |
| 26-Sep-22 | | | | | | | | | |
| 27-Sep-22 | | | | | | | | | |
| 28-Sep-22 | | | | | | | | | |
| 29-Sep-22 | | | | | | | 25.7 | 145.0 | 243.4 |
| 30-Sep-22 | | | | | | | 26.0 | 139.2 | 238.2 |

**Note : Blank coloum -Unit is in shutdown**

Annexure: II

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Power

# Terrestrial Ecology Report
# (April 2022 to September 2022)


**Environment Department,**
**Adani Power (Mundra) Limited,**
**Village Tunda & Siracha, Taluka Mundra,**
**Mundra Kutch, 370 435**
**Gujarat, India.**

## List of Abbreviations

| | | |
|---|---|---|
| APMuL | : | Adani Power (Mundra) Limited, Mundra |
| CBH | : | Circumference at Breast Height |
| DBH | : | Diameter at Breast Height |
| EIA | : | Environmental Impact Assessment |
| GPS | : | Global Positioning System |
| H' | : | Shannon-Wiener Diversity Index |
| Ha | : | Hectare |
| IUCN | : | International Union for Conservation of Nature |
| IVI | : | Importance Value Index |
| MoEF&CC | : | Ministry of Environment, Forest & Climate Change, India |
| SEZ | : | Special Economic Zone |

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## List of Plates



## List of Table

## 1. The Study Area

The Mundra coast falls in Gulf of Kutch, an ecologically important area, supports variety of fishes and birds and other associated ecosystems and hence it is necessary to monitor the ecological environment to know if any changes are happening or not due to the operation activities of power plant.

The study area has been marked as 10 Km radial distance from the existing thermal power plant boundary near village Tunda, Mundra Taluka of Kutch district of Gujarat. The study area around the plant premises comprises of terrestrial ecosystem (Fallow and barren land) and coastal ecosystem (Sea and Creeks). Topography of the study area is plain. Part of Study area falls in notified industrial zone (SEZ).

## 2. Sampling Period and Sampling Locations

The study has been carried out during the months of **April 2022 to September 2022** in two different seasons comprising Pre monsoon and monsoon season.

Sampling locations were selected based on topography, land use, vegetation pattern, etc. as per the objectives and guidelines of MoEF&CC. All observations were taken in and around sampling locations for quantitative representation of different species. List of sampling location for ecological study are given in **Table 1** and Study area map is presented in **Plate 1**.

**Table 1: List of Sampling Location**

| Sr. No. | Name of Location | Aerial Distance from Plant (Approx. Km) | GPS Location |
|---|---|---|---|
| 1 | Near Siracha Village | 2.0 | N 22° 50' 21.95" E 69° 33' 46.74" |
| 2 | Near Tunda Village | 1.5 | N 22° 50' 13.72" E 69° 32' 10.12" |
| 3 | Near Kandagra Village | 3.0 | N 22° 50' 22.85" E 69° 31' 32.85" |
| 4 | Near Navinal Creek | 8.5 | N 22° 48' 14.25" E 69° 37' 57.21" |
| 5 | Near Vandh Village | 0.5 | N 22° 48' 44.63" E 69° 32' 33.38" |
| 6 | Near Desalpar Village | 7.0 | N 22° 52' 51.22" E 69° 34' 44.82" |
| 7 | Common Intake Channel area | 3.8 | N 22° 47' 32.02" E 69° 32' 10.25" |
| 8 | Outfall Channel and Kotdi creek area | 3.5 | N 22° 48' 08.21" E 69° 34' 34.08" |


**Plate 1: Map showing Ecological Sampling Locations around 10 km radial distance**

## 3. Collection of Primary Data

### A. Vegetation Diversity

***Methodology***

The study area is dominated by the vegetation of dry deciduous scrub of small tree, shrub and very few large trees along with agricultural fields towards the northern part. Therefore, the observation of vegetation was made by visiting different sampling stations and accordingly among available plants, the dominant plants species were recorded.

***Observation***

***Forest Type***: According to Champion and Seth, the vegetation in the study area can be classified as "VI – B Northern Tropical Forest" Sub type C-I Desert Thorn Forest (Kutch, Saurashtra, Gujarat). The forest patches falling under this category have mono-dominant *Prosopis juliflora*. *Acasia spp., Cassia auriculata Euphorbia spp., Zyziphus mauritiana* and *Zyziphus nummularis* are also found in these scrubs.

***Vegetation Structure and Composition***: Trees Composition varies considerably in condition, composition, and density with change in location. The vegetation has a very open appearance and is widely spaced with scanty natural growth typical of a saline soil with hot and humid climate mainly composed of co-dominant, thorny trees and shrubs which are xerophytic in nature. The dominant tree species vary from 5-10m in height and tends to be collected in clumps. Regeneration by root suckers is common, especially in *Prosopis* and *Capparis*. The perennial grasses grow in clumps and tussocks (Bunch). There is a thin growth of annual grasses after the rains. They wither after the rainy season.

Vegetation generally occurs near human settlement areas and agricultural bunds. The most dominant species in this region is *Prosopis juliflora*. Other tree species observed are namely *Salvadora oleoides, Salvadora persica, Phoenix sylvestris* and *Ficus religiosa.* Large horticulture crops of Chiku (*Manilkara zapota*), Coconut (*Cocos nucifera*), Mango (*Mangifera indica*), Guava (*Psidium guajava*) and Date Palm (*Phoenix dactylifera*) are observed near northern part of the study area. Medicinal trees like *Aegle marmelos (Bel), Azadirachta indica (Neem), Tamarindus indica (Amli)* etc are also commonly observed in the study area.

The vertical structure of the vegetation shows three distinguished layers i.e. Top, Middle and Ground. *Azadirachta indica, Borassus flabellifer, Ficus bengalensis, Ficus racemosa, Mangifera indica, Tamarindus indica, salvadora persica* etc. comprises top layer of the vegetation.

*Salvadora oleoides, Phoenix sylvestris, Cassia auriculata, Capparis deciduas, Pithecellobium dulce, Calotropis procera, Euphorbia nevulia, Prosopis juliflora, Zizyphus mauritiana, Zizyphus nummularia, Tamarix dioica,* etc. forms middle layer of vegetation.

Ground layer vegetation consists of *Aloe vera, Achyranthes aspera, Boerrhavia repens, Citrullus colocynthis, Cynodon dactylon, Ipomoea biloba Indigofera cordifolia, Suaeda fruticosa, Suaeda nudiflora, Solanum xanthocarpum, Tridax procumbens, Sporolobus maderaspatenus* etc.

**Dominance, Density and Frequency:** The floristic composition assessment of the study area has been evaluated. Phyto sociological studies were carried out by using least count quadrant method. Trees, shrubs and herbs were sampled by taking randomly distributed 10 quadrates of 100 $m^2$, 25 $m^2$ and 1 $m^2$ respectively. The data obtained was further used to estimate Relative Density, Relative Frequency, Relative Dominance and calculation of Importance Value Index (IVI).

The Importance Value Index (IVI) for trees varies between 22.69 and 45.86. The highest IVI of studied tree recorded in study area is of *Cocos nucifera* (45.86) and lowest IVI recorded is of *Casuarina equisetifolia* (22.69) during study period. For shrubs, IVI varies between 12.53 and 35.69. The highest IVI of studied shrubs recorded in study area is of *Cassia auriculata* (35.69) and lowest IVI recorded is of *Calotropis procera* (12.53) during study period. The undergrowth vegetation (herbs) shows IVI in between 9.67 and 26.90. The highest IVI of studied herbs recorded in study area is of *Suaeda fruticosa* (26.90) and lowest IVI recorded is of *Solanum xanthocarpum* (9.67) during study period. The details of IVI are presented in **Table 2 to 4** for tree shrubs and herbs respectively.

**Diversity Index:** Diversity means variety or variability. Species diversity therefore refers to the variation that exists among the different living forms. Species indicates the extent of biodiversity in the ecosystem. Species diversity is a statistical abstraction with two components. These are the number of species or richness and

evenness or equitability. For better understanding of plant diversity, the Shannon-Wiener diversity index was used. The index considers two important characters of vegetation, i.e. floristic richness and proportional abundance of the species. Diversity index increases with floral spectra (more species means that more wide diversity) which represents actual scenario of ecosystem. The index is given as:

$$H' = -\sum_{i=1}^{s} \text{Pi} \ln (\text{Pi})$$

Where H' = Shannon-Wiener diversity index

Pi = Proportional abundance of the i $^{th}$ (individual) species

S = species richness (total number of species present)

ln = natural log (base $_e$)

The species diversity of the study area found to be **2.05, 2.24** and **2.24** for tree, shrub and herbs respectively. The details are presented in **Table 2 to 4** for trees, shrubs and herbs respectively.

## Table 2: Study of Diversity Indices for Trees

| Scientific Name | IUCN Category | No. of Plots in Sp. Occ. | Total No. Sp. | Total CBH (cm) | Radius (cm) | DBH (cm) | Total Basal Cover (Sq. Meter) | Density/ ha | R-Density | Domin. | R-Domin. | Freq. | R-Freq. | IVI | Pi | ln (Pi) | Pi X Ln (Pi) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Acacia nilotica* | NE | 8 | 18 | 41 | 6.52 | 13.05 | 0.01 | 180 | 7.26 | 0.13 | 4.13 | 0.8 | 12.31 | 23.69 | 0.0726 | -2.6231 | 0.19 |
| *Azadiracta indica* | NE | 10 | 25 | 68 | 10.82 | 21.64 | 0.04 | 250 | 10.08 | 0.37 | 11.36 | 1 | 15.38 | 36.82 | 0.1008 | -2.2946 | 0.23 |
| *Borassus flabellifer* | NE | 6 | 7 | 85 | 13.53 | 27.05 | 0.06 | 70 | 2.82 | 0.57 | 17.74 | 0.6 | 9.23 | 29.80 | 0.0282 | -3.5675 | 0.10 |
| *Casuarina equisetifolia* | NE | 5 | 32 | 15 | 2.39 | 4.77 | 0.00 | 320 | 12.90 | 0.02 | 0.55 | 0.5 | 7.69 | 21.15 | 0.1290 | -2.0477 | 0.26 |
| *Cocos nucifera* | NE | 8 | 36 | 95 | 15.12 | 30.24 | 0.07 | 360 | 14.52 | 0.72 | 22.16 | 0.8 | 12.31 | 48.99 | 0.1452 | -1.9299 | 0.28 |
| *Mangifera indica* | DD | 9 | 34 | 57 | 9.07 | 18.14 | 0.03 | 340 | 13.71 | 0.26 | 7.98 | 0.9 | 13.85 | 35.53 | 0.1371 | -1.9871 | 0.27 |
| *Phoenix dactylifera* | NE | 7 | 23 | 91 | 14.48 | 28.96 | 0.07 | 230 | 9.27 | 0.66 | 20.34 | 0.7 | 10.77 | 40.38 | 0.0927 | -2.3779 | 0.22 |
| *Prosopis juliflora* | NE | 6 | 61 | 37 | 5.89 | 11.78 | 0.01 | 610 | 24.60 | 0.11 | 3.36 | 0.6 | 9.23 | 37.19 | 0.2460 | -1.4026 | 0.34 |
| *Salvadora persica* | NE | 6 | 12 | 71 | 11.30 | 22.60 | 0.04 | 120 | 4.84 | 0.40 | 12.38 | 0.6 | 9.23 | 26.45 | 0.0484 | -3.0285 | 0.15 |
| **Total** | | | **248** | | | | | **2480** | **100.00** | **3.24** | **100.00** | **6.5** | **100.00** | **300.00** | | | **2.05** |
| | | | | | | | | | | | | | | | | **Shannon-Wiener** | **2.05** |

**NE:** Not Evaluated, **DD:** Data Deficient

## Table 3: Study of Diversity Indices for Shrubs

| Scientific Name | IUCN Category | No. of Plots in Sp. Occ. | Total No. of Sp. | Density/ ha | Relative Density | Frequency | Relative Frequency | IVI | Pi | ln (Pi) | Pi X Ln (Pi) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Aerva javanica* | NE | 4 | 6 | 15 | 5.04 | 0.40 | 10.00 | 15.04 | 0.0504 | -2.9874 | 0.15 |
| *Calotropis gigantea* | NE | 2 | 7 | 18 | 5.88 | 0.20 | 5.00 | 10.88 | 0.0588 | -2.8332 | 0.17 |
| *Calotropis procera* | NE | 5 | 8 | 20 | 6.72 | 0.50 | 12.50 | 19.22 | 0.0672 | -2.6997 | 0.18 |
| *Capparis deciduas* | NE | 4 | 9 | 23 | 7.56 | 0.40 | 10.00 | 17.56 | 0.0756 | -2.5819 | 0.20 |
| *Cassia auriculata* | NE | 6 | 19 | 48 | 15.97 | 0.60 | 15.00 | 30.97 | 0.1597 | -1.8347 | 0.29 |
| *Euphorbia spp.* | NE | 4 | 13 | 33 | 10.92 | 0.40 | 10.00 | 20.92 | 0.1092 | -2.2142 | 0.24 |
| *Tamarix dioica* | NE | 3 | 17 | 43 | 14.29 | 0.30 | 7.50 | 21.79 | 0.1429 | -1.9459 | 0.28 |
| *Thevetia peruviana* | NE | 2 | 10 | 25 | 8.40 | 0.20 | 5.00 | 13.40 | 0.0840 | -2.4765 | 0.21 |
| *Zizyphus mauritiana* | NE | 4 | 14 | 35 | 11.76 | 0.40 | 10.00 | 21.76 | 0.1176 | -2.1401 | 0.25 |
| *Zizyphus numularia* | NE | 6 | 16 | 40 | 13.45 | 0.60 | 15.00 | 28.45 | 0.1345 | -2.0065 | 0.27 |
| | | **Total** | 119 | 298 | 100.00 | 4.00 | 100.00 | 200.00 | | | 2.24 |
| | | | | | | | | | | **Shannon-Wiener** | **2.24** |

**NE:** Not Evaluated, **DD:** Data Deficient

## Table 4: Study of Diversity Indices for Herbs

| Scientific Name | IUCN Category | No. of Plots in Sp. Occ. | Total No. of Sp. | Density/ ha | Relative Density | Frequency | Relative Frequency | IVI | Pi | ln (Pi) | Pi X Ln (Pi) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Achyranthes aspera* | NE | 3 | 23 | 0.23 | 12.37 | 0.3 | 7.50 | 19.87 | 0.1237 | -2.0903 | 0.26 |
| *Aloe vera* | NE | 6 | 24 | 0.24 | 12.90 | 0.6 | 15.00 | 27.90 | 0.1290 | -2.0477 | 0.26 |
| *Boerrhavia diffusa* | NE | 3 | 15 | 0.15 | 8.06 | 0.3 | 7.50 | 15.56 | 0.0806 | -2.5177 | 0.20 |
| *Citrullus colocynthis* | NE | 4 | 21 | 0.21 | 11.29 | 0.4 | 10.00 | 21.29 | 0.1129 | -2.1812 | 0.25 |
| *Ipomoea biloba* | NE | 5 | 7 | 0.07 | 3.76 | 0.5 | 12.50 | 16.26 | 0.0376 | -3.2798 | 0.12 |
| *Salicornia brachiata* | NE | 3 | 23 | 0.23 | 12.37 | 0.3 | 7.50 | 19.87 | 0.1237 | -2.0903 | 0.26 |
| *Solanum xanthocarpum* | NE | 4 | 9 | 0.09 | 4.84 | 0.4 | 10.00 | 14.84 | 0.0484 | -3.0285 | 0.15 |
| *Indigofera cordifolia* | NE | 3 | 21 | 0.21 | 11.29 | 0.3 | 7.50 | 18.79 | 0.1129 | -2.1812 | 0.25 |
| *Sporolobus maderaspatenus* | NE | 5 | 26 | 0.26 | 13.98 | 0.5 | 12.50 | 26.48 | 0.1398 | -1.9677 | 0.28 |
| *Suaeda fruticosa* | NE | 4 | 17 | 0.17 | 9.14 | 0.4 | 10.00 | 19.14 | 0.0914 | -2.3925 | 0.22 |
| *Tridax procumbens* | NE | 3 | 23 | 0.23 | 12.37 | 0.3 | 7.50 | 19.87 | 0.1237 | -2.0903 | 0.26 |
| | | **Total** | 186 | 1.86 | 100.00 | 4 | 100.00 | 200.00 | | | 2.24 |
| | | | | | | | | | | **Shannon-Wiener** | **2.24** |

**NE:** Not Evaluated, **DD:** Data Deficient

## B. Faunal Diversity

*Methodology*

For animals, since they are capable of moving from one place to another, this makes their study entirely different. Therefore, specific methods were adopted for counting these animals in the field. The on-site information (observation and interview with local people) collected during survey was further enriched by the information collected from different secondary sources.

*Observation*

***Mammals***: The diversity in fauna basically depends upon density and diversity of flora. The richer the diversity among the flora better will be the diversity in fauna. Present conditions (sparse, dry and thorny vegetation) of the area do not support higher mammals, however animals like Fox and Jackal are commonly observed. Vermin animals like Nilgai, Wild Boar and Hare also observed from the study area.

***Reptiles and amphibians***: Area is devoid of good agricultural land, however standing orchards of coconut, mango and chiku attracts many rodents and birds, which ultimately attracts many reptiles and amphibians. Lizards such as monitor lizard and garden lizards observed in the study area. The faunal elements observed in the study area during this period are given in **Table 5.**

**Table 5: Fauna Observed in the Study Area**

| Sr. No. | Common Name | Scientific Name | IUCN Red List Category | Wildlife Schedule The Indian Wildlife (Protection) Act, 1972 |
|---|---|---|---|---|
| | **Mammals** | | | |
| 1 | Nilgai | *Boselaphus tragocamelus* | *LC* | Schedule II |
| 2 | Indian Jackal | *Canis aureus indicus* | *LC* | Schedule II |
| 3 | Common Mongoose | *Herpestes edwardsii* | *LC* | Schedule II |
| 4 | Indian Hare | *Lepus nigricollis* | *LC* | Schedule IV |
| 5 | Wild Boar | *Sus scrofa* | *LC* | Schedule III |
| 6 | Palm squirrel | *Funambulus pennanti* | *LC* | Schedule IV |
| 7 | Fruit Bat | *Cyanopterus sphynx* | *LC* | Schedule V |
| | **Reptiles** | | | |
| 1 | Garden lizard | *Calotes versicolor* | *NE* | Schedule IV |
| 2 | Indian Monitor lizard | *Varanus bengalensis* | *LC* | Schedule II |
| 3 | Fan-throated lizard | *Sitana ponticeriana* | *LC* | Schedule IV |
| 4 | Indian cobra | *Naja naja* | *LC* | Schedule II: Part – II |
| 5 | Python | *Python molurus* | *NT* | Schedule I: Part – II |
| 6 | Spiny-tailed Lizard | *Uromastix hardwickii* | *LC* | Schedule II |
| 7 | Indian Fringe Toed Lizard | *Acanthodactylus cantoris* | *LC* | Schedule IV |
| 8 | John Sand Boa | *Eryx johni* | *LC* | Schedule IV |
| | | | | |

| | Amphibians | | | |
|---|---|---|---|---|
| | | | | |
| 1 | Indian Skipping Frog | *Euphlyctis cyanophlyctis* | LC | Schedule IV |
| 2 | Indian bullfrog | *Hoplobatrachus tigerinus* | LC | Schedule IV |

**LC:** Least Concern, **NT:** Near Threatened, **NE:** Not Evaluated.

## C. Avifauna

***Methodology***

For survey of the birds, the area around APMUL power plant and adjacent areas of the study area was carried out from **April 2022 to September 2022**. Birds were observed once a week. A working day was divided into two parts, *viz.*, morning (0600 to 0800hr) and afternoon (1700 to 1900hr). Existing roads, bridle paths, embankments, cattle trails, plantation areas, shore lines, canal and pond banks, etc., were used to cover the study area. The trail length varied from 500m to 1000m and the visibility of these trails was 50m to 100m width on both sides. All types of habitats were visited weekly. Maximum field visits were carried on foot but sometimes vehicles were also used to cover long distance of the study area. Birds were observed either by a pair of binoculars (**Nikon Action 8x40CF**) or by naked eyes depending on the distance of the object. Long notes were taken on whether the observed birds were singing, feeding or flying over. For identification, external morphology and other modes i.e., colour, size, shape, flight, walk, habitat, call, and sitting postures were considered, followed by the use of Field guide by Ali (1996), Ali and Ripley (1983). A camera camera (**Nikon Coolpix P900**) with **83x zoom** lens was used for photography.

The estimates of the survey provide an index of the various species of birds in the study area and allow species comparison between them. For better understanding of avian diversity, the Shannon-Wiener diversity index was used. The index considers two important characters of birds, i.e. its richness and proportional abundance of the species. Diversity index increases with the avian spectra (more species means that more wide diversity) which represents actual scenario of ecosystem. The index is given as:

$$H' = -\sum_{i=1}^{s} \mathrm{Pi} \ln (\mathrm{Pi})$$

Where H' = Shannon-Wiener diversity index
Pi = Proportional abundance of the i $^{th}$ (individual) species
S = species richness (total number of species present)
ln = natural log (base $_e$)

*Observation*

Mundra coast provides very good grounds for roosting and food to the avifauna. The coastal wetlands in Mundra coast with broad intertidal mudflats, mangroves and salt pans offer a great diversity of habitats for birds to utilize for roosting, nesting and breeding.

The study area supports three habitat types of birds namely water birds, grassland birds and coastal birds. The birds like Mynas, Crows, Sparrows, Bulbuls, Babblers and Pigeons were commonly observed in and around villages. Areas with or near the agriculture fields, grain eating herbivorous species were dominant. These species includes Doves, Sparrows, Pigeons, etc. Insectivorous bird species viz. Bee-Eaters, Bulbuls, Wagtails, Desert Wheatears, Drongos, etc. were observed in the study area. Fruit eating birds like Bulbuls, Mynas and Sunbirds usually observed near the village settlements. Water habitat and piscivorous birds like Curlews, Kingfishers, Herons, Lapwings, Plovers, Sandpipers, Indian Rollers, and Egrets were observed near the water bodies and in low-lying marshy areas. View of migratory birds & resident birds observed in the study area are shown in **(Plate 4 to 7)**. List of birds observed during the study period in the study area are given in **Table 6**.

The Shannon Weiner Diversity Index for birds in the study area is found to be **3.87** during this period and total 3909 birds were recorded during the monitoring. The Species richness for the study area is found to be **59.** Proportional abundance of the individual species varies between 0.0005 and 0.0734. The highest abundance recorded was of **Blue Rock Pigeon (*Columba livia*)** (0.0734) and the lowest recorded were of **Black-Tailed Godwit (*Limosa limosa*)** (0.0005) which is observed in study area for the first time ever. The details are presented in **Table 6**.

**Plate 2: Birds Observed in the Study Area of 10 Km**

Western Reef Heron (*Egretta gularis*)

*Greater Short-toed Lark (Calandrella brachydactyla)*

Greater Flamingo (*Phoenicopterus roseus*)

Grey Heron (*Ardea cinerea*)

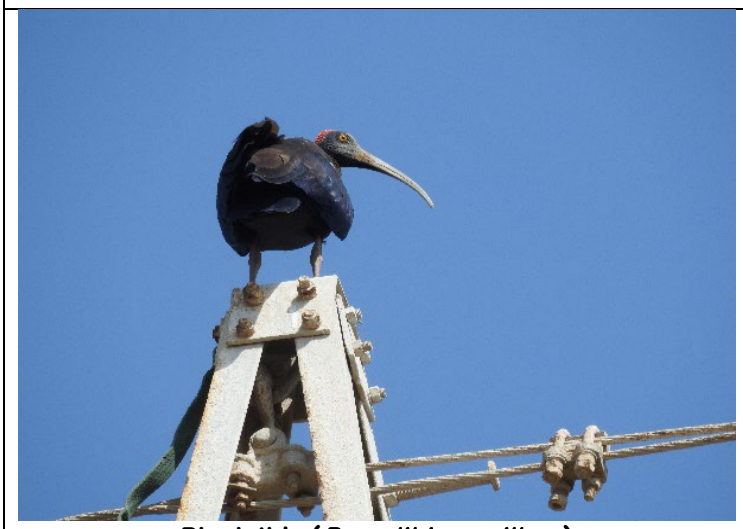
Little Cormorant (*Microcarbo niger*)

Blue Cheeked Bee Eater (*Merops persicus*)

**Plate 3: Birds Observed in the Study Area of 10 Km**

White-Throated Munia *(Lonchura malabarica)*

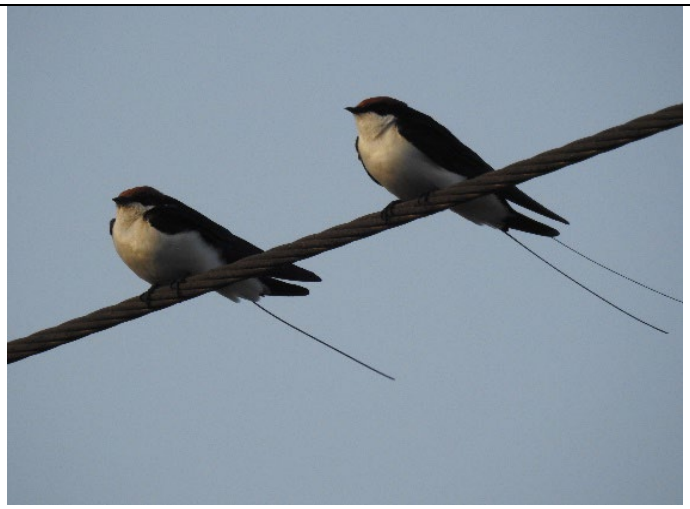
Purple Sunbird *(Nectarinia asiatica)*



Black Ibis (*Pseudibis papillosa*)

Black-Winged Stilt (*Himantopus himantopus*)

Common Myna (*Acridotheres tristis*)



Wire-tailed Swallow (*Hirundo smithii*)

**Plate 4: Birds Observed in the Study Area of 10 Km**

House Crow (*Corvus splendens*)

Purple Sunbird (*Nectarinia asiatica*)

Indian Roller (*Coracias benghalensis*)

White Breasted Kingfisher (*Halcyon smyrnensis*)

Ashy Crowned Sparrow Lark (Eremopterix griseus)

Black-Winged kite (*Elanus caeruleus*)

**Plate 5: Birds Observed in the Study Area of 10 Km**

**Jungle Babbler (*Turdoides striata*)**

**Pied Kingfisher (*Ceryle rudis*)**

**Table 6: Study of Diversity Indices for Birds (Avi-Fauna)**

| Sr. No. | Common Name | Scientific Name | IUCN Category | Wildlife Schedule | Total | Pi | ln Pi | SWI |
|---|---|---|---|---|---|---|---|---|
| 1 | Asian Koel | Eudynamys scolopaceus | LC | Schedule IV | 63 | 0.0161 | -4.128 | 0.0665 |
| 2 | Black-Tailed Godwit | Limosa limosa | NT | Schedule IV | 2 | 0.0005 | -7.578 | 0.0039 |
| 3 | Black-crowned sparrow-lark | Eremopterix nigriceps | LC | Schedule IV | 80 | 0.0205 | -3.890 | 0.0796 |
| 4 | Black Drongo | Dicrurus macrocercus | LC | Schedule IV | 79 | 0.0202 | -3.902 | 0.0789 |
| 5 | Black Headed Gull | Chroicocephalus ridibundus | LC | Schedule IV | 12 | 0.0031 | -5.787 | 0.0178 |
| 6 | Black Ibis/Glossy Ibis | Pseudibis papillosa | LC | Schedule IV | 65 | 0.0166 | -4.097 | 0.0681 |
| 7 | Black Necked Strok | Ephippiorhynchus asiaticus | NT | Schedule IV | 29 | 0.0074 | -4.904 | 0.0364 |
| 8 | Black-Winged Stilt | Himantopus himantopus | LC | Schedule IV | 114 | 0.0292 | -3.535 | 0.1031 |
| 9 | Black-Shouldered Kite | Elanus caeruleus | LC | Schedule IV | 26 | 0.0067 | -5.013 | 0.0333 |
| 10 | Blue Cheeked Bee Eater | Merops persicus | LC | Schedule IV | 78 | 0.0200 | -3.915 | 0.0781 |
| 11 | Blue Rock Pigeon | Columba livia neglecta | NE | Schedule IV | 287 | 0.0734 | -2.612 | 0.1917 |
| 12 | Brahminy Starling | Sturnia pagodarum | NE | Schedule IV | 42 | 0.0107 | -4.534 | 0.0487 |
| 13 | Cattle Egret | Bubulcus ibis | LC | Schedule IV | 84 | 0.0215 | -3.841 | 0.0825 |
| 14 | Common Babbler | Turdoides caudata | LC | Schedule IV | 105 | 0.0269 | -3.618 | 0.0972 |
| 15 | Common Coot | Fulica atra | LC | Schedule IV | 28 | 0.0072 | -4.939 | 0.0354 |
| 16 | Common Crested Lark | Galerida cristata | LC | Schedule IV | 79 | 0.0202 | -3.902 | 0.0789 |
| 17 | Common Hoopoe | Upupa epops | LC | Schedule IV | 30 | 0.0077 | -4.870 | 0.0374 |
| 18 | Common Iora | Aegithina tiphia | LC | Schedule IV | 36 | 0.0092 | -4.688 | 0.0432 |
| 19 | Common Myna | Acridotheres tristis | LC | Schedule IV | 56 | 0.0143 | -4.246 | 0.0608 |
| 20 | Common Quail | Coturnix coturnix | LC | Schedule IV | 54 | 0.0138 | -4.283 | 0.0592 |
| 21 | Common Greenshank | Tringa nebularia | LC | Schedule IV | 22 | 0.0056 | -5.180 | 0.0292 |
| 22 | Common Swallow | Hirundo rustica | LC | Schedule IV | 90 | 0.0230 | -3.772 | 0.0868 |
| 23 | Common Teal | Anas crecca | LC | Schedule IV | 14 | 0.0036 | -5.632 | 0.0202 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 24 | Desert Wheatear | Oenanthe deserti | LC | Schedule IV | 65 | 0.0166 | -4.097 | 0.0681 |
| 25 | Great Stone Plover | Esacus recurvirostris | NT | Schedule IV | 97 | 0.0248 | -3.697 | 0.0917 |
| 26 | Eurasian Collared Dove | Streptopelia decaocto | LC | Schedule IV | 26 | 0.0067 | -5.013 | 0.0333 |
| 27 | Eurasian Whimbrel | Platalea leucorodia | LC | Schedule IV | 141 | 0.0361 | -3.323 | 0.1198 |
| 28 | Greater Flamingo | Phoenicopterus roseus | LC | Schedule IV | 99 | 0.0253 | -3.676 | 0.0931 |
| 29 | Greater Short-toed Lark | Calandrella brachydactyla | LC | Schedule IV | 79 | 0.0202 | -3.902 | 0.0789 |
| 30 | Green Bee Eater | Merops orientalis | LC | Schedule IV | 61 | 0.0156 | -4.161 | 0.0649 |
| 31 | Grey Heron | Ardea cinerea | LC | Schedule IV | 68 | 0.0174 | -4.052 | 0.0705 |
| 32 | Grey Francolin | Francolinus pondicerianus | LC | Schedule IV | 110 | 0.0281 | -3.571 | 0.1005 |
| 33 | House Crow | Corvus splendens | LC | Schedule V | 233 | 0.0596 | -2.820 | 0.1681 |
| 34 | House Sparrow | Passer domesticus | LC | Schedule IV | 81 | 0.0207 | -3.877 | 0.0803 |
| 35 | Indian Pond Heron | Ardeola grayii | LC | Schedule IV | 47 | 0.0120 | -4.421 | 0.0532 |
| 36 | Indian Robin | Saxicoloides fulicatus | LC | Schedule IV | 46 | 0.0118 | -4.442 | 0.0523 |
| 37 | Indian Roller/ Neelkanth | Coracias benghalensis | LC | Schedule IV | 70 | 0.0179 | -4.023 | 0.0720 |
| 38 | Large Egret | Ardea alba | LC | Schedule IV | 66 | 0.0169 | -4.082 | 0.0689 |
| 39 | Laughing Dove | Spilopelia senegalensis | LC | Schedule IV | 48 | 0.0123 | -4.400 | 0.0540 |
| 40 | Little Cormorant | Microcarbo niger | LC | Schedule IV | 56 | 0.0143 | -4.246 | 0.0608 |
| 41 | Oriental White Ibis / Black-Headed ibis | Threskiornis melanocephalus | NT | Schedule IV | 91 | 0.0233 | -3.761 | 0.0875 |
| 42 | Painted Stork | Mycteria leucocephala | NT | Schedule IV | 44 | 0.0113 | -4.487 | 0.0505 |
| 43 | Pied Kingfisher | Ceryle rudis | LC | Schedule IV | 82 | 0.0210 | -3.865 | 0.0811 |
| 44 | Purple Sunbird | Nectarinia asiatica | LC | Schedule IV | 123 | 0.0315 | -3.459 | 0.1088 |
| 45 | Red Vented Bulbul | Pycnonotus cafer | LC | Schedule IV | 86 | 0.0220 | -3.817 | 0.0840 |
| 46 | Red Wattled Lapwing | Vanellus indicus | LC | Schedule IV | 70 | 0.0179 | -4.023 | 0.0720 |
| 47 | Ring Dove | Streptopelia capicola | LC | Schedule IV | 28 | 0.0072 | -4.939 | 0.0354 |
| 48 | Rose-Ringed Parakeet | Psittacula krameri | LC | Schedule IV | 27 | 0.0069 | -4.9752 | 0.0344 |
| 49 | Shikra | Accipiter badius | LC | Schedule IV | 28 | 0.0072 | -4.939 | 0.0354 |
| 50 | Small Blue Kingfisher | Alcedo atthis | LC | Schedule IV | 42 | 0.0107 | -4.534 | 0.0487 |
| 51 | Western Reef Heron | Egretta gularis | LC | Schedule IV | 22 | 0.0056 | -5.180 | 0.0292 |
| 52 | Snake Bird/ Darter | Anhinga melanogaster | NT | Schedule IV | 21 | 0.0054 | -5.227 | 0.0281 |
| 53 | Spot billed duck | Anas poecilorhyncha | LC | Schedule IV | 34 | 0.0087 | -4.745 | 0.0413 |
| 54 | Western Reef Heron | Egretta gularis | LC | Schedule IV | 33 | 0.0084 | -4.775 | 0.0403 |
| 55 | White Breasted Kingfisher | Halcyon smyrnensis | LC | Schedule IV | 45 | 0.0115 | -4.465 | 0.0514 |
| 56 | White Wagtail | Motacilla alba | LC | Schedule IV | 50 | 0.0128 | -4.360 | 0.0558 |
| 57 | White-Eared Bulbul | Pycnonotus leucotis | LC | Schedule IV | 61 | 0.0156 | -4.161 | 0.0649 |
| 58 | White-Throated Munia | Lonchura malabarica | LC | Schedule IV | 86 | 0.0220 | -3.817 | 0.0840 |
| 59 | Wire-tailed Swallow | Hirundo smithii | LC | Schedule IV | 68 | 0.0174 | -4.052 | 0.0705 |
| **Total** | | | | | **3909** | | | **3.87** |
| **Shannon Wiener Index** | | | | | | | | **3.87** |

**LC:** Least Concern, **NT:** Near Threatened.

## 4. Green Belt Activities

Horticulture Department of Adani Power (Mundra) Limited, Mundra has taken many steps to develop plantation in and around the power plant premises.
The main objectives are:

- To improve the soil fertility
- To reduce the use of chemical fertilizers,
- To produce organic manure facility by utilizing the fly ash

To achieve the above objectives, APMuL Mundra had constructed Vermicompost which is useful for growth of plants. From April 2022 to September 2022 total 232.41 MT of Vermicompost manure was produced and all are utilized in development of greenbelt in the plant premises. In addition to this Environment department had developed an Eco-Park, which is prepared with waste and reusable material. It spreads in 4.1366 ha of land. Eco-Park is based on Concept 4-R: Reduce, Reuse, Recover and Recycle. Eco-Park has an Organic Waste converter unit which converts kitchen waste into organic compost. From April 2022 to September 2022 total 2408 kg of organic manure was produced from kitchen waste.

New nursery is established to cater the needs of new plantation and gap filing activities. Native trees species plantation is carried out to suppress the dust and for maintaining the aesthetic beauty of the region. The tree species include *Azadirachta indica, Casuarina equisetifolium, Jatropha, Salvadora oleoides and Cocos nucifera* were recently planted for greenbelt development. Plant species planted for landscaping are mainly evergreen species. These are *Caesalpinia pulcherrima*, *Ficua Panda, Hibiscus rosa-sinensis, Ixora hybrid and Plumeria alba.* Many orchard species are also grown inside the plant premises such as mango, chicku, Sapota and pomegranate.

The greenbelt details regarding area, species, and number of trees, palm & shrubs planted is given in **Annexure: VI**.

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adani

# MARINE MONITORING REPORT

June 2022

FOR

M/s. ADANI POWER (MUNDRA) LIMITED

At

Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
KUTCH, GUJARAT – 370 435

Prepared by

UniStar
Environment & Research Labs Pvt. Ltd.

## PREFACE

**M/s. Adani Power (Mundra) Limited (APMuL)** is a subsidiary company of Adani Group engaged in imported coal-based thermal power generation located near village Tunda and Siracha, Taluka Mundra District Kutch, Gujarat. APMuL has commissioned the first supercritical 660 MW unit in the country. This is also the World's First supercritical technology project to have received the 'Clean Development Mechanism (CDM) Project' certification from United Nations Framework Convention on Climate Change (UNFCCC). Currently, the total power production capacity of the APMuL has increased to 4620 MW.

APMuL has engaged **M/s. UniStar Environment and Research Labs Pvt. Ltd., Vapi** to **carry out the** seasonal Marine Monitoring Study along with the seawater intake and outfall (discharge) channels of Mundra power plant. This marine monitoring study involved the assessment of Physio-chemical parameters at the earlier prescribed locations. The distribution and diversity of marine flora and fauna were assessed through water sampling from sub-tidal regions. Furthermore, the distribution of the benthic community was evaluated from the sediment samples collected along the sub-tidal and inter-tidal regions. The overall objective of this study is to monitor the status of prevailing ecology along the intake and discharge (outfall) channels, in terms of water and sediment quality through assessment of physico-chemical parameters and marine biota. This marine monitoring report provides a comprehensive analysis of the Data obtained through a monitoring study undertaken during June 2022.

Date: 08/06/2022

**M/S.UniStar Environment and Research Labs Pvt. Ltd.**
White House, Char Rasta,
Vapi-396 191

| Sampling by | Report Prepared By | Approved by |
|---|---|---|
|  |  |  |
| (Bhavin Patel) | (Shweta Rana) | (Jaivik Tandel) |

adani

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# 1. INTRODUCTION

## 1.1 OVERVIEW

Adani Power (Mundra) Limited (APMuL) is an imported coal-based thermal power plant located near village Tunda and Siracha, Taluka Mundra, District Kutch, Gujarat, India. APMuL is the largest single location private coal-based power plant in the world. Mundra plant capacity is 4620 MW, comprising of 9 units with 4 units of 330 MW (Phase I and II) and 5 units of 660MW (Phase III and IV). The 330 MW units are based on subcritical technology and the 660 MW units are based on supercritical technology. APMuL has created history by synchronizing the first super-critical technology based 660MW generating unit. This is not only the first super-critical generating unit in the country but also the fastest project implementation ever by any power developer in the country. The Phase III of the Mundra project, which is based on supercritical technology, has received the 'Clean Development Mechanism (CDM) Project' certification from United Nations Framework Convention on Climate Change (UNFCCC).

**M/S. UniStar Environment and Research Labs Pvt. Ltd**., Vapi, India have carried out the routine Marine Monitoring Study in the vicinity of the APMuL Mundra plant. The sampling was carried out along the sea intake channel (2 stations) and discharge/outfall water mixing (3 stations) region. This assessment involves the collection of physico-chemical parameters from 5 subtidal locations (Table 1). The distribution and diversity of marine microflora (phytoplankton and pigments) and fauna (zooplankton) were assessed from water samples collected from 5 subtidal stations (Table 1). The assemblage of the microbenthic community was studied from 5 sub-tidal and 3 inter-tidal stations. The Outfall Channel of the APMuL was closed due to maintenance work since September 2021 and just started in June 2022. Thus, this report presents the detailed account of the results observed during the Marine Monitoring Study at the vicinity of the APMuL.

## 1.2 OBJECTIVES

**a)** To analyses the physico-chemical seawater parameter for understanding the water quality in the study area.

**b)** Evaluation of the prevailing status of marine biota through the quantitative and qualitative analysis of marine flora (phytoplankton and pigments) and fauna (zooplankton and macrobenthos).

**c)** To recommend adequate marine environmental management measures.

## 2. STUDY PROGRAM

### 2.1 STUDY PERIOD

The field investigation was carried out on 08 and 09 June 2022. The sampling strategy was planned in such a manner as to get a detailed characteristic of the marine environment of the study area. Sampling and analysis for the marine environment have been carried out by **M/S. UniStar Environment and Research Labs Pvt. Ltd, Vapi, India**.

### 2.2 SAMPLING LOCATIONS

Sampling was carried out at 5 subtidal stations and 3 intertidal transects along with the sea intake and outfall channels. Out of 5 subtidal stations, 2 were in the sea intake channel and 3 along the discharge mixing (outfall channel) region. One intertidal station was located along the sea intake channel and 2 were along the discharge region. The detailed geographic coordinates of sampling stations are given in Table 1 and Figure 1.1.

**Table 1: Geographic coordinates, water, and sediment parameters at the subtidal sampling stations, APMuL during June 2022.**

| **Subtidal station** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Station** | **Station code** | **Locations** | **Coordinates** | | **Water depth** | **Tide** | **Sediment texture** |
| 1 | St-1 | Intake point | 22°48’ 30.’50”N | 69°32’57.84”E | 5 m | Flood | Silty-sand |
| 2 | St-2 | Mouth of intake point | 22°47’07.20 ”N | 69°32’06.50”E | 5.6 m | Flood | Silty-sand |
| 3 | St-3 | West port area | 22°45’27.70 ”N | 69°34’50.63”E | 5.1 m | Ebb | Silty-sand |
| 4 | St-4 | Outfall area | 22°44’ 40.56”N | 69°36’26.61”E | 4.0 m | Ebb | Silty clay |
| 5 | St-5 | Outfall area | 22°45’12.60 ”N | 69°36’44.54”E | 4.2 m | Ebb | Silty clay |

**Table 2: Geographic coordinates, water, and sediment parameters at the inertial sampling stations, APMuL during June 2022.**

| Intertidal transect | | | | | | |
|---|---|---|---|---|---|---|
| **Station** | **Station code** | **Tide Level** | **Coordinates** | **Water depth** | **Intertidal exposed area** | **Sediment texture** |
| I | IT-1 (HW) | High Tidewater level | 22°47'07.55" N | 69°32'16.91" E | 9 m | Silty-sand |
| | IT-1 (LW) | Low Tide water level | 22°47'06.38"N | 69°32'11.62"E | | Silty-sand |
| II | IT-2 (HW) | High Tide water level | 22°45'58.72" N | 69°34'35.41" E | 8 m | Silty-Sandy |
| | IT-2 (LW) | Low Tidewater level | 22°45'57.74" N | 69°34'35.05" E | | Silty-sand |
| III | IT-3 (HW) | High Tidewater level | 22°44' 52.21" N | 69°36'41.64"E | 9.2 m | Sandy |
| | IT-3 (LW) | Low Tidewater level | 22°44' 51.23" N | 69°36'39.28" E | | Sandy |

**Figure 1: Map of the study area illustrating the subtidal and intertidal sampling stations.**

## 2.3 SAMPLING STRATEGY

### 2.3.1 Sampling frequency

A sampling at the subtidal stations was carried out during the flood to ebb tides. Surface and bottom water samples were collected in duplicate for assessing water quality and marine biota. Intertidal samples were collected in duplicate during low tide at each transect.

### 2.3.2 Sampling methodology

For estimation of physico-chemical parameters and marine flora (phytoplankton and pigments), subsurface samples were collected using the Niskin water sampler (5-litre capacity) with a mechanism for closing at the desired depth. Surface water samples were collected using a clean polyethylene bucket. Phytoplankton samples were collected in clean polyethylene bottles (1 L) fitted with inert cap liners and preserved with 4% Lugol's iodine solution. For pigment analysis, water samples were stored in the clean, dark polyethylene cans (5 L). Chemical parameters samples were collected in polyethylene or glass bottles. Samples for phenol were collected in polyethylene or glass bottles and PHs collected in glass bottles. Dissolve oxygen (DO) and Biological Oxygen Demand (BOD) samples were collected in glass BOD bottles. The temperature was measured on the field with a calibrated thermometer. Analysis of other parameters was carried out in the laboratory.

For zooplankton oblique hauls were made using Heron Tranter net attached with calibrated flow meter. Samples were stored in clean polyethylene bottles (0.5 L) and fixed with 5% formaldehyde.

For the analysis of macrobenthos, subtidal sediment samples were collected using a Van Veen grab covering an area of 0.04 $m^2$. Intertidal samples were collected using a metal quadrant. Samples were sieved with a 500 µ metal sieve and preserved with Rose Bengal-formalin solution and stored in plastic zip-lock bags.

## 2.4 SAMPLE ANALYSIS METHODS

### 2.4.1 Physico-chemical parameter:

Samples were analysed by using different analytical methods for estimations of Temperature, Turbidity, PH, Suspended Solid (SS), Salinity, DO, BOD, COD, Phosphate, Total nitrogen, Nitrite, Nitrate, Phenols and PHc. The standard methods used for the analysis of each parameter are given in Table 3.

**2.4.2 Sediment Quality parameters:**

Sediment texture, Petroleum Hydrocarbon (PHc), Phosphorus, Organic Carbon, Aluminium, Iron, Chromium, Nickel, Zinc, Lead, Copper, Cobalt, Cadmium, Mercury, Arsenic. The standard methods used for the analysis of each parameter.

**2.4.3 Biological parameters**:

**2.4.3a Phytoplankton:**

The Lugol's preserved samples were allowed to settle for 48-72 hrs. The identification and enumeration of phytoplankton cells were carried out under a compound microscope using the Sedgwick Rafter slide. Species were identified to the genus level.

**2.4.3b Phytoplankton pigments:**

For the estimation of Chlorophyll *a* (Chl*a*) and Pheophytin, a known volume of field-collected water samples were filtered through Whatman glass microfiber filters (GF/F). Then filter paper was macerated in 90% acetone and stored overnight in the dark at 4°C. For estimation of Chl*a* fluorescence of extract was measured using Turner Fluorometer. For phaeophytin fluorescence was measured after acidification with 0.1 N HCl.

**2.4.3c Zooplankton:**

Formalin preserved sample was divided into 4 equal portions using the Folsom Plankton Splitter. One portion of samples was used to determine biomass using the volume displacement method. Another portion was used for enumeration and identification of (25-50%) faunal composition.

For quantification of zooplankton, 4-5 ml of the sample was taken in a zooplankton counting chamber. The identification was carried out under Stereomicroscope. The zooplanktons were identified at the group level.

**2.4.3d Benthos:**

For enumeration and identification of the macrobenthos, the organisms were handpicked using forceps and a paintbrush. After sorting, organisms were preserved in 10% formalin. Identification of the organisms was done to the group level under a stereomicroscope.

## 3 WATER QUALITY MONITORING

### 3.1 RESULT OF PHYSICO-CHEMICAL WATER PARAMETER ANALYSIS

The samples collected during the field visit were brought to the laboratory for further analysis of physico-chemical parameters. The standard methods used for the analysis of water quality parameters are given in Table 3

**Table 3: Water quality parameters and their test methods.**

| Sr. No. | Parameters | Station 1 | | Station 2 | | Test Method Permissible |
|---|---|---|---|---|---|---|
| | | Surface | Bottom | Surface | Bottom | |
| PHYSICAL QUALITY | | | | | | |
| 1. | pH @ 25°C | 8.1 | 8.1 | 8.1 | 8.1 | IS 3025(Part 11)1983 |
| 2. | Temperature ($^0$C) | 32.5 | 31.2 | 32.6 | 31.5 | IS 3025(Part 9)1984 |
| 3. | Turbidity (NTU) | 1 | 1 | 1 | 1 | IS 3025(Part 10)1984 |
| CHEMICAL QUALITY | | | | | | |
| 1. | Total Suspended Solids (mg/l) | 164 | 175 | 160 | 166 | APHA 23rd Ed.,2017,2540- D |
| 2. | Salinity | 35.2 | 36.0 | 35.0 | 35.9 | By Calculation |
| 3. | Dissolved Oxygen (mg/l) | 5.7 | 5.2 | 5.9 | 5.1 | APHA 23rd Ed.,2017,4500-O, B |
| 4. | Biochemical Oxygen Demand (BOD) (mg/l) | 4.1 | 3.7 | 4.0 | 3.9 | IS 3025(Part 44)1993Amd.01 |
| 5. | Sulphate as $SO_4$ (mg/l) | 2230 | 2320 | 2386 | 2456 | APHA 23rd Ed.,2017,4500- $SO_4$ E |
| 6. | Ammonical Nitrogen (µmol/l) | BDL(MDL :2.0) | BDL(MDL:2.0) | BDL(MDL :2.0) | BDL(MDL:2.0) | APHA 23rd Ed.,2017,4500- $NH_3$ B |
| 7. | Total Nitrogen (µmol/l) | 3.8 | 3.9 | 3.7 | 5.1 | By Calculation |
| 8. | $PO_4^{3-}$-P (µmol/l) | 0.6 | 1.1 | 0.7 | 1.5 | APHA 23rd Ed.,2017,4500 $NH_3$ - B |
| 9. | ($NO_3^-$-N) (µmol/l) | 4.8 | 5.1 | 3.2 | 4.1 | APHA 23rd Ed.,2017,4500 $NO_3$-B |
| 10. | ($NO_2^-$-N) Nitrite (µmol/l) | 0.3 | 0.3 | 0.3 | 0.4 | APHA 23rd Ed.,2017,4500$NO_2$B |
| 11. | Phenol (mg/l) | BDL(MDL :0.01) | BDL(MDL:0.01) | BDL(MDL :0.01) | BDL(MDL:0.01) | IS 3025(Part 43)1992 Amd.02 |
| 12. | PHc (ppb) | N.D. | N.D. | N.D. | N.D. | GC Method |

Note: MDL = Minimum Detection Limit (MDL: 0.01) and N.D. = Not detectable
Turbidity= 0.1=1 to 10 NTU; 1=10 to 40 NTU; 5=40-100 NTU

Table 3 (Continued 2)

| Sr. No | Parameters | Station 3 | | Station 4 | | Test Method Permissible |
|---|---|---|---|---|---|---|
| | | Surface | Bottom | Surface | Bottom | |
| PHYSICAL QUALITY | | | | | | |
| 1. | pH @ 25°C | 8.1 | 8.2 | 8.2 | 8.2 | IS 3025(Part 11)1983 |
| 2. | Temperature $^0$C | 33 | 32.5 | 32.2 | 31.5 | IS 3025(Part 9)1984 |
| 3. | Turbidity (NTU) | 1 | 1 | 5 | 5 | IS 3025(Part 10)1984 |
| CHEMICAL QUALITY | | | | | | |
| 1. | Total Suspended Solids (mg/l) | 181 | 198 | 160 | 166 | APHA 23rd Ed.,2017,2540-D |
| 2. | Salinity | 35.2 | 36.3 | 36.4 | 37.1 | By Calculation |
| 3. | Dissolved Oxygen (mg/l) | 6.1 | 5.3 | 5.5 | 5.1 | APHA 23rd Ed.,2017,4500-O, B |
| 4. | Biochemical Oxygen Demand (BOD) (mg/l) | 3.9 | 3.5 | 4.3 | 3.9 | IS 3025(Part 44)1993Amd.01 |
| 5. | Sulphate as $SO_4$ (mg/l) | 2280 | 2610 | 2482 | 2610 | APHA 23rd Ed.,2017,4500-$SO_4$ E |
| 6. | Ammonical Nitrogen (µmol/l) | BDL(MDL: 2.0) | BDL(MDL:2.0) | BDL(MDL:2.0) | BDL(MDL:2.0) | APHA 23rd Ed.,2017,4500-$NH_3$ B |
| 7. | Total Nitrogen (µmol/l) | 3.9 | 4.6 | 3.1 | 2.9 | By Calculation |
| 8. | $PO_4^{3-}$-P (µmol/l) | 0.6 | 1.0 | 0.6 | 0.9 | APHA 23rd Ed.,2017,4500 $NH_3$ - B |
| 9. | ($NO_3^-$-N) (µmol/l) | 3.2 | 3.9 | 4.2 | 4.6 | APHA 23rd Ed.,2017,4500 $NO_3$-B |
| 10. | ($NO_2^-$-N) Nitrite (µmol/l) | 0.4 | 0.3 | 0.3 | 0.5 | APHA 23rd Ed.,2017,4500$NO_2$B |
| 11. | Phenol (mg/l) | BDL(MDL: 0.01) | BDL(MDL:0.01) | BDL(MDL:0.01) | BDL(MDL:0.01) | IS 3025(Part 43)1992 Amd.02 |
| 12. | PHc (ppb) | N.D. | N.D. | N.D. | N.D. | GC Method |

Note: MDL = Minimum Detection Limit (MDL: 0.01) and N.D. = Not detectable
Turbidity= 0.1=1 to 10 NTU; 1=10 to 40 NTU; 5=40-100 NTU

Table 3 (Continued 3)

| Sr. No. | Parameters | Station 5 | | Test Method Permissible |
|---|---|---|---|---|
| | | Surface | Bottom | |
| PHYSICAL QUALITY | | | | |
| 1. | pH @ 25°C | 8.2 | 8.2 | IS 3025(Part 11)1983 |
| 2. | Temperature ($^0$C ) | 32.1 | 31.6 | IS 3025(Part 9)1984 |
| 3. | Turbidity (NTU) | 1 | 1 | IS 3025(Part 10)1984 |
| CHEMICAL QUALITY | | | | |
| 1. | Total Suspended Solids | 171 | 178 | APHA 23rd Ed.,2017,2540- D |
| 2. | Salinity | 36.8 | 37.3 | By Calculation |
| 3. | Dissolved Oxygen (mg/l) | 5.9 | 5.4 | APHA 23rd Ed.,2017,4500-O, B |
| 4. | Biochemical Oxygen Demand (BOD) (mg/l) | 4.0 | 5.1 | IS 3025(Part 44)1993Amd.01 |
| 5. | Sulphate as $SO_4$ (mg/l) | 2524 | 2460 | APHA 23rd Ed.,2017,4500-$SO_4$ E |
| 6. | Ammonical Nitrogen(µmol/l) | BDL(MDL:2.0) | BDL(MDL:2.0) | APHA 23rd Ed.,2017,4500-$NH_3$ B |
| 7. | Total Nitrogen (µmol/l) | 3.8 | 3.1 | By Calculation |
| 8. | $PO_4^{3-}$-P (µmol/l) | 0.8 | 1.2 | APHA 23rd Ed.,2017,4500 $NH_3$ - B |
| 9. | ($NO_3^-$-N) (µmol/l) | 4.2 | 4.8 | APHA 23rd Ed.,2017,4500 $NO_3$-B |
| 10. | ($NO_2^-$-N) Nitrite (µmol/l) | 0.3 | 0.4 | APHA 23rd Ed.,2017,4500$NO_2$B |
| 11. | Phenol (mg/l) | BDL (MDL:0.01) | BDL(MDL:0.01) | IS 3025(Part 43)1992 Amd.02 |
| 12. | PHc (ppb) | N.D. | N.D. | GC Method |

Note: MDL = Minimum Detection Limit and N.D. = Not detectable
Turbidity= 0.1=1 to 10 NTU; 1=10 to 40 NTU; 5=40-100 NTU

**3.1.1 Temperature:** Marine water temperature was checked on site during the sampling. Surface and bottom water temperatures observed in the study area was in a range between 31.2$^0$C to 33$^0$C. The water temperature generally varied in accordance with the prevailing air temperature, tidal activity, and seasonality.

**3.1.2 pH:** The pH of the water is generally buffering effect, influenced by the freshwater and anthropogenic discharge from land. The observed pH in the study area was in the range of 8.1 to 8.2 at the surface and bottom water.

**3.1.3 Turbidity:** Seawater turbidity is the cloudiness caused by large numbers of individual particles such as very fine clay and minute marine organisms. This also varies seasonally due to intrusion of land runoff and/or sediment resuspension. Surface and bottom water turbidity observed in the study area was in a range between 1 (10.3-19.7 NTU) to 5 (41.5-46.2) NTU.

**3.1.4 Total suspended solids (TSS)**: The suspended solids generally constitute silt and clay eroded from the land or shore erosions and suspension of the benthic layers from the seabed. Anthropogenic discharges also contribute to suspended solids in the form of contaminants such as oil and solid waste in a polluted area. On a seasonal basis, high TSS in seawater could be observed during the active monsoon season. Suspended solid concentration in the study area was a little variable. In surface water, TSS was 160 to 181 mg/l and in the bottom water, it was range from 166 to 198 mg/l.

**3.1.5 Salinity:** Salinity is an indicator of (saline or freshwater) water masses intrusion within the region. The standard average salinity of seawater is 35, which may vary with the riverine or inland influx, rains, or evaporation in the region. The salinity variation during the present sampling was 35 to 36.8 at surface and 35.9 to 37.3 at bottom water.

**3.1.6 DO and BOD:** High DO level is an indication of good oxidizing conditions in an aquatic environment. In unpolluted waters equilibrium is maintained through oxygen production during photosynthesis, dissolution from the atmosphere consumption by the respiration and decay of organic matter in a manner that DO levels are close to or above saturation value.

The DO level of the study area was varied from 5.4 to 6.1 mg/l at the water surface and 5.1 to 5.4 mg/l at bottom water. The average DO value was 5.6 mg/l, which indicates the oxygenated conditions in the study region.

BOD is generally indicating effective consumption of oxidizable matter in that water body. The industrial effluents contain high BOD levels. Thus, high BOD is also an indication of the intrusion of industrial polluted effluent into natural waters. BOD levels in the study area were varied from 3.9 to 4.3 mg/l at surface and 3.5 to 5.1 mg/l at bottom water.

**3.1.7 Nutrients:** Dissolved phosphorus and nitrogen compounds serve as the nutrients for phytoplankton growth. The high nutrient concentrations in the seawater generally could be attributed to anthropogenic and industrial influx. This could lead to further eutrophication and further deterioration of the pristine ecosystem. Phosphorous compounds are present predominantly as reactive phosphate while combined nitrogen is present as nitrate, nitrite, and ammonium species. In the present study, Phosphate concentration was range from 0.6

to 0.8 µmol/l on the surface and 0.9 to 1.5 µmol/l bottom water. Nitrate concentrations were not detected on the surface and bottom water. Nitrite concentration was range from 3.2 to 4.8 µmol/l on the surface and 3.9 to 5.1 µmol/l bottom water.

**3.1.8 PHc and phenol:** The Phenol compounds and PHc were not detected in the present investigation.

## 4 BIOLOGICAL PARAMETERS (BIODIVERSITY STUDY)

Marine ecosystems are subject to a multitude of direct human pressures, such as overexploitation, eutrophication, pollution, and species introductions. These stressors can have synergistic effects on marine ecosystems, altering its functioning. Anthropogenic involvements constantly compromise the health of the marine ecosystem by disturbing the ecological balance. Hence the assessment of the biotic components along with abiotic factors is an integral part of environmental assessment and monitoring study. During present investigation at APMuL, the abundance and distribution of marine organism (Plankton and benthos) were studied as part of routine environmental monitoring.

### 4.1 PLANKTONIC FORMS

The name plankton is derived from the Greek word “planktons”, meaning “wanderer” or “drifter”. While some forms of plankton are capable of independent movement and can swim up to several hundred meters in a single day, their position is primarily determined by currents in the body of water they inhabit. As per definition, organisms classified as "plankton" are unable to resist ocean currents. Plankton is primarily divided into two broad functional groups i.e., Phytoplankton and Zooplankton.

#### 4.1.1 Phytoplankton

Phytoplankton are microscopic, single-celled photosynthetic organisms that live suspended in all water niches, including oceans, freshwater and marine niche. Like the terrestrial ecosystem where plants are integral part of the ecosystem, phytoplankton play key role in biogeochemistry of the oceans. As they are dependent on sunlight for the energy, they mostly inhabit euphotic zone. Therefore, they are responsible for production of half of the atmosphere’s oxygen and more than half of the primary production in the oceans. There are many species of phytoplankton, each of which has a characteristic shape, size, and function. Marine species of phytoplankton grow abundantly in oceans around the world and are the foundation of the marine food chain. Marine phytoplankton are the producing (autotrophic)

component in the ocean. There are fourteen classes of phytoplankton. Each class of phytoplankton contains unique attributes in size, cell structure, nutrients, and function.

### 4.1.2 Zooplankton:

Zooplankton occupy second position in the food web of marine niche. They are the primary consumers organisms and generally feed on phytoplankton or small, microscopic group of organisms for they are nutritional needs. They are incapable of making their own food from sun-light or inorganic compounds, and feed on organisms or the remains of other organisms to get the energy necessary for survival.

## 4.2 SIGNIFICANCE OF PHYTO- AND ZOOPLANKTONS

Phytoplankton are vital to marine ecosystems. They are producers, or autotrophs, that form the foundation of most marine food webs. As photosynthetic organisms, they can convert solar energy into chemical energy and store it in form of sugars. They are responsible for half of the photosynthetic activity on the planet. The significance of zooplanktons is found in their role of transferring biological production from phytoplankton to large organisms in the marine food web and the seafloor. The microscopic protozoan, tunicates, copepods, and other crustaceans graze upon many phytoplankton species. These in turn become food for other animals further linking the food web. Therefore, variability in reproduction of copepods would affect the survival of young fish that feeds on them.

**Table 4: Test methods for phytoplankton and zooplankton analysis**

| Sr. no. | Test performed | Method |
|---|---|---|
| 1 | Phytoplankton | APHA, Edition 23, Part 10000, 10200 F |
| 2 | Chlorophyll *a* and Pheophytin | APHA, Edition 23, Part 10000, 10200 H (with some modification) |
| 3 | Zooplankton | APHA, Edition 23, Part 10000, 10200 G |
| 4 | Macro benthos | APHA, Edition 23, Part 10000,10500 A-10500 D |

## 4.3 PHYTOPLANKTON DIVERSITY:

Phytoplankton sampling was carried out at 5 stations. At each station, water samples were collected from surface and bottom waters. During the sampling period (June 2022) the

phytoplankton population in the coastal waters of APMuL, Mundra was diverse and represented with a total of 41 phytoplankton genera (Table 5) belonging to diatoms (34 genera) and dinoflagellates (7 genera). Diatoms Species belonged to *Bellerochea* sp. *Chaetoceros* sp. *Corethron* sp., *Coscinodiscus* sp., *Cyclotella* sp., *Cymbella* sp., *Ditylum* spp., *Guinardia* sp., *Melosira* sp., *Odontella* spp., *Paralia sulcate*, *Rhizosolenia* spp., *Thalassiosira* sp., *Amphora* sp., *Amphorprora* sp., *Asterionella* sp., *Bacillaria* sp., *Bellerochea* sp., *Cylindrotheca* sp., *Diploneis* sp., *Gyrosigma* sp., *Lauderia* sp., *Leptocylindrus* sp., *Licmophora* sp., *Lithodesmium* sp., *Meunieri* sp., *Navicula* spp., *Nitzschia* spp., *Pinnularia* sp., *Pleurosigma* spp., *Pseudo-nitzschia* spp., *Surirella* sp., *Synedra* sp. and *Thalassionema* sp. (Table 5). Among them, *Asterionella* sp. (16%), *Coscinodiscus* sp. (12%) and *Nitzschia* spp. (9%) were predominant. The predominance of *Asterionella* sp. (72 cells×$10^2$/L) was observed at surface of station 2. Similarly, *Coscinodiscus* sp. (38 cells×$10^2$/L) and *Nitzschia* sp. (36 cells×$10^2$/L) were also dominant at surface depth of Station 2. Among dinoflagellates, *Scrippsiella* sp. (5.34%). and *Gymnodinium* spp. (1.5%) were predominant. *Scrippsiella* sp. was predominant (16 cells×$10^2$/L) at Station 3 and 4 bottom waters.

The phytoplankton abundance in the study region was ranged from 114 to 228 cells×$10^2$/L (Figure 2; Table 5). The highest phytoplankton abundance was observed at Station 2 in surface (228 cells×$10^2$/L) and then at Station 5 in surface water (189 cells×$10^2$/L). The lowest phytoplankton abundance (114 cells×$10^2$/L) was observed at Station 3 in bottom water. The study shows that the marine water around was enriched with the diverse phytoplankton population

**Table 5: Phytoplankton abundance (cells×$10^{-2}$/L) at different sampling stations in the coastal waters of APMuL, Mundra during June 2022.**

Note: S=surface; B=bottom; St=station

| Phytoplankton Genera | Sampling Stations | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | St-1 | St-1 | St-2 | St-2 | St-3 | St-3 | St-4 | St-4 | St-5 | St-5 |
| | S | B | S | B | S | B | S | B | S | B |
| **Diatoms** | | | | | | | | | | |
| *Bellerochea* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| *Chaetoceros* sp. | 0 | 4 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 2 |
| *Corethron* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 |
| *Coscinodiscus* sp. | 26 | 34 | 38 | 26 | 14 | 10 | 18 | 14 | 2 | 6 |
| *Cyclotella* sp. | 0 | 2 | 2 | 0 | 6 | 0 | 0 | 0 | 2 | 2 |
| *Cymbella* sp. | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Ditylum* spp. | 4 | 8 | 4 | 2 | 0 | 2 | 12 | 6 | 2 | 2 |
| *Guinardia* sp. | 18 | 2 | 4 | 30 | 0 | 6 | 2 | 10 | 18 | 0 |
| *Melosira* sp. | 8 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Odontella* spp. | 14 | 10 | 2 | 2 | 8 | 2 | 16 | 2 | 20 | 22 |
| *Paralia* sp. | 8 | 0 | 2 | 2 | 26 | 26 | 10 | 6 | 2 | 0 |
| *Rhizosolenia* spp. | 2 | 2 | 18 | 12 | 4 | 4 | 0 | 10 | 4 | 2 |
| *Thalassiosira* sp. | 0 | 0 | 18 | 12 | 0 | 0 | 0 | 2 | 0 | 0 |
| *Amphora* sp. | 0 | 0 | 0 | 2 | 8 | 2 | 0 | 0 | 8 | 4 |
| *Amphorprora* sp. | 0 | 0 | 0 | 0 | 0 | 2 | 20 | 2 | 0 | 0 |
| *Asterionella* sp. | 22 | 36 | 72 | 22 | 18 | 4 | 16 | 4 | 46 | 36 |
| *Bacillaria* sp. | 4 | 0 | 0 | 0 | 8 | 2 | 0 | 0 | 6 | 0 |
| *Bellerochea* sp. | 2 | 0 | 0 | 2 | 0 | 2 | 6 | 0 | 2 | 0 |
| *Cylindrotheca* sp. | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 |
| *Diploneis* sp. | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| *Gyrosigma* sp. | 2 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| *Lauderia* sp. | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Leptocylindrus* sp. | 0 | 0 | 18 | 4 | 0 | 2 | 0 | 0 | 0 | 0 |
| *Licmophora* sp. | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 0 |
| *Lithodesmium* sp. | 8 | 0 | 0 | 0 | 2 | 0 | 2 | 8 | 0 | 0 |
| *Meunieri* sp. | 2 | 4 | 0 | 2 | 2 | 2 | 0 | 0 | 0 | 0 |
| *Navicula* spp. | 12 | 2 | 2 | 2 | 6 | 4 | 6 | 14 | 10 | 6 |
| *Nitzschia* spp. | 2 | 20 | 36 | 16 | 2 | 0 | 8 | 12 | 20 | 32 |
| *Pinnularia* sp. | 8 | 0 | 0 | 2 | 0 | 0 | 10 | 0 | 2 | 2 |
| *Pleurosigma* spp | 2 | 10 | 0 | 2 | 8 | 2 | 14 | 12 | 12 | 2 |
| *Pseudo-nitzschia* spp. | 0 | 0 | 2 | 0 | 0 | 2 | 4 | 4 | 2 | 0 |
| *Surirella* sp. | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 0 |
| *Synedra* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 0 |
| *Thalassionema* sp. | 14 | 22 | 0 | 2 | 16 | 16 | 8 | 18 | 10 | 18 |
| **Dinoflagellates** | | | | | | | | | | |
| *Alexandrium* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| *Chattonella* sp. | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Gymnodinium* sp. | 0 | 2 | 0 | 0 | 10 | 4 | 0 | 4 | 4 | 2 |
| *Gyrodinium* spp. | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Protoperidinium* spp. | 4 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| *Prorocentrum* sp. | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 |
| *Scrippsiella* spp. | 8 | 4 | 6 | 6 | 10 | 16 | 8 | 16 | 10 | 4 |
| **Total Phytoplankton (Cells x $10^2$/L)** | **172** | **168** | **228** | **158** | **158** | **114** | **164** | **152** | **188** | **144** |

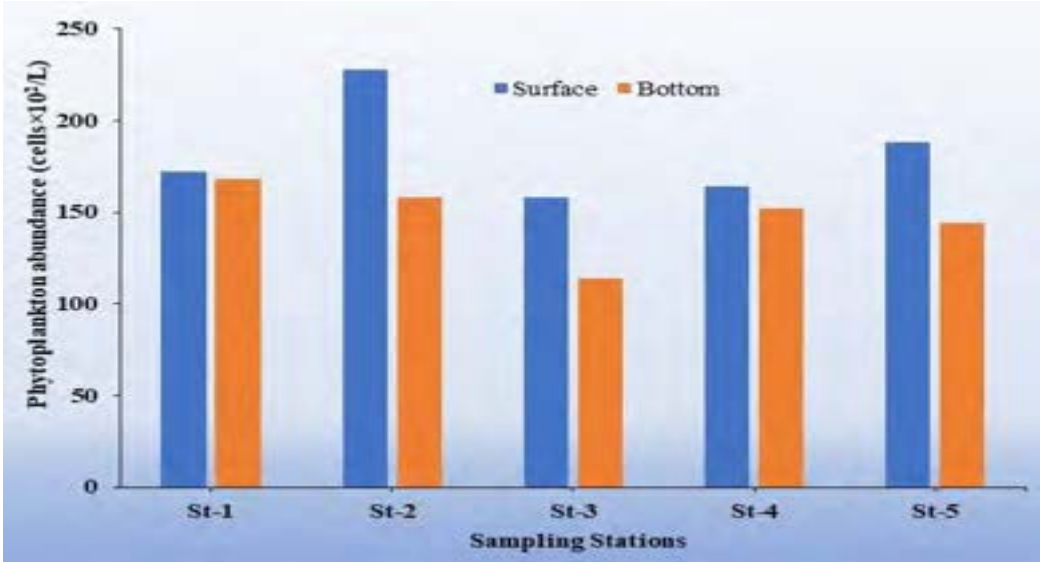
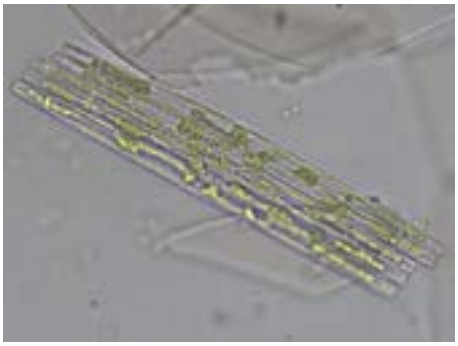
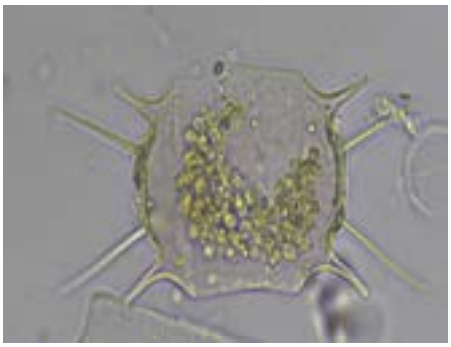



**Figure 2: Phytoplankton abundance (cells×$10^2$/L) reported in the surface and bottom waters along the APMuL coast, Mundra during June 2022. Note: St=Station**

***Pseudo-Nitzschia* sp.**



***Bacillaria* sp.**



***Odontella* sp.**

***Cosinodiscus* sp.**

**Figure 3: Microphotographs of phytoplankton reported in the coastal waters of APMuL, Mundra during June 2022.**

## 4.4 PHYTOPLANKTON PIGMENTS (CHLOROPHYLL *a* AND PHEOPHYTIN):

Marine phytoplankton contains the essential as well as accessory pigment like that of terrestrial plants. Phytoplankton pigments capture sunlight. The resulting photosynthesis and its products, especially the oxygen and organic compounds, all rely on the light energy captured by the different phytoplankton pigments. Chlorophyll *a* is the major pigment for light harvesting, and play a significant role in photosynthesis and photoprotection, by extending the light collection window and protecting the cell from damage of high irradiance levels or high ultraviolet light exposure.

Algal chlorophyll forms a series of degradation products upon degradation. In addition to Chlorophyll the naturally occurring pigments in algal cells. The nature of these degradation products depends on which part of the chlorophyll molecule is affected. As chlorophyll degrades, the initial step is either the loss of the magnesium from the center of the molecule or the loss of the phytol tail. This results in the formation of the molecule, phaeophytin. Depending on the parent molecule several distinct molecules like phaeophytins, chlorophyllides, and pheophorbides can be produced. Thus, in addition to Chlorophyll a filtered seawater contains color degradation products of phytoplankton pigments.

### 4.4a CHLOROPHYLL *a* AND PHAEOPHYTIN CONCENTRATIONS

The phytoplankton biomass distribution expressed in terms of Chlorophyll a (Chl-*a*) and Pheophytin at selected stations in the coastal region of APMuL, Mundra is presented in Table 6. The Chl-*a* concentrations in the study region were ranged from 1.5 µg/L to 2.0 µg/L. The Pheophytin content was ranged from 0.6 µg/L to 1.0 µg/L. The Chl-*a* and Pheophytin concentrations were more in the surface water as compared to the bottom water. The variations observed between the surface and bottom waters could be due to several natural biological variability. The highest Chl-*a* and Pheophytin concentrations were observed at Station 2 surface water (Table 6).

**Table 6: Chlorophyll *a*, Pheophytin concentrations along with their ratios (Chl*a*: Pheophytin) in the marine waters of APMuL, Mundra during June 2022.**

Note: ST= Station

| Sampling stations | | Chlorophyll a (µg/L) | Phaeophtin (µg/L) | Chl*a*:Phaeophtin ratio |
|---|---|---|---|---|
| **St-1** | **Surface** | 1.9 | 1.0 | 1.9 |
| **St-1** | **Bottom** | 1.6 | 1.0 | 1.7 |

| | | | | |
|---|---|---|---|---|
| **St-2** | **Surface** | 2.0 | 1.0 | 2.0 |
| **St-2** | **Bottom** | 1.8 | 0.9 | 2.0 |
| **St-3** | **Surface** | 1.7 | 0.8 | 2.1 |
| **St-3** | **Bottom** | 1.6 | 0.6 | 2.7 |
| **St-4** | **Surface** | 1.9 | 1.0 | 1.9 |
| **St-4** | **Bottom** | 1.5 | 0.8 | 1.9 |
| **St-5** | **Surface** | 1.9 | 0.9 | 2.1 |
| **St-5** | **Bottom** | 1.7 | 0.8 | 2.1 |

The concentration of Pheophytin is a measure of the dead cells and is an indirect indicator of biotic and abiotic stress conditions of the algae leading to a deterioration of Chl-*a*. The ratio from concentrations of Chl-*a* and Pheophytin in an aquatic ecosystem suggests a balance between the growth and mortality of phytoplankton life. In healthy environments, ratios of Chl-*a* to Pheophytin generally exceed 1.1. In the present study, this ratio was ranged from 1.7 to 2.7 (Table 6). The Chl-*a* and Pheophytin ratio showed marginally elevated levels in the surface waters as compared to the bottom waters. Overall, the ratios of Chl-*a* and Pheophytin concentration in the study region were generally high (>1), indicating that the appropriate conditions prevailed for the phytoplankton growth.

### 4.5 ZOOPLANKTON DIVERSITY:

Zooplankton standing stock in terms of population and biomass revealed substantial spatial variation within all 5 stations (Table 7; Figure 4). The maximum zooplankton population (17.6 no×$10^3$/100 $m^3$) and biomass (1.9 ml/ 100 $m^3$) were recorded at Station 4. The lowest zooplankton population (10.7 no×$10^3$/100 $m^3$) and biomass (1.01 ml/100 $m^3$) observed at Station 3 and Station 1, respectively (Table 7). A total of 8 groups of zooplankton including Copepods, Cyclopoids, Harpacticoids, Copepod nauplii, Barnacle nauplius, Gastropda, Chaetognath and Polychaete were identified during this study (Table 7). Among these groups Copepod nauplii (31%) and Copepods (30%) were most dominant (Figure 5). Harpacticoids were also dominant group (21%) in zooplankton population (Figure 5). Gastropod, polychaete larvae as well as fish eggs also were another observed as minor group the present study. The occurrence of copepods and their nauplii together with decapods and fish larvae/eggs in zooplankton samples highlights the fair production potential of live food resources (organisms) to support the fish and crustacean population in the study region

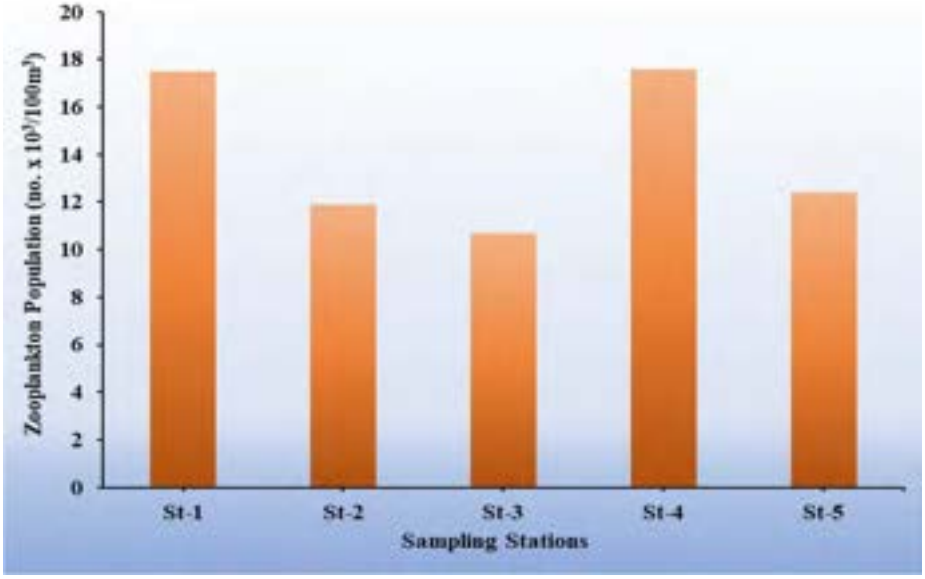



**Figure 4: Zooplankton density (nos. /100 $m^3$) reported in the subtidal waters (Station 1 to 5) along the APMuL coast, Mundra during June 2022.**

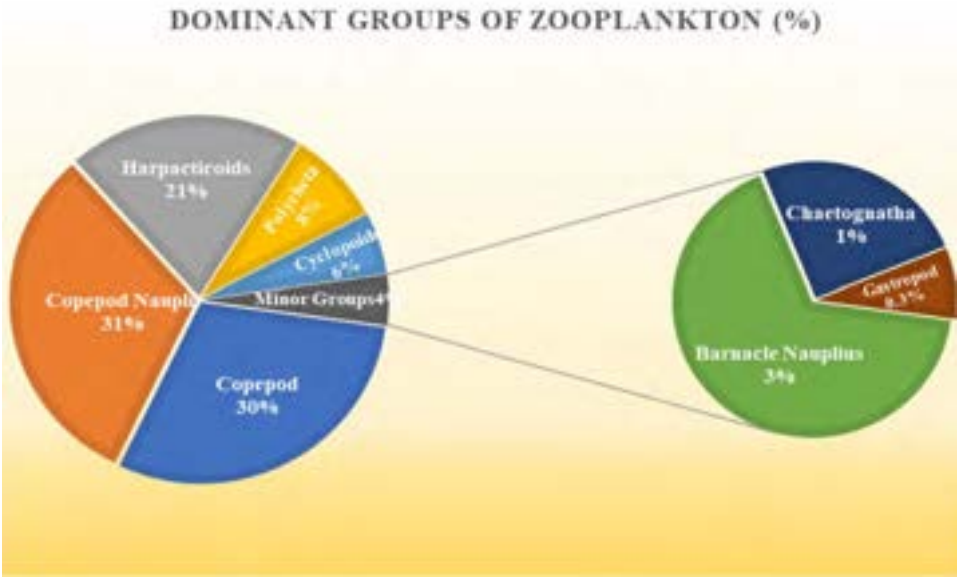



**Figure 5: Dominant groups of Zooplankton reported from APMuL coast, Mundra during June 2022.**

**Table 7: Density (no/100m$^3$), percentage contribution (%) and biomass (ml/100m$^3$) of various zooplankton groups in the coastal waters at the APMuL, Mundra during June 2022.**

| Zooplankton Groups | St-1 | St-2 | St-3 | St-4 | St-5 |
|---|---|---|---|---|---|
| **Copepods** | | | | | |
| *Acartia* sp. | 4 | 2 | 4 | 0 | 4 |
| *Subeucalanus* sp. | 10 | 0 | 2 | 2 | 4 |
| *Labidocera* sp. | 1 | 1 | 2 | 0 | 0 |
| *Centropages* sp. | 0 | 0 | 0 | 2 | 0 |
| *Tortanus* sp. | 0 | 1 | 0 | 0 | 1 |
| Other calanoids | 30 | 10 | 9 | 60 | 45 |
| **Cyclopoids** | | | | | |
| *Oithona* sp. | 1 | 6 | 5 | 11 | 6 |
| *Corycaeus* sp. | 0 | 0 | 1 | 0 | 0 |
| **Harpacticoids** | | | | | |
| *Euterpina acutifrons* | 10 | 7 | 11 | 8 | 4 |
| *Microsetella* sp. | 2 | 7 | 6 | 0 | 0 |
| Other harpacticoids | 4 | 23 | 8 | 20 | 10 |
| Copepod nauplii | 66 | 48 | 39 | 9 | 39 |
| **Non-Copepods** | | | | | |
| Barnacle nauplius | 2 | 6 | 3 | 4 | 1 |
| Gastropoda | 1 | 0 | 1 | 0 | 0 |
| Chaetognatha | 2 | 0 | 3 | 0 | 1 |
| Polychaeta | 20 | 0 | 4 | 38 | 2 |
| Decapod larva | 18 | 8 | 1 | 13 | 1 |
| Oekopleura | 0 | 0 | 5 | 0 | 8 |
| Bryozoan larva | 3 | 0 | 2 | 3 | 1 |
| Fish egg | 1 | 0 | 0 | 0 | 0 |
| Bivalve | 0 | 0 | 1 | 6 | 0 |
| Fish larva | 0 | 0 | 0 | 0 | 1 |
| **Population (no. x 10$^3$/100m$^3$)** | **17.5** | **11.9** | **10.7** | **17.6** | **12.4** |
| **Biomass (ml./100 m$^3$)** | **1.01** | **1.5** | **1.3** | **1.9** | **1.5** |

**Polychaete Larva**

**Copepod Nauplius**

Fish Larva

Cyclopoid Copepod

**Figure 6: Microphotographs of zooplanktons reported in the coastal waters of APMuL, Mundra during June 2022.**

### 4.6 Microbenthic fauna

The benthic zone is the lowest ecological zone of a water body which usually involves the sediments at the seafloor. The benthic environment is divided into distinctive ecological zones based on depth, seafloor topography, and vertical gradients of physical parameters. These are the supralittoral, littoral, sublittoral, bathyal, abyssal, and hadal zones. The number of phyla and species of benthic animals exceeds those of pelagic species, at least partly because of the greater physical variety of benthic habitats. Benthic animals are separated into infaunal and epifaunal species, depending upon whether they live within sediments or on the surface of the seafloor, respectively. Size categories of the zoobenthos consist of the larger macrofauna (>1.0 mm), the small meiofauna which is characteristically found in sand and mud, and the microfauna which is made up mostly of protozoans.

Benthic organisms are morphologically different from those planktonic organisms. Many are adapted to live on the substrate (bottom). In benthic habitats, they can be considered dominant creatures. These organisms adapted to deep-water pressure so cannot survive in the upper parts of the water column. Since light does not penetrate very deep ocean water, the benthic organisms often depend on the organic matter falling from the upper water column as their main energy source. This dead and decaying matter sustains the benthic food chain. The most benthic organisms are scavengers or detritivores. These organisms under being relatively stationary, are constantly exposed to changes undergoing in overlying water, and hence, respond very well to aquatic pollution. The macro benthos population is very sensitive to environmental perturbation and is highly influenced by the physicochemical

characteristics of water, the nature of the substratum, food, predation, and other factors. The density of benthic invertebrates also fluctuates widely with the changes in the season.

**4.6.1 Significance of macrobenthic organisms**

The biomass of microbenthic organisms in estuaries and coastal embayment is often high. It declines if communities affected by prolonged periods of poor water quality especially when anoxia and hypoxia are common. Burrowing and tube-building by deposit-feeding benthic organisms (bioturbations) help to mix the sediment and enhance the decomposition of organic matter. Nitrification and denitrification are also enhanced because a range of oxygenated and anoxic micro-habitats are created. For example, the area of oxic-anoxic boundaries and the surface area available for diffusive exchange are increased by tube-building macrobenthos. The loss of benthic suspension-feeders can further enhance turbidity levels because these organisms filter suspended particles including planktonic algae, and they enhance sedimentation rates through bio deposition (i.e., voiding of their wastes and unwanted food). Changes in the macro fauna (and flora) cause changes in nutrient storage pools. Macro fauna is also important constituents of fish diets and thus are an important link for transferring energy and nutrients between trophic levels, also driving pelagic fish and crustacean production. For these reasons, the benthic organisms are extremely important indicators of environmental change.

**4.6.2 Benthic Diversity**

**4.6.2a Subtidal region:**

During the present study, more macrobenthos abundance and biomass was reported at subtidal stations than intertidal stations at APMuL, Mundra (Table 8). The macrobenthos density was ranged from 225 no/$m^2$ to 500 no/$m^2$ at sampling stations (Table 8; Figure 7). The biomass of the macrobenthic community in the study region was ranged from 0.84 g/$m^2$ to 1.54 g/$m^2$ in the study region. The maximum abundance of benthic microorganisms was reported at Station 3 (500 no/ $m^2$) and mainly contributed by dominance of amphipods (24%). The highest biomass of macrobenthic species was observed at Station 5 (1.54 g/ $m^2$) with dominance of Polychaetas (84%). The least density (225 no/ $m^2$) and biomass (0.76 g/ $m^2$) was observed at Station 1 (Table 8; Figure 8). In species composition, Polychaete species (Phylum Annelida) belonging to the family Paraonidae, Pilargidae, Capitillidae, Cossuridae, *Sternaspis* sp, Ciratullidae, *Nephthys* sp, Heterospionidae, Lumbriconereis, Spionidae were abundant contributing ~79% to macrobenthic population (Figure 8). Overall, the presence of

Polychaete, Sipuncula worms and amphipods suggest the availability of food organisms for benthic predators in the area.

**Table 8: Faunal composition, density (no/m$^2$) and biomass (g/m$^2$) of the macrobenthos community in the subtidal region at APMuL, Mundra during June 2022.**

Note: ST=Station

| Taxa | Stations | | | | |
|---|---|---|---|---|---|
| | St-1 | St-2 | St-3 | St-4 | St-5 |
| **Phylum Polychaeta** | | | | | |
| Paraonidae | 50 | 125 | 25 | 0 | 25 |
| Pilargidae | 50 | 0 | 0 | 0 | 0 |
| Capitillidae | 50 | 100 | 75 | 75 | 0 |
| Cossuridae | 0 | 25 | 50 | 0 | 0 |
| *Sternaspis* sp. | 0 | 0 | 75 | 0 | 0 |
| Ciratullidae | 0 | 0 | 50 | 25 | 0 |
| *Nephthys* sp. | 0 | 0 | 0 | 100 | 150 |
| Heterospionidae | 0 | 0 | 75 | 0 | 0 |
| Lumbriconereis | 0 | 0 | 0 | 150 | 150 |
| Spionidae | 25 | 25 | 0 | 0 | 25 |
| **Phylum Mollusca** | | | | | |
| Bivalvia | 25 | 50 | 0 | 0 | 0 |
| Gastropoda | 25 | 0 | 50 | 0 | 0 |
| **Phylum Arthopoda** | | | | | |
| Cumaceans | 0 | 0 | 0 | 0 | 0 |
| Amphipoda | 0 | 50 | 100 | 50 | 75 |
| **Total abundance (no/m$^2$)** | **225** | **375** | **500** | **400** | **425** |
| **Biomass (g/m$^2$)** | **0.76** | **0.84** | **1.12** | **1.01** | **1.54** |

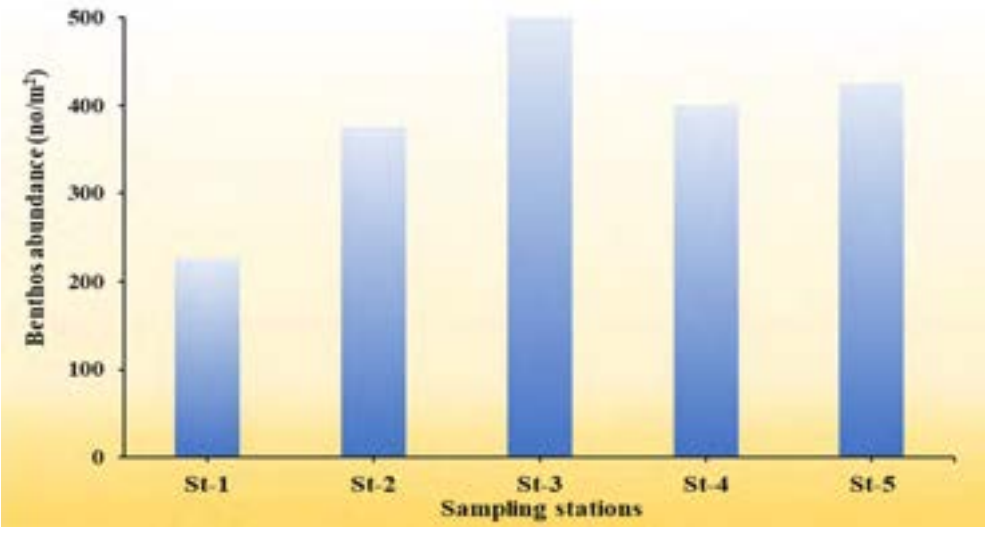



**Figure 7: Subtidal macro benthos abundance (no/m$^2$) at different sampling stations at APMuL, Mundra during June 2022**

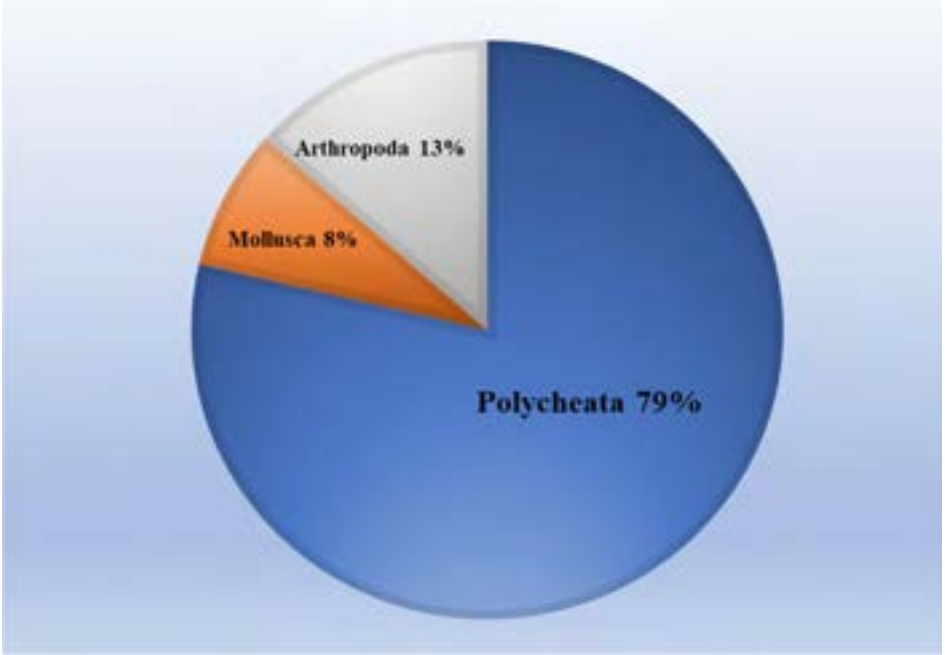



**Figure 8: Percent composition of Subtidal benthic taxa from the marine waters of APMuL, Mundra during June 2022**

**4.6.2b Intertidal region**

The sandy substratum with low organic matter affects the occurrence of the microbenthic community in the intertidal region. Low macrobenthos biomass was measured (0.10 g/$m^2$ to 0.14 g/$m^2$) in the intertidal region at the APMuL (Table 9). The lowest density of macrobenthic organisms was reported at station IT-3 (LW) (75 no/$m^2$), whereas the highest density was reported at Station IT-2 (HW) (125 no/$m^2$). Polychaete species contributed (48%) to the total macrobenthic abundance at these stations followed by Amphipoda (30%) (Table 9). No macrobenthic community was observed at station 3 (HW and LW) may be due to sandy sediment.

**Table 9: Faunal composition, density (no/m$^2$) of macrobenthos from the sediments collected at High tide water level (HW) and Low tide water level (LW) in the inter-tidal region at APMuL, Mundra during June 2022.**

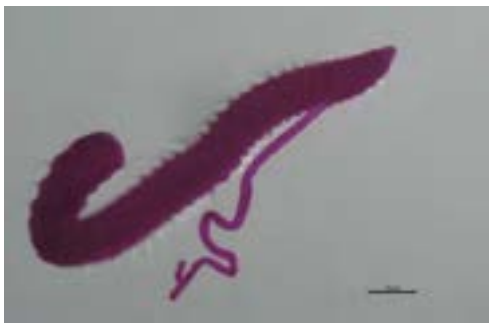
(Note: LW=low water during low tide; HW=high water during high tide; St=Station)

| Faunal groups | Intertidal stations | | | | | |
|---|---|---|---|---|---|---|
| | IT-1 (HW) | IT-1 (LW) | IT-2 (HW) | IT-2 (LW) | IT-3 (HW) | IT-3 (LW) |
| **Phylum Annelida** | | | | | | |
| Polychaetes | 50 | 50 | 75 | 25 | | |
| **Phylum Mollusca** | | | | | | |
| Bivalve | 0 | 25 | 0 | 0 | | |
| **Phylum Arthropoda** | | | | | | |
| Amphipoda | 25 | 50 | 25 | 25 | | |
| Isopoda | 25 | 0 | 25 | 0 | | |
| **Phylum Sipuncula** | | | | | | |
| Sipunculids | 0 | 0 | 0 | 25 | | |
| **Total density (no/m$^2$)** | **75** | **125** | **125** | **75** | - | - |
| **Biomass (g/m$^2$)** | **0.11** | **0.12** | **0.14** | **0.10** | - | - |

**Capitallidae**

**Spoinidae**

**Pilargidae**



**Cossuridae**

**Figure 9: Microphotographs of microbenthic organisms observed in the sediment samples collected in the vicinity of APMuL, Mundra during June 2022.**

## 5 CONCLUSIONS

- The phytoplankton abundance in the study region ranged from 114 to 228 cells×$10^2$/ L. Highest phytoplankton abundance was observed at the Station 2 surface water. A maximum 41 phytoplankton genera were identified from water samples collected in this region. The diverse phytoplankton population supported by the environmental cues emphasizes healthy ecosystem.
- In general, the Chl*a* concentrations in the study region were ranged from 1.5 µg/L to 2.0 µg/L. The highest Chl*a* (2.0 µg/L) and pheophytin (1.0 µg/L) content was recorded at Station 2.
- Zooplankton abundance was ranged in between 10.7 to 17.6 no x$10^3$/100 $m^3$. The highest zooplankton abundance (17.6 no x$10^3$/100 $m^3$) and biomass (1.9 ml/100 $m^3$) was reported at Station 4.
- In the sub-tidal region, the high macro benthos abundance and biomass were reported at station 3 (500 no/$m^2$) and Station 5 (1.54 g/$m^2$) respectively. The lowest abundance (225 no/$m^2$) and biomass (0.76 g/$m^2$) was recorded at station 1. The more abundance of macrobenthic community suggests the stable and enriched substratum supports their growth. In turn benthic macrofauna could support the benthic feeder fish population in this region.

The present assessment reveals the influence of the environmental cues on the physicochemical and biological parameters along the study region. The diverse phytoplankton and zooplankton population indicates favourable water condition for their survival and growth along the region. This diverse planktonic flora together with enriched subtidal benthic fauna along the outfall channel region could substantially support the fishery population in the region. These observations are in line with our present bioassay study where 90% survival of fish Mugil cephalus recorded in absolute outfall water as per compliance. For bioassay study, these fishes were collected from the Kotadi Creek. 90% survival of fish population in bioassay study together with the diverse biota at outfall channel from the present study emphasizes that the abiotic characteristics does not have adverse biological impact of discharge water.

**Table 10: Names of the Marine Monitoring Team Members**

| Sr. No. | Name of Person |
|---|---|
| 1. | Mr. Vijay Thanki (Env. Chemist) |
| 2. | Mr. Pravin Singh (Env. Chemist) |
| 3. | Ms. Shweta A. Rana (Env. Microbiologist) |
| 4. | Mr. Bhavin Patel (Env. Engineer) |

## PHOTOGRAPHS OF DIFFERENT TYPES OF SAMPLING

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| adani Power | Adani Power (Mundra) Limited, Mundra | Annexure-IV |
|---|---|---|
| | Summary of Continues Ambient Air Quality Monitoring System Reports (Apr'2022 To Spt'2022) | |

| | | Station: ECO Park | | | | Station: Near Main Gate | | | | Station: Near Ash Pond | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Parameters | | PM10 | PM2.5 | $SO_2$ | $NO_2$ | PM10 | PM2.5 | $SO_2$ | $NO_2$ | PM10 | PM2.5 | $SO_2$ | $NO_2$ |
| UNIT | | $ug/m^3$ | $ug/m^3$ | $ug/m^3$ | $ug/m^3$ | $ug/m^3$ | $ug/m^3$ | $ug/m^3$ | $ug/m^3$ | $ug/m^3$ | $ug/m^3$ | $ug/m^3$ | $ug/m^3$ |
| MONTH | GPCB LIMIT | 100 | 60 | 80 | 80 | 100 | 60 | 80 | 80 | 100 | 60 | 80 | 80 |
| Apr'22 | Minimum | 51.7 | 19.5 | 13.8 | 22.9 | 51.4 | 20.4 | 14.8 | 22.2 | 59.5 | 23.5 | 14.5 | 21.6 |
| | Maximum | 66.2 | 32.2 | 26.1 | 32.6 | 68.2 | 33.7 | 28.8 | 35.9 | 74.2 | 29.1 | 18.2 | 26.3 |
| | Average | 59.2 | 26.3 | 20.2 | 28.6 | 60.6 | 27.3 | 20.4 | 27.6 | 65.7 | 26.2 | 16.5 | 24.2 |
| May'22 | Minimum | 49.6 | 23.1 | 12.9 | 19.8 | 50.3 | 26.2 | 15.7 | 22.8 | 60.8 | 29.1 | 15.6 | 22.8 |
| | Maximum | 64.1 | 35.8 | 25.2 | 29.5 | 67.1 | 39.5 | 29.7 | 36.5 | 75.5 | 34.7 | 21.5 | 27.5 |
| | Average | 56.6 | 30.0 | 19.4 | 25.6 | 59.4 | 33.0 | 21.2 | 28.1 | 66.9 | 31.8 | 17.7 | 25.4 |
| Jun'22 | Minimum | 45.6 | 19.4 | 13.8 | 20.9 | 50.3 | 19.4 | 17.3 | 19.0 | 47.2 | 19.8 | 16.7 | 24.0 |
| | Maximum | 61.2 | 30.1 | 26.1 | 30.6 | 67.1 | 28.7 | 29.2 | 32.7 | 70.3 | 26.3 | 22.6 | 28.7 |
| | Average | 53.6 | 24.2 | 20.1 | 26.5 | 58.6 | 23.5 | 22.6 | 24.4 | 58.2 | 22.7 | 18.8 | 26.6 |
| Jul'22 | Minimum | 41.0 | 15.3 | 14.5 | 18.6 | 37.4 | 15.6 | 15.2 | 16.6 | 36.3 | 17.6 | 17.2 | 21.0 |
| | Maximum | 54.1 | 20.9 | 22.0 | 28.0 | 49.2 | 25.8 | 24.8 | 32.7 | 54.0 | 23.2 | 23.1 | 26.0 |
| | Average | 46.4 | 18.9 | 18.3 | 24.2 | 44.8 | 20.2 | 18.6 | 23.4 | 44.0 | 19.8 | 19.2 | 23.5 |
| Aug'22 | Minimum | 36.8 | 11.5 | 10.8 | 14.7 | 33.4 | 11.8 | 11.5 | 12.7 | 37.7 | 16.8 | 15.3 | 19.4 |
| | Maximum | 49.9 | 17.1 | 18.3 | 24.1 | 45.2 | 22.0 | 21.1 | 28.8 | 55.4 | 22.4 | 18.9 | 24.4 |
| | Average | 41.9 | 14.9 | 14.5 | 20.0 | 40.5 | 16.2 | 15.4 | 20.2 | 45.2 | 19.2 | 16.9 | 22.2 |
| Sep'22 | Minimum | 38.1 | 12.8 | 12.1 | 16.0 | 34.7 | 13.1 | 12.8 | 14.0 | 37.7 | 18.1 | 16.6 | 20.7 |
| | Maximum | 49.1 | 18.4 | 19.6 | 25.4 | 47.5 | 20.6 | 24.4 | 30.1 | 57.7 | 33.8 | 23.0 | 25.7 |
| | Average | 43.5 | 16.3 | 15.5 | 20.9 | 42.7 | 17.4 | 17.3 | 21.9 | 46.5 | 20.7 | 18.5 | 23.6 |

| adani Power | **Adani Power (Mundra) Limited, Mundra** |
|---|---|
| | Differential Water Temperature Report (April'22 to September'22) |

**Annexure V**

| **Month: April'2022** | | | |
|---|---|---|---|
| **Date** | **Intake Reservoir (ºC)** | **Outfall channel (ºC)** | **Temp. difference (ºC)** |
| 01/04/2022 | 29.0 | 31.5 | 2.5 |
| 02/04/2022 | 29.5 | 31.0 | 1.5 |
| 03/04/2022 | 29.0 | 31.5 | 2.5 |
| 04/04/2022 | 28.5 | 31.0 | 2.5 |
| 05/04/2022 | 28.0 | 29.5 | 1.5 |
| 06/04/2022 | 29.0 | 31.0 | 2.0 |
| 07/04/2022 | 29.5 | 31.5 | 2.0 |
| 08/04/2022 | 29.5 | 31.5 | 2.0 |
| 09/04/2022 | 30.0 | 32.0 | 2.0 |
| 10/04/2022 | 30.0 | 32.5 | 2.5 |
| 11/04/2022 | 30.5 | 32.5 | 2.0 |
| 12/04/2022 | 30.0 | 32.5 | 2.5 |
| 13/04/2022 | 30.5 | 32.5 | 2.0 |
| 14/04/2022 | 31.0 | 33.0 | 2.0 |
| 15/04/2022 | 30.5 | 33.5 | 3.0 |
| 16/04/2022 | 31.0 | 34.0 | 3.0 |
| 17/04/2022 | 31.0 | 34.0 | 3.0 |
| 18/04/2022 | 31.0 | 34.5 | 3.5 |
| 19/04/2022 | 31.0 | 34.5 | 3.5 |
| 20/04/2022 | 31.0 | 34.5 | 3.5 |
| 21/04/2022 | 31.0 | 34.0 | 3.0 |
| 22/04/2022 | 31.0 | 34.5 | 3.5 |
| 23/04/2022 | 31.0 | OUM | OUM |
| 24/04/2022 | 31.0 | OUM | OUM |
| 25/04/2022 | 30.5 | OUM | OUM |
| 26/04/2022 | 30.5 | OUM | OUM |
| 27/04/2022 | 31.0 | OUM | OUM |
| 28/04/2022 | 31.0 | OUM | OUM |
| 29/04/2022 | 31.5 | OUM | OUM |
| 30/04/2022 | 31.0 | OUM | OUM |
| **Min.** | **28.0** | **29.5** | **1.5** |
| **Max.** | **31.5** | **34.5** | **3.5** |
| **Average** | **30.3** | **32.6** | **2.5** |

**Note:** OUM=Outfall Channel Under Maintenance

| adani Power | **Adani Power (Mundra) Limited, Mundra** |
|---|---|
| | Differential Water Temperature Report (April'22 to September'22) |

| **Month: May'2022** | | | |
|---|---|---|---|
| **Date** | **Intake Reservoir (ºC)** | **Outfall channel (ºC)** | **Temp. difference (ºC)** |
| 01/05/2022 | 33.5 | OUM | OUM |
| 02/05/2022 | 33.0 | OUM | OUM |
| 03/05/2022 | 32.5 | OUM | OUM |
| 04/05/2022 | 32.5 | OUM | OUM |
| 05/05/2022 | 33.0 | OUM | OUM |
| 06/05/2022 | 33.5 | OUM | OUM |
| 07/05/2022 | 33.0 | OUM | OUM |
| 08/05/2022 | 32.5 | OUM | OUM |
| 09/05/2022 | 33.0 | OUM | OUM |
| 10/05/2022 | 33.5 | OUM | OUM |
| 11/05/2022 | 34.0 | OUM | OUM |
| 12/05/2022 | 33.5 | OUM | OUM |
| 13/05/2022 | 33.5 | OUM | OUM |
| 14/05/2022 | 33.0 | OUM | OUM |
| 15/05/2022 | 33.0 | OUM | OUM |
| 16/05/2022 | 33.5 | OUM | OUM |
| 17/05/2022 | 33.5 | OUM | OUM |
| 18/05/2022 | 33.0 | OUM | OUM |
| 19/05/2022 | 33.0 | OUM | OUM |
| 20/05/2022 | 32.5 | OUM | OUM |
| 21/05/2022 | 32.0 | OUM | OUM |
| 22/05/2022 | 32.5 | OUM | OUM |
| 23/05/2022 | 32.5 | OUM | OUM |
| 24/05/2022 | 32.5 | OUM | OUM |
| 25/05/2022 | 32.0 | OUM | OUM |
| 26/05/2022 | 32.5 | OUM | OUM |
| 27/05/2022 | 33.0 | OUM | OUM |
| 28/05/2022 | 32.5 | OUM | OUM |
| 29/05/2022 | 32.5 | OUM | OUM |
| 30/05/2022 | 32.5 | OUM | OUM |
| 31/05/2022 | 32.5 | OUM | OUM |
| **Min.** | **32.0** | OUM | OUM |
| **Max.** | **34.0** | OUM | OUM |
| **Average** | **32.9** | OUM | OUM |

**Note:** OUM=Outfall Channel Under Maintenance

| adani Power | **Adani Power (Mundra) Limited, Mundra** |
|---|---|
| | Differential Water Temperature Report (April'22 to September'22) |

| **Month: June'2022** | | | |
|---|---|---|---|
| **Date** | **Intake Reservoir (ºC)** | **Outfall channel (ºC)** | **Temp. difference (ºC)** |
| 01/06/2022 | 33.0 | OUM | OUM |
| 02/06/2022 | 32.5 | OUM | OUM |
| 03/06/2022 | 33.0 | OUM | OUM |
| 04/06/2022 | 33.0 | OUM | OUM |
| 05/06/2022 | 32.5 | OUM | OUM |
| 06/06/2022 | 33.0 | OUM | OUM |
| 07/06/2022 | 33.0 | OUM | OUM |
| 08/06/2022 | 33.0 | OUM | OUM |
| 09/06/2022 | 33.0 | OUM | OUM |
| 10/06/2022 | 32.5 | OUM | OUM |
| 11/06/2022 | 32.5 | OUM | OUM |
| 12/06/2022 | 32.5 | OUM | OUM |
| 13/06/2022 | 32.5 | OUM | OUM |
| 14/06/2022 | 33.0 | OUM | OUM |
| 15/06/2022 | 32.5 | OUM | OUM |
| 16/06/2022 | 32.5 | OUM | OUM |
| 17/06/2022 | 32.5 | OUM | OUM |
| 18/06/2022 | 33.0 | OUM | OUM |
| 19/06/2022 | 33.0 | OUM | OUM |
| 20/06/2022 | 33.0 | OUM | OUM |
| 21/06/2022 | 32.5 | OUM | OUM |
| 22/06/2022 | 32.0 | OUM | OUM |
| 23/06/2022 | 32.5 | 34.5 | 2.0 |
| 24/06/2022 | 32.5 | 34.5 | 2.0 |
| 25/06/2022 | 32.5 | 35.0 | 2.5 |
| 26/06/2022 | 32.0 | 34.5 | 2.5 |
| 27/06/2022 | 32.0 | 34.0 | 2.0 |
| 28/06/2022 | 32.0 | 34.5 | 2.5 |
| 29/06/2022 | 32.5 | 34.5 | 2.0 |
| 30/06/2022 | 32.5 | 34.5 | 2.0 |
| **Min.** | **32.0** | **34.0** | **2.0** |
| **Max.** | **33.0** | **35.0** | **2.5** |
| **Average** | **32.6** | **34.5** | **2.2** |

**Note:** OUM=Outfall Channel Under Maintenance

| adani Power | **Adani Power (Mundra) Limited, Mundra** |
|---|---|
| | Differential Water Temperature Report (April'22 to September'22) |

| **Month: July'2022** | | | |
|---|---|---|---|
| **Date** | **Intake Reservoir (ºC)** | **Outfall channel (ºC)** | **Temp. difference (ºC)** |
| 01/07/2022 | 32.5 | 35.0 | 2.5 |
| 02/07/2022 | 32.0 | 34.5 | 2.5 |
| 03/07/2022 | 32.0 | 35.0 | 3.0 |
| 04/07/2022 | 32.0 | 34.5 | 2.5 |
| 05/07/2022 | 32.0 | 34.0 | 2.0 |
| 06/07/2022 | 32.0 | 35.0 | 3.0 |
| 07/07/2022 | 32.0 | 34.5 | 2.5 |
| 08/07/2022 | 31.5 | 34.5 | 3.0 |
| 09/07/2022 | 31.5 | 34.0 | 2.5 |
| 10/07/2022 | 31.0 | 34.0 | 3.0 |
| 11/07/2022 | 31.5 | 34.5 | 3.0 |
| 12/07/2022 | 31.0 | 34.5 | 3.5 |
| 13/07/2022 | 31.0 | 35.0 | 4.0 |
| 14/07/2022 | 30.5 | 34.5 | 4.0 |
| 15/07/2022 | 30.5 | 34.0 | 3.5 |
| 16/07/2022 | 31.0 | 34.5 | 3.5 |
| 17/07/2022 | 31.0 | 34.5 | 3.5 |
| 18/07/2022 | 31.5 | 34.0 | 2.5 |
| 19/07/2022 | 31.0 | 33.5 | 2.5 |
| 20/07/2022 | 31.5 | 33.5 | 2.0 |
| 21/07/2022 | 31.0 | 34.0 | 3.0 |
| 22/07/2022 | 31.0 | 33.5 | 2.5 |
| 23/07/2022 | 30.5 | 33.0 | 2.5 |
| 24/07/2022 | 30.5 | 33.0 | 2.5 |
| 25/07/2022 | 30.5 | 34.0 | 3.5 |
| 26/07/2022 | 30.0 | 33.5 | 3.5 |
| 27/07/2022 | 30.5 | 33.5 | 3.0 |
| 28/07/2022 | 31.0 | 34.0 | 3.0 |
| 29/07/2022 | 31.0 | 34.5 | 3.5 |
| 30/07/2022 | 30.5 | 33.5 | 3.0 |
| 31/07/2022 | 30.5 | 33.0 | 2.5 |
| **Min.** | **30.0** | **33.0** | **2.0** |
| **Max.** | **32.5** | **35.0** | **4.0** |
| **Average** | **31.2** | **34.1** | **3.0** |

| adani Power | **Adani Power (Mundra) Limited, Mundra** |
|---|---|
| | Differential Water Temperature Report (April'22 to September'22) |

| **Month: August'2022** | | | |
|---|---|---|---|
| **Date** | **Intake Reservoir (ºC)** | **Outfall channel (ºC)** | **Temp. difference (ºC)** |
| 01/08/2022 | 30.0 | 33.0 | 3.0 |
| 02/08/2022 | 30.5 | 33.0 | 2.5 |
| 03/08/2022 | 30.5 | 33.5 | 3.0 |
| 04/08/2022 | 31.5 | 33.5 | 2.0 |
| 05/08/2022 | 31.0 | 34.0 | 3.0 |
| 06/08/2022 | 30.5 | 33.5 | 3.0 |
| 07/08/2022 | 30.5 | 33.0 | 2.5 |
| 08/08/2022 | 30.0 | 33.5 | 3.5 |
| 09/08/2022 | 30.5 | 33.5 | 3.0 |
| 10/08/2022 | 31.0 | 34.0 | 3.0 |
| 11/08/2022 | 31.0 | 33.5 | 2.5 |
| 12/08/2022 | 31.5 | 34.0 | 2.5 |
| 13/08/2022 | 31.0 | 34.0 | 3.0 |
| 14/08/2022 | 30.5 | 33.0 | 2.5 |
| 15/08/2022 | 30.0 | 33.5 | 3.5 |
| 16/08/2022 | 30.0 | 33.0 | 3.0 |
| 17/08/2022 | 30.0 | 32.5 | 2.5 |
| 18/08/2022 | 29.5 | 33.0 | 3.5 |
| 19/08/2022 | 29.5 | 33.0 | 3.5 |
| 20/08/2022 | 30.0 | 32.5 | 2.5 |
| 21/08/2022 | 30.0 | OTS | OTS |
| 22/08/2022 | 29.5 | OTS | OTS |
| 23/08/2022 | 30.0 | OTS | OTS |
| 24/08/2022 | 29.5 | OTS | OTS |
| 25/08/2022 | 29.0 | OTS | OTS |
| 26/08/2022 | 29.5 | OTS | OTS |
| 27/08/2022 | 30.5 | 33.5 | 3.0 |
| 28/08/2022 | 30.0 | 34.0 | 4.0 |
| 29/08/2022 | 30.5 | 33.5 | 3.0 |
| 30/08/2022 | 31.0 | 34.0 | 3.0 |
| 31/08/2022 | 30.5 | 34.0 | 3.5 |
| **Min.** | **29.0** | **32.5** | **2.0** |
| **Max.** | **31.5** | **34.0** | **4.0** |
| **Average** | **30.3** | **33.4** | **3.0** |

**Note:** OTS=Outfall Temporary Shutdown

| adani Power | **Adani Power (Mundra) Limited, Mundra** |
|---|---|
| | Differential Water Temperature Report (April'22 to September'22) |

| **Month: September'2022** | | | |
|---|---|---|---|
| **Date** | **Intake Reservoir (ºC)** | **Outfall channel (ºC)** | **Temp. difference (ºC)** |
| 01/09/2022 | 31.0 | 33.0 | 2.0 |
| 02/09/2022 | 31.0 | 33.0 | 2.0 |
| 03/09/2022 | 31.5 | 33.0 | 1.5 |
| 04/09/2022 | 31.0 | 33.5 | 2.5 |
| 05/09/2022 | 31.5 | 33.0 | 1.5 |
| 06/09/2022 | 31.0 | 32.5 | 1.5 |
| 07/09/2022 | 31.5 | 33.0 | 1.5 |
| 08/09/2022 | 31.5 | 33.5 | 2.0 |
| 09/09/2022 | 31.0 | 34.0 | 3.0 |
| 10/09/2022 | 31.0 | 34.0 | 3.0 |
| 11/09/2022 | 31.0 | 34.0 | 3.0 |
| 12/09/2022 | 31.5 | 34.5 | 3.0 |
| 13/09/2022 | 30.0 | 31.5 | 1.5 |
| 14/09/2022 | 29.5 | 32.0 | 2.5 |
| 15/09/2022 | 29.5 | OTS | OTS |
| 16/09/2022 | 30.0 | OTS | OTS |
| 17/09/2022 | 30.0 | OTS | OTS |
| 18/09/2022 | 30.5 | OTS | OTS |
| 19/09/2022 | 31.0 | OTS | OTS |
| 20/09/2022 | 31.0 | 33.0 | 2.0 |
| 21/09/2022 | 31.5 | 34.0 | 2.5 |
| 22/09/2022 | 31.5 | 34.0 | 2.5 |
| 23/09/2022 | 31.0 | 34.0 | 3.0 |
| 24/09/2022 | 31.0 | 34.0 | 3.0 |
| 25/09/2022 | 30.5 | 33.5 | 3.0 |
| 26/09/2022 | 30.5 | 33.5 | 3.0 |
| 27/09/2022 | 31.0 | 33.5 | 2.5 |
| 28/09/2022 | 30.5 | 34.0 | 3.5 |
| 29/09/2022 | 30.0 | 33.5 | 3.5 |
| 30/09/2022 | 30.5 | 33.0 | 2.5 |
| **Min.** | **29.5** | **31.5** | **1.5** |
| **Max.** | **31.5** | **34.5** | **3.5** |
| **Average** | **30.8** | **33.4** | **2.5** |

**Note:** OTS=Outfall Temporary Shutdown

| adani Power | **Adani Power (Mundra) Limited, Mundra** |
|---|---|
| | Greenbelt Details (April'22 to September'22) |

**Annexure: VI**

**Greenbelt Details:**

| Area (ha) | No. of Trees & Palm Planted | No. of Shrubs Planted |
|---|---|---|
| 142.37 | 329078 | 1403954 |

**Plant species planted at Adani Power Limited, Mundra**

| Sr. No. | Scientific Name | Common Name |
|---|---|---|
| **Tress** | | |
| 1. | *Achras sapota* | Sapota / Chiku |
| 2. | *Areca catechu* | Nut Palm tree |
| 3. | *Azadirachta indica* | Neem |
| 4. | *Bismarckia nobilis* | Bismarckia Palm |
| 5. | *Bauhinia blakeana* | Kachnar |
| 6. | *Callistemon viminalis* | Pink Bottle brush |
| 7. | *Callistemon lanceolatus* | Red Bottle brush |
| 8. | *Casuarina equisetifolia* | Saru/Casuarina |
| 9. | *Cocos nucifera* | Nariyal/Cocconut |
| 10. | *Delonix regia* | Gulmohar |
| 11. | *Ficus benghalensis* | Baniyan tree |
| 12. | *Ficus religiosa* | Peepal Tree |
| 13. | *Punica granatum* | Pomegranate |
| 14. | *Emblica officinalis* | Aamla |
| 15. | *Ficus infectoria* | Pilkhan /White Fig tree |
| 16. | *Mangifera indica* | Aam/ Mango |
| 17. | *Polyalthia longifolia* | Ashok/ False Ashok |
| 18. | *Psidium guajava* | Guava |
| 19. | *Salvadora oleoides* | Peelu |
| 20. | *Citrus limon* | Lemon |
| 21. | *Syzygium cumini* | Jamun |
| 22. | *Washingtonia filifera* | Washingtonia Palm |
| 23. | *Wodyetia bifurcata* | Palm |
| **Shrubs** | | |
| 24. | *Allamanda* | Yellow Bell |
| 25. | *Bougainvillea spectabilis* | Bougainvillea/ Booganbel |
| 26. | *Catharanthus alba* | Vinca |
| 27. | *Clerodendrum inerme* | Wild Jasmine |
| 28. | *Cycas circinalis* | Cycas |
| 29. | *Euphorbia cotinifolia* | Tropical Smoke Bush |
| 30. | *Euphorbia milii* | Christ Thorn |
| 31. | *Ficus panda* | - |
| 32. | *Hymenocallis caroliniana* | Spider Lily |
| 33. | *Ixora hybrid* | Ixora |
| 34. | *Jasminum molle* | Jui |
| 35. | *Jatropha curcas* | Ratanjyot, |
| 36. | *Nerium indicum* | Kaner |
| 37. | *Nerium odoratum* | Kaner |
| 38. | *Plumeria alba* | Champa |
| 39. | *Tecoma* | Yellow Trumpetbush |
| 40. | *Ziziphus mauritiana* | Ber/Bor/Indian plum |
| 41. | *Furcraea macdougalii* | Furcraea |
| 42. | *Nicadevia* | Nicadevia |

# Adani Power (Mundra) Limited, Mundra

## Ash Production & Disposal (April 2022 to September 2022)

**Annexure – VII**

| Month | Total Ash Generation | For Cement Manufacturing (Fly Ash + Bottom Ash + Pond Ash) | For Export / Domestic Treaders | Filling of low-lying area | Ash Dyke | Dyke Ash lifted for reutilization Embankment / Back Filling | Bottom Ash lifted for Embankment / Back Filling | Total Ash Utilization | % Utilization | Previous Month's Stock (MT) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 1497 |
| Apr'22 | 44352 | 31524 | 3721 | 0 | 0 | 0 | 6677 | 41922 | 94.52 | 3928 |
| May'22 | 39782 | 32827 | 4253 | 0 | 0 | 0 | 5389 | 42469 | 106.75 | 1241 |
| June'22 | 50497 | 39175 | 5679 | 0 | 0 | 0 | 6111 | 50966 | 100.93 | 772 |
| July'22 | 23652 | 8821 | 12367 | 0 | 0 | 0 | 2753 | 23941 | 101.22 | 483 |
| Aug'22 | 13543 | 1785 | 10387 | 0 | 0 | 0 | 1018 | 13190 | 97.40 | 835 |
| Sept'22 | 26598 | 8920 | 14089 | 0 | 0 | 0 | 3410 | 26420 | 99.33 | 879 |
| **Note: -** Total 879 MT Ash stocked (749 MT Ash in ash silo and 130 MT Ash filled in bags) and will be utilized in upcoming month | | | | | | | | | | |
| **Total** | **198424** | **123052** | **50497** | **0** | **0** | **0** | **25359** | **198908** | **100.24** | |

adani

Power

Ref: APMuL/ENV/FLYASH/99/07/2022
Date: 18/07/2022

**To,**
**Additional Principle Chief Conservator of Forest**
**Ministry of Environment, Forest and Climate Change**
**Integrated Reginal Office (Near Kishan Circle)**
**Aranya Bhavan, Fourth Floor, Room No 407**
**Sector 10 A, Gandhinagar, Gujarat 382010.**

**Sub: Advisory regarding implementation of Notification No. G.S.R. 02(E) dated: 2nd January 2014 for supply and use of coal with ash content – regarding.**

**Ref. No: File No. L-11011/21/2014-IA. I (T), dated: 13.04.2015**

Dear Sir,

With reference to above subject and reference, we are submitting herewith the compliance of said notification.

The half yearly compliance reports of Fly Ash management for environmental safeguards stipulated in the EC and Consent are being regularly submitted to both the Regional offices of MoEFCC, Bhopal as well as Gujarat Pollution Control Board (GPCB). We are also submitting the half yearly & annual reports of Fly ash utilization & Ash content of Coal to Central Electricity Authority (CEA) since plant operation.

We are enclosing herewith the monthly as well as **Quarterly Average Ash Content** in the coal used by our plant during the period of **April'2022 to June'2022** as Annexure – I.

| | | |
|---|---|---|
| **Total Capacity of TPP:** | | **4620 MW** |
| Phase – I | : | 660 (2x330) MW |
| Phase – II | : | 1980 (2x330) + (2x660) MW |
| Phase – III | : | 1980 (3x660) MW |

This is for your kind information and record please.

Thanking You,

Yours faithfully,
**for Adani Power (Mundra) Limited,**

**(R N Shukla)**
**Head-Environment**

**Encl**: As above

Adani Power (Mundra) Ltd
Adani Corporate House
Shantigram, S G Highway
Ahmedabad 382 421
Gujarat, India
CIN: U40300GJ2015PLC082295

Tel +91 79 2555 4444
Fax +91 79 2555 7177
info@adani.com
www.adanipower.com

ADANI POWER (MUNDRA) LIMITED

Annexure – I

## ASH PERCENTAGE IN COAL

(From April'2022 to June'2022)

| Month | Coal Consumption (MT) | Ash Content in Coal (in %) |
|---|---|---|
| April'2022 | 915,432 | 4.84 |
| May'2022 | 613,356 | 6.49 |
| June'2022 | 916,053 | 5.51 |
| **Quarterly Average (%)** | **----** | **5.61** |

MT: Metric Tone

adani

Power

Ref: APMuL/ENV/FLYASH/107/10/2022
Date: 14/10/2022

**To,**
**Additional Principle Chief Conservator of Forest**
**Ministry of Environment, Forest and Climate Change**
**Integrated Reginal Office (Near Kishan Circle)**
**Aranya Bhavan, Fourth Floor, Room No 407**
**Sector 10 A, Gandhinagar, Gujarat 382010.**

**Sub: Advisory regarding implementation of Notification No. G.S.R. 02(E) dated: 2nd January 2014 for supply and use of coal with ash content – regarding.**

**Ref. No: File No. L-11011/21/2014-IA. I (T), dated: 13.04.2015**

Dear Sir,

With reference to above subject and reference, we are submitting herewith the compliance of said notification.

The half yearly compliance reports of Fly Ash management for environmental safeguards stipulated in the EC and Consent are being regularly submitted to both the Regional office of MoEFCC, Bhopal as well as Gujarat Pollution Control Board (GPCB). We are also submitting the half yearly & annual reports of Fly ash utilization & Ash content of Coal to Central Electricity Authority (CEA) since plant operation.

We are enclosing herewith the monthly as well as **Quarterly Average Ash Content** in the coal used by our plant during the period of **July'2022 to September'2022** as Annexure – I.

| | | |
|---|---|---|
| **Total Capacity of TPP:** | | **4620 MW** |
| Phase – I | : | 660 (2x330) MW |
| Phase – II | : | 1980 (2x330) + (2x660) MW |
| Phase – III | : | 1980 (3x660) MW |

This is for your kind information and record please.

Thanking You,

Yours faithfully,
**for Adani Power (Mundra) Limited,**

**(R N Shukla)**
**Head-Environment**

**Encl:** As above

Adani Power (Mundra) Ltd
Adani Corporate House
Shantigram, S G Highway
Ahmedabad 382 421
Gujarat, India
CIN: U40300GJ2015PLC082295

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www.adanipower.com

**ADANI POWER (MUNDRA) LIMITED**

**Annexure – I**

## ASH PERCENTAGE IN COAL

**(From July'2022 to September'2022)**

| Month | Coal Consumption (MT) | Ash Content in Coal (in %) |
|---|---|---|
| July'2022 | 406912 | 5.81 |
| August'2022 | 279686 | 4.84 |
| September'2022 | 533559 | 4.99 |
| **Quarterly Average (%)** | **----** | **5.21** |

**MT: Metric Tone**

UniStar
Environment and Research Labs Pvt. Ltd.

White House,
Near G.I.D.C. Office, Char Rasta,
Vapi-396 195, Gujarat, India.
Phone : +91 260 2433966 / 2425610
Email : response@uerl.in Website : www.uerl.in

MoEF&CC (GOI) Recognized Environmental Laboratory under the EPA-1986 (12.01.2020 to17.03.2023) | QCI-NABET Accredited EIA Consultant Organization | GPCB Recognized Environmental Auditor (Schedule-II) | ISO 9001:2015 Certified Company | ISO 45001:2018 Certified Company

## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/08/APL-0546** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **31/08/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Nr. Emergency Ash Pond Bore Well Water Sample - 1** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **24/08/2022** | Sample Received Date | **26/08/2022** |
| Test Started Date | **26/08/2022** | Test Completion Date | **30/08/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/08/APL-0546** | | |

**TEST RESULTS:**

| **DISCIPLINE : Chemical Testing** | | | **NAME OF GROUP: Water** | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **PHYSIO-CHEMICAL PARAMETERS** | | | | |
| 1. | pH @ 25 ° C | IS 3025(Part 11)1983 | -- | 7.64 |
| 2. | Conductivity | IS 3025(Part 14)1984 | (µS/cm) | 15124 |
| 3. | Total Dissolved Solids | (APHA 23rd Ed.,2017,2540- C) | mg/L | 9680 |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 1. | Chloride as $Cl^-$ | (APHA 23rd Ed.,2017,4500-Cl) | mg/L | 4208.6 |
| 2. | Carbonate as CaCO3 | IS 3025(Part 51)2001 | mg/L | 24.6 |
| 3. | Bicarbonate as CaCO3 | IS 3025(Part 51)2001 | mg/L | 175 |
| 4. | Total Alkalinity | [IS 3025(Part 23)1986, Amd.2] | mg/L | 358.8 |
| 5. | Calcium as Ca | (APHA 23rd Ed.,2017,3500 Ca. B) | mg/L | 329.3 |
| 6. | Magnesium as Mg | (APHA 23rd Ed.,2017, 3500 Mg. B) | mg/L | 172.40 |
| 7. | Sodium as Na | APHA 23rd Ed.,2017,3500 Na, B | mg/L | 1440 |
| 8. | Potassium as K | APHA 23rd Ed.,2017,3500 K,B | mg/L | 64 |
| 9. | Sulphate as SO4-2 | IS 3025(Part 24)1986 | mg/L | 501 |
| 10. | Nitrate as NO3 | (APHA 23rd Ed.,2017,4500 NO3-B) | mg/L | 19.6 |
| 11. | Phosphate as $PO_4$ | (APHA 23rd Ed.,2017,4500-P,D) | mg/L | 2.10 |
| 12. | Fluoride as F | (APHA 23rd Ed.,2017,4500 F,D) | mg/L | 2.40 |
| **DISCIPLINE : Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
| 13 | Mercury as Hg | (APHA 23rd Ed.,2017,3112-B) | mg/L | BDL(MDL:0.001) |
| 14 | Arsenic as As | APHA 23rd Ed.,2017,3114-C | mg/L | BDL(MDL:0.01) |
| 15 | Lead as Pb | (APHA 23rd Ed.,2017,3111-B) | mg/L | BDL(MDL:0.01) |
| 16 | Chromium as Cr | APHA 23rd Ed.,2017,3125 | mg/L | BDL(MDL:0.05) |
| 17 | Cadmium as Cd | IS 3025(Part 41)1992, | mg/L | BDL(MDL:0.003) |
| 18 | Iron (as Fe) | IS 3025(Part 53)2003, | mg/L | BDL(MDL:0.1) |
| 19 | Zinc (as Zn) | IS 3025(Part 49)1994, | mg/L | BDL(MDL:0.05) |
| 20 | Cobalt as Co | APHA 23rdEd.2017-3500-Co | mg/L | BDL(MDL:0.5) |
| 21 | Copper as Cu | IS 3025(Part 42)1992amd.01, | mg/L | BDL(MDL:0.05) |



**Note:** This report is subject to terms and conditions mentioned overleaf.

UniStar
Environment and Research Labs Pvt. Ltd.

White House,
Near G.I.D.C. Office, Char Rasta,
Vapi-396 195, Gujarat, India.
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MoEF&CC (GOI) Recognized Environmental Laboratory under the EPA-1986 (12.01.2020 to17.03.2023) | QCI-NABET Accredited EIA Consultant Organization | GPCB Recognized Environmental Auditor (Schedule-II) | ISO 9001:2015 Certified Company | ISO 45001:2018 Certified Company

## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/08/APL-0546** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **31/08/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Nr. Emergency Ash Pond Bore Well Water Sample - 1** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **24/08/2022** | Sample Received Date | **26/08/2022** |
| Test Started Date | **26/08/2022** | Test Completion Date | **30/08/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/08/APL-0546** | | |

**TEST RESULTS:**

| **DISCIPLINE: Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 22. | Manganese as Mn | APHA 23rd Ed.,2017,3500 Mn B | mg/L | BDL(MDL:0.1) |
| 23. | Nickel as Ni | IS 3025(Part 54)2003, | mg/L | BDL(MDL:0.02) |
| **Remarks: BDL=** Below Detection Limit, **MDL** = Minimum Detection Limit, | | | | |
| **Opinion & Interpretation (If required): --** | | | | |

UniStar Environment and Research Labs Pvt. Ltd.

********* End of Report *********

**Checked By:**

**Nilesh C. Patel**
(Sr. Chemist)

**Authorized By:**

**Nitin B. Tandel**
(Technical Manager)



**Note:** This report is subject to terms and conditions mentioned overleaf.

UniStar
Environment and Research Labs Pvt. Ltd.

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Near G.I.D.C. Office, Char Rasta,
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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/08/APL-0546** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **31/08/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Nr. Emergency Ash Pond Bore Well Water Sample - 1** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **24/08/2022** | Sample Received Date | **26/08/2022** |
| Test Started Date | **26/08/2022** | Test Completion Date | **30/08/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/08/APL-0546** | | |

**TEST RESULTS:**

| **DISCIPLINE : Chemical Testing** | | | **NAME OF GROUP: Water** | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 1. | Salinity | By Calculation | ppt | 7.60 |
| **DISCIPLINE: Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
| 2. | Barium as Ba | AAS Method | mg/L | N.D. |
| **Remarks: N.D.** = Not Detectable, | | | | |
| **Opinion & Interpretation (If required): --** | | | | |

UniStar Environment and Research Labs Pvt. Ltd.

********* End of Report *********

**Checked By:**

**Nilesh C. Patel**
(Sr. Chemist)

**Authorized By:**

**Nitin B. Tandel**
(Technical Manager)



**Note:** This report is subject to terms and conditions mentioned overleaf.

UniStar
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White House,
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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/08/APL-0547** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **31/08/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Nr. Emergency Ash Pond Bore well Water Sample - 2** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **24/08/2022** | Sample Received Date | **26/08/2022** |
| Test Started Date | **26/08/2022** | Test Completion Date | **30/08/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/08/APL-0547** | | |

**TEST RESULTS:**

| **DISCIPLINE : Chemical Testing** | | | **NAME OF GROUP: Water** | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **PHYSIO-CHEMICAL PARAMETERS** | | | | |
| 1. | pH @ 25 ° C | IS 3025(Part 11)1983 | -- | 7.41 |
| 2. | Conductivity | IS 3025(Part 14)1984 | (µS/cm) | 16288 |
| 3. | Total Dissolved Solids | (APHA 23rd Ed.,2017,2540- C) | mg/L | 10424 |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 1. | Chloride as $Cl^-$ | (APHA 23rd Ed.,2017,4500-Cl) | mg/L | 4384.6 |
| 2. | Carbonate as CaCO3 | IS 3025(Part 51)2001 | mg/L | 23.3 |
| 3. | Bicarbonate as CaCO3 | IS 3025(Part 51)2001 | mg/L | 188 |
| 4. | Total Alkalinity | [IS 3025(Part 23)1986, Amd.2] | mg/L | 365.3 |
| 5. | Calcium as Ca | (APHA 23rd Ed.,2017,3500 Ca.B) | mg/L | 312.1 |
| 6. | Magnesium as Mg | (APHA 23rd Ed.,2017, 3500 Mg.B) | mg/L | 182.70 |
| 7. | Sodium as Na | APHA 23rd Ed.,2017,3500 Na,B | mg/L | 1906 |
| 8. | Potassium as K | APHA 23rd Ed.,2017,3500 K,B | mg/L | 101 |
| 9. | Sulphate as SO4-2 | IS 3025(Part 24)1986 | mg/L | 757 |
| 10. | Nitrate as NO3 | (APHA 23rd Ed.,2017,4500 NO3-B) | mg/L | 24.1 |
| 11. | Phosphate as $PO_4$ | (APHA 23rd Ed.,2017,4500-P,D) | mg/L | 2.84 |
| 12. | Fluoride as F | (APHA 23rd Ed.,2017,4500 F,D) | mg/L | 2.30 |
| **DISCIPLINE: Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
| 13 | Mercury as Hg | (APHA 23rd Ed.,2017,3112-B) | mg/L | BDL(MDL:0.001) |
| 14 | Arsenic as As | APHA 23rd Ed.,2017,3114-C | mg/L | BDL(MDL:0.01) |
| 15 | Lead as Pb | (APHA 23rd Ed.,2017,3111-B) | mg/L | BDL(MDL:0.01) |
| 16 | Chromium as Cr | APHA 23rd Ed.,2017,3125 | mg/L | BDL(MDL:0.05) |
| 17 | Cadmium as Cd | IS 3025(Part 41)1992, | mg/L | BDL(MDL:0.003) |
| 18 | Iron (as Fe) | IS 3025(Part 53)2003,<br>(APHA 23rd Ed.,2017,3111-B) | mg/L | BDL(MDL:0.1) |
| 19 | Zinc (as Zn) | IS 3025(Part 49)1994, | mg/L | BDL(MDL:0.05) |
| 20 | Cobalt as Co | APHA 23rdEd.2017-3500-Co | mg/L | BDL(MDL:0.5) |
| 21 | Copper as Cu | IS 3025(Part 42)1992amd.01, | mg/L | BDL(MDL:0.05) |



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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/08/APL-0547** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **31/08/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Nr. Emergency Ash Pond Bore well Water Sample - 2** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **24/08/2022** | Sample Received Date | **26/08/2022** |
| Test Started Date | **26/08/2022** | Test Completion Date | **30/08/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/08/APL-0547** | | |

**TEST RESULTS:**

| **DISCIPLINE: Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 22. | Manganese as Mn | APHA 23rd Ed.,2017,3500 Mn B | mg/L | BDL(MDL:0.1) |
| 23. | Nickel as Ni | IS 3025(Part 54)2003, | mg/L | BDL(MDL:0.02) |
| **Remarks: BDL=** Below Detection Limit, **MDL** = Minimum Detection Limit, | | | | |
| **Opinion & Interpretation (If required): --** | | | | |

UniStar Environment and Research Labs Pvt. Ltd.

********* End of Report *********

**Checked By:**

**Nilesh C. Patel**
(Sr. Chemist)

**Authorized By:**

**Nitin B. Tandel**
(Technical Manager)



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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/08/APL-0547** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **31/08/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Nr. Emergency Ash Pond Bore well Water Sample - 2** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **24/08/2022** | Sample Received Date | **26/08/2022** |
| Test Started Date | **26/08/2022** | Test Completion Date | **30/08/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/08/APL-0547** | | |

**TEST RESULTS:**

| **DISCIPLINE : Chemical Testing** | | | **NAME OF GROUP: Water** | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 1. | Salinity | By Calculation | ppt | 7.9 |
| **DISCIPLINE: Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
| 2. | Barium as Ba | AAS Method | mg/L | N.D. |
| **Remarks: N.D.** = Not Detectable, | | | | |
| **Opinion & Interpretation (If required): --** | | | | |

UniStar Environment and Research Labs Pvt. Ltd.

********* End of Report *********

**Checked By:**

**Nilesh C. Patel**
(Sr. Chemist)

**Authorized By:**

**Nitin B. Tandel**
(Technical Manager)



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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/08/APL-0548** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **31/08/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Nr. Emergency Ash Pond Bore well Water Sample - 3** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **24/08/2022** | Sample Received Date | **26/08/2022** |
| Test Started Date | **26/08/2022** | Test Completion Date | **30/08/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/08/APL-0548** | | |

**TEST RESULTS:**

| **DISCIPLINE : Chemical Testing** | | | **NAME OF GROUP: Water** | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **PHYSIO-CHEMICAL PARAMETERS** | | | | |
| 1. | pH @ 25 ° C | IS 3025(Part 11)1983 | -- | 7.49 |
| 2. | Conductivity | IS 3025(Part 14)1984 | (µS/cm) | 15108 |
| 3. | Total Dissolved Solids | (APHA 23rd Ed.,2017,2540- C) | mg/L | 9670 |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 1. | Chloride as $Cl^-$ | (APHA 23rd Ed.,2017,4500-Cl) | mg/L | 4129 |
| 2. | Carbonate as CaCO3 | IS 3025(Part 51)2001 | mg/L | 30.8 |
| 3. | Bicarbonate as CaCO3 | IS 3025(Part 51)2001 | mg/L | 162.6 |
| 4. | Total Alkalinity | [IS 3025(Part 23)1986, Amd.2] | mg/L | 343.4 |
| 5. | Calcium as Ca | (APHA 23rd Ed.,2017,3500 Ca.B) | mg/L | 298.5 |
| 6. | Magnesium as Mg | (APHA 23rd Ed.,2017,, 3500 Mg.B) | mg/L | 152.7 |
| 7. | Sodium as Na | APHA 23rd Ed.,2017,3500 Na,B | mg/L | 1310.4 |
| 8. | Potassium as K | APHA 23rd Ed.,2017,3500 K,B | mg/L | 89.6 |
| 9. | Sulphate as SO4-2 | IS 3025(Part 24)1986 | mg/L | 640 |
| 10. | Nitrate as NO3 | (APHA 23rd Ed.,2017,4500 NO3-B) | mg/L | 23.3 |
| 11. | Phosphate as $PO_4$ | (APHA 23rd Ed.,2017,4500-P,D) | mg/L | 2.0 |
| 12. | Fluoride as F | (APHA 23rd Ed.,2017,4500 F,D) | mg/L | 2.2 |
| **DISCIPLINE : Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
| 13 | Mercury as Hg | (APHA 23rd Ed.,2017,3112-B) | mg/L | BDL(MDL:0.001) |
| 14 | Arsenic as As | APHA 23rd Ed.,2017,3114-C | mg/L | BDL(MDL:0.01) |
| 15 | Lead as Pb | (APHA 23rd Ed.,2017,3111-B) | mg/L | BDL(MDL:0.01) |
| 16 | Chromium as Cr | APHA 23rd Ed.,2017,3125 | mg/L | BDL(MDL:0.05) |
| 17 | Cadmium as Cd | IS 3025(Part 41)1992, | mg/L | BDL(MDL:0.003) |
| 18 | Iron (as Fe) | IS 3025(Part 53)2003,<br>(APHA 23rd Ed.,2017,3111-B) | mg/L | BDL(MDL:0.1) |
| 19 | Zinc (as Zn) | IS 3025(Part 49)1994, | mg/L | BDL(MDL:0.05) |
| 20 | Cobalt as Co | APHA 23rdEd.2017-3500-Co | mg/L | BDL(MDL:0.5) |
| 21 | Copper as Cu | IS 3025(Part 42)1992amd.01, | mg/L | BDL(MDL:0.05) |



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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/08/APL-0548** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **31/08/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Nr. Emergency Ash Pond Bore well Water Sample - 3** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **24/08/2022** | Sample Received Date | **26/08/2022** |
| Test Started Date | **26/08/2022** | Test Completion Date | **30/08/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/08/APL-0548** | | |

**TEST RESULTS:**

| **DISCIPLINE: Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 22. | Manganese as Mn | APHA 23rd Ed.,2017,3500 Mn B | mg/L | BDL(MDL:0.1) |
| 23. | Nickel as Ni | IS 3025(Part 54)2003, | mg/L | BDL(MDL:0.02) |
| **Remarks: BDL=** Below Detection Limit, **MDL** = Minimum Detection Limit, | | | | |
| **Opinion & Interpretation (If required): --** | | | | |

UniStar Environment and Research Labs Pvt. Ltd.

********* End of Report *********

**Checked By:**

**Nilesh C. Patel**
(Sr. Chemist)

**Authorized By:**

**Nitin B. Tandel**
(Technical Manager)



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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/08/APL-0548** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **31/08/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Nr. Emergency Ash Pond Bore well Water Sample - 3** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **24/08/2022** | Sample Received Date | **26/08/2022** |
| Test Started Date | **26/08/2022** | Test Completion Date | **30/08/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/08/APL-0548** | | |

**TEST RESULTS:**

| **DISCIPLINE : Chemical Testing** | | | **NAME OF GROUP: Water** | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 1. | Salinity | By Calculation | ppt | 7.46 |
| **DISCIPLINE: Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
| 2. | Barium as Ba | AAS Method | mg/L | N.D. |
| **Remarks: N.D.** = Not Detectable, | | | | |
| **Opinion & Interpretation (If required): --** | | | | |

UniStar Environment and Research Labs Pvt. Ltd.

********* End of Report *********

**Checked By:**

**Nilesh C. Patel**
(Sr. Chemist)

**Authorized By:**

**Nitin B. Tandel**
(Technical Manager)



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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/08/APL-0549** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **31/08/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Nr. Emergency Ash Pond Bore well Water Sample - 4** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **24/08/2022** | Sample Received Date | **26/08/2022** |
| Test Started Date | **26/08/2022** | Test Completion Date | **30/08/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/08/APL-0549** | | |

**TEST RESULTS:**

| **DISCIPLINE : Chemical Testing** | | | **NAME OF GROUP: Water** | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **PHYSIO-CHEMICAL PARAMETERS** | | | | |
| 1. | pH @ 25 ° C | IS 3025(Part 11)1983 | -- | 7.48 |
| 2. | Conductivity | IS 3025(Part 14)1984 | (µS/cm) | 15798 |
| 3. | Total Dissolved Solids | (APHA 23rd Ed.,2017,2540- C) | mg/L | 10110 |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 1. | Chloride as $Cl^-$ | (APHA 23rd Ed.,2017,4500-Cl) | mg/L | 4323.2 |
| 2. | Carbonate as CaCO3 | IS 3025(Part 51)2001 | mg/L | 26.9 |
| 3. | Bicarbonate as CaCO3 | IS 3025(Part 51)2001 | mg/L | 155.1 |
| 4. | Total Alkalinity | [IS 3025(Part 23)1986, Amd.2] | mg/L | 379.3 |
| 5. | Calcium as Ca | (APHA 23rd Ed.,2017,3500 Ca.B) | mg/L | 341.8 |
| 6. | Magnesium as Mg | (APHA 23rd Ed.,2017,, 3500 Mg.B) | mg/L | 141.5 |
| 7. | Sodium as Na | APHA 23rd Ed.,2017,3500 Na,B | mg/L | 1476 |
| 8. | Potassium as K | APHA 23rd Ed.,2017,3500 K,B | mg/L | 80.1 |
| 9. | Sulphate as SO4-2 | IS 3025(Part 24)1986 | mg/L | 626.3 |
| 10. | Nitrate as NO3 | (APHA 23rd Ed.,2017,4500 NO3-B) | mg/L | 24.8 |
| 11. | Phosphate as $PO_4$ | (APHA 23rd Ed.,2017,4500-P,D) | mg/L | 2.1 |
| 12. | Fluoride as F | (APHA 23rd Ed.,2017,4500 F,D) | mg/L | 2.3 |
| **DISCIPLINE : Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
| 13 | Mercury as Hg | (APHA 23rd Ed.,2017,3112-B) | mg/L | BDL(MDL:0.001) |
| 14 | Arsenic as As | APHA 23rd Ed.,2017,3114-C | mg/L | BDL(MDL:0.01) |
| 15 | Lead as Pb | (APHA 23rd Ed.,2017,3111-B) | mg/L | BDL(MDL:0.01) |
| 16 | Chromium as Cr | APHA 23rd Ed.,2017,3125 | mg/L | BDL(MDL:0.05) |
| 17 | Cadmium as Cd | IS 3025(Part 41)1992, | mg/L | BDL(MDL:0.003) |
| 18 | Iron (as Fe) | IS 3025(Part 53)2003, | mg/L | BDL(MDL:0.1) |
| 19 | Zinc (as Zn) | IS 3025(Part 49)1994, | mg/L | BDL(MDL:0.05) |
| 20 | Cobalt as Co | APHA 23rdEd.2017-3500-Co | mg/L | BDL(MDL:0.5) |
| 21 | Copper as Cu | IS 3025(Part 42)1992amd.01, | mg/L | BDL(MDL:0.05) |



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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/08/APL-0549** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **31/08/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Nr. Emergency Ash Pond Bore well Water Sample - 4** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **24/08/2022** | Sample Received Date | **26/08/2022** |
| Test Started Date | **26/08/2022** | Test Completion Date | **30/08/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/08/APL-0549** | | |

**TEST RESULTS:**

| **DISCIPLINE: Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 22. | Manganese as Mn | APHA 23rd Ed.,2017,3500 Mn B | mg/L | BDL(MDL:0.1) |
| 23. | Nickel as Ni | IS 3025(Part 54)2003, | mg/L | BDL(MDL:0.02) |
| **Remarks: BDL=** Below Detection Limit, **MDL** = Minimum Detection Limit, | | | | |
| **Opinion & Interpretation (If required): --** | | | | |

UniStar Environment and Research Labs Pvt. Ltd.

********* End of Report *********

**Checked By:**

**Nilesh C. Patel**
(Sr. Chemist)

**Authorized By:**

**Nitin B. Tandel**
(Technical Manager)



**Note:** This report is subject to terms and conditions mentioned overleaf.

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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/08/APL-0549** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **31/08/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Nr. Emergency Ash Pond Bore well Water Sample - 4** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **24/08/2022** | Sample Received Date | **26/08/2022** |
| Test Started Date | **26/08/2022** | Test Completion Date | **30/08/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/08/APL-0549** | | |

**TEST RESULTS:**

| **DISCIPLINE : Chemical Testing** | | | **NAME OF GROUP: Water** | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 1. | Salinity | By Calculation | ppt | 7.81 |
| **DISCIPLINE: Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
| 2. | Barium as Ba | AAS Method | mg/L | N.D. |
| **Remarks: N.D.** = Not Detectable, | | | | |
| **Opinion & Interpretation (If required): --** | | | | |

UniStar Environment and Research Labs Pvt. Ltd.

********* End of Report *********

**Checked By:**

**Nilesh C. Patel**
(Sr. Chemist)

**Authorized By:**

**Nitin B. Tandel**
(Technical Manager)



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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/05/L-0397** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **04/06/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Bore well Water Sample - 1** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **27/05/2022** | Sample Received Date | **30/05/2022** |
| Test Started Date | **30/05/2022** | Test Completion Date | **03/06/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/05/L-0397** | | |

**TEST RESULTS:**

| **DISCIPLINE : Chemical Testing** | | | **NAME OF GROUP: Water** | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **PHYSIO-CHEMICAL PARAMETERS** | | | | |
| 1. | pH @ 25 ° C | IS 3025(Part 11)1983 | -- | 7.72 |
| 2. | Conductivity | IS 3025(Part 14)1984 | (µS/cm) | 16690 |
| 3. | Total Dissolved Solids | (APHA 23rd Ed.,2017,2540- C) | mg/L | 10830 |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 1. | Chloride as $Cl^-$ | (APHA 23rd Ed.,2017,4500-Cl) | mg/L | 4719.6 |
| 2. | Carbonate as CaCO3 | IS 3025(Part 51)2001 | mg/L | 27.2 |
| 3. | Bicarbonate as CaCO3 | IS 3025(Part 51)2001 | mg/L | 198.1 |
| 4. | Total Alkalinity | [IS 3025(Part 23)1986, Amd.2] | mg/L | 382.9 |
| 5. | Calcium as Ca | (APHA 23rd Ed.,2017,3500 Ca.B) | mg/L | 348.4 |
| 6. | Magnesium as Mg | (APHA 23rd Ed.,2017,, 3500 Mg.B) | mg/L | 215.6 |
| 7. | Sodium as Na | APHA 23rd Ed.,2017,3500 Na,B | mg/L | 1660 |
| 8. | Potassium as K | APHA 23rd Ed.,2017,3500 K,B | mg/L | 71.2 |
| 9. | Sulphate as SO4-2 | IS 3025(Part 24)1986 | mg/L | 540.2 |
| 10. | Nitrate as NO3 | (APHA 23rd Ed.,2017,4500 NO3-B) | mg/L | 21.2 |
| 11. | Phosphate as $PO_4$ | (APHA 23rd Ed.,2017,4500-P,D) | mg/L | 2.9 |
| 12. | Fluoride as F | (APHA 23rd Ed.,2017,4500 F,D) | mg/L | 2.9 |
| **DISCIPLINE : Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
| 13 | Mercury as Hg | (APHA 23rd Ed.,2017,3112-B) | mg/L | BDL(MDL:0.001) |
| 14 | Arsenic as As | APHA 23rd Ed.,2017,3114-C | mg/L | BDL(MDL:0.01) |
| 15 | Lead as Pb | (APHA 23rd Ed.,2017,3111-B) | mg/L | BDL(MDL:0.01) |
| 16 | Chromium as Cr | APHA 23rd Ed.,2017,3125 | mg/L | BDL(MDL:0.05) |
| 17 | Cadmium as Cd | IS 3025(Part 41)1992, | mg/L | BDL(MDL:0.003) |
| 18 | Iron (as Fe) | IS 3025(Part 53)2003, | mg/L | BDL(MDL:0.1) |
| 19 | Zinc (as Zn) | IS 3025(Part 49)1994, | mg/L | BDL(MDL:0.05) |
| 20 | Cobalt as Co | APHA 23rdEd.2017-3500-Co | mg/L | BDL(MDL:0.5) |
| 21 | Copper as Cu | IS 3025(Part 42)1992amd.01, | mg/L | BDL(MDL:0.05) |



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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/05/L-0397** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **04/06/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Bore well Water Sample - 1** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **27/05/2022** | Sample Received Date | **30/05/2022** |
| Test Started Date | **30/05/2022** | Test Completion Date | **03/06/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/05/L-0397** | | |

**TEST RESULTS:**

| **DISCIPLINE: Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 22. | Manganese as Mn | APHA 23rd Ed.,2017,3500 Mn B | mg/L | BDL(MDL:0.1) |
| 23. | Nickel as Ni | IS 3025(Part 54)2003, | mg/L | BDL(MDL:0.02) |
| **Remarks: BDL=** Below Detection Limit, **MDL** = Minimum Detection Limit, | | | | |
| **Opinion & Interpretation (If required): --** | | | | |

UniStar Environment and Research Labs Pvt. Ltd.

********* End of Report *********

**Checked By:**

**Nilesh C. Patel**
(Sr. Chemist)

**Authorized By:**

**Nitin B. Tandel**
(Technical Manager)



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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/05/L-0397** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **04/06/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Bore well Water Sample - 1** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **27/05/2022** | Sample Received Date | **30/05/2022** |
| Test Started Date | **30/05/2022** | Test Completion Date | **03/06/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/05/L-0397** | | |

**TEST RESULTS:**

| **DISCIPLINE : Chemical Testing** | | | **NAME OF GROUP: Water** | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 1. | Salinity | By Calculation | ppt | 8.35 |
| **DISCIPLINE: Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
| 2. | Barium as Ba | AAS Method | mg/L | N.D. |
| **Remarks: N.D.** = Not Detectable, | | | | |
| **Opinion & Interpretation (If required): --** | | | | |

UniStar Environment and Research Labs Pvt. Ltd.

********* End of Report *********

**Checked By:**

**Nilesh C. Patel**
(Sr. Chemist)

**Authorized By:**

**Nitin B. Tandel**
(Technical Manager)



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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/05/L-0398** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **04/06/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Bore well Water Sample - 2** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **27/05/2022** | Sample Received Date | **30/05/2022** |
| Test Started Date | **30/05/2022** | Test Completion Date | **03/06/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/05/L-0398** | | |

**TEST RESULTS:**

| **DISCIPLINE : Chemical Testing** | | | **NAME OF GROUP: Water** | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **PHYSIO-CHEMICAL PARAMETERS** | | | | |
| 1. | pH @ 25 ° C | IS 3025(Part 11)1983 | -- | 7.49 |
| 2. | Conductivity | IS 3025(Part 14)1984 | (µS/cm) | 17790 |
| 3. | Total Dissolved Solids | (APHA 23rd Ed.,2017,2540- C) | mg/L | 12248 |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 1. | Chloride as $Cl^-$ | (APHA 23rd Ed.,2017,4500-Cl) | mg/L | 4641.1 |
| 2. | Carbonate as CaCO3 | IS 3025(Part 51)2001 | mg/L | 32.9 |
| 3. | Bicarbonate as CaCO3 | IS 3025(Part 51)2001 | mg/L | 238.8 |
| 4. | Total Alkalinity | [IS 3025(Part 23)1986, Amd.2] | mg/L | 406.8 |
| 5. | Calcium as Ca | (APHA 23rd Ed.,2017,3500 Ca.B) | mg/L | 364.2 |
| 6. | Magnesium as Mg | (APHA 23rd Ed.,2017,, 3500 Mg.B) | mg/L | 187.5 |
| 7. | Sodium as Na | APHA 23rd Ed.,2017,3500 Na,B | mg/L | 2074 |
| 8. | Potassium as K | APHA 23rd Ed.,2017,3500 K,B | mg/L | 132.4 |
| 9. | Sulphate as SO4-2 | IS 3025(Part 24)1986 | mg/L | 824.5 |
| 10. | Nitrate as NO3 | (APHA 23rd Ed.,2017,4500 NO3-B) | mg/L | 31.6 |
| 11. | Phosphate as $PO_4$ | (APHA 23rd Ed.,2017,4500-P,D) | mg/L | 3.5 |
| 12. | Fluoride as F | (APHA 23rd Ed.,2017,4500 F,D) | mg/L | 2.8 |
| **DISCIPLINE : Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
| 13 | Mercury as Hg | (APHA 23rd Ed.,2017,3112-B) | mg/L | BDL(MDL:0.001) |
| 14 | Arsenic as As | APHA 23rd Ed.,2017,3114-C | mg/L | BDL(MDL:0.01) |
| 15 | Lead as Pb | (APHA 23rd Ed.,2017,3111-B) | mg/L | BDL(MDL:0.01) |
| 16 | Chromium as Cr | APHA 23rd Ed.,2017,3125 | mg/L | BDL(MDL:0.05) |
| 17 | Cadmium as Cd | IS 3025(Part 41)1992, | mg/L | BDL(MDL:0.003) |
| 18 | Iron (as Fe) | IS 3025(Part 53)2003,<br>(APHA 23rd Ed.,2017,3111-B) | mg/L | BDL(MDL:0.1) |
| 19 | Zinc (as Zn) | IS 3025(Part 49)1994, | mg/L | BDL(MDL:0.05) |
| 20 | Cobalt as Co | APHA 23rdEd.2017-3500-Co | mg/L | BDL(MDL:0.5) |
| 21 | Copper as Cu | IS 3025(Part 42)1992amd.01, | mg/L | BDL(MDL:0.05) |



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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/05/L-0398** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **04/06/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Bore well Water Sample - 2** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **27/05/2022** | Sample Received Date | **30/05/2022** |
| Test Started Date | **30/05/2022** | Test Completion Date | **03/06/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/05/L-0398** | | |

**TEST RESULTS:**

| **DISCIPLINE: Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 22. | Manganese as Mn | APHA 23rd Ed.,2017,3500 Mn B | mg/L | BDL(MDL:0.1) |
| 23. | Nickel as Ni | IS 3025(Part 54)2003, | mg/L | BDL(MDL:0.02) |
| **Remarks: BDL=** Below Detection Limit, **MDL** = Minimum Detection Limit, | | | | |
| **Opinion & Interpretation (If required): --** | | | | |

UniStar Environment and Research Labs Pvt. Ltd.

********* End of Report *********

**Checked By:**

**Nilesh C. Patel**
(Sr. Chemist)

**Authorized By:**

**Nitin B. Tandel**
(Technical Manager)



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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/05/L-0398** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **04/06/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Bore well Water Sample - 2** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **27/05/2022** | Sample Received Date | **30/05/2022** |
| Test Started Date | **30/05/2022** | Test Completion Date | **03/06/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/05/L-0398** | | |

**TEST RESULTS:**

| **DISCIPLINE : Chemical Testing** | | | **NAME OF GROUP: Water** | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 1. | Salinity | By Calculation | ppt | 8.20 |
| **DISCIPLINE: Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
| 2. | Barium as Ba | AAS Method | mg/L | N.D. |
| **Remarks: N.D.** = Not Detectable, | | | | |
| **Opinion & Interpretation (If required): --** | | | | |

UniStar Environment and Research Labs Pvt. Ltd.

********* End of Report *********

**Checked By:**

**Nilesh C. Patel**
(Sr. Chemist)

**Authorized By:**

**Nitin B. Tandel**
(Technical Manager)



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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/05/L-0399** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **04/06/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Bore well Water Sample - 3** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **27/05/2022** | Sample Received Date | **30/05/2022** |
| Test Started Date | **30/05/2022** | Test Completion Date | **03/06/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/05/L-0399** | | |

**TEST RESULTS:**

| **DISCIPLINE : Chemical Testing** | | | **NAME OF GROUP: Water** | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **PHYSIO-CHEMICAL PARAMETERS** | | | | |
| 1. | pH @ 25 ° C | IS 3025(Part 11)1983 | -- | 7.62 |
| 2. | Conductivity | IS 3025(Part 14)1984 | (µS/cm) | 15430 |
| 3. | Total Dissolved Solids | (APHA 23rd Ed.,2017,2540- C) | mg/L | 10220 |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 1. | Chloride as $Cl^-$ | (APHA 23rd Ed.,2017,4500-Cl) | mg/L | 4721.5 |
| 2. | Carbonate as CaCO3 | IS 3025(Part 51)2001 | mg/L | 34.4 |
| 3. | Bicarbonate as CaCO3 | IS 3025(Part 51)2001 | mg/L | 174.8 |
| 4. | Total Alkalinity | [IS 3025(Part 23)1986, Amd.2] | mg/L | 362.9 |
| 5. | Calcium as Ca | (APHA 23rd Ed.,2017,3500 Ca.B) | mg/L | 311.2 |
| 6. | Magnesium as Mg | (APHA 23rd Ed.,2017,, 3500 Mg.B) | mg/L | 189.8 |
| 7. | Sodium as Na | APHA 23rd Ed.,2017,3500 Na,B | mg/L | 1350.4 |
| 8. | Potassium as K | APHA 23rd Ed.,2017,3500 K,B | mg/L | 103.1 |
| 9. | Sulphate as SO4-2 | IS 3025(Part 24)1986 | mg/L | 694.5 |
| 10. | Nitrate as NO3 | (APHA 23rd Ed.,2017,4500 NO3-B) | mg/L | 25.1 |
| 11. | Phosphate as $PO_4$ | (APHA 23rd Ed.,2017,4500-P,D) | mg/L | 2.6 |
| 12. | Fluoride as F | (APHA 23rd Ed.,2017,4500 F,D) | mg/L | 2.9 |
| **DISCIPLINE : Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
| 13 | Mercury as Hg | (APHA 23rd Ed.,2017,3112-B) | mg/L | BDL(MDL:0.001) |
| 14 | Arsenic as As | APHA 23rd Ed.,2017,3114-C | mg/L | BDL(MDL:0.01) |
| 15 | Lead as Pb | (APHA 23rd Ed.,2017,3111-B) | mg/L | BDL(MDL:0.01) |
| 16 | Chromium as Cr | APHA 23rd Ed.,2017,3125 | mg/L | BDL(MDL:0.05) |
| 17 | Cadmium as Cd | IS 3025(Part 41)1992, | mg/L | BDL(MDL:0.003) |
| 18 | Iron (as Fe) | IS 3025(Part 53)2003,<br>(APHA 23rd Ed.,2017,3111-B) | mg/L | BDL(MDL:0.1) |
| 19 | Zinc (as Zn) | IS 3025(Part 49)1994, | mg/L | BDL(MDL:0.05) |
| 20 | Cobalt as Co | APHA 23rdEd.2017-3500-Co | mg/L | BDL(MDL:0.5) |
| 21 | Copper as Cu | IS 3025(Part 42)1992amd.01, | mg/L | BDL(MDL:0.05) |



**Note:** This report is subject to terms and conditions mentioned overleaf.

UniStar
Environment and Research Labs Pvt. Ltd.

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Near G.I.D.C. Office, Char Rasta,
Vapi-396 195, Gujarat, India.
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MoEF&CC (GOI) Recognized Environmental Laboratory under the EPA-1986 (12.01.2020 to17.03.2023) | QCI-NABET Accredited EIA Consultant Organization | GPCB Recognized Environmental Auditor (Schedule-II) | ISO 9001:2015 Certified Company | ISO 45001:2018 Certified Company

## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/05/L-0399** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **04/06/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Bore well Water Sample - 3** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **27/05/2022** | Sample Received Date | **30/05/2022** |
| Test Started Date | **30/05/2022** | Test Completion Date | **03/06/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/05/L-0399** | | |

**TEST RESULTS:**

| **DISCIPLINE: Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 22. | Manganese as Mn | APHA 23rd Ed.,2017,3500 Mn B | mg/L | BDL(MDL:0.1) |
| 23. | Nickel as Ni | IS 3025(Part 54)2003, | mg/L | BDL(MDL:0.02) |
| **Remarks: BDL=** Below Detection Limit, **MDL** = Minimum Detection Limit, | | | | |
| **Opinion & Interpretation (If required): --** | | | | |

UniStar Environment and Research Labs Pvt. Ltd.

********* End of Report *********

**Checked By:**

**Nilesh C. Patel**
(Sr. Chemist)

**Authorized By:**

**Nitin B. Tandel**
(Technical Manager)



**Note:** This report is subject to terms and conditions mentioned overleaf.

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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/05/L-0399** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **04/06/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Bore well Water Sample - 3** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **27/05/2022** | Sample Received Date | **30/05/2022** |
| Test Started Date | **30/05/2022** | Test Completion Date | **03/06/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/05/L-0399** | | |

**TEST RESULTS:**

| **DISCIPLINE : Chemical Testing** | | | **NAME OF GROUP: Water** | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 1. | Salinity | By Calculation | ppt | 7.99 |
| **DISCIPLINE: Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
| 2. | Barium as Ba | AAS Method | mg/L | N.D. |
| **Remarks: N.D.** = Not Detectable, | | | | |
| **Opinion & Interpretation (If required): --** | | | | |

UniStar Environment and Research Labs Pvt. Ltd.

********* End of Report *********

**Checked By:**

**Nilesh C. Patel**
(Sr. Chemist)

**Authorized By:**

**Nitin B. Tandel**
(Technical Manager)



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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/05/L-0400** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **04/06/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Bore well Water Sample - 4** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **27/05/2022** | Sample Received Date | **30/05/2022** |
| Test Started Date | **30/05/2022** | Test Completion Date | **03/06/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/05/L-0400** | | |

**TEST RESULTS:**

| **DISCIPLINE : Chemical Testing** | | | **NAME OF GROUP: Water** | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **PHYSIO-CHEMICAL PARAMETERS** | | | | |
| 1. | pH @ 25 ° C | IS 3025(Part 11)1983 | -- | 7.57 |
| 2. | Conductivity | IS 3025(Part 14)1984 | (µS/cm) | 16530 |
| 3. | Total Dissolved Solids | (APHA 23rd Ed.,2017,2540- C) | mg/L | 10990 |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 1. | Chloride as $Cl^-$ | (APHA 23rd Ed.,2017,4500-Cl) | mg/L | 4773.2 |
| 2. | Carbonate as CaCO3 | IS 3025(Part 51)2001 | mg/L | 38.7 |
| 3. | Bicarbonate as CaCO3 | IS 3025(Part 51)2001 | mg/L | 194.8 |
| 4. | Total Alkalinity | [IS 3025(Part 23)1986, Amd.2] | mg/L | 401.1 |
| 5. | Calcium as Ca | (APHA 23rd Ed.,2017,3500 Ca.B) | mg/L | 359.4 |
| 6. | Magnesium as Mg | (APHA 23rd Ed.,2017,, 3500 Mg.B) | mg/L | 172 |
| 7. | Sodium as Na | APHA 23rd Ed.,2017,3500 Na,B | mg/L | 1764 |
| 8. | Potassium as K | APHA 23rd Ed.,2017,3500 K,B | mg/L | 95.6 |
| 9. | Sulphate as SO4-2 | IS 3025(Part 24)1986 | mg/L | 798 |
| 10. | Nitrate as NO3 | (APHA 23rd Ed.,2017,4500 NO3-B) | mg/L | 26.7 |
| 11. | Phosphate as $PO_4$ | (APHA 23rd Ed.,2017,4500-P,D) | mg/L | 2.3 |
| 12. | Fluoride as F | (APHA 23rd Ed.,2017,4500 F,D) | mg/L | 2.4 |
| **DISCIPLINE : Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
| 13 | Mercury as Hg | (APHA 23rd Ed.,2017,3112-B) | mg/L | BDL(MDL:0.001) |
| 14 | Arsenic as As | APHA 23rd Ed.,2017,3114-C | mg/L | BDL(MDL:0.01) |
| 15 | Lead as Pb | (APHA 23rd Ed.,2017,3111-B) | mg/L | BDL(MDL:0.01) |
| 16 | Chromium as Cr | APHA 23rd Ed.,2017,3125 | mg/L | BDL(MDL:0.05) |
| 17 | Cadmium as Cd | IS 3025(Part 41)1992, | mg/L | BDL(MDL:0.003) |
| 18 | Iron (as Fe) | IS 3025(Part 53)2003, | mg/L | BDL(MDL:0.1) |
| 19 | Zinc (as Zn) | IS 3025(Part 49)1994, | mg/L | BDL(MDL:0.05) |
| 20 | Cobalt as Co | APHA 23rdEd.2017-3500-Co | mg/L | BDL(MDL:0.5) |
| 21 | Copper as Cu | IS 3025(Part 42)1992amd.01, | mg/L | BDL(MDL:0.05) |



**Note:** This report is subject to terms and conditions mentioned overleaf.

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CIN:U73100GJ2007PTC051463

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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/05/L-0400** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **04/06/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Bore well Water Sample - 4** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **27/05/2022** | Sample Received Date | **30/05/2022** |
| Test Started Date | **30/05/2022** | Test Completion Date | **03/06/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/05/L-0400** | | |

**TEST RESULTS:**

| **DISCIPLINE: Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 22. | Manganese as Mn | APHA 23rd Ed.,2017,3500 Mn B | mg/L | BDL(MDL:0.1) |
| 23. | Nickel as Ni | IS 3025(Part 54)2003, | mg/L | BDL(MDL:0.02) |
| **Remarks: BDL=** Below Detection Limit, **MDL** = Minimum Detection Limit, | | | | |
| **Opinion & Interpretation (If required): --** | | | | |

UniStar Environment and Research Labs Pvt. Ltd.

********* End of Report *********

**Checked By:**

**Nilesh C. Patel**
(Sr. Chemist)

**Authorized By:**

**Nitin B. Tandel**
(Technical Manager)



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## TEST REPORT

| | | | |
|---|---|---|---|
| ULR No. | -- | Report No. | **URC /22/05/L-0400** |
| Name & Address of Customer | **M/s. Adani Power (Mundra) Ltd.**<br>Village: Tunda &Siracha,<br>Tal. Mundra, Dist.: Kutch. GUJARAT – 370 435. | Date of Report | **04/06/2022** |
| | | Customer's Ref. | -- |
| Sample Details | **Bore well Water Sample - 4** | Location | -- |
| Sample Qty. | **2 Lit** | Appearance | **Colourless** |
| Sampling Date | **27/05/2022** | Sample Received Date | **30/05/2022** |
| Test Started Date | **30/05/2022** | Test Completion Date | **03/06/2022** |
| Sampled By | **UniStar Env. & Research Labs** | Sampling Method | **UREL/CHM/SOP/116** |
| UERL Lab ID. No. | **22/05/L-0400** | | |

**TEST RESULTS:**

| **DISCIPLINE : Chemical Testing** | | | **NAME OF GROUP: Water** | |
|---|---|---|---|---|
| **Sr. No.** | **Parameters** | **Test Method Permissible** | **Unit of Measurement** | **Results** |
| **GENERAL CHEMICAL PARAMETERS** | | | | |
| 1. | Salinity | By Calculation | ppt | 8.08 |
| **DISCIPLINE: Chemical Testing** | | **NAME OF GROUP: Residues and Contaminants in Water** | | |
| 2. | Barium as Ba | AAS Method | mg/L | N.D. |
| **Remarks: N.D.** = Not Detectable, | | | | |
| **Opinion & Interpretation (If required): --** | | | | |

UniStar Environment and Research Labs Pvt. Ltd.

********* End of Report *********

**Checked By:**

**Nilesh C. Patel**
(Sr. Chemist)

**Authorized By:**

**Nitin B. Tandel**
(Technical Manager)



**Note:** This report is subject to terms and conditions mentioned overleaf.

adani
Power

Ref: APL/APMuL/Env.Statement/GPCB/08/2022
Date: 01/08/2022

**To,**

**The Regional Officer,**
**GUJARAT POLLUTION CONTROL BOARD,**
Kandala Port Trust Office,
Sector 8, Ghandhidham,
KUTCH, GUJARAT 370201

**Sub: SUBMISSION OF ENVIRONMENT STATEMENT FOR YEAR OF 2021-22**

Ref: CTO/CCA- **AWH 102106** on dated 17/07/2019 GPCB ID - **29389**

Dear Sir,

With reference to above subject, kindly find enclosed herewith Environment Statement FORM-V for the financial year 2021-22 duly filed as per format of Environment Statement prescribed by the Board.

Kindly acknowledge the same.

Thanking you,
Yours faithfully,
for **Adani Power (Mundra) Limited**

(R N Shukla)
**Head-Environment**

Encl: As Above

CC: **The Member Secretary,**
GPCB, Paryavaran Bhavan,
Sector- 10 A, Gandhinagar, Gujarat

01/08/22
Gujarat Pollution Control Board
Head Office
Sector No.-10-A,
Gandhinagar-382010

Adani Power (Mundra) Ltd
Adani Corporate House
Shantigram, S G Highway
Ahmedabad 382 421
Gujarat, India
CIN: U40300GJ2015PLC082295

Tel +91 79 2555 4444
Fax +91 79 2555 7177
info@adani.com
www.adanipower.com

Registered Office: Adani House, Nr Mithakhali Six Roads, Navrangpura, Ahmedabad 380 009, Gujarat, India

# ENVIRONMENTAL STATEMENT

## FOR THE FINANCIAL YEAR

## 2021 - 2022

Adani Power (Mundra) Limited

Vill: Tunda & Siracha

Mundra, Kutch Gujarat

# ENVIRONMENTAL STATEMENT

## FORM-V

**(See Rule 14)**

From:

**Adani Power (Mundra) Ltd.**
Plot No. Tunda [180/P], Siracha,
Village: Tunda, Tal: Mundra,
Dist: Kutch
Gujarat – 370435

To,
**Gujarat Pollution Control Board,**
**Paryavaran Bhavan,**
**Sector 10 A,**
**Gandhinagar 382010**

**Environmental Statement** for the Financial Year ending the 31st March 2022

## PART- A

| | |
|---|---|
| (i) Name and address of the occupier of the industry operation | : Shri. Pramod Kumar Saxena,<br>**Adani Power (Mundra) Ltd.**<br>Tunda [180/P], Siracha.<br>Village: Tunda Tal: Mundra<br>Dist. Kutch Gujarat: 370435 |
| (ii) Industry Category Primary (STC Code)<br>Secondary – (SIC Code) | : AADCA2957LST001 |
| (iii) Production Capacity (Power) | : Phase I: 2 x 330MW<br>Phase II: 2 x 330M +2x660MW<br>Phase III: 3 x 660 MW |
| (iv) Year of Establishment | : Phase I – U#1 - Aug'09, U#2-Mar'10<br>: Phase II –U#3 -Aug'10, U#4-Dec'10<br>-U#5 - Dec'10, U#6-Feb'12<br>: Phase III –U#7 – Nov'11,<br>-U#8–Mar'12, U#9-Mar'12 |
| (v) Date of the last Environmental Statement submitted | : **09/07/2021** |

## PART – B

## WATER AND RAW MATERIAL CONSUMPTION

### a. Water Consumption for the period (April'21 – March'22)

Process* : 455 KL/Day

Cooling & Boiler Feed : 260374 KL/day

Domestic** : 4304 KL/day

- * Sea water drawl for RO water production
- **Domestic water quantity includes Potable water and service water

| Name of Product | Process Water Consumption per Unit of Product Output | |
|---|---|---|
| | During the previous year (2020 - 2021) | During the current year (2021 - 2022) |
| Power Generation | 0.0144 Lit/Unit | 0.0139 Lit/Unit |

### b. Raw Material Consumption

| Name of Product | Name of Raw Materials | Unit | Consumption of Raw Material Per Unit of Power | |
|---|---|---|---|---|
| | | | During the previous Financial Year (2020-2021) | During the current Financial year (2021-2022) |
| POWER | Fuel Oil | KL | 0.088 KL/mus | 0.063 KL/mus |
| | Coal | MT | 543.93 MT/mus | 550.32 MT/mus |

*mus: million units

**PART – C**

**POLLUTION DISCHARGED TO ENVIRONMENT / UNIT OF OUTPUT**

a. **Water:**

| | |
|---|---|
| Outfall water Quantity | : 204438 KL/day |
| Avg. Domestic effluent quantity | : 306 KL/ Day |

**Note:**

1. Average temperature of seawater intake and outlet water is enclosed as **Annexure –I.**
2. Effluent treated water is reused for water sprinkling to Coal stack yard and Road.
3. The Cooling tower (CT) blowdown and desalination reject water is utilized for FGD scrubber system to control the sulfur emission and FGD effluent is passes through aeration basin for final discharge. Treated water discharges to sea as per the norms and as per suggested by NIO recommendation.
4. Third party Environment monitoring reports is enclosed as **Annexure - III.**
5. Treated sewage water (STP) is being utilized in plantation & Green Belt development.

b. **Air:**

| Sr. No. | Stack Attached to | Pollutant | Quantity of Pollutants Discharge in Mass/day (Kg/Day) | Concentration of Pollution Discharged in Mass/Volume ($mg/Nm^3$) | Variance (exceeding allowed Quantity) |
|---|---|---|---|---|---|
| 1 | Boiler unit I | PM | 1013.0 | 32.0 | No deviation |
| 2 | Boiler unit II | PM | 937.4 | 29.7 | No deviation |
| 3 | Boiler unit III | PM | 1219.4 | 35.9 | No deviation |
| 4 | Boiler unit IV | PM | 1157.5 | 34.0 | No deviation |
| 5 | Boiler unit V | PM | 2191.6 | 35.0 | No deviation |
| 6 | Boiler unit VI | PM | 2255.6 | 36.7 | No deviation |
| 7 | Boiler unit VII | PM | 2199.3 | 34.2 | No deviation |
| | | $SO_2$ | 11067.1 | 172.1 | No deviation |
| 8 | Boiler unit VIII | PM | 2196.1 | 34.3 | No deviation |
| | | $SO_2$ | 10654.2 | 166.5 | No deviation |
| 9 | Boiler unit IX | PM | 2118.6 | 32.9 | No deviation |
| | | $SO_2$ | 10740.0 | 166.9 | No deviation |

All Stack Emission data are average of monthly monitoring reports.

## PART - D

As specified under Hazardous Waste (Management & Handling & Transboundary movement rules) Amendment Rules 2008

| Sr. No. | Hazardous Wastes | Total Quantity (KL) | |
|---|---|---|---|
| | | During the previous financial year (2020-2021) | During the current financial year (2021- 2022) |
| 1. | Used Oil | 34.41 | 14.48 |
| 2. | Spent Resins | 0.850 | 0.0 |
| 3. | Discarded Container | 19.169 | 13.03 |
| 4. | Insulation Waste (Glass Wool) | 2.120 | 0.0 |
| 5. | Oily Cotton Waste | 1.750 | 3.07 |

## PART – E

**Solid Wastes**

| Details | Ash Generation (in MT) | |
|---|---|---|
| | (2020- 2021) | (2021- 2022) |
| From Process | **679228** | **344815** |
| From Pollution Control facilities | NIL | NIL |

## PART-F

**Please specify the characterization (in terms of composition and quantum) of hazardous as well as solid wastes and indicate disposal practice adopted for both the categories of wastes.**

**Non-Hazardous Solid Waste**

Solid Waste generation : Ash (**Fly ash & Wet ash**)

**Ash Utilization in 2021-22** : **103. 41 %**

Hazardous waste disposal details is enclosed **as Annexure – II.**

Ash utilization data is enclosed as **Annexure –III.**

## PART – G

**Impact of the Pollution abatement measures taken on conservation of natural resources and the cost of production**

The unit has installed highly efficient super critical boilers in Unit 5, 6, 7, 8 and 9. The environmental advantages of super critical boiler are as below:

Reduction in coal consumption
Reduction in Green house gases
Reduction of water requirements
Overall reduction in Auxiliary Power Consumption
Reduction in requirement of Ash Emergency land & Consumptive water

The APL has commissioned the first supercritical 660 MW unit in India. APL, Mundra is also the world's first supercritical technology based thermal power project to have received 'Clean Development Mechanism (CDM) Project' certification from United Nations Framework Convention on Climate Change (UNFCCC).

## PART – H

**Additional measures / Investment proposal for environmental protection including abatement of pollution, prevention of pollution**

1. Greenbelt of about 139.46 developed and further development in progress...

| Area (ha) | No. of Trees & Palm Planted | No. of Shrubs Planted |
|---|---|---|
| 141.67 | 326979 | 1403954 |

2. Online ambient air quality monitoring stations has been installed at three different directions & closed to the plant boundary.

3. Seawater based FGDs has been installed at Unit 7, 8 & 9 for $SO_2$ reduction in Stack Emissions. The Cooling tower (CT) blow down and Desalination plant Reject will be utilized for FGD scrubber system and FGD effluent will be disposed off to the sea through aeration chamber.

4. Online Effluent Quality Monitoring System has installed at final outfall channel.

5. Emergency ash pond provided for disposal of unutilized ash.

6. We have adopted Ammonia Flue Gas Conditioning System in Unit 1 & 7 for bringing down the SPM level from the flue gas is through ESP. It is based on effective dispersion & diffusion of ammonia gas in the flue gas.

7. Regular water sprinkling is being done to control the fugitive dust in CHP area and all other areas. In addition, mechanical sweeping machine have been deployed for cleaning the road.
8. Wind breaking wall provided coal yard area for reducing fugitive emission & coal loss.

9. Single Use Plastic Free Project for "Certification for Single Use Plastic Free Company" is being implemented at APMuL, Mundra site in line with compliance of Plastic Waste Management Rule 2011. Various exercised being carried out for compliance of single use plastic ban initiatives at site and based on that inspection checklists are filled and submitted to CII, New Delhi for final assessment and certification process.

**PART – I**

**Any other particulars for improving the quality of the environment**

1. We have Implemented **ISO-14001:2015** Environment Management System (EMS) for Mundra TPP of Adani Power Limited. The department wise core team has been established to maintain the compliance of the standard. All Head of the Departments are responsible for ensuring the compliance of the standard.
2. NABL - Desktop Surveillance Audit for continuation of NABL Accreditation status of Environmental laboratory as per ISO/IEC 17025:2017 is successfully carried out by Quality Council of India. Extension in validity of Accreditation letter received on 11.05.2021 having validity period upto:28.05.2022. (Certificate No. TC-5215).
3. APL, Mundra also participated in GRI-G4 Sustainability reporting initiative for sustainable development and published reports from FY2014-15 to FY 20-21 which are available on the website and FY 21-22 under progress.
4. GPCB appointed Schedule#1 Environmental Auditors (M/s VVP Engineering college, Rajkot) successfully conducted environmental audit of APMuL, Mundra. Audit report received on 05.06.2021 is submitted in the office of GPCB Gandhidham on 15.06.2021
5. Membership with GPCB authorized TSDF agency is renewed with 5 Years validity up to 14.12.2024 for disposal of identified hazardous Waste material generated from our plant operation. Certificates received.
6. Organic waste converter installed for converting the canteen waste into organic manure. The organic manure is used for gardening.
7. Fly ash utilized to produce vermicomposting
8. The Rooftop Rainwater collection & groundwater recharging Scheme has been adopted & installed at three locations within plant premises
9. Green belt development/plantation work is swing and our efforts are being made to develop more greenery in and around the plant.
10. Digital LED Display board is installed at main gate of plant for display the environmental parameters.
11. Integrated Ash silo system has been commissioned & make operational to handle ash at single location to minimize fugitive emission & minimize vehicle movement.

12. Ash bagging plant has been commissioned & make operational for fine ash bagging for export to increase ash utilization.
13. Boiler & turbine high-energy drain passing survey has been done for reducing heat losses
14. Condenser cleaning for vacuum improvement, which increase plant efficiency & improve heat rate
15. Best start-up practices adopted for reducing start-up oil consumption
16. Replacement of cooling tower fans existing blades with energy efficient blades for aux. power saving
17. CW pump & CT fans operation optimization for auxiliary power saving
18. Compressor operation optimization for auxiliary power saving.
19. Periodic energy audit and implementation
20. Elimination of chlorine tonner by replacing sea water based Electro chlorination plant. This eliminates the chlorine gas hazards from the environment.

**21. Bio Diversity:**

- APL is also committed towards biodiversity conservation by adhering to the Biodiversity Policy and APL is an active signatory member of India Business Biodiversity Initiative (IBBI).
- APL is continuously monitoring by adopting various scientific techniques for monitoring Biodiversity (terrestrial & Marine) of in and around 10 km radius distance of each operational locations.
- An Eco-Park is developed, which is being prepared with waste and reusable material. The main concept for this park is to promote waste recovery, recycling, reuse and environmental engineering among the employees and visitors. It also gives a platform for experimental garden for plantation activities.
- The Eco-Park has been developed to provide shelter and breeding ground to the local and resident birds with an area of approximately 2 ha inside the plant premises. The area is covered with live fencing of Casuarina sp. and Prosopis *juliflora* plant species. To attract birds, *fruitivorus* plants like Sapota (Manilkara zapota), Pomegranates (Punica granatum), Neem tree (*Azadirachta* indica), Banyan Tree (Ficus *benghalensis*), and *Pilu* (Salvadora persica) are planted.
- The Eco- Park serves as a habitat for the reptiles like frog, lizard, and snake whereas mammals like *Mangoose* are also occasionally sighted. 28 resident bird species have been identified during the monitoring.

- The company has an ambitious target to create a net positive biodiversity impact at all out operations and projects. At the time of proposing new projects, wildlife and biodiversity studies are carried out.
- Moreover, raising awareness among employees on biodiversity is one of the major efforts towards conservation initiatives.

Sign:

Name: R N Shukla
Designation: Head – Environment & Forest
Address: Adani Power (Mundra) Ltd, Mundra

Annexure-1

## Monthly Temperature average differential records during

## April-2021 to March-2022

| Months | Intake Reservoir °C | Outfall channel °C | Temp. Difference °C |
|---|---|---|---|
| April, 2021 | 27.7 | 31.5 | 3.8 |
| May, 2021 | 29.7 | 33.5 | 3.8 |
| June, 2021 | 29.7 | 33.8 | 4.1 |
| July, 2021 | 29.9 | 33.1 | 3.2 |
| August, 2021 | 30.1 | 32.9 | 2.9 |
| September, 2021 | 30.2 | 31.8 | 2.2 |
| October, 2021 | 31.0 | OUM | OUM |
| November, 2021 | 29.7 | OUM | OUM |
| December, 2021 | 27.5 | OUM | OUM |
| January, 2022 | 26.5 | OUM | OUM |
| February, 2022 | 24.5 | OUM | OUM |
| March, 2022 | 27.1 | 29.5 | 2.1 |

Note: * Outfall channel under shutdown

**Annexure-2**

**Hazardous Waste Disposal data for FY 2021-22**

| Sr. No. | Waste | Waste Category | Waste disposal Limit ( MT) | Waste disposal Qty. | Disposal Method | Remarks |
|---|---|---|---|---|---|---|
| 1 | Used Oil | 5.1 | 62.7 | 14.48 | Send to Authorized Registered Recycler. | M/s Jawrawala Petroleum, Narol, Ahmedabad |
| 2 | Discarded Containers/ Barrels | 33.11 | 160 | 13.03 | Send to Authorized Registered Recycler. | M/s Jawrawala Petroleum, Narol, Ahmedabad |
| 3 | Spent Ion-exchange Resin | 35.2 | 2035 | 0.0 | Send to TSDF Site for Incineration by common incinerator | Membership with M/s Saurashtra Enviro Projects Pvt Ltd, Surat |
| 4 | Oily Cotton Waste & Oil Filters | 33.2 | 15 | 3.08 | Send to TSDF Site for Incineration by common incinerator | Membership with M/s Saurashtra Enviro Projects Pvt Ltd, Surat |
| 5 | Chemical Sludge | 35.3 | 200 | 0.0 | Send to TSDF Site for Secure Landfill | M/s DETOX INDIA PVT LTD, Surat |
| 6 | Used Lead Acid Batteries | -- | -- | 21.32 | Send to Authorized Registered Recycler. | M/s Shri Nagendra Metals Pvt. Ltd, Anjar |
| 7 | E - Waste | -- | --- | 9.06 | Send to Authorized Registered Recycler. | M/s Galaxy Recycling, Gondal |

Annexure-3

# Ash Utilization Report

## April-2021 to March-2022

| Month | Total Ash Production (MT/Month) | For Cement Manufacturing (Fly Ash + Bottom Ash + Pond Ash) (MT/Month) | For Brick / Construction / Export / Domestic Treaders (MT/Month) | Filling of low lying area (MT/Month) | Ash Dyke (MT/Month) | Dyke Ash lifted for reutilization Embankment / Back Filling (MT/Month) | Bottom Ash lifted for Embankment / Back Filling (MT/Month) | Total Ash Utilization (MT/Month) | % Utilization |
|---|---|---|---|---|---|---|---|---|---|
| Apr-21 | 80788 | 70396 | 4495 | 5337 | 0 | 0 | 0 | 80228 | 99.31 |
| May-21 | 51622 | 35406 | 11142 | 5568 | 0 | 0 | 0 | 52116 | 100.96 |
| Jun-21 | 40947 | 28480 | 13275 | 0 | 0 | 0 | 0 | 41756 | 101.98 |
| Jul-21 | 29033 | 16793 | 13034 | 0 | 0 | 0 | 0 | 29826 | 102.73 |
| Aug-21 | 34997 | 12261 | 17327 | 6103 | 0 | 0 | 0 | 35691 | 101.98 |
| Sep-21 | 12674 | 4519 | 7167 | 2300 | 0 | 0 | 0 | 13986 | 110.35 |
| Oct-21 | 14399 | 9804 | 4616 | 0 | 0 | 0 | 0 | 14420 | 100.15 |
| Nov-21 | 7195 | 5531 | 3752 | 0 | 0 | 0 | 0 | 9283 | 129.03 |
| Dec-21 | 17289 | 11376 | 3336 | 0 | 0 | 0 | 2446 | 17158 | 99.25 |
| Jan-22 | 17243 | 9487 | 4784 | 0 | 0 | 0 | 2852 | 17122 | 99.30 |
| Feb-22 | 9205 | 4514 | 4563 | 0 | 0 | 0 | 275 | 9351 | 101.59 |
| Mar-22 | 29423 | 19327 | 5988 | 0 | 0 | 7000 | 3328 | 35643 | 121.14 |
| **TOTAL** | **344815** | **227894** | **93479** | **19308** | **0** | **7000** | **8901** | **356583** | **103.41** |
| **Note:-** Total 1497 MT Ash stocked (177 MT Ash in ash silo and 1320 MT Ash filled in bags) and will be utilized in upcoming month | | | | | | | | | |

## Expenditure for Environmental Protection & CER

(Fig. in Rs. Lacs)

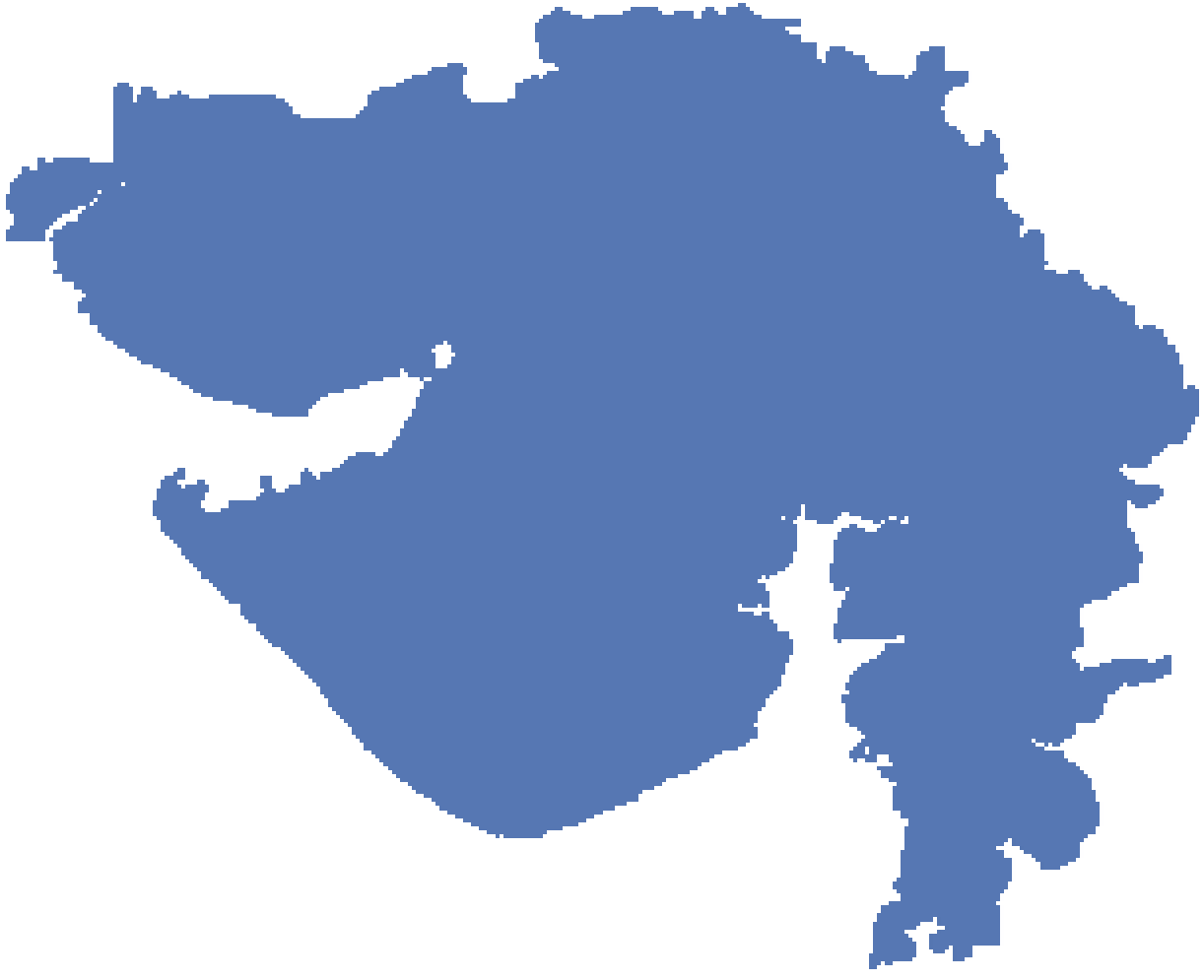
| Sr. No. | Particular | Expenditure from Aprl'22 to Sept'22 |
|---|---|---|
| 1. | Green belt development | 60.36 |
| 2. | Legal, Consent Fee, GPCB lab bills, NABL fee | 0.44 |
| 3. | Hazardous waste disposal/Bio Medical disposal cost | 0.67 |
| 4. | Treatment and Disposal cost (Wastewater & Sewage Treatment) | 42.80 |
| 5. | Maintenance cost of ESP & FGD (Material Cost) | 101.6 |
| 6. | Online Environment Monitoring cost<br>a. CEMS and EQMS data transferring to GPCB and CPCB. | 2.66 |
| | b. Annual Maintaining cost for CAAQMS (03 Nos.) & EQMS system | 11.02 |
| 7. | Third party Environment Monitoring & Inhouse monitoring including laboratory consumable items, chemical and spares of monitoring equipment. | 8.31 |
| | Calibration and maintenance of Environment monitoring equipment | 1.37 |
| 8. | Insurance, training, and external environmental management | 1.38 |
| **Total** | | **230.61** |

adani
Foundation

# CSR GUJRAT

## Six Monthly Report 2022-23

*Adani Foundation*
*Adani House, Port Road, Mundra – Kutch 370 421*
*[info@adanifoundation.com] [www.adanifoundation.com]*



With an aim to contribute to the holistic development of communities, the Adani Foundation is contributing to the global agenda of meeting Sustainable Development Goals (SDGs).

Adani Foundation Gujrat sites are catalyst for rural communities residing in villages of Kutch,, Surat and Bharuch District. AF has transformed thousands of lives by serving community to uplift their standard of living by performing CSR activities in various in terms of Infrastructure, Social development, Education, Agriculture, Women empowerment, Water conservation and management and empowering fishermen and Tribal community.

Upcoming six months will be full of challenge and new journey as new strategic mission will be initiated for Primitive Tribal Community at Netrang and Umarpada. Natural Farming district level competition and new speddy era for women empowerment.

Indeed the great motivation by Respected Chairperson mam, Respected Gadhvi sir, Respected Rakshit sir and the head office team is equal partners in this journey of empowerment.

# Inside

# CSR DAHEJ

# EDUCATION

- **Project Utthan:** Utthan introduced summer activities session-2 from 4-June-22 to 11-June-22,. Session is focused on scholastic (curricular) and co-scholastic (co-curricular) areas. **760 students participated in summer activities.**
- Supper Mom activity held in Utthan Project Schools ( Lakhigam, Luvara, Jageshwar, Ambetha, Dahej Kanyashala, Jolva, Suva, Koliyad, Vegani and Kaladara Schools). The children's express feelings for mothers on pieace of papers by drawing, slogans, paintings and poems. Total 659 students have participated from class 4 to 8th std. and total 96 mother have also participated in the school.
- Guru Purnima Day celebrated in all Utthan Schools, and 110 students' class 3 to 8 participated in the activity
- 165 nos. of Home visits made by the Utthan Sahayaks during the Summer activity session and 498 no of home visits made during School time.
- 63 nos. of Mothers meeting held in Utthan Schools ( Lakhigam, Jageshwar, Ambetha, Dahej Kanyashala, Jolva, Suva, Rahiyad Koliyad, Vegni and Kaladara School). Total 407 mothers had actively participated.
- 222 students actively participated in Balmela activity in all Utthan Schools in July 2022.
- Minimum Level Test progressive learners-based on reading, writing and numeracy. **Class 3 to 6 Assessment is done by Utthan Sahayaks. Out of 725 students 55 students achieved level 4 in Reading, Writing and Numeracy.**

# EDUCATION

- 75 Independence day celebration: Total 1050 students participated in Independence day celebration. Various programs organized to encourage students' participation. Class 6 to 8 students sang patriotic songs with dance, students' speeches on great freedom fighters.
- Rakshabhandahan Festival celebrated by Utthan Sahayaks in 12 Project Schools ( Lakhigam, Luvara, Jageshwar, Ambetha, Dahej Kanyashala, Jolva, Suva, Koliyad, Vengani, Kaladara and Atali Asharamshala). Total 433 students participated in making Rakhi and tie with trees.
- National Sports Day celebrated in 14 Govt. Schools to honor the birth anniversary of hockey hero Late Shri. Major Dhyan Chand. Utthan Sahayaks read out about Shri Major Dhyan Chand in morning assembly, Mini sports tournament for mothers and students and sports quiz competition organized for class 5 to 8.
- **"World Yoga Day"** is celebrated in all 14 schools of Vagra taluka by various activities and celebrations were held from 14th June to 22nd June 2022 at different places in which a total of 1350 children participated enthusiastically.
- Grand Parents' Day Celebrated in Utthan Project Schools to honor grand parents for their support and creating awareness among the children of the moral support. Total 233 Grand Parents participated.
- **Tribal Development Initiative :** To find out the scope of intervention under AF's thematic area - Education. Under Tribal Development Initiative visited tribal villages. ( Hathakundi and Mauza Schools, KVK, Chasvad and Thava High School)
- Sh. Gautambhai Adani Sir's 60th Birthday celebrated in 32 schools of Vagra and Netrang blocks. 6000 sweet packets distributed among the children.

# SUSTAINABLE LIVELIHOOD DEVELOPMENT

**Project Pashudhan (AH) with objective to** Improve the breed and productivity of the local milch cattle and Improve the nutritional and financial security of families engaged in animal husbandry Operational in 17 villages: 7 core villages and 10 peripheral villages. Total Beneficiaries of Pashudhan Program – 250+ beneficiaries

**Achievements in 6 months**

| Cattle Breeding Center Village Wise Details April to September- 2022 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AI | | | Pregnancy Diagnosis | | | Conform Pregnancy | | | Cow Calving | | Buff Calving | | Total |
| Village | Cow | Buff | Total | Cow | Buff | Total | Cow | Buff | Total | Male | Female | Male | Female | |
| Lakhigam | 15 | 18 | **33** | 20 | 30 | **50** | 16 | 16 | **32** | 8 | 5 | 3 | 4 | **20** |
| Luvara | 14 | 9 | **23** | 10 | 7 | **17** | 3 | 8 | **11** | 1 | 1 | 1 | 0 | **3** |
| Jageshwar | 3 | 11 | **14** | 9 | 21 | **30** | 6 | 9 | **15** | 2 | 2 | 1 | 1 | **6** |
| Ambheta | 0 | 10 | **10** | 2 | 11 | **13** | 1 | 7 | **8** | 0 | 0 | 0 | 1 | **1** |
| Dahej | 0 | 0 | **0** | 0 | 0 | **0** | 0 | 0 | **0** | 0 | 0 | 0 | 0 | **0** |
| Jolva | 0 | 4 | **4** | 0 | 4 | **4** | 0 | 1 | **1** | 0 | 0 | 0 | 1 | **1** |
| Suva | 1 | 18 | **19** | 2 | 13 | **15** | 2 | 4 | **6** | 0 | 0 | 0 | 2 | **2** |
| Rahiyad | 0 | 0 | **0** | 0 | 0 | **0** | 0 | 0 | **0** | 0 | 0 | 0 | 0 | **0** |
| Koliyad | 1 | 7 | **8** | 0 | 12 | **12** | 0 | 6 | **6** | 0 | 2 | 3 | 3 | **8** |
| Atali | 68 | 15 | **83** | 92 | 22 | **114** | 35 | 10 | **45** | 7 | 8 | 0 | 2 | **17** |
| Vegni | 9 | 10 | **19** | 8 | 14 | **22** | 5 | 6 | **11** | 7 | 7 | 8 | 10 | **32** |
| Kaladra | 4 | 4 | **8** | 4 | 4 | **8** | 2 | 2 | **4** | 0 | 2 | 0 | 0 | **2** |
| **Total** | **115** | **106** | **221** | **147** | **138** | **285** | **70** | **69** | **139** | **25** | **27** | **16** | **24** | **92** |

# SUSTAINABLE LIVELIHOOD DEVELOPMENT

**Green Fodder Cultivation** 21 beneficiaries sowed green fodder stumps in January 2021. These 21 beneficiaries are continuously getting savings from green fodder and in August 2021 BHN 10 stumps distributed to another 15 new beneficiaries.

15 beneficiaries sowed green fodder stumps in 2.95 acres land. They have been receiving production continuously. Up to September 2022, the total production 134.10 ton and savings of 15 beneficiaries is **Rs. 3,74,580/-**.

**Silage demonstration activity:**

Fodder silage introduced among 25 beneficiaries of 7 villages. Each beneficiary got 500kg. In small meetings dairy farmers were educated about dose of feeding - @7kg per day for 3 months

AF's contribution: Rs.96000/-

Beneficiary's contribution. Rs. 4800/-

**Impact :**

Within 15 days of distribution found an increase in overall milk production by 2.23%

**Future course of action:** Dairy farmers would be educated on silage making.

**livestock trainings** organized in Lakhigam and Vengani villages. 77 beneficiaries (60 females & 17 males) participated in these trainings.

**Impact Assessment survey** of PASHUDHAN PROGRAM conducted by Goodera Consultancy from 11th to 14th May 2022. They met 221 beneficiaries of 12 villages.

# SUSTAINABLE LIVELIHOOD DEVELOPMENT

**Project Annapurna** with objective to improve agriculture crop pattern,

**Training on soil sample collection**
AF team conducted theory and practical sessions on soil sample collection for soil test with 35 farmers of farmers of Koliyad and kaladara villages.
Points covered:

- Objective of the activity
- Suitable time for soil sample collection
- Farm preparation before soil sample collection
- Required tools
- What details should farmers mention with tag( Farmer name, land details, 2 contact number, Address, details of collect sample for how many land, last sowing crop)
- Selection of areas of the farm for sample collection

**Soil Test**
On 10th June 2022, 26 farmers had given soil samples in three villages - Koliyad, Vengni, Kaladara. Samples sent to Krishi Vigyan Kendra, Chasvad for testing.

**Smart Agriculture Activity**
On 08 August'22 AF organized farmers' training on soil test report of farmers in Koliyad village. This training was conducted by Shri Lalit Patil- Agricultural Scientist Krishi Vigyan Kendra, Bharuch. 22 farmers participated in this training.
Points of discussion:

- Elements of soil analysis
- Recommendation of biological and chemical fertilizers as per crop report

Micronutrients' importance in soil

- Discussion on green manure (green padwas)

# SUSTAINABLE LIVELIHOOD DEVELOPMENT

| S.N | Group | Members | Type of Business | Monthly Saving (In Rs.) | Total Savings (In Rs.) | Six Month income (In Rs.) |
|---|---|---|---|---|---|---|
| 1 | Shiv Shakti Sakhi Mandal, Jageshwar village | 10 | Bag making & face masks | 1000/- | 77566/- | 1,36,750/- |
| 2 | Mahadev Mahila Sakhi Mandal, Luvara | 11 | Vermi compost | 1100/- | 57270/- | 29,840/- |
| 3 | Sadhdada Mahila Sakhi Mandal, Lakhigam village | 11 | Amul Parlour & Snacks | 5500/- | 99,659/- | 1,19,176/- |
| 4 | Ekta Mahila Sakhi Mandal, Jolva village | 10 | | 1000/- | 13237/- | |
| 5 | Guashala Mahila Sakhi Mandal, Suva | 10 | | 1000/- | 4000/- | |
| | **Total** | **52** | | | | **2.85,766/-** |

SHG Mahadev Mahila Sakhi Mandal, Luvara got an opportunity to participate in "Sakhi Melo and Vande Gujarat" exhibition organized by District Livelihood Mission. In one week long 28th June to 4th July 2022 50 SHGs are participating.

# SUSTAINABLE LIVELIHOOD DEVELOPMENT

**Linked with Govt. Schemes**

objective : Cattle dwellers, farmers & SHGs avail the benefits of Govt. schemes and get inclination towards natural farming

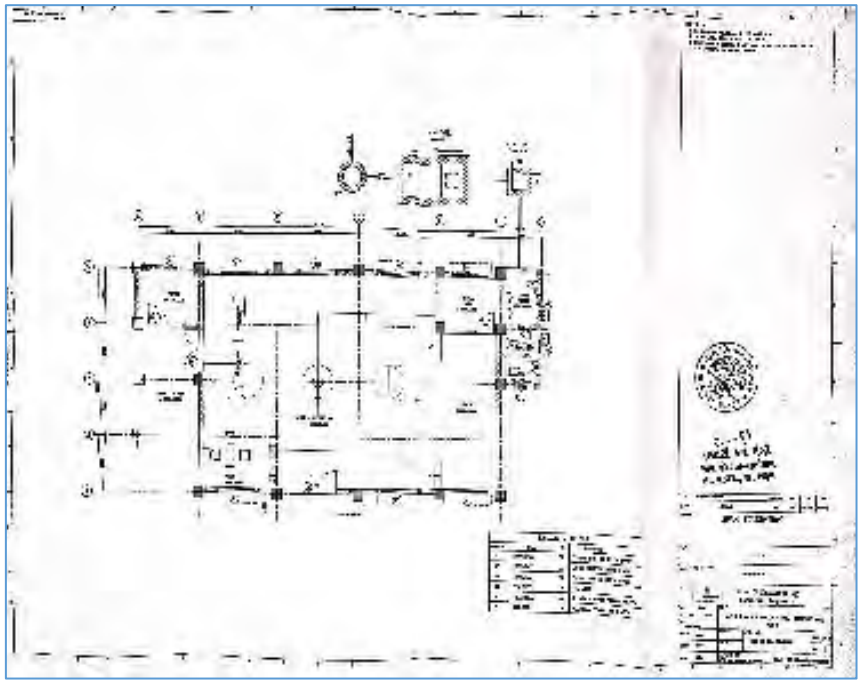
Adani Foundation, Dahej facilitated **23 dairy farmers** of 5 villages – Lakhigam, Luvara, Atali, Vengani & Kaladara to get register under Govt.'s Animal Husbandry scheme - **Mining assistance to pregnant cattle (cows / buffalos) of common breed breeders.** They will get benefit 100% written assistance for a total of 250 kg mining per beneficiary.

**4 dairy farmers** registered under scheme of Assistance to general caste cattle herders on purchase of power-driven **chaff cutter**. He will get benefit whichever is **75% subsidy** of the purchase price or Rs.18,000/- whichever is less. 2 beneficiaries have got the benefits.

**2 dairy farmers** registered under scheme of Plan for organizing the **best Animal Husbandry Award** Ceremony in the state. He will get benefit (1). Taluka Level Award - First Prize - Rs. 10000, Second Prize - Rs. 2000 (2). District Level - First Prize - Rs. 15000, Second Prize - Rs. 10000 (3). State Level Award - First Prize - Rs. 30,000, Second Prize - Rs. 30,000, third prize - Rs. 30,000 Total Prizes = 2

**2 animal holders** registered under scheme of Assistance on purchase of fodder after sterilization of cattle (cows / buffaloes) of common breeders. He will get benefit 100% per beneficiary for a total of 150 kg mining.

# NEED BASED **COMMUNITY INFRASTRUCTURE DEVELOPMENT**



**Social Process for MPH**

Social Process for construction of Multipurpose Hall in Lakhigam village is completed. Gram Panchayat has provided request letter, NOC and approval of building design.

**Library in Tribal area Netrang**

Inauguration of a Library at Eklavya Vidyalaya, Thava, Ta. Netrang by Shri Capt. A.K. Singh sir, CEO Adani Port Hazira and Dahej on 09/07/2022. Tribal area students of nearby 15 villages of Netrang and Dediyapada will get benefitted.

At present seating capacity of library is 36 students

# CSR HAZIRA

# EDUCATION

## Navchetan Vidyalaya

NVPW has arranged a PRAVESHOTSAV program to welcome the students of Class-I. Educational kits with a flower plant provided to the students of Class-I.

Rapport building activities for KG students and revision work with activity-based education. 5-S is a system for organizing spaces so work can be performed efficiently, effectively, and safely. 381 students and Teacher's remain present in the session. Disaster management program was arranged for the students 347 Students from Class- V to XII attended the same.

Baseline assessment of under NIPUN BHARAT project of NEP is executed. Baseline assessment of students of Class- I to IV for Foundational Literacy and Numeracy (FLN) was carried out. 2nd dose of vaccination against COVID, for the age group of 12 to 15 years students were completed on 28/07/2022

On 05/08/2022, a session on "Indian Armed Forces, Introduction, Roles and Responsibilities" was organized. The keynote speaker was Captain Prasan Tokas (Ex. Army and AGM, Security, AHPL, Hazira). A total of 312 students of Class VIII to XII and 12 teachers remain present

76th Independence Day was celebrated with great enthusiasm and patriotic fervor. On this special occasion, the program started with flag hoisting.

# EDUCATION

AF, Hazira has been successfully running project Utthan in 10 schools of 08 villages of Hazira coastal area. AF, Hazira has signed an MoU with DPEO, Surat for additional 15 schools of Olpad block

Celebrated World Environment Day (5th June) to raise awareness to protect nature and the planet earth. 43 students have planted trees near their house and took pledge to nurture them
2400+ Students of 25 Utthan schools of AF-Hazira celebrated International Yoga Day with great enthusiasm

5 days capacity building program was organized for Utthan Sahayaks.

National Means Cum-Merit Scholarship (NMMS) is centrally sponsored scheme. Objective is, to award scholarships to meritorious students of economically weaker sections to reduce their drop out from class VIII
AF, Hazira has supported 300 students for NMMS examination of Choryasi and Olpad blocks.
200+ have got minimum qualifying marks. 17 students are selected as per higher merits, each student will get scholarship of 12,000 Rs. Per year, for 04 Years.

# EDUCATION

The strength of 25 Utthan Schools of Hazira site is 2926 of class- I to VIII, among them 1308 students are of Class-III to VII. 1764 students were assessed.

- Training and capacity building of Utthan Sahayaks make important contribution to raise a school to the apex of excellence. It increases the productivity and internal efficiency of teachers.
- Utthan Sahayaks have received 22 certificates, Which includes Course offered by DiKSHA of GoG, Webinar/Seminar arranged by Universities or International Educational institutes.
- In last six months with support of 16 Utthan Sahayak 86 progressive students are main streamed, and they have achieved 295 competencies
- Independence Day was celebrated with great enthusiasm and patriotic fervor in 25 Utthan Schools Students, Teachers' and Utthan Sahayaks took out a rally to create awareness of the "Har Ghar Tiranga" initiative on 14th & 15th August 2022. Students have prepared drawings and various best out of waste of tricolor.
- Every month Mother's meet is conducted in which 575+ mothers remain present.


| Block | Identified Progressive Students | No. of Competencies to be achieved | Progressive students main streamed in Aug. & Sep. 2022 | Competencies achieved in Aug. & Sep. 2022 | No. of Progressive students Yet to be main streamed | No. of Competencies Yet to be achieved |
|---|---|---|---|---|---|---|
| Choryasi | 812 | 2199 | 98 | 376 | 714 | 1823 |
| Olpad | 496 | 1236 | 89 | 243 | 407 | 993 |
| Total | 1308 | 3435 | 187 | 619 | 1121 | 2816 |

# HEALTH

- Spectacles distribution program organized at Govt. primary school, Mora with support from Rotary club, Surat & Prizma eye care, Surat.18 students got spectacles during program, those who diagnosed earlier during eye checkup camp in school. Earlier 281 students benefitted from eye checkup camp in school out of which 18 students required spectacles. Regular Checkup camps supports in early detection of any kind of eye related issues and treatment and helps in spreading awareness regarding eye care.

- 21 days residential De-addiction program conducted with support from Parivartan trust, Surat. Various engagement activity conducted during residential program like personal counselling, Group discussion, Yoga & Meditation etc. for continuous engagement of patients and distract them from addiction. Total 16 patients got treatment at de-addiction center till September 2022. We have also conducted awareness program, Street plays in villages.

- AF has supported Jagruti Sakhi Mandal (SHG), Songadh, Tapi to start production of 2.5 lakh sanitary pads which will further distributed among Adolescent Girls of Anganwadi Centers across Tapi District

- Multi–specialty general health check up camp organized at Barbodhan village in Olpad block of Surat district. Total 170+ patients get benefitted through medical camp.

- Conducted gynecologist visits in villages regarding health issues for women & adolescent girls . Total 7 visits conducted till September 2022 – 115+ women benefitted



# SUSTAINABLE LIVELIHOOD DEVELOPMENT

With support of BAIF, AF has conducted 26 trainings batches in various villages for ideal and profitable Sex Sorted Semen, AI, Nutrition and animal Health. 545+ Animal keepers have attended these trainings

2300 Mango Saplings distributed to 289 beneficiaries in 6 Villages Junagaam, Suvali, Damka, Vasva, Bhatlai and Hazira.

Work in started solar irrigation system setup under energy project at Lavachha and aadmor Villages, Olpad block.

35 SHGs member from 6 SHGs of Ghanavad village were trained in production of Papad, Pickle and Spices in collaboration with the RSETI Center.

10 Sakhi Mandal members from 3 villages were trained in Costume Jewellery in collaboration with the RSETI Center.

2 new Halpati community SHG groups were formed in Vansva village. We have planned for stitching center.

6 new SHG formed at Umarpada of Vasava Tribes – they have started savings.

Total 25 SHG is formed till date

# COMMUNITY INFRASTRUCTURE DEVELOPMENT



- Adani foundation has developed 3 ponds at Damka, Suvali & Bhatlai out of which Suvali and Bhatlai ponds were developed as Amrit Sarovar under Azadi ka Amrit Mahotsav. Plantation was done around Suvali pond.
- Fencing on Road divider was provided from Mora circle to Mora village by Adani foundation, Hazira.
- Plantation was also done on road divider.

# COMMUNITY INFRASTRUCTURE DEVELOPMENT



Inauguration of girls' hostel at Vanraj Ashram Shala, Umarda village of Umarpada block by Shri Capt. A.K. Singh sir, CEO – Adani Hazira Port Ltd. Two rooms of 11m X 6.m each was built by AF, Hazira for 75 girls of Vanraj Ashram Shala


- Construction of community Hall (1st floor) was done by Adani foundation, Hazira at Damka village.

# UDAAN - HAZIRA

The aim of this project is to inspire young minds by giving them exposure visits at Adani facilities. From this year we have started Adani Wilmar visit along with Adani Hazira Port.

In Month of August we have conducted **14** visits with different institutions of Surat District. Bifurcations are given below:


| Types of Institutions | School | | College | Other | Total |
|---|---|---|---|---|---|
| | Grant | Pvt | Pvt | Pvt | |
| No. of Visits | 1 | 10 | 2 | 1 | 14 |
| Male | 23 | 314 | 17 | 41 | 395 |
| Female | 29 | 215 | 85 | 5 | 334 |
| Total Participants | 52 | 529 | 102 | 46 | 729 |

# CSR KUTCH

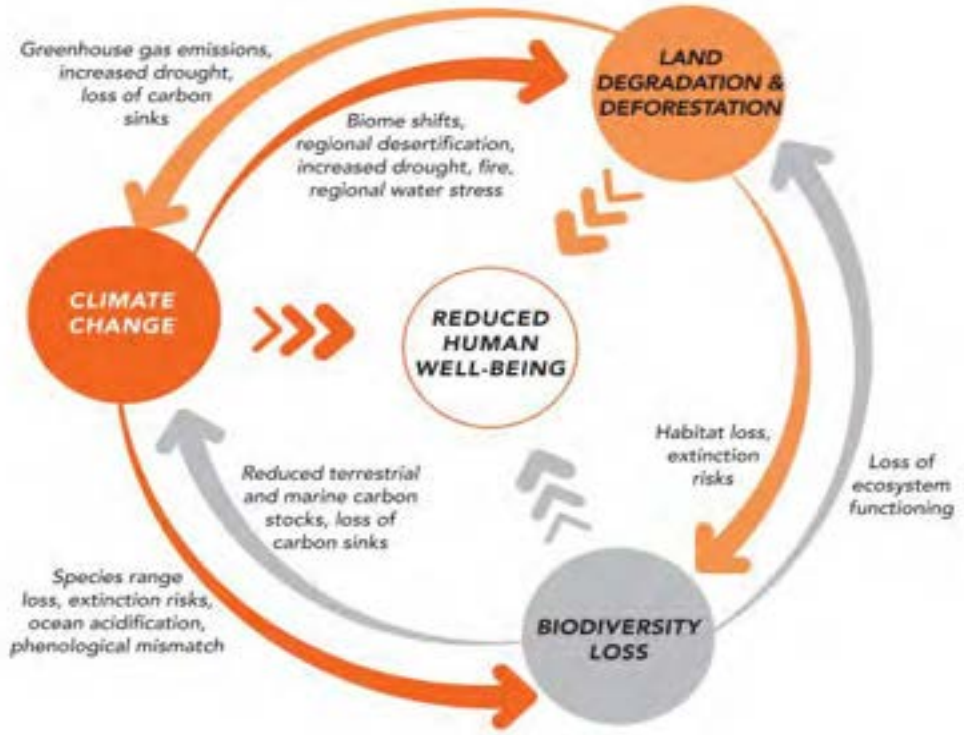
# ENVIRONMENT SUSTAINABILITY

Environmental sustainability is the responsibility to conserve natural resources and protect global ecosystems to support health and wellbeing for present and future. These components are closely interrelated and mutually re-enforcing Under Corporate Environmental responsibility.

To make connections between human actions Environment & biological diversity found within a habitat and/or ecosystem, Adani Foundation executing various Project as Below

**Biodiversity conservation:** to preserve biodiversity and Natural Resources.

**Regenerative capacity:** Protect the depletion of natural resources and keep the harvest rate of renewable resources within the capacity of regeneration.




*Environment Sustainability Projects : Ensuring ecological balance, protection of flora and fauna, terrestrial and coastal spices conservation, welfare, agro forestry, conservation of natural resources and maintaining quality of soil, air and water*

# REDUCING CARBON FOOTPRINT

## 1. Miyawaki – Nana Kapaya

Miyawaki- Dense Plantation is developed n year 2021-22 at Nana Kapaya Village in 2.0 acre land. Miyawaki plot is very close to sewage water tank so watering to plantation by the same.

As discussed with villagers and Adani Foundation, we proposed the close or dense plantation at site- called Miyawaki Types of Plantations with following **four major compartments** (45X20 meters approx.) and with following strategies:

1. Mixed Plantation dominant Drought Resistant Plants
2. Mixed Plantation dominant by Larger Leaves
3. Mixed Plantation dominant by Saline Resistant Plants
4. Mixed Plantation dominant by Medicinal Values.

Plantation of 5880 saplings of different 42 spices is completed which will resulted in dense forest due to good rain this year.

# REDUCING CARBON FOOTPRINT

## 2. Smritivan Memorial park– Bhuj

**Smritivan Memorial park** is a unique initiative by Prime Minister in order to commemorate the death of about 13,805 people during this massive earthquake which had its epicenter in Bhuj District.

The memorial will occupy around 406 acres of space of the **Bhujia Dungar near Bhuj, Kutch** that will show people's **oppressive response to a natural disaster**.

Adani Foundation has supported for 47000 saplings in Smriti van @ 100 Las INR
In September 2022, Prime Minister had inaugurated smriti van which is the biggest Miyawaki Forest in Gujrat.

# REDUCING CARBON FOOTPRINT

## 3. Mangroves Biodiversity Park

Mangroves are complex ecosystems that provide coastal bio-shield to habitats and societies from natural disasters. Important roles played by the mangroves are; stabilizing the coastline, protect water quality, reduce coastal flooding, reduce the effect of coastal cyclone, etc.

Mangroves are one of the productive ecosystems which contribute a number of ecosystem services to the nature as well as to human and are integral in the control of climate on the Earth.

With a vision to Enhance the diversity of mangrove and its associated species in suitable coastal region of Kachchh, which in turn would enhance the faunal diversity and fishery resources of the area by providing suitable habitats and breeding ground. The ultimate aim of the project is to improve overall coastal biodiversity of the region which in turn assist in improving the livelihood of the coastal populace. Further, the area will serve as a base model for researchers, knowledge center for students and promote awareness for conservation and management of mangroves for the benefit of human and the environment.

# REDUCING CARBON FOOTPRINT

Total five mangrove species, such as Ceriops, Aegiceras and Rhizophora were selected which in turn enhanced the dependent faunal diversity of the area. Thereby, there will be an increase considerable biodiversity of the area. **The initial pilot trails were undertaken in an area of approximately 16 hector during the period between 2018 and 2021 with the active participation of local communities.** Current year 4 Hector plantation is in progress which will be resulted in 20 Hector Mangroves Biodiversity Park within one year

| S. NO | Mangrove Associate | Life form |
|---|---|---|
| 1 | Suaeda Spp. | Herb |
| 2 | Porteresia coarctata | Herb |
| 3 | Opuntia elatior | Shrub |
| 4 | Sesuvium portulacastrum | Herb |
| 5 | Ipomoea biloba | Climber |
| 6 | Salvadora persica L. | Shrub |
| 7 | Urochondra setulosa | Herb |




# REDUCING CARBON FOOTPRINT

| Sr. No | Species | Common Name |
|---|---|---|
| 1. | Boleophthalmus dussumieri (Valenciennes, 1837) | Levti Mud Skipper |
| 2. | Scartelaos histophorus (Valenciennes, 1837) | Walking goby |
| 3. | Periophthalmus waltoni Koumans, 1941 | Walton's mudskipper |
| 4. | Austruca iranica (Pretzmann, 1971). | Arabian Fiddler Crab |
| 5. | Austruca sindensis (Alcock, 1900) | Indus Fiddler Crab |
| 6. | Austruca lactea (De Haan, 1835) | Milky Fiddler Crab |
| 7. | Parasesarma plicatum (Latreille, 1803) | Mudflat crab |
| 8. | Dotilla blanfordi Alcock, 1900 | Sand bubbler crab |
| 9. | Scylla serrata (Forskål, 1775) | Mud Crab |
| 10. | Eurycarcinus orientalis A. Milne-Edwards, 1867 | Violet Crab |
| 11. | Pirenella cingulata (Gmelin, 1791) | Horn snail |
| 12. | Telescopium telescopium (Linnaeus, 1758) | Telescope snail |
| 13. | Mitrella blanda (G. B. Sowerby I, 1844) | Dove snail |
| 14. | Bakawan rotundata (A. Adams, 1850) | Mangrove dweller |
| 15. | Protapes cor (G. B. Sowerby II, 1853) | Venus clam |
| 16. | Callista umbonella (Lamarck, 1818) | Striped venus clam |
| 17 | Solen digitalis Jousseaume, 1891 | Razor clam |

1. *Boleophthalmus dussumieri*

2. *Scartelaos histophorus*

3. *Periophthalmus waltoni*

4. *Austruca sindensis*

5. *Austruca lactea*

6. *Parasesarma plicatum*

# REDUCING CARBON FOOTPRINT

## 4. Home biogas -

**4,176** TONS OF ANIMAL MANURE TREATED

**359,687** HOURS OF CLEAN COOKING;
**9.3** TONS OF BIOGAS CREATED
**325** TONS OF FIREWOOD REPLACED;
**47,375** HOURS SAVED ON REDUCTION OF FIREWOOD &COLLECTION
**1225** TONS CO2 EMISSION REDUCTION

Reducing organic waste,
Transitioning to renewable energy
Motivation for reduction in use for fertilizer

Home biogas is the Israel based company was founded in 2012 manufactures dynamic biogas unit not only for farm waste but for kitchen waste too. Under Gram Utthan Project, Adani Foundation is supporting home biogas to farmers periphery Villages.

Promotion of Natural Farming–Home biogas And Improving the health and living conditions for the millions of families that are still cooking on charcoal and wood. Adani Foundation is not only supporting but creating awareness to save environment and health of the community who regularly cooking on Chula. **It is proven that one hour cooking on Chula is as dangerous as smoking 40 cigrates**.

Till date 225 farmers are utilizing it with satisfaction and considerable outcome by saving Average Rs. 23,400 for gas and fertilizer as well – with Economic benefit of Rs,52.65 Lacs.

135 Farmers are linked up with Gobardhan Yojana in which DRDA is providing Biogas with Rs. 5000 Contribution. Adani Foundation has worked as a facilitator between DRDA and Beneficiaries farmers in filling and submission of forms. Total 360 farmers are supported with Biogas as sustainable environment protection

# REDUCING CARBON FOOTPRINT

## 5. Water Conservation Project

**Since 10 years considerable Water Conservation Work carried out in Mundra Taluka. Due to satisfactory rain in current year 1.11 mtr ground water table** increased in coastal belt of Mundra as per Government Figures. Our water conservation work is as Below.

- Large number of water harvesting structure ( 18 Nos. of check dams in coordination with salinity department) and Augmentation of 3 check dams
- Ground recharge activities (pond deepening work for more than 56 ponds) individually and 26 ponds under Sujlam Suflam Jal Abhiyan were built leading to a significant increase in water table and higher returns to the farmers
- Roof Top Rain Water Harvesting 145 Nos. **(40 Nos current year)** which is having 10,000 litre storage which is sufficient for one year drinking water purpose for 5 people family.
- Recharge Bore well 201 Nos **(12 Nos current yr)** which is best ever option to direct recharge the soil
- Drip Irrigation approx. 1156 Farmers benefitted in coordination with Gujrat Green Revolution Company till date
- Bund construction on way of Nagmati River could save more than 575 MCFT water quantity which recharged in ground due to which bore well depth decreased by 50-100 Ft in Zarpara, Bhujpur and Navinal Vadi Vistar.
- **Check dam gate valve construction at Bhujpur which controlled more than 350 MCFT water to go into sea and get recharged current year.**
- **Pond Pipe line work at Prasla Vistar Zarpara which increase recharge capacity more than 25% in 100 hector area.**

# Water conservation and Management

## Process Flow for Rooftop Rain Water Harvesting System

Social Survey & TDS mapping

Community Contribution

RRWHS

Impact

- Portable water at door step
- Cost saving for portable water
- Improved water quality with
- Creates water conservation awareness in rural community
- Improves standard of living of rural community

| | |
|---|---|
| Total Target for 2022-23 | 40 |
| RRWHS Constructed in Q1 | 25 |
| Population Impacted | 300+ |
| Savings per household | 15000+ |

**TDS difference between Ground water and RRWHS water**

# REDUCING CARBON FOOTPRINT

## 6. Tree Plantation

Till the date 1,40,000 Tree have been planted at various Public places , Schools, GP and crematorium with their responsibility to nurture and maintain regularly.

For this passionate work our team Member Mr. Karshan Gadhvi was Felicited with Van Mitra Award by Forest department and Government of Gujarat.


# EDUCATION PROJECT

## Adani Vidya Mandir, Bhadreshwar (SDG - 4/4.1)

**EDUCATION: FREE AND COMPULSORY -** vision of Adani Foundation to provide cost-free education, food, uniform, books to the children of economically challenged families of Mundra Bock. Adani Vidya Mandir, Bhadreshwar was established in June 2012, with aim of uplifting the communities through education. The school is equipped with excellent infrastructure and resources required for all-round development of the student. The child is given admission in class 1 and is molded to be an educated and a good human being by experienced and compassionate teachers. The school follows a curriculum designed by GSEB. **507 underprivileged students of Fisherman & Maldhari communities from 8 villages benefitted costfree education at the school**

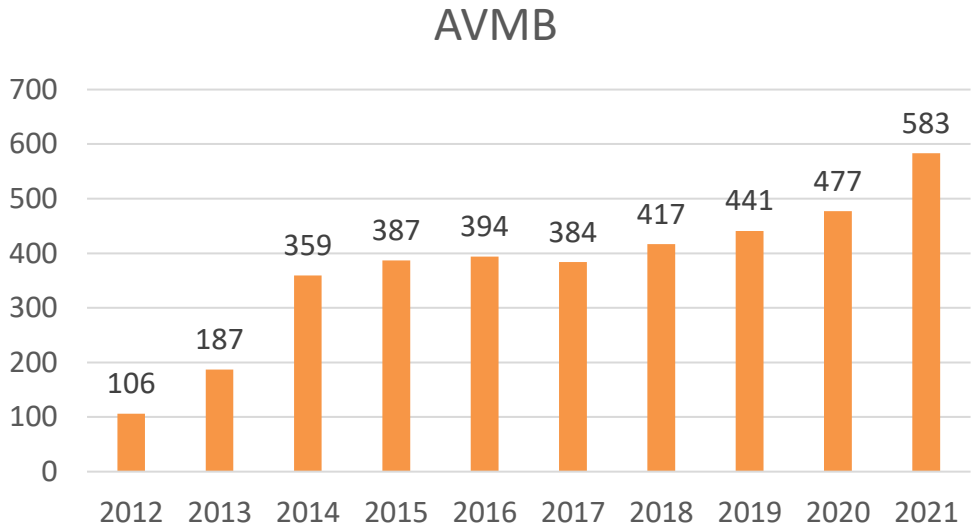
Teachers Day Celebration with facilitation of all teachers and awarded 5 best teachers in academics. District Education Officer Mr. Prajapati graced the occasion and motivated the staff.

# EDUCATION PROJECT

Two milestone achievement in this six months

- Adani Vidya Mandir Bhadreshwar Gujrat Board Standard 10th Examination Result is 100%.
- NABET Certification received after rigorous process of documentation and audit committee visit.

| Adani Vidya Mandir Bhadreshwar | | |
|---|---|---|
| 2021-22 (10th Board) | | |
| NO | GRADE | STUDENTS |
| 1 | Above 80 % | 3 |
| 2 | 60-80% | 18 |
| 3 | 40-60% | 10 |
| | TOTAL | 31 |
| Result | | 100% |




# PROJECT UTTHAN

To provide learning exposure. Utthan project encourages students to gain knowledge and read books.

Along with reading, various competitions and exercises are conducted like reading, fluency, book reviews, vocab building to hone their reading skills.

Utthan believes in creating atmosphere for students which fulfills need of holistic learning of rural students who are devoid of advanced education.

Activities like movie showing and discussing its morale helps students to increase their analytical skills.

# PROJECT UTTHAN

| Total village covered | Total School | Total Students | Priya Vidhyarthi | Book issue by library | Language reach (English) | Mother's meet | IT on wheel | Students participate in summer camp | Competitive exam |
|---|---|---|---|---|---|---|---|---|---|
| 33 | 59 | 9895 | 2600 | 41316 | 5221 | 4253 | 2101 (std.6to8) | 5316 | 898 (JNV, NMMS & PSE) |

### ૨૦૨૦-૨૧ના જિલ્લામાં તાલુકા વાઈઝ ગુણોત્સવના ગ્રેડ

| તાલુકો | A+ | A | B | C | D | કુલ |
|---|---|---|---|---|---|---|
| અબડાસા | ૦૧ | ૨૮ | ૧૧૬ | ૨૬ | ૦૨ | ૧૭૩ |
| અંજાર | ૦૦ | ૦૫ | ૬૯ | ૨૫ | ૦૦ | ૧૨૯ |
| ભચાઉ | ૦૦ | ૦૨ | ૧૨૧ | ૪૬ | ૦૩ | ૧૭૨ |
| ભુજ | ૦૧ | ૧૪ | ૧૭૮ | ૧૩૮ | ૧૧ | ૩૪૨ |
| ગાંધીધામ | ૦૦ | ૦૫ | ૪૩ | ૦૭ | ૦૧ | ૫૬ |
| લખપત | ૦૦ | ૦૦ | ૫૩ | ૪૭ | ૦૭ | ૧૦૭ |
| માંડવી | ૦૦ | ૦૯ | ૧૨૫ | ૩૩ | ૦૦ | ૧૬૭ |
| મુન્દ્રા | ૦૦ | ૦૨ | ૮૩ | ૨૦ | ૦૦ | ૧૦૫ |
| નખત્રાણા | ૦૧ | ૨૦ | ૧૨૮ | ૨૧ | ૦૦ | ૧૭૦ |
| રાપર | ૦૦ | ૦૪ | ૧૮૦ | ૮૭ | ૨૭ | ૨૬૮ |
| કુલ | ૦૩ | ૮૯ | ૧૧૨૬ | ૪૫૦ | ૫૧ | ૧૭૧૯ |

### ૨૦૨૧-૨૨ના જિલ્લામાં તાલુકા વાઈઝ ગુણોત્સવના ગ્રેડ

| તાલુકો | A+ | A | B | C | D | કુલ |
|---|---|---|---|---|---|---|
| અબડાસા | ૦૫ | ૧૫ | ૧૨૫ | ૨૫ | ૦૦ | ૧૭૦ |
| અંજાર | ૦૨ | ૧૬ | ૮૬ | ૨૦ | ૦૨ | ૧૨૬ |
| ભચાઉ | ૦૦ | ૦૮ | ૧૨૬ | ૩૪ | ૦૪ | ૧૭૨ |
| ભુજ | ૨૦ | ૫૮ | ૧૮૦ | ૭૭ | ૦૯ | ૩૪૪ |
| ગાંધીધામ | ૦૦ | ૦૭ | ૩૮ | ૧૧ | ૦૦ | ૫૬ |
| લખપત | ૦૧ | ૧૭ | ૬૩ | ૨૫ | ૦૨ | ૧૦૮ |
| માંડવી | ૦૬ | ૨૭ | ૧૦૭ | ૨૫ | ૦૧ | ૧૬૬ |
| મુન્દ્રા | ૧૪ | ૪૫ | ૩૯ | ૦૭ | ૦૦ | ૧૦૫ |
| નખત્રાણા | ૦૬ | ૩૪ | ૧૧૬ | ૧૪ | ૦૧ | ૧૭૧ |
| રાપર | ૦૩ | ૦૪ | ૧૬૦ | ૧૦૫ | ૨૨ | ૨૬૪ |
| કુલ | ૫૭ | ૨૩૧ | ૧૦૪૩ | ૩૪૩ | ૪૧ | ૧૭૧૫ |

- ✓ Government of Gujarat for strengthening the quality outcomes, launched a programe called Gunotsav, or 'Celebrating Quality'.
- ✓ Mundra - A+ : 14/105; in which 7/34 Utthan schools
- ✓ Increase gunotsav result in almost all schools.
- ✓ Teachers, Principals, SMC members & Village leaders appreciate effort of Utthan Sahayak

# PROJECT UTTHAN

- ✓ MOU between DPEO, Kutch and Adani foundation for include new 17 schools – Total 59 Schools.
- ✓ Conduct Baseline assessment & Utthan Sahayak Start teaching to progressive learner. 96 students Mainstreamed from progressive Learner this year. 730 students mainstreamed last year.
- ✓ Promoting co-curricular activities.
- ✓ Students write Letter to Supermom on Mothers day.
- ✓ Creating joyful learning spaces: Smart TV & Software, Sports kit, Music kit & Book supports.
- ✓ All Utthan School Linked Up with Google Map
- ✓ Various day were celebrated by Utthan Sahayak like, Yoga day, Gurupurnima, Rakshabandhan, Sports day, Azadika Amrit Mahotsav. Children from all classes participated enthusiastically


# UDAAN - MUNDRA

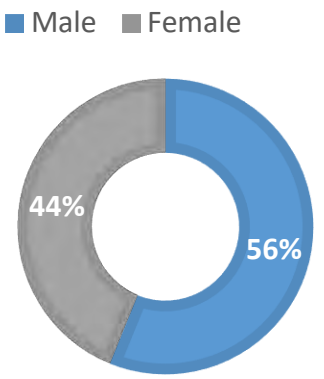
## Dashboard (June - Sep) sustainable project revenue generated

### Total Institutes engaged 177

| School | College | ITI | ASDC |
|---|---|---|---|
| 125 | 45 | 2 | 5 |

### Total Visitors
**11464 participants**

### GENDER RATIO




### Impact

**INSPIRE TO ASPIRE**
Igniting thoughts for the bright future.

**INDUCING KNOWLEDGE**
Widening of knowledge horizon.

**UNFORGETABLE EXPERIENCE**
Visitors get to observe and experience the operations on sites.

**THOUGHT PROVOKING**
Stimulating young minds to think out of the box.

**ENCOURAGE TOWARDS GOAL**
APSEZ existence proves that dreams come true if we convert them in GOALS.

**INFUSE CREATIVITY**
Students gets exposure which enable them to provoke ideas in them during visits.

## Project Udaan

Under this project exposure tours are organised wherein school students are given a chance to visit the Adani Group facilities such as Adani Port, Adani Power and Adani Wilmar refinery at Mundra, Hazira, Dahanu, Kawai, Tirorda and Dhamra to get an insight into the large-scale business operations and thus get inspired to dream big in life. The exercise stimulates the young minds to dream big and help them become entrepreneurs, innovatores and achievers of tomorrow, and thus play an active role in the process of nation building

# UDAAN - MUNDRA



## Awards & Recognitions

**10,000+** **Positive Feedbacks**

**100+** **Mementos received**

**55+** **Certificates received**

Adani Foundation, Udaan Project invited the members of self-finance School Association, Gujarat for an exposure visit.  90 participants were facilitated with extraordinary experience of Port, Power, Wilmar and Solar plants visit.

# FARMERS SUSTAINABLE LIVELIHOOD PROJECTS

## Promotion of Natural Farming

- To promote Natural farming Adani Foundation has originated cow based farming initiative with interconnected techniques which can increase farmer yield – our main objective is to improve quality of soil.

- **Implementation**
- Survey and identification of farmers to adopt Natural farming –Total **950 Farmers are selected as criteria – coordinated with ATMA for support of 10,800 INR per year by Direct Bank Transfer.**
- **65 farmers facilitated by DRDA Scheme – Gobardhan Yojana of Biogas with Contribution of Rs. 5000.**
- Water & Soil Testing- Most of Farm soil contain low organic carbon.
- Arranged Workshop & Hands on training for them which was conducted by Agri expert ,KVK and Progressive farmers with 1000+ farmers
- 325 Jivamrut unit have been set-up. Which is facilitated through with farmer Contribution.
- 257 Farmers have started to preparing JivaMrut & Gaukrupa Amrutam Bio-fertilizer and using in agri crop. Series of Training is arranged by ATMA and Adani Foundation

# FARMERS SUSTAINABLE LIVELIHOOD PROJECTS

## Prakrutik Sahkari Mandli

Formation of Shree Raj Shakti Prakrutik Kheti sahkari Mandali Limited Mangara and register Under Gujarat CO-operative SOCIETY act-1961 with 29 Members which is the First Organic Company of Registered across Kutch.


**Objective**

1.To promote natural Farming practices as group and individual

2.Value addition of Agri Produce and find out common Market to sell.

3.Set Up Cleaning, Grading Packaging and Processing Unit.

4. Established stall for input and output of Agri Produce ,Medicine ,Agri equipment.

5. Avail Agri machinery and equipment on rent to Farmers.

6.Facilittaion of Government Scheme.

7.Arrnged Exposure and Agri Training Program.

8. Laboratory et-up for soil and water Analysis

Shree Raj Mandli is planning to sale Organic Vegetables, Fruits, Grains, jevamrut and Mineral mixture. Rented Shredder Machine and preparation of bio mass is also next level planning of Mandli.

# FARMERS SUSTAINABLE LIVELIHOOD PROJECTS

## Farmer's Producer Organization

Kutch Kalpaturu Producer Company (KKPC) is established in the year of 2020 to address the challenges faced by the farmers, particularly to provide common platform for inputs & out put The company has been set up with 237 Farmers shareholders. Half year Turn Over of the company is 7.18 lacs

**Vision –**

Promotion of rural livelihood through sustainable & innovative agricultural and allied practices in the collective manner through Input and Out Support.

**Mission:-**

- Reduce Transaction cost per unit area through linking farmer with Kutch Kalpaturu Producer Company (KKPC) to Procure Input at reasonable prize.
- Imbibe Knowledge to adopt Modern Agri technology through training, Exposures and demonstration to Increase Production & Productivity.
- Enhance value of Agri produces and set up sustainable arrangement to sell their Produces.
- Sorting, grading and value addition for Proper Marketing of Agri Produces to fetch High value for the Betterment of farmers and shareholder in a sustainable way.
- Aware and Facilitation of Government Agriculture scheme over Farmers.
- Establishment of Agro Center at Various Village

**WIP:-**

**In past six months KKPC worked for** Date Packaging box, Milk Supply in Colonies and Shantivihar ,NB 21 Off suits Supply, Vegetable Seed Mineral Mixture and Cattle feed.

# FARMERS SUSTAINABLE LIVELIHOOD PROJECTS

## Pashudhan : " Fodder Support Programme, Individual Fodder Cultivation and Preventive Health Care

- Adani Foundation provides Good Quality dry and green fodder to 29 Villages. Project is covering total 14116 Cattels / AF Provide Dry and green Fodder to 29 Villages of our vicinity which covering 33072 cattle of 2747 farmers.

- Fodder Cultivation- To made fodder sustain villages - 100 Acre Gauchar land of Zarpara and 25 Acre in Siracha village is being cultivated for the same.

- To protect Cattles against Bovine Brucellosis zoonotic disease, Awareness and vaccination program is ongoing with Kutch fodder fruit & Forest development trust (KFFT) in our 11 Villages. In end of the year 100 percentage female calves will be benefitted by this initiative.

# FARMERS SUSTAINABLE LIVELIHOOD PROJECTS

## Pashudhan : Fodder Cultivation

Village Gauchar land development for the fodder cultivation to made fodder sustain village & Avail green fodder in scarcity phase.

With the support of Gauchar Seva Samiti Grassland development in Siracha-40 Acre & Zarpara 165 Acre done which resulted in total production 82 ton.

Zarpara Gauchar Land Development will become the change maker model for other villages too. 165-acre land with Shorghum, Rajko, Maize, Zinzvo etc. different types of fodder due to this nutrition value of milk will be improved and average one liter milk quantity will be increased.
Average 2450 cattle get benefitted of green fodder for 65 days months which –which increase 0.5 litre milk quantity of 50% cattle
(1225 cattle x0.5 litre milk quantity Increase x 40 INR per litre = 1592000)

Apart that due to natural grazing Benefit save farmer cost to purchase Fodder .
(2450 cattle x 7kg /Day X 65 Days = Rs. 2786875

**This Intervention could save Rs.43,78,875.00**

Adani Foundation is planning to expand this model from 125 acre to 500 acre up to next year monsoon.

# FISHERFOLK SUSTAINABLE LIVELIHOOD PROJECTS

- **Balwadi**
  - Mental and Physical Cognitive Education with Joy full learning activities to 2.5- to 6-year-old children.
  - Provide Nutritional Food Facilities.
  - Capacity Building program for Balwadi teachers.

- **Vehicle Transportation Facilities**

  Vehicle Transportation facilities to 25 school Going Children from Juan Bandar to Nearest Government School Education Kit Support
  ( Note Book , Guide, Etc) To Secondary and Higher secondary Fisherfolk students as Motivation

- Free education in Adani Vidya Mandir school.

- Due to This Efforts First generation of Fisherfolk Community get in the Main stream of education.

# FISHERFOLK SUSTAINABLE LIVELIHOOD PROJECTS

- **Mangrove plantation** and Nursery development work has created a two facet impact by providing Livelihood to Fisherfolk during two months Fishing during Off season and developing **162** hector dense mangrove afforestation. **4430 Men days work** provide to 284 Fisherfolk of Luni ,Sekhdiya and Bhadreswar Villages.

- **Youth Employment :-** Adani Foundation is committed for youth employment with imparting technical and Non-Technical Training for Fisherfolk Youth and started Electrical ,Welder ad Masson work training under Adani Skill Development Centre.
  - **35** Youth get Employed in GPVC,AWL,MSPVL and KCL WinTech and Other CFS.
  - **194** - Fisherfolk men and women were supported with skilled and unskilled Job and Contract work in various APSEZ Department.
- **Government scheme** Awareness session was held in association with Fisheries department Bhuj to facilitate pagadiya fishermen by providing fishing kits to seven Fishermen. The coordination was made by Adani Foundation to process application.
- Adani Foundation supports fisherfolk community by distributing Potable water to Luni, Bavdi and Randh Bandar on daily bases. Moreover Kutdi Zarpra, Vira bandar and Juna Bandar is also supported by Adani Foundation in association with Mundra Nagarpalika.

# WOMEN EMPOWERMENT PROJECT

"You can tell the condition of a nation by looking at the status of its women" – Women are central to the entire development process, be it in an individual family, village, state and to the whole nation.

The below mentioned figure shows determinants associated with the empowerment of women and these are the challenges for us as a CSR to work upon.

Adani Foundation is considering all parameters as a part of Empowerment.

- Education – Uthhan Project promotes girl child education, Creating awareness through various Govt schemes i.e. Vahali Dikri Yojana, Sukanya Samriddhi Yojana etc. till date covered more than 1200 girl child to get benefit out of it.
- Health and Nutrition – Home biogas is the best example of intervention of women health – 225 home biogas is supported to farmers which is good for lungs health
- Skill Development and Income Generation – Adani Foundation is working with 15 Self help group and supporting to develop entrepreneur skills to become self reliant, sourcing more than 500 women to absorb in various job – this will give them identity, confidence and right to speak in any decision for home, village and working area.
- Drinking Water and Sanitation – Total 145 Roof Top Rain Water Harvesting is supported for reducing hassle of the women to fetch the water as well as making clean water available.

# WOMEN SUSTAINABLE LIVELIHOOD PROJECT

- Total 82 Active SHG Group – 834 women are engaged with Adani Foundation for Savings activity. Among 15 SHG groups are involved in income generation. We facilitate them capacity building training for quality, Marketing Finance and team work to made them self sustain.
- Saheli Swa Sahay Juth have completed order of 10,000 Sanitary pad from District Health Department.
- “Shradhha Saheli Sva sahay Juth” is won the tender to provide Catering service in Block level Government
- Tejasvini SHG has received order of 3000 traditional dress preparation worth 3.25 Lacks
- Sonal Saheli Women SHG had supplied 1000 KG washing powder to Adani port & Willmar.
- Meghdhanush Saheli group had opened a stall of eco friendly Ganpati and did sale of 55000 INR. They have also participated in “Sartha” Exhibition in which they did sale of 15000 INR.

# WOMEN SUSTAINABLE LIVELIHOOD PROJECT

"Pragati" – 75 Stories of Empowered Women to Celebrate Azadi ka Amrut Mahotsav

Over the past two decades, Adani Foundation Mundra takes a privilege to showcase journey of women to uplift and encourage contribution in local business, services and small enterprises in nation building through this book.

The book was launched by Respected Chairman Sir Gautam Adani sir on 1st day of Auspicious Navratri Parv.

# WOMEN SUSTAINABLE LIVELIHOOD PROJECT

## Gram Bharti : Women Sustainable Livelihood Projects

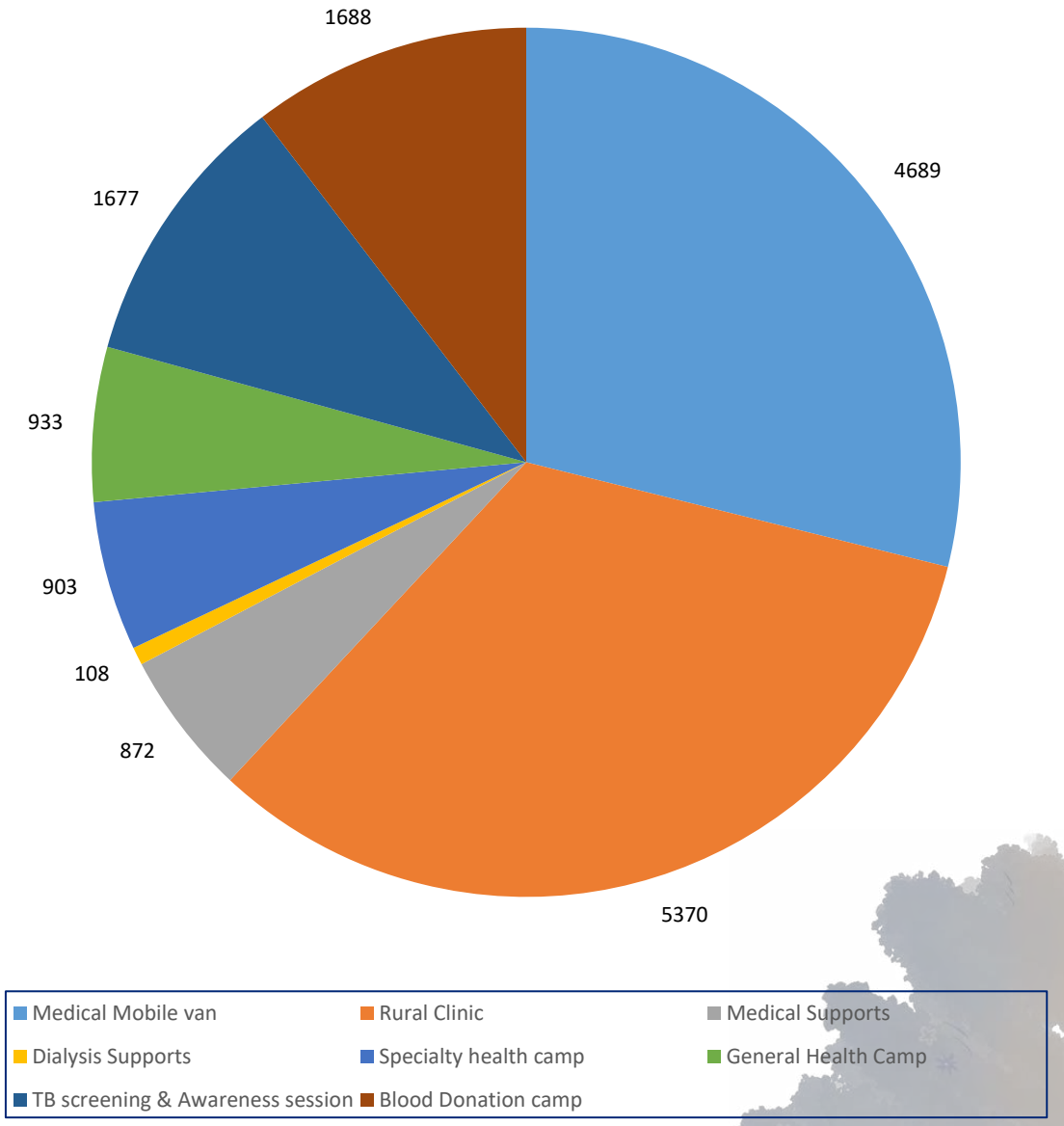
The SHG mela (exhibition cum sale) Gram Bharti, was planned between 26th to 28th September main reception lobby Adani Corporate House Ahmedabad. The inauguration session was on 26th September 2022 by Respected Chairman Gautam Adani sir with Mrs. Shilin Adani mam and Mr. Vasant Gadhavi sir.

From Mundra
Tejaswi Saheli SHG
Shraddha Saheli SHG
Pragpar Saheli SHG
Meghdhanush Saheli SHG
Radhe Saheli SHG
Umang Saheli SHG
Jyot Saheli SHG had participated with lots of enthusiasm and zeal.

**Total Sale @ 3.2 Lacs with further order of Rs. 1.1 Lacs to Meghdhanush, Jyot and Pragpar Saheli Group.**

# COMMUNITY HEALTH

Health is the basic need for any individual and community Development considering various kind of Project are being executed as per the need and assessment to ensure good health for all citizen of Mundra villages. Like Mobile health van, Rural Clinics, support to dialysis patients and poor patients and health Camp Frequently and During disease outbreak.



# COMMUNITY HEALTH

- The Adani Foundation runs Rural Clinic and Mobile health care Unit to render basic Medical Facilities to Interior Villages and Fishermen vasahat since 10 Year.
- Equipped with 94 types of general and life saving medicines with Potable ECG machine.
- **Rural Clinic**:- 09 Villages
  06 villages of Mundra block, 02 villages of Anjar block and 01 village of Mandvi block)
- **Mobile health care Unit:-** Covered 30 Villages.
- Total Patients Benefitted:- 10059.
- **Apart that Adani Foundation facilitates early diagnosis and screening for non communicable disease during MHCU & Rural clinic visit**


# COMMUNITY HEALTH

**Dialysis Support:-**

Awareness camps are conducted in community for Prevention and Care against Kidney Stone followed by support for dialysis if more criticality is there. Patients are provided with dialysis support for months and years as per their needs and medical condition.

**5 financially challenged patients has been supported with Dialysis treatment at 108 Times which added day in their Life**.

**Economically underprivileged Patients Support:-**

Medical support is a service by foundation which includes, consultation, medicine, vaccination drives and immediate care to the needy patients **872** Patients from Mundra, Mandavi and Anjar Block are Benefitted at adani hospital.

**National TB Elimination Programme (NTEP)** aims to meet the ambitious goal, announced by the Honorable Prime Minister Shri. Narendra Modi, of ending the TB epidemic by 2025.

Adani foundation with APSEZ, APML, AWL and MSPVL HR department has started cluster based screening program to eliminate TB in labors under Dignity of workforce program. Adani Ports and SEZ Limited has initiated screening Total 3200 work force screened in first & Second phase with target of screening more than 10,000 workforce of all group businesses and SEZ Industries.

# COMMUNITY HEALTH

**Health camp**

specialty camps , Eye checkup camps ,Blood donation camp, Anti-tobacco awareness camp, TB screening, and other are conducted in core villages as well as in labour colonies.

**Specialty health**(Gynec , Pediatric eye specialty health camp) :- 04 camp – 903 Patients.

**General health camp** :- 05 camp -1041 Patients

**Awareness Session**

1.Health & Hygiene for School Students- - 432 Students.

2. Malnourished Child and Adolescent Girl- 108 Child and Girls.

**Blood Donation** camp was held at various location on the Occasion of Respected Chairman sir's birthday on 24th June.

Total 590800 CC quantity of Blood had been donated by 1088 Employees.

Patients who are suspected with critical illness directed towards G.K General Hospital.

# COMMUNITY INFRASTRUCTURE DEVELOPMENT

Adani Foundation has designed, planned and built a strong infrastructure to improve the Standard of Education, Health, Agriculture and Basic facilities for the betterment of Community.

All initiatives were fulfilled according to the official requests and demands of people of the community and the Gram Panchayat.

# COMMUNITY INFRASTRUCTURE DEVELOPMENT

- **Work completed.**
  1. Percolation well Recharging work at Bhadiya & Mota Kandgra village.
  2. Sluice gate Construction to Control Flood during Flooding at Khoydivadi Vistar Bhujpur.
  3. Pond Beatification and Bund Strengthening at Bhujpur village.
  4. commissioning of Community Training Centre at Shekhadiya.
  5. Two Pond Deepening at Zarpara under Amrut Sarovar Yojna.
  6. JCB & Hitachi Machine Support for Pre-Moonson activities.
  7. Repairing and Maintenance work of Approach at Luni, Bavdi and Navinal Fishermen Bandar.
- **Work in Progress.**
  1. Development of Vegetable Market Development at Mundra with 128 Stall Work in Progress.
  2. Pond Pipe Line Work at Pranshla vadi vistar Zarpara village.
  3. Sluice gate Construction & Pipe line work to Control Flood during Flooding at Pranshlavadi Vistar Zarpara.
  4. Check dam Restrengthening and Road restoration at Bharudiya village
  5. Development of Cricket Ground at Hatdi Village.
  6. Renovation and reaparing work Community Center , Mundra.
  7. Renovation and Road reparing work at All Fishermen Vasahat.

# ADANI SKILL DEVELOPMENT CENTRE

## ASDC Bhuj - Total Centre Admissions FY 22 - 23

| Courses | Female | Male | Total | Revenue Generated |
|---|---|---|---|---|
| Interview Skills | 21 | 9 | 30 | 0 |
| General Duty Assistant | 21 | 7 | 28 | 1,93,714 |
| Disaster Management | 0 | 2 | 2 | 3,998 |
| Basic Functional English | 0 | 2 | 2 | 1,198 |
| Beauty Therapist | 2 | 0 | 2 | 3,998 |
| Assistant Beauty Therapist | 1 | 0 | 1 | 1,499 |
| Self Employed Tailor | 8 | 0 | 8 | 7,992 |
| Digital Literacy | 5 | 1 | 6 | 3,349 |
| Domestic Data Entry Operator | 0 | 1 | 1 | 4,720 |
| Non Domain Employability Skills | 21 | 8 | 29 | 0 |
| Understanding Operating System | 21 | 7 | 28 | 0 |
| Entrepreneurship | 23 | 7 | 30 | 20,800 |
| Financial Literacy | 45 | 1 | 46 | 0 |
| **Total** | **168** | **45** | **213** | **2,41,268** |

MOU with Kachchh District Education Office. In this MOU we will provide training of Digital Literacy and Basic Functional English in Kachchh District Schools. As per MOU Kachchh District Education Office will provide minimum 5000 candidates to us for training (Adani Skill Development Centre).

| Courses | Total |
|---|---|
| Basic Functional English | 1387 |
| Digital Literacy | 211 |
| **Total** | **1598** |

# ADANI SKILL DEVELOPMENT CENTRE

**Soft Launching of**
**Self Employed Tailor – Outreach Batch at Meghpar**
Soft Launched Self-Employed Tailor Batch at Meghpar (Out-reach). Total 25 candidates are enrolled.

**Soft Launch of General Duty Assistant Batch**
Soft launched General Duty Assistant Batch with 30 candidates under DDU-GKY scheme as per instruction by GLPC.

**Soft Launch of Entrepreneurship Development Program**
Soft Launch of Entrepreneurship Development Program Training at Centre under CED with 30 candidates.

**Soft Launch of FL Training under Special Project**
Launching Special Project Jointly with KMVS NGO for FSW ( Female Sex Worker) Financial Literacy training Inaugurated on 22-07-2022
Total 37 women participant

# ADANI SKILL DEVELOPMENT CENTRE

## ASDC Mundra

**ASDC and Thermax Foundation Done MoU**

- ASDC and Thermax Foundation Jointly Organised , Skill Development training program for " Dhrab Village youth", In 1st phase completed Domestic Data Entry Operator training with 50 students ( 25 girls and 25 boys)
- Chief Guest of this program was Mr.Anees Shaikh- Head ,ER& Administration , Thermax, Ashlam bhai Turk- Dhrab Village Sarpanch remained present
- CSR head Thermax Ms. Sujata Deshpande has joined from Pune and given motivation and best wishes for training.

**Tie Ups with (Thermax Foundation, Empazer, Navin Group and DEO Kutch @ Rs.21.58 lacs.**

| Course Name | Total Admissions |
|---|---|
| Pedicurist and Manicurist | 68 |
| Self Employed Tailor | 01 |
| Assistant Electrician | 30 |
| Bar Bender and Steel Fixer | 29 |
| Meson General | 29 |
| Domestic Data Entry Operator | 55 |
| Junior Crane Operator | 23 |
| Interview Skills | 32 |
| Self Employed Tailor | 30 |
| Basic Functional English & Digital Literacy | 1539 |
| | **1836** |

# ADANI SKILL DEVELOPMENT CENTRE

## ASDC Mundra

Success of completion of batch 1 of Pragati was celebrated at Adani House, Mundra in esteemed presence of Mr Vikram Tandon, Chief Human Resource Officer, Adani Group, Shri Vasant Gadhavi ,Executive Director, Adani Foundation and Mr Rakshit Shah, Executive Director, APSEZ. Other dignitaries who graced the occasion were Mr. Anil Kumar Kalaga, , Mr. Charles Douglas, CEO, Mundra and Tuna Ports, Jatin Trivedi, COO, Adani Skill Development Centre and all HR and Department heads of APSEZ, Power, Solar and Wilmar.

The event celebrated by distributing skill training certificate to 52 fisher folk students, who were trained under Mason and Assistant Electrician job roles under Adani Saksham. Event also included batch 2 launch ceremony by providing training kits to trainees.

All trainees got the privilege to meet Mr. Vikram Tandon and received words of encouragement and guidance from him for their bright future ahead. Highlight of the Project Pragati is All 52 students who underwent trainees got placed with decent income. This will transform not just their lives but also will gradually lead to socio economic shift in fisher folk community of Mundra, Kutch.

# ADANI KANDLA BULK TERMINAL PVT LTD - TUNA

**Fodder Support**

Support of Dry & Green Fodder to Tuna and Rampar Village Gaushala Cattles during Scarcity which impacted on Cattle health and Milk Productivity ultimately Farmers Income as well. Total 643825 Kg green Fodder Supported for 900 Cattles of Tuna & Rampar.

**Tree –Plantation**

Total 200 Tree was planted and ensure responsibility for watering and Gurdning Public place and Schools Premises with involving Community and School students and sensitized to plant more trees and nurture.

**Water at Fisherfolk settlement**

Potable water (18 KL per Day) Distribution to Vira and Dhavlvaro Bandar through Water tanker Regularly which improve Hygiene and Health standard and reduce Women drudgery ,Cost and Time to get water by **Linkages through AKBTPL and GWIL daily bases.**

# ADANI GREEN ENERGY LTD - ABDASA

Adani Solar Plant Bitta is under Adani Green Energy Limited. Adani Foundation is doing regular support of JCB during monsoon or any accident cases as and when required.

Apart from it Celebrated Chairperson's Birthday by distribution of school bags to the children taking admission in class 1 along with necessary books and Education Material. Which includes Bitta School, Nani Dhufi School and Moti Dhufi School.

SUPOSHAN

# THARAD

fortune Suposhan

A CSR initiative by Adani Wilmar Ltd.

# SUPOSHAN

| Activities | Beneficiary |
|---|---|
| Family counselling | 1728 |
| Anthropometry | 4644 |
| Focus Group Discussion | 535 |
| Cooking demo | 43 |
| Poshan Vatika | 165 |
| Plantation (Moringa, Papaya, Lemon etc.) | 220 |
| CMTC / NRC admission | 04 |
| CMTC / NRC discharge | 04 |
| New Pregnant women identified | 148 |
| Newborn Identified | 114 |
| No. of WASH Kit Distributed | 03 |
| Village level Events | 68 |
| No of Sanginis | 23 |

# SUCCESS STORY - Mundra


Amrutaben desired to ask God for one thing, a new pushcart ! -

Jiluben is an elderly woman with physical limitations and a terrible economic state. She's been widowed for thirty years. Jiluben's son is 50 years old, unmarried and almost face continuously ill. while her daughter Amrutaben is divorced (she got married 20 years ago). Jiluben, who is 70 years old only has her daughter Amrutaben is working. Amrutaben used to use her old pushcart but it was heavy and too old for her to carry around everywhere, plus she didn't have enough money to buy a new one. Amrutaben only desired to ask God for one thing, a new pushcart ! because everything else she could take care of on her own despite such bad situation.

An employee of the Adani foundation have spoken with Sarpanch Hawaben about the work being done by the Foundation on support of people with disabilities. As soon as she informed & requested that to make visit at Jiluben house. Their pushcart needs were discussed by representative from the visited, verified all the necessary paperwork, and spoke with Jiluben and her family about government programs for widows and people with disabilities. And a week later the entire process was completed and the new pushcart was provided to them. She is now able to work promptly and help their family in overcoming this difficulty.

# SUCCESS STORY- Mundra


## Only a teacher can turn the disability into a talent ! - Mundra

Challenges are what make life interesting. Overcoming them is what makes life meaningful". Halepotra sadiya studying in class 4 of Dhrub primary school is the SEN - special education needed .she is not able to see clearly through her eyes that is having the problem of vision by birth , she underwent 4 operations but have a great IQ level which never stopped her from learning new things. sadiya's parents never stopped her coming to school. she had a problem in basic maths ,gujarati reading and writing but within an year she worked continuously during her free time and now is able to read write and perform basic calculation. Her favourite hobby is learning new things , colouring and listening new rhymes from YouTube. she can now stand up in morning assembly and give her introduction in English . "only a teacher can turn the disability into a talent through hard work and self confidence". Her dream is to become a teacher.

# SUCCESS STORY
# Hazira

Journey of Transformation in the Lives of Umarpada Tribal Women

Umarpada is a Town and Taluka in Surat District of Gujarat. According to census 2011 there are 17,338 houses and 83,723 people living in the taluka. In terms of literacy, 58.56% of people in Umarpada Taluka are educated. From 2022 to 2023, the Adani Foundation's Hazira unit begin its CSR efforts in the Umarpada block as part of the Tribal Development Initiative. empowerment of women is One of the most significant aspects of this project. In Ghanawad village, most of the women used to do household work and often went into the forest and nearby villages for agriculture related work. They labour 8 to 10 hours and actually earn between Rs. 100 and Rs.130. This group, which is entirely made up of tribal people, also includes one of the oldest still-existing primitive tribes, the Kotwadiya community. Due to the majority of their hours being spent at work, they are unable to emphasise on the health and education of their child.

Ten potential SHGs have been uncovered by AF Hazira Team. A group of women were encountered and trained by the AF Hazira staff. In the initial batch, 35 tribal women were Trained in the production of papad, pickles, and masala. These women thought they could manage this business unit after ten days of training. With the help of the hygienic standards they have begun preparing pickles and papads in their own kitchens. They have partnerships with Surat-based businesses to supply their items to their canteen as well as local markets where they sell their products. They have a fixed source of additional income. They gather around and talk about one other's challenges in order to discover solutions as a group. The other villager's women have looked up to this group of women as a role model.

# SUCCESS STORY - Dahej

Impact of silage in Income of Maheshbhai

Maheshbhai Haribhai Ahir lives in the Atali village of Dahej Taluka with his family. His primary source of income comes from the production and distribution of milk. His family has owned 3 cows and 23 buffaloes in addition to 5 acres of agricultural land. Twenty buffalos and two cows are currently lactating. This is the second generation of the family working in animal husbandry. In the summer, they suffer from a lack of green fodder due to irrigation systems being insufficient. There is plenty of green animal feed available during the rainy season. In order to produce milk, green feed is crucial.

Adani Foundation held farmer meetings in the village of Atali on January 18, 2012. Give details about making silage for animal feeding at this meeting. Making silage would solve the problem of summer time green fodder shortage. Maheshbhai received 10 50kg silage bags in March 2022. Silage feeding increased milk production by 2 litres per day (from current milk production 6 litres). In just 60 days, milk production has increased by a total of 120 litres, and income has increased by a total of Rs. 7200. Production of milk increased by 480 litres from the following year to 300 litres in 2021.

# SUCCESS STORY - Mundra

health care service is to save the lives !

Mohammad Sadik Turk, 16, of Dhrub arrived in critical condition because of pain in the area of his kidneys. The condition was treated as an intestinal problem by doctors. The specialists tried their best to treat him & offering variety of medications. Support him for his routine dialysis for six to eight months while paying attention to his condition. He no longer needs dialysis after complete therapy, but he still needs to regularly administer injections three times every month.

Many young children pass away each year from insufficient medical care and inability to pay for necessary treatments. As long as there is only one source of income for the family and everyone depends on him, it is hard to provide costs for those who are living below the poverty line. Although India has more than 50,000 patients who receive long term dialysis, it has only a thousand kidney specialists in the entire country. Furthermore, treatment can be expensive. In situation like this Foundation pays for the child's injections in light of his financial situation and wishes him a quick recovery and a long and healthy life. The main goal of the Adani Foundation's community health care service is to save the lives of children like Sadik.

# SUCCESS STORY
# Mundra


Hope and Faith from the Mobile health Unit Justify!

Jorubha Bapubha Jadeja, age 70 of Hatadi village has been suffering severe weakness. He was short of Money and means of transportation to go to the hospital. thereafter waits for the Adani Foundation's mobile health care unit to arrive. A foundation initiative to provide primary facility at door by the mobile health care unit. Since everyone in the village is aware of this, they regularly choose to come here for primary health problems. After giving them basic care, transfer them to a hospital facility if required, and if not, doctors follow up with them until they recovered. Jorubha anticipated the arrival of the Mobile Unit of the Foundation in his village because he was unable to get to the hospital & he has faith in Mobile unit as he has earlier recovered from illness without visiting a hospital.

The prospect of meeting with a doctor gave them hope for improvement in his health. His health had become a little worse since it had been a few days. Jorubha entered worth of headache, nausea, and vomiting symptoms. His blood pressure was 168/90 mmHg at the moment, so he needed symptomatic and other necessary treatment. Along with medication, the doctor encourages him to take care of himself by avoiding unhealthy food that is fried or oily, applying salt sparingly, and engaging in light activity like walking. yoga. Doctor take ongoing telephone follow-up with Jorubha & providing them with the information they wanted. The mobile health unit returned on Friday to check blood pressure once more; it was 155/85mmHg. then Antihypertensive medication was started. Blood pressure is periodically checked every Friday and is continuously monitored after 20 days when it enters the usual range of 123/80 mmHg. Jorubha was delighted when he saw how much the doctor cared like his son and also how his health had improved. The Adani Foundation received blessing from him.

# SUCCESS STORY - Mundra

**Suf Handicraft : Conserving "VIRASAT" of Decades**

Parvati Ben's earliest memory of stitching delicate handicrafts is from when she was as little as 5-years-old. Since then, she has followed this art with an immense dedication that shows through her intricate and precise handiwork. Parvati is a resident of Pragpar-2 village. She lives in a house with 5 other people and is the sole breadwinner. Even so, Parvati is a humble, loving and welcoming individual.

Parvati Ben had been practising her intricate Suf handicraft all along, making scarves, table cloths, garments and more for her fellow villagers and the occasional visitors. Her artwork had consistently been worth more than what she sold it for- her only desire being that her art finds an expression, a space in the world, however small it may be. One day, Adani Foundation discovered this diligent, rigorous woman. Parvati Ben now works on projects brought to her by Adani Foundation and is hence able to sustain her entire family on her own. She has risen to be an aspirational figure, looked upon as a role model by her fellow village women. Parvati Ben is playing a major role in now setting up a federation for the village women across Mundra district to practise their handicraft work and earn a livelihood. But more than all the titles and positions, what Parvati Ben deems sacred is the sheer recognition of her art. All she ever wanted was to be known as an artist and now she is the voice of this very own art, inspiring dozens of women like her to become independent.

# EVENTS

Support of Biogas kits on Earth Day

Participation Krishi Mela in presence of Central Agricultural minister

Utthan students prepared cards on Mother's Day

World Health Day celebrated by creating health awareness programs and schools and at Adani wilmar.

No Tobacco day celebrated by creating awareness to take preventive measures for workforce

Tree plantation at Zarpara village on 'Word Environment Day' in presence of SDM

International coastal clean-up day was celebrated in association with National Coast Guard department at mandavi with Cleanliness Drive.

The International Mangrove Day for the Conservation of the Mangrove Ecosystem is celebrated every year on **26th July**,

Teacher Day Celebration on 5th September in all Utthan School.

# AWARDS


Adani Foundation received Diamond Award in participatory ground water management organized by Quality circle forum of India - QCFI


Jyoti ben tank received Award from Vice Precident in Amazing Indians Awards who is member of Prakrutik Sahkari Mandali supported by Adani Foundation which is matter of Proud

Received appreciation letter from District Animal Welfare Departent for commendable work for Cattles affected by Lumpy Virus

# PRESS NOTE

## અદાણી ફાઉન્ડેશન દ્વારા સ્વંત્રતા દિવસે ૧૭ શાળાઓમાં સ્પોર્ટસ અને મ્યુઝિક કીટનું વિતરણ

## અદાણી ફાઉન્ડેશન આઈસીડીએસ અને ઈન્નરવ્હીલ કલબ ઓફ મુંદરાના સંયુક્ત ઉપક્રમે મહિલા દિવસની અનોખી ઉજવણી

## જળસંરક્ષણ ક્ષેત્રે અસામાન્ય કામગીરી બદલ સન્માન

# અદાણી ફાઉન્ડેશનને જળશક્તિ મંત્રાલય તરફથી એવોર્ડ એનાયત

## અદાણી ફાઉન્ડેશને નેત્રંગ તાલુકાના અંતરિયાળ વિસ્તારમાં પુસ્તકાલયની સ્થાપના કરી

## મુંદરા પોર્ટની અદાણી વિલમાર કંપનીમાં વિશ્વ મેલેરિયા દિવસની ઉજવણી કરાઈ

### મેલેરિયા કેવી રીતે ફેલાય છે?

# PRESS NOTE

કચ્છમિત્ર

## વાહકજન્ય રોગો અંગે સમજ આપી સંપૂર્ણ સારવાર પર ભાર મુકાયો

કલ્પતરુ પ્રોજેક્ટ હેઠળ ૫૦ લાખ વૃક્ષોનું વાવેતર કરવાનું લક્ષ્ય

## બોરાણામાં મુન્દ્રાની બ્રહ્માકુમારીઝ સંસ્થા દ્વારા ૧૧૦૦ રોપાંઓનું વાવેતર

## મુન્દ્રામાં સક્ષમ દ્વારા રોજગારીની તરકો વધારતા માછીમાર યુવાનો

પ્રગતિની બેચ-૧ પૂર્ણ અને બેચ-૨નો પ્રારંભ કરવામાં આવ્યો

## કચ્છની ૫૯ શાળાઓમાં 'ઇકો ફ્રેન્ડલી' રક્ષાબંધનની ઉજવણી

અદાણી ફાઉન્ડેશન પ્રકલ્પ ઉત્થાન પ્રોજેક્ટ અંતર્ગત વિવિધ દિવસોનો કરવામાં આવતી અનોખી રીતે ઉજવણી

## મુંદ્રામાં લોમ આયોગેસ પ્લાન્ટનું વિતરણ કરી 'વર્લ્ડ અર્થ ડે' ઉજવાયો

'અર્થ ડે'ને સાર્થક કરતુ અદાણી ફાઉન્ડેશનનું સરાહનીય કદમ!

## અદાણી ફાઉન્ડેશન ચોમાસામાં ટપકતી છત નીચે રહેતી આદિવાસી કન્યાઓની વ્હારે આવ્યું

लोकतेज

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अदाणी फाउंडेशन द्वारा नियोजित उड़ान परियोजना के तहत

## अदाणी हजीरा पोर्ट के शैक्षिक दौरे पर सूरत के छात्र


## अदाणी फाउन्डेशન દ્વારા હજીરા વિસ્તારમાં ત્રણ મીઠા પાણીના તળાવો તૈયાર કરવામાં આવ્યાં

અકસ્માત નિવારણ માટે રેલીંગ, વૃક્ષારોપણ સહિત અનેક લોકોપયોગી કાર્યો થઈ રહ્યાં છે

# Thank you

Annexure - XII

# World Environment Day, 2022 Celebration at Adani Power (Mundra) Limited

## World Environment Day, 2022 Celebration at Adani Power (Mundra) Limited

**World Environment Day 2022 is being held under the theme " # Only One Earth", highlighting the need of live Sustainably in harmony with nature by bringing transformative changes through Policies and our choices towards CLEANER, GREENER LIFESTYLES. The WED 2022 is being hosted by SWEDEN this year. The year 2022 marks 50 years since the first United Nations Conference on the Human Environment – the 1972 Stockholm Conference that led to the creation of UNEP and designating 5 June every year as World Environment Day.**

**On this Event, being Environment friendly Power producer, APMuL, Environment Department has organized awareness programme and activities as below details in view to spread awareness among our employees / associates of APMuL.**

An event was opened on 2nd by releasing online quiz, poster making competition, Model Making, Nature Online Photography competition and mass tree plantation. A successful mass tree plantation at East Side of Phase-4 LDO tank was organized on 4th in the presence of Shri Pramod Kumar Saxena, Station Head, different department HOD's, APMuL employees and associate business partners.

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## Sensitizing APMuL Employees and associates through Banners and Circulars



# Symbolic Plantation

Shri Pramod Kumar Saxena, Station Head planting saplings on the WED, 2022 Celebration

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## APMuL Dignitaries and Employees planting saplings on the WED, 2022 Celebration

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## Symbolic Plantation

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## Glimpse of Spot Quiz Organized at Various Department






# Glimpse of Spot Quiz Organized at Various Department





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## Winners of Environmental Model Competition

**1st Winner**
**Mr. Kaushik Pambhar**
**MMD Department**

**Runner Up**
**Mr. Prashant Akabari**
**MMD Department**

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# Winners of Environmental Posters Competition


**1st Winner**
**Mr. K I Raju**
**C & I Department**


**2nd Winner**
**Mr. Ghanshyam Makwana**
**C & I Department**


**3rd Winner**
**Mr. Aditya Tiwari**
**C & I Department**

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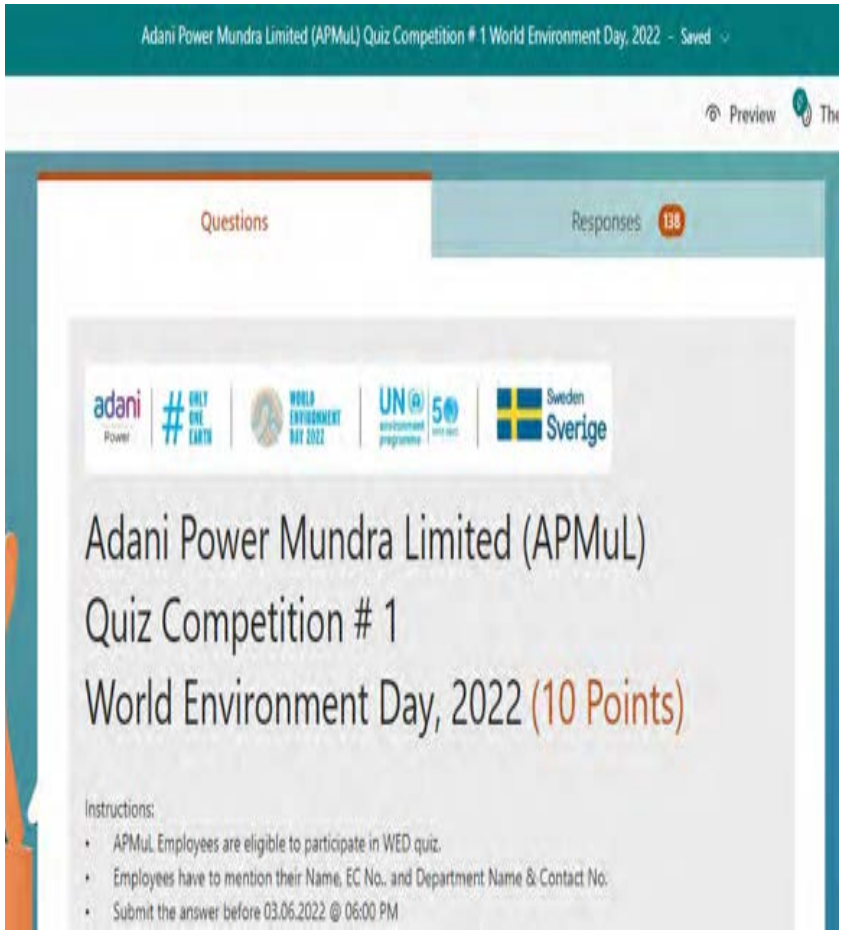
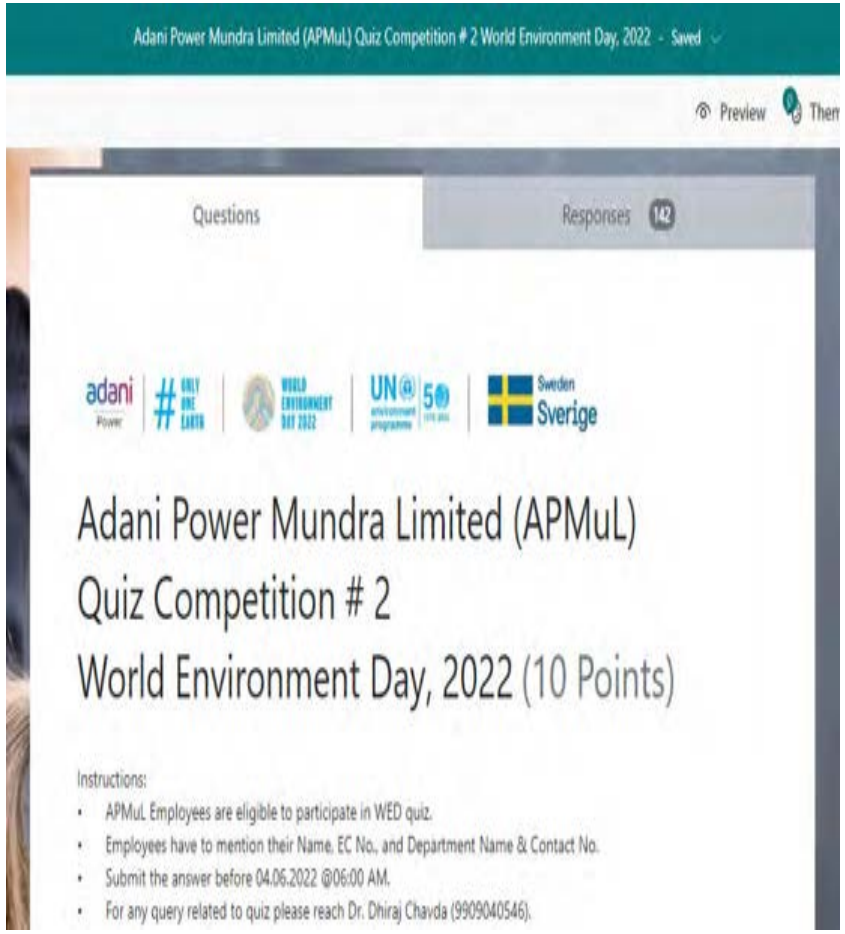
## Nature Photography Competition

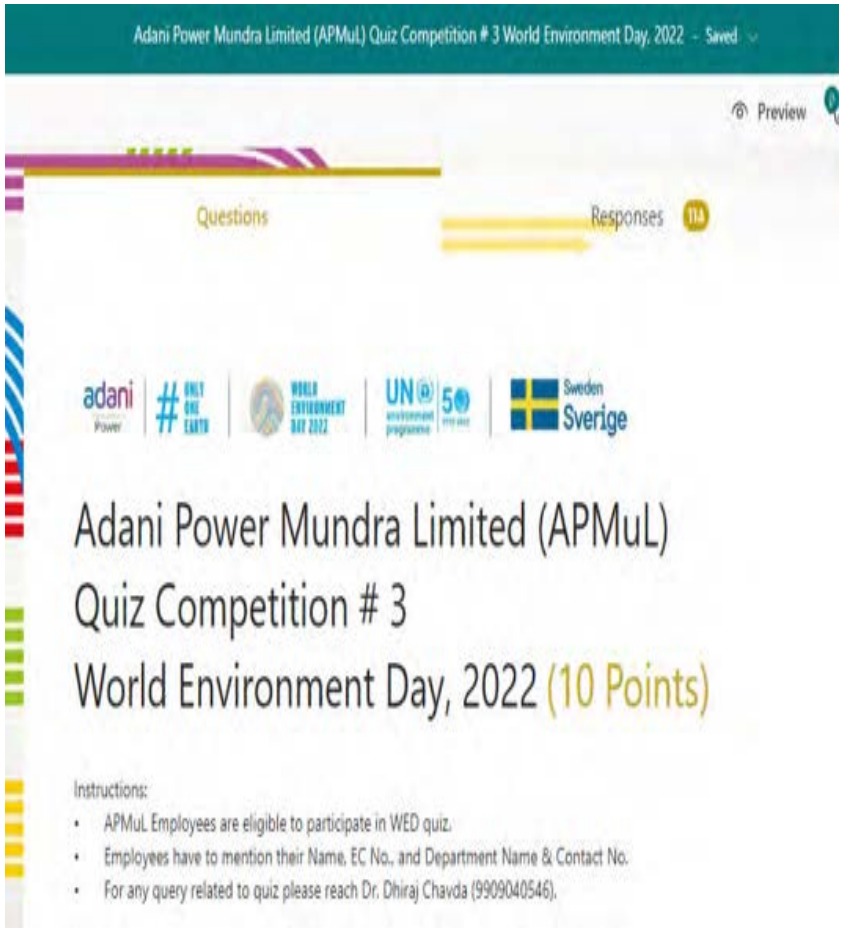
**1st Winner**
**Mr. Prashant Akbari**
**MMD Department**

**2nd Winner**
**Mr. Tajvirsinh Jadeja**
**C & I Department**

**3rd Winner**
**Mr. Sandip Kakadiya**
**CHP Department**




# Environmental Online Quiz Competition (03 Days)

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# Winners of Online Quiz

| Online Quiz # 1 | | |
|---|---|---|
| **Prize** | **Employee Name** | **Department** |
| 1st | Mr. Chandan Kumar | MMD-BOP |
| 2nd | Mr. Trushar R. Vyas | MTP & OE |
| 3rd | Mr. Amrut Mohanty | Chemistry |

| Online Quiz # 2 | | |
|---|---|---|
| **Prize** | **Employee Name** | **Department** |
| 1st | Mr. Ghanshyam Makwana | C&I Maintenance |
| 2nd | Mr. Jashvantrao Thakare | Chemistry |
| 3rd | Mr. Sandip Kakadiya | Inplant FM |

| Online Quiz # 3 | | |
|---|---|---|
| **Prize** | **Employee Name** | **Department** |
| 1st | Mr. Ashish Jha | C&I-O&M |
| 2nd | Mr. Meraj satapara | MMD |
| 3rd | Mr. Shailesh Gurjar | Operation-330 |

# Awareness Program on Environment for Homemakers/Housewives


- In view of creating awareness on adverse effects of environmental Pollution and uncontrolled extraction of natural resources in our society an Environment awareness Programme has been organized as a part of World Environment Day 2022 celebration activities for the Homemakers / Housewives of APMuL employees.

- The above programme was chaired by Mrs. Shubha Saxena, Mrs. Laxmi Mulla & Mrs. Leena Datar as Guest of Honor.


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