SIX-MONTHLY ENVIRONMENTAL COMPLIANCE REPORT OF STIPULATED CONDITIONS OF ENVIRONMENTAL CLEARANCE

(April, 2023 to September, 2023)

For

ESTABLISHED OF NEW MOLASSES/CANE JUICE/ GRAIN BASED DISTILLERY HAVING CAPACITY: 100 KLD ALONG WITH 4.5 MW

By

M/s Forever Distillery Private Limited

At

Plot No.-A, UPSIDA, Usar Bazar, Tehsil: Rudrapur, District: Deoria, Uttar Pradesh

For Submission to:

Ministry of Environment, Forest & Climate Change (Regional Office, Lucknow)

Submitted By:

M/s Forever Distillery Private Limited

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CHAPTER No. 01
INTRODUCTION AND PROJECT DESCRIPTION

Six monthly environmental compliance / status report is submitted for Established of New Molasses/Cane Juice/ Grain Based Distillery Having Capacity: 100 KLD Along With 4.5 MW by M/s Forever Distillery Pvt. Limited, for April, 2023 to September, 2023. The Project is located at Plot No.-A, UPSIDA, Usar Bazar, Tehsil: Rudrapur, District: Deoria, Uttar Pradesh Prior Environment Clearance was obtained from State Level Environment Impact Assessment Authority, Uttar Pradesh wide Ref. no.: **38/Parya/SEIAA/5948/2020, dated May 31st, 2021.** Consent to Establish under the provisions of Air and water has already been obtained for the project Vide Ref No. - **133465/UPPCB/Gorakhpur (UPPCBRO)/CTE/DEORIA/2021, dated 10/09/2021**. Copy of CTE is attached here as **Annexure - 1**. Industry started operating in September 2022, copy of CTO is attached as **Annexure - 2 (164110 /UPPCB /Gorakhpur (UPPCBRO) / CTO / both / DEORIA / 2022 dated 16.09.2022**.

Specific and general conditions stipulated in Environment Clearance complied during construction and will be complied post construction phases. Currently project is under operation phase.

Environmental mitigation measures described in Environmental Management Plan are being implemented operation phase. **M/s Forever Distillery Pvt. Limited** management team is fully conscious about Environmental Management and enhancing green belt development in project surrounding area.

Six monthly compliance/status reports for **April, 2023 to September, 2023** for conditions stipulated in the Environmental Clearance letter issued by SEIAA, U.P. are enclosed as **Annexure - 3**. Photographs view of implemented mitigation measures are also attached for the ready reference as Photo Documentation.

CHAPTER No. 02

COMPLIANCE OF STIPULATED CONDITIONS OF ENVIRONMENTAL CLEARANCE

Name of the Project: Established of New Molasses / Cane Juice / Grain Based Distillery having Capacity: 100 KLD along with 4.5 MW by Forever Distillery Private Limited, at Plot No.-A, UPSIDA, Usar Bazar, Tehsil: Rudrapur, District: Deoria, Uttar Pradesh.

Clearance Letter No: 38/Parya/SEIAA/5948/2020, dated May 31st, 2021.

Period of Compliance Report: (April, 2023 to September, 2023).

I. Statutory compliance		
Sr. No.	**Conditions**	**Compliance Status**
1.	45 days monitoring report of the area for air quality, water quality, noise level. Besides flora & fauna should be examined twice a week and be submitted within 60 days for a record.	Condition noted.
2.	The project proponent shall obtain forest clearance under the provisions of Forest (Conservation) Act, 1986, in case of the diversion of forest land for non-forest purpose involved in the project.	No forest area is found in study area; hence forest clearance condition is not applicable.
3.	The project proponent shall obtain clearance from the National Board for Wildlife, if applicable.	Not applicable.
4.	The project proponent shall prepare a Site-Specific Conservation Plan & Wildlife. Management Plan and approved by the Chief Wildlife Warden. The recommendations of the approved Site-Specific Conservation Plan/Wildlife Management Plan shall be implemented in consultation with the State Forest Department. The implementation report shall be furnished along with the six-monthly compliance report. (in case of the presence of schedule-I species in the study area).	Condition Noted. No schedule-I species is found in study area; hence this condition is not applicable.
5.	The project proponent shall obtain Consent to Establish/ Operate under the provisions of Air (Prevention &Control of Pollution) Act, 1981 and the Water (Prevention &Control of Pollution) Act, 1974 from the concerned	Consent to Establish/operate for the project has been obtained from the State Pollution Control Board as required under Air (Prevention and Control of Pollution) Act, 1981 and

	State pollution Control Board/ Committee.	the Water (Prevention and Control of Pollution) Act, 1974. Copy of CTE (Air & Water) is Enclosed as **Annexure-1.** Copy of CTO (Air and Water) is enclosed as **Annexure-2**.
6.	The project proponent shall obtain authorization under the Hazardous and other Waste Management Rules, 2016 as amended from time to time.	Unit obtain Hazardous Authorization under the Hazardous and other Waste Management Rules, 2016 as amended from time to time.
7.	The company shall strictly comply with the rules and guidelines under Manufacture, Storage and Import of Hazardous Chemical (MSIHC) Rules, 1989 as amended time to time. All transportation of Hazardous Chemical shall be as per the Motor Vehicle Act (MVA),1989.	The company has strictly be complying with the rules and guidelines under Manufacture Storage and Import of Hazardous Chemicals is as per the Motor Vehicle Act (MVA), 1989.
I.	**Air quality monitoring and preservation:**	
1.	The project proponent shall install 24x7 continuous emission monitoring system at process stacks to monitor stack emission with respect to standards prescribed in Environment (Protection) Rules 1986 and connected to SPCB and CPCB online server and calibrate this system from time to time according to equipment supplier specification through labs recognized under Environment (Protection) Act, 1986 or NABL accredited laboratories.	Unit has installed 24x7 continuous emission monitoring system at stack to monitor stack emissions with respect to standards prescribed in Environment (Protection) Rules 1986 and installed OCEMS is connected to SPCB and CPCB online servers. Regular calibrations of these systems are being done time to time according to equipment supplier specification through labs recognized under Environment (Protection) Act, 1986.
2.	The project proponent shall install system carryout to Ambient Air Quality Monitoring for common/criterion parameters relevant to the main pollutants released (eg PM_{10} and $PM_{2.5}$ in reference to PM emission, and SO_2 and NO_x in reference to SO_2 and Nox emissions) within and outside the plant area at least at four locations (one within and three outside the plant area at an angle of 120º each), covering upwind and downwind direct ions. (Case to case basis small plants:	As per the direction, unit has made arrangement for ambient air quality monitoring. Monitoring Results are attached as **Annexure-4**.

	Manual; Large plants: Continuous).	
3.	The project proponent shall submit monthly summary report of continuous stack emission and air quality monitoring and results of manual stack monitoring and manual monitoring of air quality/fugitive emissions to Regional Office of MoEF&CC, Zonal office of CPCB and Regional Office of SPCB along with six-monthly monitoring report.	Stack Monitoring and Ambient Air quality monitoring report is attached as **Annexure-4**.
4.	Appropriate Air Pollution Control (APC) system shall be provided for all the dust generating points including fugitive dust from all vulnerable sources, so as to comply prescribed stack emission and fugitive emission standards.	The unit installed bag filters as air pollution control system. Continuous online monitoring system has been installed as per guidelines on stack.
5.	The National Ambient Air Quality Emission Standards issued by the Ministry vide G.S.R. No. 826 (E) dated 16th November, 2009 shall be complied with.	The National Ambient Air Quality Emission Standards issued by the Ministry vide G.S.R. No. 826 (E) dated 16th November, 2009 will be complied with. Test report is attached as **Annexure-4**.
6.	Sulphur content should not exceed 0.5% in the coal for use in coal fired boilers to control particulate emissions within permissible limits (as applicable). The gaseous emissions shall be dispersed through stack of adequate height as per CPCB/SPCB guidelines.	Unit is only using biomass / bagasse as a fuel. Unit is using Biomass as fuel in boiler. The gaseous emissions are dispersed through stack of adequate height as per CPCB/SPCB guidelines.
7.	The DG set shall be equipped with suitable pollution control devices and the adequate stack height so that the emissions are in conformity with the extant regulations and the guidelines in the regard.	Condition noted and complied.
8.	Storage of raw materials, coal etc shall be either stored in silos or in covered areas to prevent dust pollution and other fugitive emissions.	Fuel stored in covered sheds and Grains is being stored in Silos. Regular water sprinkling is being done avoid dust pollution and fugitive emissions.
II.	**Water quality monitoring and preservation:**	
1.	For online continuous monitoring of effluent, the unit shall install web camera with night vision capability and flow meters	Unit is based on Zero Liquid discharge. Online equipment has been installed as per guidelines for

	in the channel/drain carrying effluent within the premises (applicable in case of the projects achieving ZLD) and connected to SPCB and CPCB online servers.	CPCB.
2.	Zero liquid discharge shall be ensured and no waste/treated water shall be discharged outside the premises (applicable in case of the project achieving the ZLD).	Unit is maintaining as zero liquid discharge system as per consent condition.
3.	Process effluent/ any wastewater shall not be allowed to mix with storm water. The Storm water from the premises shall be collected and discharged through a separate conveyance system.	Separate Storm water drain has been provided. The Storm water from the premises has been collected and discharged through a separate conveyance system.
4.	The effluent discharge shall conform to the standards prescribed under the Environment (Protection) Rules, 1986, or as specified by the State Pollution Control Board while granting Consent under the Air/Water Act, whichever is more stringent.	Unit is maintaining as Zero Liquid Discharge system as per consent condition.
5.	Total fresh water requirement shall not exceed the proposed quantity or as specified by the committee. Prior permission shall be obtained from the concerned regulatory authority/ CGWA in this regard.	Unit has obtained NOC from Ground Water Department of Uttar Pradesh.
6.	Industrial/ trade effluent shall be segregated into High COD/TDS and Low COD/TDS effluent streams. High TDS/COD shall be passed through stripper followed by MEE and ATFD (agitated thin film drier). Low TDS effluent stream shall be treated in ETP and then passed through RO system.	Unit is maintaining as Zero Liquid Discharge system as per consent condition. Other effluent is being treated in Condensate polishing unit and 100 % treated water is being recycled.
7.	The Company shall harvest rainwater from the roof tops of the buildings and storm water drains to recharge the ground water and utilize the same for different industrial operations within the plant.	Rain water harvesting has been adopted by industry for roof top only.
III.	**Noise monitoring and prevention:**	
1.	Acoustic enclosure shall be provided to DG set for controlling the noise pollution.	DG set are provided with acoustic enclosure to reduce the noise level.
2.	The overall noise levels in and around the plant area shall be kept well within the standards by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of	The overall noise levels in and around the plant area is being kept well within the standards as unit provided noise control measures including acoustic hoods, silencers,

	noise generation.	enclosures etc. on all sources of noise generation. Monitoring report is attached as **Annexure-4**.
3.	The ambient noise levels should conform to the standards prescribed under E (P)A Rules, 1986 viz. 75 dB(A) during day time and 70 dB(A) during night time.	Ambient Noise level is found within standard. Ambient Noise monitoring report is attached as **Annexure-4**.
IV. Energy Conservation measure:		
1.	The Energy sources for lighting purposes shall preferably be LED based.	The unit already installed LED lighting in the campus.
V. Waste management:		
1.	Hazardous chemicals shall be stored in tanks, tank farms, drums, carboys etc. Flame arresters shall be provided on tank farm and the solvent transfer through pumps.	Condition noted and complied.
2.	Process organic residue and spent carbon, if any shall be sent to cement industries. ETP sludge, process inorganic & evaporation salt shall be disposed off to the TSDF.	Hazardous waste generated is being provided to TSDF for further disposal.
3.	**The company shall undertake waste minimization measures as below: -**	
iii.	Metering and control of quantities of active ingredients to minimize waste.	Mass flow meter has been installed at different point as per the guidelines.
iv.	Reuse of by- products from the process as raw materials or as raw material substitutes in other processes.	DDGS generated from the spent wash treatment which is being sell in the market as Cattle feed.
v.	Use of automated filling to minimized spillage.	Complied.
vi.	Use of Close feed system into batch reactors.	Closed feed system has been provided.
vii.	Venting equipment through vapour recovery system.	Already provided.
viii.	Use of high-pressure hoses for equipment clearing to reduce waste water generation.	Noted.
VI. Green Belt:		
1.	Green belt shall be developed in an area equal to 33% of the plant area with a native tree species in accordance with CPCB guidelines. The greenbelt shall inter alia cover the entire periphery of the plant.	33% green belt is being developed within the plant premises as per the guidelines.
VII. Safety, Public hearing and Human health issues:		
1.	Emergency preparedness plan based on the	Disaster management plan has been

	Hazard identification and Risk Assessment (HIRA) and Disaster Management Plan shall be implemented.	prepared and same is being implemented within premises.
2.	The PP shall provide Personal Protection Equipment (PPE) as per the norms of Factory Act.	Personal Protection Equipment (PPE) has been provided as per the norms of Factory Act.
3.	Training shall be imparted to all employees on safety and health aspects of chemicals handling. Pre-employment and routine periodical medical examinations for all employees shall be undertaken on regular basis. Training to all employees on handling of chemicals shall be imparted.	Training is being imparted to all employees on safety and health aspects of chemicals handling. Records is being maintained.
4.	Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	Condition noted.
5.	Occupational health surveillance of the workers shall be done on a regular basis and records maintained as per the Factories Act.	Occupation health surveillance of worker is being done once in six months and record is being maintained.
6.	There shall be adequate space inside the plant premises earmarked for parking of vehicles for raw materials and finished products, and no parking to be allowed outside on public places.	Unit earmark adequate space for parking of vehicles. Copy of the final layout depicting parking area is already submitted.
VIII.	**Corporate Environment Responsibility**	
1.	The project proponent shall comply with the provisions contained in this Ministry's OM vide F.No 22-65/2017-IA.III dated 1st May 2018, as applicable, regarding Corporate Environment Responsibility.	The MoEF Office Memorandum dated 30.09.2020 has superseded the Office Memorandum dated 01.05.2018 regarding the Corporate Environmental Responsibility. The unit is committed and is providing education funds in training centers/support in nearby villages school, support in health care facilities, drinking water supply, and allocated funds for miscellaneous activities like solar

		street lights, battery, solar panel etc. in nearby villages.
2.	The company shall have a well laid down environmental policy duly approve by the Board of Directors. The environmental policy should prescribe for standard operating procedures to have proper checks and balances and to bring into focus any infringements/ deviation/ violation of the environmental/ forest/ wildlife norms/ conditions. The company shall have defined system of reporting infringements/ deviation/ violation of the environmental/ forest/ wildlife norms I conditions and / or shareholders/ stake holders. The copy of the board resolution in this regard shall be submitted to the MoEF&CC as a part of six-monthly report.	Company has laid down the Environmental policy. Same is being displayed.
3.	A separate Environmental cell both at the project and company head quarter level, with qualified personnel shall be set up under the control of senior Executive, who will directly to the head of the organization.	The unit has organized an Environmental Cell to take care of all concerning stipulated conditions regarding environment.
4.	Action plan for implementing EMP and environmental conditions along with responsibility matrix of the company shall be prepared and shall be duly approved by competent authority. The year wise funds earmarked for environmental protection measures shall be kept in separate account and not to be diverted for any other purpose. Year wise progress of implementation of action plan shall be reported to the Ministry/ Regional Office along with the Six-Monthly Compliance report.	Approved Environmental management plan has been implemented and Cost for Environmental Management plan is attached as **Annexure-5**.
5.	Self-environmental audit shall be conduct annually. Every three years third party environmental audit shall be carried out.	Condition noted and complied.
IX.	**Miscellaneous:**	
1.	As proposed treated waste water should be completely recycle/ reuse and ZLD should be achieved. Under no circumstances treated waste water shall be discharged to any	Unit is working on principle of maximum reuse and recycle; unit is being maintaining zero liquid discharge scheme.

	drain/sewer line/ inland surface water/ Nala etc.	
2.	"Directions/suggestions given during public hearing and commitment made by the project proponent should be strictly complied".	Action plan against the public hearing issues has been submitted with Final EIA and EMP. Action plan is attached as **Annexure-6**.
3.	The project proponent shall make public the environmental clearance granted for their project along with the environmental conditions and safeguard at their cost by prominently advertising it at least in two newspapers of the District or State, of which one shall be in the vernacular language within seven days and in addition this shall also be displayed in the project proponent's website permanently.	The copy of published information (in 2 newspapers) regarding grant of environmental clearance.
4.	The copies of the environmental clearance shall be submitted by the project proponent to the Heads of the local bodies, Panchayat and Municipal bodies in addition to the relevant officers of the Government who in turn has to display the same for 30 days from the date of receipt.	The copies of the environment clearance letter are submitted to the Heads of local bodies Panchayat and Municipal bodies.
5.	The project 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 on half-yearly basis.	Condition noted and complied.
6.	The project proponent shall monitor the criteria pollutant levels namely; PM_{10}, SO_2, NO_x (ambient levels as well as stack emissions) or critical sectorial parameters, indicated for the projects and display the same at a convenient location for discloser to the public and put on the website of the company.	Unit is regularly monitoring the ambient air quality; copy of the test reports is enclosed here with as **Annexure-4**.
7.	The project proponent shall submit six-monthly reports on the status of the compliance of the stipulated environmental conditions on the website of the ministry of Environment, Forest and climate change at environmental clearance portal.	Condition noted and complied.
8.	The project proponent shall submit the	Point is noted and complied.

	environmental statement for each financial year in Form-V to the concerned State Pollution Control Board as prescribed under the Environmental (Protection) Rules, 1986, as amended subsequently and put on the website of the company.	Form V has been submitted within stipulated time frame.
9.	The project proponent shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities, commencing the land development work and start of production operation by the project.	Unit has started the production in September 2022.
10.	The project authorities must strictly adhere to the stipulations made by the State Pollution Control Board and the State Government.	The project authorities are strictly complying to the stipulations made by the State Pollution Control Board and the State Government.
11.	The project proponent shall abide by all the commitments and recommendations made in the EIA/EMP report, commitment made during Public Hearing and also that during their presentation to the Expert Appraisal Committee.	The project proponent abides by all the commitments and recommendations made in the EIA/EMP report, commitment made during Public Hearing and also that during their presentation to the Expert Appraisal Committee
12.	No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment, Forest and climate change (MoEF&CC).	Unit will not expand or modify the plant without prior approval from the MoEF as well as UPPCB.
13.	Concealing factual data or submission of false/fabricated data may result in revocation of this environmental clearance and attract action under the provisions of Environment (Protection) Act, 1986.	Unit has not concealed any data.
14.	The Ministry may revoke or suspend the clearance, if implementation of any of the above conditions is not satisfactory.	Condition noted.
15.	The Ministry reserves the right to stipulate additional conditions if found necessary.	Condition noted.
16.	The company in a time bound manner shall implement these conditions.	Condition noted.
17.	The Regional Office of this Ministry shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the Officer (s) of	Condition noted.

	the Regional Office by furnishing the requisite data/information/monitoring reports.	
18.	The above condition shall be enforced inter-alia under the provisions of the water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Rules 1986, the Hazardous and other Waste Management Rules, 2016 and the Public Liability Insurance Act, 1991 along with their amendments and Rules and any other orders passed by the Hon'ble Supreme Court of India/ High Courts and any other Court of Law relating to the subject matter.	Condition noted and complied.
19.	Any appeal against this EC shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act 2010.	Condition noted.

CHAPTER No. 03
DETAILS OF ENVIRONMENTAL MONITORING

3.1 AMBIENT AIR QUALITY MONITORING

3.1.1 Ambient air Quality Monitoring Stations

Ambient air quality monitoring has been carried out 04 locations to assess the ambient air quality. This will enable to have analytical understanding about air quality and the changes in the air environment in the study area with respect to the condition prevailing. The locations of the ambient air quality monitoring stations are given in **Table-3.1**: -

Table-3.1: Details of Ambient Air Quality Monitoring Stations

Sr. No	Location Code	Location Name/ Description	Environmental Setting of surrounding	Date of Monitoring
1.	AAQ - 1	Near Main Gate	Industrial	16.08.2023 to 17.08.2023
2.	AAQ - 2	Usra Bazar	Residential	16.08.2023 to 17.08.2023
3.	AAQ - 3	Loniatola	Residential	17.08.2023 to 18.08.2023
4.	AAQ - 4	Majhgawan	Residential	17.08.2023 to 18.08.2023

AAQ - 1: Near Main Gate

The sampler was placed Near Main Gate and was free from any obstructions. Surroundings of the sampling site represent industrial environmental setting.

AAQ - 2: Usra Bazar

The sampler was placed at Usra Bazar and was free from any obstructions. Surroundings of the sampling site represent residential environmental setting.

AAQ - 3: Loniatola

The sampler was placed at Loniatola and it was also free from any obstructions. Surroundings of the sampling site represent residential environment setting.

AAQ - 4: Near Sai Baba Temple

The sampler was placed at Majhgawan and it was also free from any obstructions. Surroundings of the sampling site represent residential environment setting.

3.1.2 Ambient Air Quality Monitoring Methodology

Monitoring was conducted in respect of the following parameters:

- Respirable Suspended Particulate Matter (PM_{10})
- Fine Particulate Matter ($PM_{2.5}$)
- Sulphur Dioxide (SO_2)
- Oxides of Nitrogen (NO_X)

The duration of sampling of PM_{10}, $PM_{2.5}$, SO_2 and NO_X was 24 hourly continuous sampling per day duration monitoring. The monitoring was conducted for one day at the location. This is to allow a comparison with the National Ambient Air Quality Standards.

The air samples were analyzed as per standard methods specified by Central Pollution Control Board (CPCB) and IS: 5182. The techniques used for ambient air quality monitoring and minimum detectable levels are given in **Table-3.2**.

Fine Particulate Sampler instruments have been used for monitoring Particulate Matter 2.5 ($PM_{2.5}$ i.e. <2.5 microns), and Respirable Dust Sampler with gaseous sampling attachment was used for sampling Respirable fraction (<10 microns), gaseous pollutants like SO_2, and NOx.

Table-3.2: Techniques used for Ambient Air Quality Monitoring

Sr. No	Parameter	Technique	Range of testing /limit of detection
1.	Respirable Suspended Particulate Matter (PM_{10})	Respirable Dust Sampler, with cyclone separator, Gravimetric Method	5.0 - 1200
2.	Fine Particulate Matter ($PM_{2.5}$)	Fine Particulate Sampler, Gravimetric Method	2.0 - 500
3.	Sulphur dioxide	Modified West and Gaeke	5.0 - 1050
4.	Oxides of Nitrogen	Jacob & Hochheiser	6.0 - 750

3.1.3 Ambient Air Quality Monitoring Results Near Main Gate

The detailed on-site monitoring results of $PM_{2.5}$, PM_{10}, SO_2 and NO_X are presented in **Table-3.3**.

Table-3.3: Ambient Air Quality Monitoring Results Near Main Gate

Sr. No	Particulars	Protocol	Unit	Result	Range of testing /limit of detection	Standard as per NAAQS; dated 18/11/ 2009
1	**Particulate matters size less than 10 µm (PM_{10})**	IS: 5182 (Part-23): 2006 Reaffirmed: 2022	µg/m^3	**82.6**	5.0 - 1200	For 24 hour =100
2	**Particulate matters size less than 2.5 µm ($PM_{2.5}$)**	IS: 5182 (Part-24): 2019	µg/m^3	**53.50**	2.0 - 500	For 24 hour =60
3	**Sulphur Dioxides (SO_2)**	IS: 5182 (Part-2): 2001 Reaffirmed: 2022	µg/m^3	**14.31**	5.0 - 1050	For 24 hour =80
4	**Oxides of Nitrogen (NO_X)**	IS: 5182 (Part-6): 2006 Reaffirmed: 2022	µg/m^3	**21.46**	6.0 - 750	For 24 hour =80

3.1.4 Ambient Air Quality Monitoring Results at Usra Bazar

The detailed on-site monitoring results of $PM_{2.5}$, PM_{10}, SO_2 and NOx are presented in **Table-3.4**.

Table-3.4: Ambient Air Quality Monitoring Results at Usra Bazar

Sr. No	Particulars	Protocol	Unit	Result	Range of testing /limit of detection	Standard as per NAAQS; dated 18/11/ 2009
1	**Particulate matters size less than 10 µm (PM_{10})**	IS: 5182 (Part-23): 2006 Reaffirmed: 2022	µg/m^3	**79.6**	5.0 - 1200	For 24 hour =100
2	**Particulate matters size less than 2.5 µm ($PM_{2.5}$)**	IS: 5182 (Part-24): 2019	µg/m^3	**49.66**	2.0 - 500	For 24 hour =60
3	**Sulphur Dioxides (SO_2)**	IS: 5182 (Part-2): 2001 Reaffirmed: 2022	µg/m^3	**13.42**	5.0 - 1050	For 24 hour =80
4	**Oxides of Nitrogen (NO_X)**	IS: 5182 (Part-6): 2006 Reaffirmed: 2022	µg/m^3	**19.68**	6.0 - 750	For 24 hour =80

3.1.5 Ambient Air Quality Monitoring Results at Loniatola

The detailed on-site monitoring results of $PM_{2.5}$, PM_{10}, SO_2 and NO_X are presented in **Table-3.5**.

Table-3.5: Ambient Air Quality Monitoring Results at Loniatola

Sr. No	Particulars	Protocol	Unit	Result	Range of testing /limit of detection	Standard as per NAAQS; dated 18/11/ 2009
1	**Particulate matters size less than 10 µm (PM_{10})**	IS: 5182 (Part-23): 2006 Reaffirmed: 2022	µg/m^3	**76.2**	5.0 - 1200	For 24 hour =100
2	**Particulate matters size less than 2.5 µm ($PM_{2.5}$)**	IS: 5182 (Part-24): 2019	µg/m^3	**45.91**	2.0 - 500	For 24 hour =60
3	**Sulphur Dioxides (SO_2)**	IS: 5182 (Part-2): 2001 Reaffirmed: 2022	µg/m^3	**12.98**	5.0 - 1050	For 24 hour =80
4	**Oxides of Nitrogen (NO_X)**	IS: 5182 (Part-6): 2006 Reaffirmed: 2022	µg/m^3	**19.42**	6.0 - 750	For 24 hour =80

3.1.6 Ambient Air Quality Monitoring Results at Majhgawan

The detailed on-site monitoring results of $PM_{2.5}$, PM_{10}, SO_2 and NO_X are presented in **Table-3.6**.

Table-3.6: Ambient Air Quality Monitoring Results at Majhgawan

Sr. No	Particulars	Protocol	Unit	Result	Range of testing /limit of detection	Standard as per NAAQS; dated 18/11/ 2009
1	**Particulate matters size less than 10 µm (PM_{10})**	IS: 5182 (Part-23): 2006 Reaffirmed: 2022	µg/m^3	**79.3**	5.0 - 1200	For 24 hour =100
2	**Particulate matters size less than 2.5 µm ($PM_{2.5}$)**	IS: 5182 (Part-24): 2019	µg/m^3	**46.36**	2.0 - 500	For 24 hour =60
3	**Sulphur Dioxides (SO_2)**	IS: 5182 (Part-2): 2001 Reaffirmed: 2022	µg/m^3	**13.02**	5.0 - 1050	For 24 hour =80
4	**Oxides of Nitrogen (NO_X)**	IS: 5182 (Part-6): 2006 Reaffirmed: 2022	µg/m^3	**17.86**	6.0 - 750	For 24 hour =80

3.1.7 Discussion on Ambient Air Quality in the Study Area

The value of PM_{10} at Ambient Air Monitoring Station No: 1, 2, 3 & 4 are 82.6 µg/m^3, 79.6 µg/m^3, 76.2 µg/m^3 & 79.3 µg/m^3 respectively which were within permissible limit of 100 µg/m^3 and $PM_{2.5}$ levels are 53.50 µg/m^3 Near Main Gate, 49.66 µg/m^3 at Usra Bazar, 45.91 µg/m^3 at Loniatola and 46.60 µg/m^3 at Majhgawan, were also observed within permissible limit of 46.36 µg/m^3 (for residential, rural and other areas as stipulated in the National Ambient Air Quality Standards). SO_2 ranges between 12.98 µg/m^3 to 14.31 µg/m^3 and NO_X ranges between 17.86 µg/m^3 to 21.46 µg/m^3 was also observed within the corresponding stipulated limits (Limit for SO_2 and NO_X; 80 µg/m^3) at all of the 04 monitoring locations. Station wise variation of ambient air quality parameters has been graphically shown in **Figure-3.1 to 3.4**.

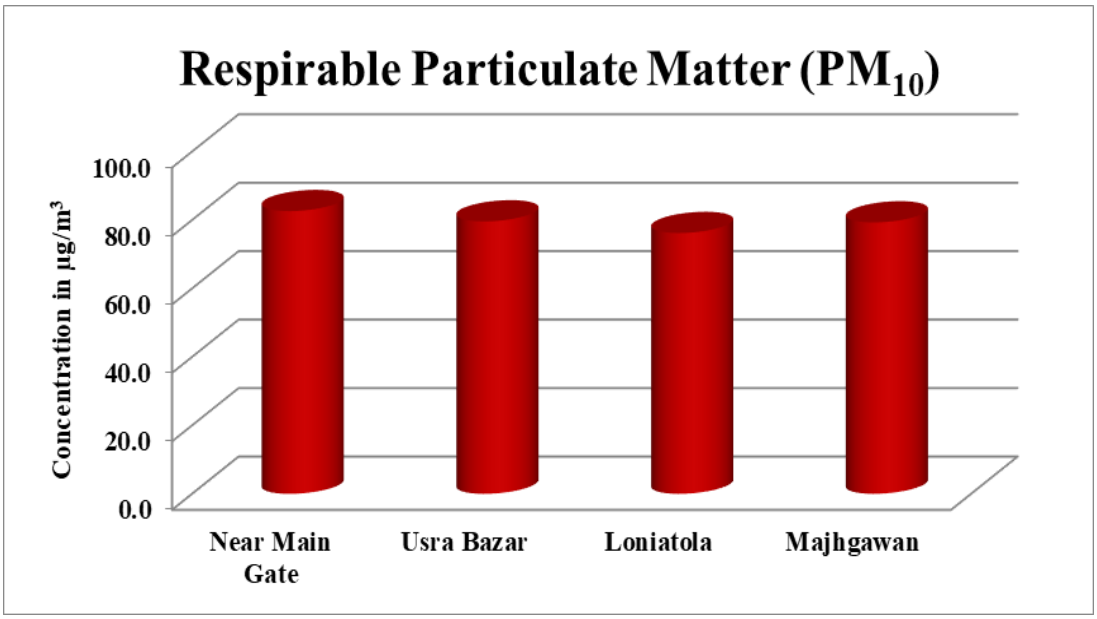

Figure-3.1: Graphs Showing PM_{10} Concentration at all sites

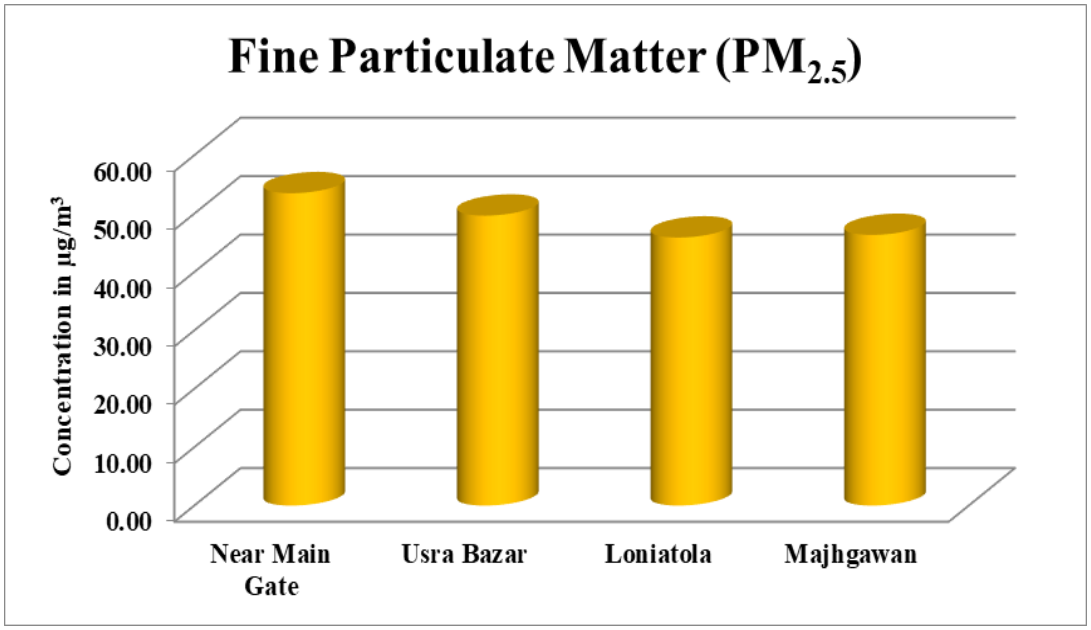

Figure-3.2: Graphs Showing $PM_{2.5}$ Concentration at all sites

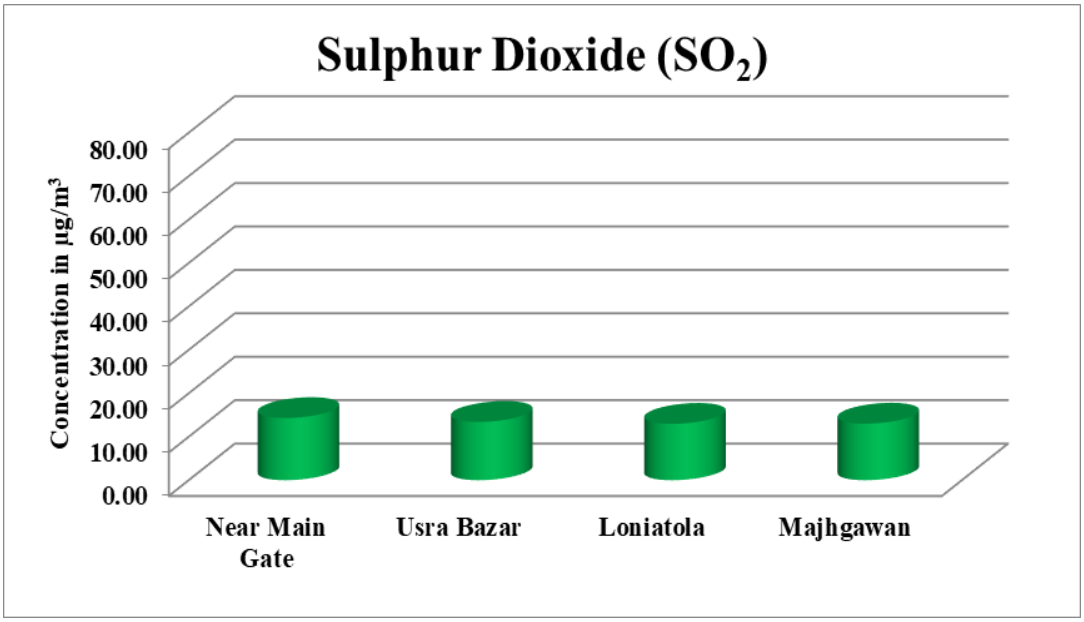

Figure-3.3: Graphs Showing SO_2 Concentration at all sites

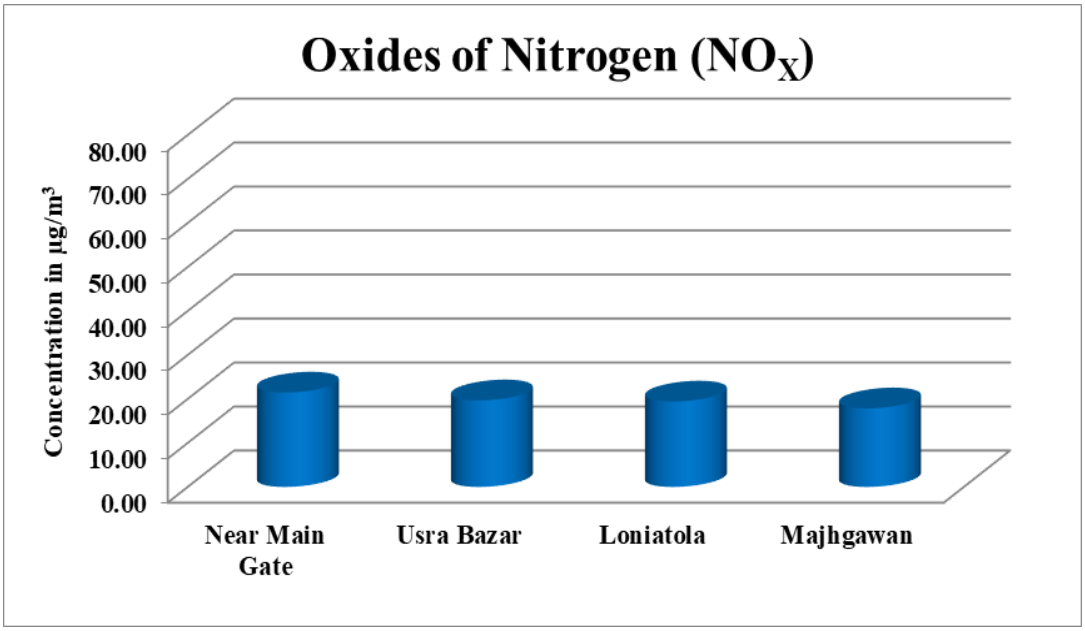

Figure-3.4: Graphs Showing NO_X Concentration at all sites

3.2 STACK EMISSION MONITORING

Stack Emission monitoring was carried out by EPA approved Laboratory on date 16.08.2023 for the installed 35.0 TPH slop fired boiler attached with Electro Static Precipitator as air pollution control device with a stack height of 72 meter.

3.2.1 Stack Emission Monitoring Methodology

Monitoring was conducted in respect of the following parameters:

- Particulate Matter (PM)

The Method used for Stack Emission monitoring and range of testing with CPCB standard are given in **Table-3.7**

Table-3.7: Details of Stack Emission Monitoring Results

Sr. No.	Parameter	Unit	Protocol	Result	Range of Testing/ Limit of Detection	Standard (as per CPCB)
1	Particulate Matter	mg/Nm^3	IS: 11255 (Part-1): 1985 Reaffirmed: 2019	**46.38**	2.0 - 1000	150

3.3 AMBIENT NOISE MONITORING

3.3.1 Ambient Noise Monitoring Locations

The main objective of noise monitoring in the study area is to assess the present ambient noise levels near project site due to various industrial activities and increased vehicular movement. A preliminary reconnaissance survey has been undertaken to identify the major noise generating sources in the area. Ambient noise monitoring was conducted at 1 location as given in **Table-3.8**.

Table-3.8: Details of Ambient Noise Monitoring Stations

Sr. No	Location Code	Location name and description	Date of Monitoring
1.	NQ - 01	At Plant Premises	17/08/2023 to 18/08/2023

3.3.2 Methodology of Noise Monitoring

Noise levels were measured using sound level meter. Noise level monitoring was carried out continuously for 24-hours with one-hour interval starting at 06:00 hrs to 06:00 hrs next day. The noise levels were monitored on working days only. During each hour Leq were directly computed by the instrument based on the sound pressure levels. Monitoring was carried out at 'A' response.

3.3.3 Ambient Noise Monitoring Results

The location wise ambient noise monitoring results is summarized in **Table-3.9**. The noise levels are graphically presented in **Figure-3.5**.

Table-3.9: Ambient Noise Monitoring Results

Ambient Noise Level				
Sr. No.	**Parameter**	**Unit**	**Results Day Time (06:00 AM - 10:00 PM)**	**Results Night Time (10:00 PM - 06:00 AM)**
1	**Equivalent sound level**	**dB(A)**	62.34	50.86

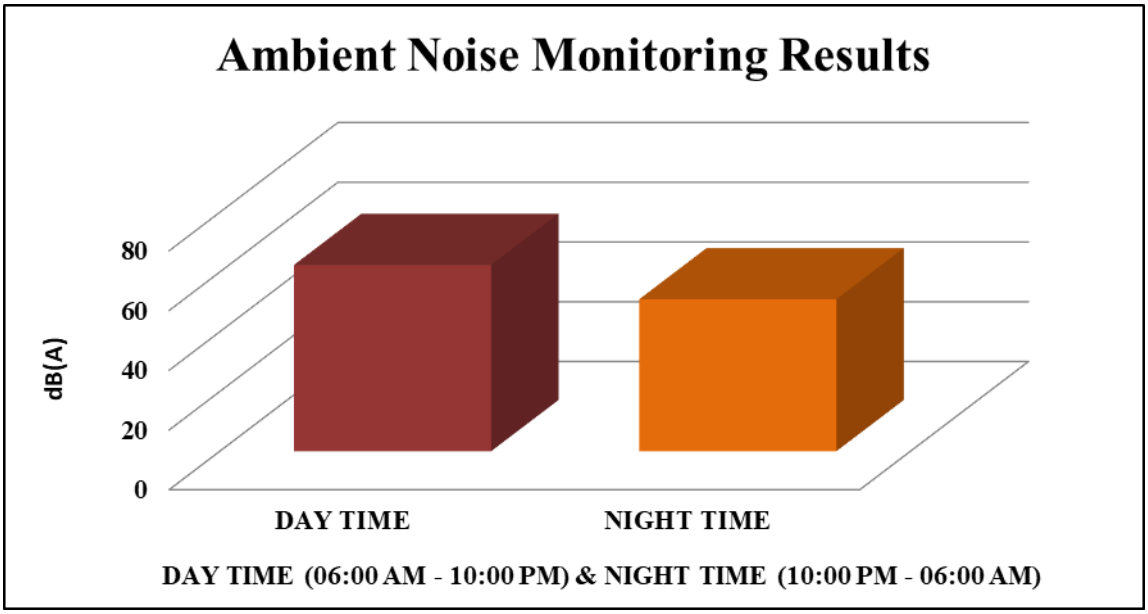

Figure-3.5: Day and Night Time noise Level at Plant Premises

Noise Standards as per CPCB Schedule rule 3(1) and 4(1)			
Area Code	Category of Area/Zone	Limits in dB(A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

3.3.4 Discussion on Ambient Noise Levels in the Study Area

Day Time Noise Levels (L_{day}):

The day time noise level at monitoring station was found 62.34 dB(A), which is within limits prescribed for industrial area i.e. 75 db (A).

Night Time Noise Levels (L_{night}):

The night time noise level at monitoring station was found 50.86 dB(A), which is within limit prescribed for industrial area i.e. 70 dB (A)

3.4 GROUND WATER QUALITY MONITORING

3.4.1 Ground water Quality Monitoring Locations

Keeping in view the importance of ground water, sample of ground water was collected from the project site for the assessment of impacts of the project on the groundwater quality.

Water sample was collected from the project site. The sample was analyzed for various parameters to compare with the standards for Ground water as per IS: 10500 for Groundwater sources. The details of water sampling locations are given in **Table-3.10.**

Table-3.10: Details of Water Quality Monitoring Station

Sr. No	Location Code	Location name and description	Date of Monitoring
1.	GW - 01	**Borewell water**	**19th April, 2023**
2.	GW - 01	**Borewell water**	**23rd May, 2023**
3.	GW - 01	**Borewell water**	**22nd June, 2023**
4.	GW - 01	**Borewell water**	**25th July, 2023**
5.	GW - 01	**Borewell water**	**18th August, 2023**
6.	GW - 01	**Borewell water**	**22nd September-2023**

3.4.2 Methodology of ground water Quality Monitoring

Sampling of ground water was carried out on 19.04.2023, 23.05.2023, 22.06.2023, 25.07.2023, 18.08.2023 and 22.09.2023. Samples were collected as grab sample and sampling forms are filled in as per the sampling plan. The preservative sample were properly added to preserve as per standard operating procedures (SOP) and stored immediately in ice boxes, which were ensured for appropriate temperatures. **Sample for chemical analysis was collected in polyethylene carboys. Sample collected for metal content were acidified to <2 pH with 1 ml HNO_3. A sample for bacteriological analysis was collected in sterilized glass bottles.**

Soon after the completion of sampling, chain of custody sheets for the samples are filled in and then they were transported by road to Environmental & Technical Research Centre, Lucknow for further analysis. Proper care was taken during packing and transportation of samples. All the samples reached the central laboratory within the holding times for different parameters. After ensuring the same the samples were forwarded immediately for analysis.

The samples were analyzed as per the standard procedures specified in 'Standard Methods for the Examination of Water and Wastewater' published by American Public Health Association (APHA) and CPCB. The analytical techniques and the test methods adopted for testing of ground water are given in **Table-3.11 to Table-3.16.**

3.4.3 Ground water Quality Monitoring Results

The detailed Ground water quality monitoring results are presented in **Table-3.11 to Table-3.16.**

Table-3.11:
Ground Water Quality Results at Borewell Water (April, 2023)

Sr. No	Test Parameter	Unit	Protocol/Test Method	Result	Range of testing /limit of detection	Indian Standard 10500: 2012	
						Desirable	Permissible
Physico-chemical Parameters							
1	**Colour**	Hazen	IS: 3025 (Part-4): 1983 Reaffirmed: 2017	**<5.0**	5 - 30	5	15
2	**Odour**	-	IS: 3025 (Part-5): 1983 Reaffirmed: 2017	**Agreeable**	Qualitative	Agreeable	Agreeable
3	**pH**	-	APHA 23rd Ed. 2017-4500 H^+	**7.3**	1 - 14	6.5-8.5	No Relaxation
4	**Turbidity**	NTU	APHA 23rd Ed. 2017-2130 B	**<2.0**	2 - 40	1	5
5	**Total Dissolved Solids (TDS)**	mg/l	IS: 3025 (Part-16): 1984 Reaffirmed: 2017	**386.4**	10 - 5000	500	2000
6	**Ammonia (as total ammonia-N)**	mg/l	APHA 23rd Ed. 2017-4500-NH_3 F	**<0.5**	0.5 - 2.0	0.5	No Relaxation
7	**Anionic Detergents (as MBAS)**	mg/l	APHA 23rd Ed. 2017-5540 C	**<0.05**	0.05 - 0.5	0.2	1.0
8	**Calcium as Ca**	mg/l	IS: 3025 (Part-40): 1991 Reaffirmed: 2019	**52.8**	2.0 - 600	75	200
9	**Magnesium as Mg**	mg/l	APHA 23rd Ed. 2017-3500 Mg, B	**28.18**	0.1 - 200	30	100
10	**Chloride as Cl**	mg/l	APHA 23rd Ed. 2017-4500-Cl^- B	**28.0**	2.0 - 2000	250	1000
11	**Fluoride as F**	mg/l	APHA 23rd Ed. 2017-4500 F^- C	**0.37**	0.02 - 5.0	1.0	1.5
12	**Free Residual Chlorine**	mg/l	IS: 3025 (Part-26): 1986 Reaffirmed: 2019	**<0.1**	0.1 - 5.0	0.2	1.0
13	**Nitrate as NO_3**	mg/l	IS: 3025 (Part-34): 1986 Reaffirmed: 2019	**<1.0**	1.0 - 70	45	No Relaxation
14	**Phenolic Compound (as C_6H_5OH)**	mg/l	APHA 23rd Ed. 2017-5530 C	**<0.001**	0.001 - 0.005	0.001	0.002
15	**Sulphate as SO_4**	mg/l	APHA 23rd Ed. 2017-4500- SO_4^{2-}	**24.0**	1.0 - 500	200	400
16	**Alkalinity as $CaCO_3$**	mg/l	APHA 23rd Ed. 2017-2320 B	**272.0**	2.0 - 1000	200	600
17	**Total Hardness as $CaCO_3$**	mg/l	APHA 23rd Ed. 2017-2340 C	**248.0**	5.0 - 800	200	600
18	**Aluminium as Al**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.015**	0.015 - 5.0	0.03	0.2
19	**Boron as B**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.05**	0.05 - 2.0	0.5	1.0
20	**Copper as Cu**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.03**	0.03 - 10	0.05	1.5
21	**Iron as Fe**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**0.13**	0.05 - 20	0.3	No Relaxation
22	**Manganese as Mn**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**0.02**	0.02 - 5.0	0.1	0.3
23	**Zinc as Zn**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**0.42**	0.05 - 15	5	15
24	**Cadmium as Cd**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.05**	0.05 - 2.0	0.003	No Relaxation
25	**Lead as Pb**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.01**	0.01 - 10	0.01	No Relaxation
26	**Mercury as Hg**	µg/l	APHA 23rd Ed. 2017-3112 B	**<0.5**	0.5 - 1000	1.0	No Relaxation
27	**Nickel as Ni**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.05**	0.05 - 5.0	0.02	No Relaxation
28	**Arsenic as As**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.02**	0.02 - 2	0.01	0.05
29	**Total Chromium**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.03**	0.03 - 5.0	0.05	No Relaxation
Microbiological Parameters							
30	***E. coli***	MPN/ 100 ml	IS: 1622 - 1981 Reaffirmed: 2019	**Absent**	≥ 2 MPN Present or Absent per 100 ml	Shall not be detected in any 100 ml sample	
31	***T. coli***	MPN/ 100 ml	IS: 1622 - 1981 Reaffirmed: 2019	**Absent**	≥ 2 MPN Present or Absent per 100 ml	Shall not be detected in any 100 ml sample	

Table-3.12:

Ground Water Quality Results at Borewell Water (May, 2023)

Sr. No	Test Parameter	Unit	Protocol/Test Method	Result	Range of testing /limit of detection	Indian Standard 10500: 2012	
						Desirable	Permissible
Physico-chemical Parameters							
1	**Colour**	Hazen	IS: 3025 (Part-4): 1983 Reaffirmed: 2017	**<5.0**	5 - 30	5	15
2	**Odour**	-	IS: 3025 (Part-5): 1983 Reaffirmed: 2017	**Agreeable**	Qualitative	Agreeable	Agreeable
3	**pH**	-	APHA 23rd Ed. 2017-4500 H^+	**7.5**	1 - 14	6.5-8.5	No Relaxation
4	**Turbidity**	NTU	APHA 23rd Ed. 2017-2130 B	**<2.0**	2 - 40	1	5
5	**Total Dissolved Solids (TDS)**	mg/l	IS: 3025 (Part-16): 1984 Reaffirmed: 2017	**390.2**	10 - 5000	500	2000
6	**Ammonia (as total ammonia-N)**	mg/l	APHA 23rd Ed. 2017-4500-NH_3 F	**<0.5**	0.5 - 2.0	0.5	No Relaxation
7	**Anionic Detergents (as MBAS)**	mg/l	APHA 23rd Ed. 2017-5540 C	**<0.05**	0.05 - 0.5	0.2	1.0
8	**Calcium as Ca**	mg/l	IS: 3025 (Part-40): 1991 Reaffirmed: 2019	**54.4**	2.0 - 600	75	200
9	**Magnesium as Mg**	mg/l	APHA 23rd Ed. 2017-3500 Mg, B	**30.13**	0.1 - 200	30	100
10	**Chloride as Cl**	mg/l	APHA 23rd Ed. 2017-4500-Cl^- B	**30.0**	2.0 - 2000	250	1000
11	**Fluoride as F**	mg/l	APHA 23rd Ed. 2017-4500 F^- C	**0.38**	0.02 - 5.0	1.0	1.5
12	**Free Residual Chlorine**	mg/l	IS: 3025 (Part-26): 1986 Reaffirmed: 2019	**<0.1**	0.1 - 5.0	0.2	1.0
13	**Nitrate as NO_3**	mg/l	IS: 3025 (Part-34): 1986 Reaffirmed: 2019	**<1.0**	1.0 - 70	45	No Relaxation
14	**Phenolic Compound (as C_6H_5OH)**	mg/l	APHA 23rd Ed. 2017-5530 C	**<0.001**	0.001 - 0.005	0.001	0.002
15	**Sulphate as SO_4**	mg/l	APHA 23rd Ed. 2017-4500- SO_4^{2-}	**28.0**	1.0 - 500	200	400
16	**Alkalinity as $CaCO_3$**	mg/l	APHA 23rd Ed. 2017-2320 B	**288.0**	2.0 - 1000	200	600
17	**Total Hardness as $CaCO_3$**	mg/l	APHA 23rd Ed. 2017-2340 C	**260.0**	5.0 - 800	200	600
18	**Aluminium as Al**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.015**	0.015 - 5.0	0.03	0.2
19	**Boron as B**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.05**	0.05 - 2.0	0.5	1.0
20	**Copper as Cu**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.03**	0.03 - 10	0.05	1.5
21	**Iron as Fe**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**0.03**	0.05 - 20	0.3	No Relaxation
22	**Manganese as Mn**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**0.05**	0.02 - 5.0	0.1	0.3
23	**Zinc as Zn**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**0.46**	0.05 - 15	5	15
24	**Cadmium as Cd**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.05**	0.05 - 2.0	0.003	No Relaxation
25	**Lead as Pb**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.01**	0.01 - 10	0.01	No Relaxation
26	**Mercury as Hg**	µg/l	APHA 23rd Ed. 2017-3112 B	**<0.5**	0.5 - 1000	1.0	No Relaxation
27	**Nickel as Ni**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.05**	0.05 - 5.0	0.02	No Relaxation
28	**Arsenic as As**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.02**	0.02 - 2	0.01	0.05
29	**Total Chromium**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.03**	0.03 - 5.0	0.05	No Relaxation
Microbiological Parameters							
30	***E. coli***	MPN/ 100 ml	IS: 1622 - 1981 Reaffirmed: 2019	**Absent**	≥ 2 MPN Present or Absent per 100 ml	Shall not be detected in any 100 ml sample	
31	***T. coli***	MPN/ 100 ml	IS: 1622 - 1981 Reaffirmed: 2019	**Absent**	≥ 2 MPN Present or Absent per 100 ml	Shall not be detected in any 100 ml sample	

Table-3.13:

Ground Water Quality Results at Borewell Water (June, 2023)

Sr. No	Test Parameter	Unit	Protocol/Test Method	Result	Range of testing /limit of detection	Indian Standard 10500: 2012	
						Desirable	Permissible
Physico-chemical Parameters							
1	**Colour**	Hazen	IS: 3025 (Part-4): 1983 Reaffirmed: 2017	**<5.0**	5 - 30	5	15
2	**Odour**	-	IS: 3025 (Part-5): 1983 Reaffirmed: 2017	**Agreeable**	Qualitative	Agreeable	Agreeable
3	**pH**	-	APHA 23rd Ed. 2017-4500 H^+	**7.6**	1 - 14	6.5-8.5	No Relaxation
4	**Turbidity**	NTU	APHA 23rd Ed. 2017-2130 B	**<2.0**	2 - 40	1	5
5	**Total Dissolved Solids (TDS)**	mg/l	IS: 3025 (Part-16): 1984 Reaffirmed: 2017	**404.6**	10 - 5000	500	2000
6	**Ammonia (as total ammonia-N)**	mg/l	APHA 23rd Ed. 2017-4500-NH_3 F	**<0.5**	0.5 - 2.0	0.5	No Relaxation
7	**Anionic Detergents (as MBAS)**	mg/l	APHA 23rd Ed. 2017-5540 C	**<0.05**	0.05 - 0.5	0.2	1.0
8	**Calcium as Ca**	mg/l	IS: 3025 (Part-40): 1991 Reaffirmed: 2019	**60.8**	2.0 - 600	75	200
9	**Magnesium as Mg**	mg/l	APHA 23rd Ed. 2017-3500 Mg, B	**29.16**	0.1 - 200	30	100
10	**Chloride as Cl**	mg/l	APHA 23rd Ed. 2017-4500-Cl^- B	**26.0**	2.0 - 2000	250	1000
11	**Fluoride as F**	mg/l	APHA 23rd Ed. 2017-4500 F^- C	**0.39**	0.02 - 5.0	1.0	1.5
12	**Free Residual Chlorine**	mg/l	IS: 3025 (Part-26): 1986 Reaffirmed: 2019	**<0.1**	0.1 - 5.0	0.2	1.0
13	**Nitrate as NO_3**	mg/l	IS: 3025 (Part-34): 1986 Reaffirmed: 2019	**<1.0**	1.0 - 70	45	No Relaxation
14	**Phenolic Compound (as C_6H_5OH)**	mg/l	APHA 23rd Ed. 2017-5530 C	**<0.001**	0.001 - 0.005	0.001	0.002
15	**Sulphate as SO_4**	mg/l	APHA 23rd Ed. 2017-4500- SO_4^{2-}	**24.0**	1.0 - 500	200	400
16	**Alkalinity as $CaCO_3$**	mg/l	APHA 23rd Ed. 2017-2320 B	**296.0**	2.0 - 1000	200	600
17	**Total Hardness as $CaCO_3$**	mg/l	APHA 23rd Ed. 2017-2340 C	**272.0**	5.0 - 800	200	600
18	**Aluminium as Al**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.015**	0.015 - 5.0	0.03	0.2
19	**Boron as B**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.05**	0.05 - 2.0	0.5	1.0
20	**Copper as Cu**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.03**	0.03 - 10	0.05	1.5
21	**Iron as Fe**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**0.13**	0.05 - 20	0.3	No Relaxation
22	**Manganese as Mn**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**0.03**	0.02 - 5.0	0.1	0.3
23	**Zinc as Zn**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**0.35**	0.05 - 15	5	15
24	**Cadmium as Cd**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.05**	0.05 - 2.0	0.003	No Relaxation
25	**Lead as Pb**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.01**	0.01 - 10	0.01	No Relaxation
26	**Mercury as Hg**	µg/l	APHA 23rd Ed. 2017-3112 B	**<0.5**	0.5 - 1000	1.0	No Relaxation
27	**Nickel as Ni**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.05**	0.05 - 5.0	0.02	No Relaxation
28	**Arsenic as As**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.02**	0.02 - 2	0.01	0.05
29	**Total Chromium**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.03**	0.03 - 5.0	0.05	No Relaxation
Microbiological Parameters							
30	***E. coli***	MPN/ 100 ml	IS: 1622 - 1981 Reaffirmed: 2019	**Absent**	≥ 2 MPN Present or Absent per 100 ml	Shall not be detected in any 100 ml sample	
31	***T. coli***	MPN/ 100 ml	IS: 1622 - 1981 Reaffirmed: 2019	**Absent**	≥ 2 MPN Present or Absent per 100 ml	Shall not be detected in any 100 ml sample	

Table-3.14:

Ground Water Quality Results at Borewell Water (July, 2023)

Sr. No	Test Parameter	Unit	Protocol/Test Method	Result	Range of testing /limit of detection	Indian Standard 10500: 2012	
						Desirable	Permissible
Physico-chemical Parameters							
1	**Colour**	Hazen	IS: 3025 (Part-4): 1983 Reaffirmed: 2017	**<5.0**	5 - 30	5	15
2	**Odour**	-	IS: 3025 (Part-5): 1983 Reaffirmed: 2017	**Agreeable**	Qualitative	Agreeable	Agreeable
3	**pH**	-	APHA 23rd Ed. 2017-4500 H^+	**7.4**	1 - 14	6.5-8.5	No Relaxation
4	**Turbidity**	NTU	APHA 23rd Ed. 2017-2130 B	**<2.0**	2 - 40	1	5
5	**Total Dissolved Solids (TDS)**	mg/l	IS: 3025 (Part-16): 1984 Reaffirmed: 2017	**392.6**	10 - 5000	500	2000
6	**Ammonia (as total ammonia-N)**	mg/l	APHA 23rd Ed. 2017-4500-NH_3 F	**<0.5**	0.5 - 2.0	0.5	No Relaxation
7	**Anionic Detergents (as MBAS)**	mg/l	APHA 23rd Ed. 2017-5540 C	**<0.05**	0.05 - 0.5	0.2	1.0
8	**Calcium as Ca**	mg/l	IS: 3025 (Part-40): 1991 Reaffirmed: 2019	**56.0**	2.0 - 600	75	200
9	**Magnesium as Mg**	mg/l	APHA 23rd Ed. 2017-3500 Mg, B	**27.21**	0.1 - 200	30	100
10	**Chloride as Cl**	mg/l	APHA 23rd Ed. 2017-4500-Cl^- B	**28.0**	2.0 - 2000	250	1000
11	**Fluoride as F**	mg/l	APHA 23rd Ed. 2017-4500 F^- C	**0.40**	0.02 - 5.0	1.0	1.5
12	**Free Residual Chlorine**	mg/l	IS: 3025 (Part-26): 1986 Reaffirmed: 2019	**<0.1**	0.1 - 5.0	0.2	1.0
13	**Nitrate as NO_3**	mg/l	IS: 3025 (Part-34): 1986 Reaffirmed: 2019	**<1.0**	1.0 - 70	45	No Relaxation
14	**Phenolic Compound (as C_6H_5OH)**	mg/l	APHA 23rd Ed. 2017-5530 C	**<0.001**	0.001 - 0.005	0.001	0.002
15	**Sulphate as SO_4**	mg/l	APHA 23rd Ed. 2017-4500- SO_4^{2-}	**26.0**	1.0 - 500	200	400
16	**Alkalinity as $CaCO_3$**	mg/l	APHA 23rd Ed. 2017-2320 B	**268.0**	2.0 - 1000	200	600
17	**Total Hardness as $CaCO_3$**	mg/l	APHA 23rd Ed. 2017-2340 C	**252.0**	5.0 - 800	200	600
18	**Aluminium as Al**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.015**	0.015 - 5.0	0.03	0.2
19	**Boron as B**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.05**	0.05 - 2.0	0.5	1.0
20	**Copper as Cu**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.03**	0.03 - 10	0.05	1.5
21	**Iron as Fe**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**0.10**	0.05 - 20	0.3	No Relaxation
22	**Manganese as Mn**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**0.02**	0.02 - 5.0	0.1	0.3
23	**Zinc as Zn**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**0.29**	0.05 - 15	5	15
24	**Cadmium as Cd**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.05**	0.05 - 2.0	0.003	No Relaxation
25	**Lead as Pb**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.01**	0.01 - 10	0.01	No Relaxation
26	**Mercury as Hg**	µg/l	APHA 23rd Ed. 2017-3112 B	**<0.5**	0.5 - 1000	1.0	No Relaxation
27	**Nickel as Ni**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.05**	0.05 - 5.0	0.02	No Relaxation
28	**Arsenic as As**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.02**	0.02 - 2	0.01	0.05
29	**Total Chromium**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.03**	0.03 - 5.0	0.05	No Relaxation
Microbiological Parameters							
30	***E. coli***	MPN/ 100 ml	IS: 1622 - 1981 Reaffirmed: 2019	**Absent**	≥ 2 MPN Present or Absent per 100 ml	Shall not be detected in any 100 ml sample	
31	***T. coli***	MPN/ 100 ml	IS: 1622 - 1981 Reaffirmed: 2019	**Absent**	≥ 2 MPN Present or Absent per 100 ml	Shall not be detected in any 100 ml sample	

Table-3.15:
Ground Water Quality Results at Borewell Water (August, 2023)

Sr. No	Test Parameter	Unit	Protocol/Test Method	Result	Range of testing /limit of detection	Indian Standard 10500: 2012	
						Desirable	Permissible
Physico-chemical Parameters							
1	**Colour**	Hazen	IS: 3025 (Part-4): 1983 Reaffirmed: 2017	**<5.0**	5 - 30	5	15
2	**Odour**	-	IS: 3025 (Part-5): 1983 Reaffirmed: 2017	**Agreeable**	Qualitative	Agreeable	Agreeable
3	**pH**	-	APHA 23rd Ed. 2017-4500 H^+	**7.5**	1 - 14	6.5-8.5	No Relaxation
4	**Turbidity**	NTU	APHA 23rd Ed. 2017-2130 B	**<2.0**	2 - 40	1	5
5	**Total Dissolved Solids (TDS)**	mg/l	IS: 3025 (Part-16): 1984 Reaffirmed: 2017	**388.4**	10 - 5000	500	2000
6	**Ammonia (as total ammonia-N)**	mg/l	APHA 23rd Ed. 2017-4500-NH_3 F	**<0.5**	0.5 - 2.0	0.5	No Relaxation
7	**Anionic Detergents (as MBAS)**	mg/l	APHA 23rd Ed. 2017-5540 C	**<0.05**	0.05 - 0.5	0.2	1.0
8	**Calcium as Ca**	mg/l	IS: 3025 (Part-40): 1991 Reaffirmed: 2019	**52.8**	2.0 - 600	75	200
9	**Magnesium as Mg**	mg/l	APHA 23rd Ed. 2017-3500 Mg, B	**28.18**	0.1 - 200	30	100
10	**Chloride as Cl**	mg/l	APHA 23rd Ed. 2017-4500-Cl^- B	**26.0**	2.0 - 2000	250	1000
11	**Fluoride as F**	mg/l	APHA 23rd Ed. 2017-4500 F^- C	**0.37**	0.02 - 5.0	1.0	1.5
12	**Free Residual Chlorine**	mg/l	IS: 3025 (Part-26): 1986 Reaffirmed: 2019	**<0.1**	0.1 - 5.0	0.2	1.0
13	**Nitrate as NO_3**	mg/l	IS: 3025 (Part-34): 1986 Reaffirmed: 2019	**<1.0**	1.0 - 70	45	No Relaxation
14	**Phenolic Compound (as C_6H_5OH)**	mg/l	APHA 23rd Ed. 2017-5530 C	**<0.001**	0.001 - 0.005	0.001	0.002
15	**Sulphate as SO_4**	mg/l	APHA 23rd Ed. 2017-4500- SO_4^{2-}	**30.0**	1.0 - 500	200	400
16	**Alkalinity as $CaCO_3$**	mg/l	APHA 23rd Ed. 2017-2320 B	**260.0**	2.0 - 1000	200	600
17	**Total Hardness as $CaCO_3$**	mg/l	APHA 23rd Ed. 2017-2340 C	**248.0**	5.0 - 800	200	600
18	**Aluminium as Al**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.015**	0.015 - 5.0	0.03	0.2
19	**Boron as B**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.05**	0.05 - 2.0	0.5	1.0
20	**Copper as Cu**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.03**	0.03 - 10	0.05	1.5
21	**Iron as Fe**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**0.13**	0.05 - 20	0.3	No Relaxation
22	**Manganese as Mn**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**0.05**	0.02 - 5.0	0.1	0.3
23	**Zinc as Zn**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**0.36**	0.05 - 15	5	15
24	**Cadmium as Cd**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.05**	0.05 - 2.0	0.003	No Relaxation
25	**Lead as Pb**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.01**	0.01 - 10	0.01	No Relaxation
26	**Mercury as Hg**	µg/l	APHA 23rd Ed. 2017-3112 B	**<0.5**	0.5 - 1000	1.0	No Relaxation
27	**Nickel as Ni**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.05**	0.05 - 5.0	0.02	No Relaxation
28	**Arsenic as As**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.02**	0.02 - 2	0.01	0.05
29	**Total Chromium**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.03**	0.03 - 5.0	0.05	No Relaxation
Microbiological Parameters							
30	***E. coli***	MPN/ 100 ml	IS: 1622 - 1981 Reaffirmed: 2019	**Absent**	≥ 2 MPN Present or Absent per 100 ml	Shall not be detected in any 100 ml sample	
31	***T. coli***	MPN/ 100 ml	IS: 1622 - 1981 Reaffirmed: 2019	**Absent**	≥ 2 MPN Present or Absent per 100 ml	Shall not be detected in any 100 ml sample	

Table-3.16:
Ground Water Quality Results at Borewell Water (September, 2023)

Sr. No	Test Parameter	Unit	Protocol/Test Method	Result	Range of testing /limit of detection	Indian Standard 10500: 2012	
						Desirable	Permissible
Physico-chemical Parameters							
1	**Colour**	Hazen	IS: 3025 (Part-4): 1983 Reaffirmed: 2017	**<5.0**	5 - 30	5	15
2	**Odour**	-	IS: 3025 (Part-5): 1983 Reaffirmed: 2017	**Agreeable**	Qualitative	Agreeable	Agreeable
3	**pH**	-	APHA 23rd Ed. 2017-4500 H^+	**7.3**	1 - 14	6.5-8.5	No Relaxation
4	**Turbidity**	NTU	APHA 23rd Ed. 2017-2130 B	**<2.0**	2 - 40	1	5
5	**Total Dissolved Solids (TDS)**	mg/l	IS: 3025 (Part-16): 1984 Reaffirmed: 2017	**404.6**	10 - 5000	500	2000
6	**Ammonia (as total ammonia-N)**	mg/l	APHA 23rd Ed. 2017-4500-NH_3 F	**<0.5**	0.5 - 2.0	0.5	No Relaxation
7	**Anionic Detergents (as MBAS)**	mg/l	APHA 23rd Ed. 2017-5540 C	**<0.05**	0.05 - 0.5	0.2	1.0
8	**Calcium as Ca**	mg/l	IS: 3025 (Part-40): 1991 Reaffirmed: 2019	**54.4**	2.0 - 600	75	200
9	**Magnesium as Mg**	mg/l	APHA 23rd Ed. 2017-3500 Mg, B	**26.24**	0.1 - 200	30	100
10	**Chloride as Cl**	mg/l	APHA 23rd Ed. 2017-4500-Cl^- B	**28.0**	2.0 - 2000	250	1000
11	**Fluoride as F**	mg/l	APHA 23rd Ed. 2017-4500 F^- C	**0.38**	0.02 - 5.0	1.0	1.5
12	**Free Residual Chlorine**	mg/l	IS: 3025 (Part-26): 1986 Reaffirmed: 2019	**<0.1**	0.1 - 5.0	0.2	1.0
13	**Nitrate as NO_3**	mg/l	IS: 3025 (Part-34): 1986 Reaffirmed: 2019	**<1.0**	1.0 - 70	45	No Relaxation
14	**Phenolic Compound (as C_6H_5OH)**	mg/l	APHA 23rd Ed. 2017-5530 C	**<0.001**	0.001 - 0.005	0.001	0.002
15	**Sulphate as SO_4**	mg/l	APHA 23rd Ed. 2017-4500- SO_4^{2-}	**30.0**	1.0 - 500	200	400
16	**Alkalinity as $CaCO_3$**	mg/l	APHA 23rd Ed. 2017-2320 B	**276.0**	2.0 - 1000	200	600
17	**Total Hardness as $CaCO_3$**	mg/l	APHA 23rd Ed. 2017-2340 C	**244.0**	5.0 - 800	200	600
18	**Aluminium as Al**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.015**	0.015 - 5.0	0.03	0.2
19	**Boron as B**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.05**	0.05 - 2.0	0.5	1.0
20	**Copper as Cu**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.03**	0.03 - 10	0.05	1.5
21	**Iron as Fe**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**0.14**	0.05 - 20	0.3	No Relaxation
22	**Manganese as Mn**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**0.03**	0.02 - 5.0	0.1	0.3
23	**Zinc as Zn**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**0.64**	0.05 - 15	5	15
24	**Cadmium as Cd**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.05**	0.05 - 2.0	0.003	No Relaxation
25	**Lead as Pb**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.01**	0.01 - 10	0.01	No Relaxation
26	**Mercury as Hg**	µg/l	APHA 23rd Ed. 2017-3112 B	**<0.5**	0.5 - 1000	1.0	No Relaxation
27	**Nickel as Ni**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.05**	0.05 - 5.0	0.02	No Relaxation
28	**Arsenic as As**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.02**	0.02 - 2	0.01	0.05
29	**Total Chromium**	mg/l	APHA 23rd Ed. 2017-3120 B (ICP-OES)	**<0.03**	0.03 - 5.0	0.05	No Relaxation
Microbiological Parameters							
30	***E. coli***	MPN/ 100 ml	IS: 1622 - 1981 Reaffirmed: 2019	**Absent**	≥ 2 MPN Present or Absent per 100 ml	Shall not be detected in any 100 ml sample	
31	***T. coli***	MPN/ 100 ml	IS: 1622 - 1981 Reaffirmed: 2019	**Absent**	≥ 2 MPN Present or Absent per 100 ml	Shall not be detected in any 100 ml sample	

3.5 SOIL MONITORING

3.5.1 Soil Monitoring Locations

The objective of the soil monitoring is to identify the impacts of ongoing project activities on soil quality and also predict impacts, which have arisen due to execution of various constructions allied activities. Accordingly, a study of assessment of the soil quality has been carried out.

To assess impacts of ongoing project activities on the soil in the area, the Physico-chemical characteristics of soils were examined by obtaining soil samples from selected points and analysis of the same. Single sample of soil was collected from the project site for studying soil characteristics, the location of which is listed in **Table-3.17**.

Table-3.17: Details of Soil Monitoring Stations

Sr. No	Location Code	Location name and description
1.	SQ-1	Near Project Site

3.5.2 Methodology of Soil Monitoring

The sampling has been done in line with IS: 2720 & Methods of Soil Analysis, Part-01st, 02nd Edition, 1986 of American Society for Agronomy and Soil Science Society of America. The homogenized samples were analyzed for physical and chemical characteristics (physical, chemical and heavy metal concentrations). The soil samples were collected in the month of August on 18.08.2023.

The samples have been analyzed as per the established scientific methods for Physico-chemical parameters. The heavy metals have been analyzed by using Atomic Absorption Spectro-photometer.

3.5.3 Soil Monitoring Results

Single sample of soil is collected from the site to check the quality of soil of the study area. The Physico-chemical characteristics of the soil, as obtained from the analysis of the soil sample, are presented in **Table-3.18**.

Table-3.18: Physico-Chemical Characteristics of Soil at Near Plant Site

Sr. No.	Test Parameter	Unit	Protocol/Test Method	Result	Range of testing /limit of detection
1	**pH**	-	IS: 2720 (Part-26):1987 Reaffirmed: 2021	**7.2**	1 - 14
2	**Electrical Conductivity**	µmhos/cm	IS: 14767: 2000 Reaffirmed: 2021	**304.0**	1.0 - 40000
3	**Moisture content**	%	IS: 2720 (Part-2):1973 Reaffirmed: 2020	**2.93**	1.0 - 50
4	**Sulphur**	Kg/Hec	IS: 14685: 1999 Reaffirmed: 2019	**15.24**	5.0 - 100
5	**Boron**	mg/kg	Method Manual of Soil Testing in India	**<4.0**	4.0 - 100
6	**Copper**	mg/kg	Method Manual of Soil Testing in India	**0.39**	0.3 - 500
7	**Zinc**	mg/kg	Method Manual of Soil Testing in India	**9.42**	1.0 - 500
8	**Iron**	mg/kg	Method Manual of Soil Testing in India	**126.0**	5.0 - 500
9	**Manganese**	mg/kg	Method Manual of Soil Testing in India	**19.36**	5.0 - 500

3.5.4 Discussion on Soil Characteristics in the Study Area

The soil in study area is characterized by moderate organic content. The soil quality in the project area has not been affected by the project activities