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Power

Ref.: UPCL/P-I/ENV/EC/MoEFCC/167/05/22
Date: 28/05/2022

To,
Additional Principal Chief Conservator of Forest (APCCF)
Ministry of Environment, Forest and Climate Change
Regional Office (Southern Zone)
Kendriya Sadan, Koramangala,
Bangalore – 560 034

Sub: Submission of Six Monthly EC compliance report & CRZ Compliance report for 2x600 MW Thermal Power Plant of Udupi Power Corporation Limited (UPCL)

Ref: Environmental Clearance No: **J-13011/23/1996-IA.II (T) Dated: 01.09.2011.**
CRZ Clearance No: **11-14/2010-IA-III dated: 18.05.2010**

Dear Sir,

With reference to above subject, please find enclosed herewith the Six-monthly compliance report for the period of **October'2021 to March'2022** against the conditions of Consolidated Environmental Clearance for **2x600 MW Udupi Thermal Power Plant** and CRZ Clearance of Sea Water Pipe-Line granted to UPCL through **e-mail.**

Thanking you,
Yours sincerely,
for **Udupi Power Corporation Limited**

(Santosh Kumar Singh)
Authorized Signatory

Encl: As above

CC:

The Member Secretary,
Central Pollution Control Board,
Parivesh Bhavan, East Arjun Nagar,
Kendriya Paryavaran Bhawan, New Delhi – 110 032

The Member Secretary
Karnataka State Pollution Control Board
"Parisara Bhavan", #49, 4th & 5th Floor,
Church Street, Bangalore – 560 001

Zonal Office,
Central Pollution Control Board,
1st and 2nd Floor, Nisarga Bhavan, A-Block, Thimmaiah Main Road, 7th Cross, Shivanagar, Bengaluru – 560 010

Regional Office,
Karnataka State Pollution Control Board.
Plot no-36-C, Shivalli Industrial Area,
Manipal, Udupi – 576 104

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Adani Corporate House
Shantigram, S G Highway
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SIX MONTHLY COMPLIANCE REPORT
(October 2021 to March 2022)

Of

Environmental Clearance for 2x600 MW Thermal Power Plant and CRZ Clearance of Sea Water Pipeline of Udupi Power Corporation Limited

Submitted to

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

Zonal Office Central Pollution Control Board,

Karnataka State Pollution Control Board

Submitted By

Udupi Power Corporation Limited

Yelluru Village, Pilar Post, Padubidri,

Udupi District, Karnataka

CONTENTS

UDUPI POWER CORPORATION LIMITED (UPCL):

Udupi Power Corporation Limited is a 2X600 MW imported coal based power project in the Udupi District of Karnataka. Situated in the western coastal region of India, the plant is situated in the village of Yellur, between Mangalore and Udupi.

UPCL is the first independent power project (IPP) using 100% imported coal as fuel in the country. The Udupi Power Project supplies 90% of the power it generates to the State of Karnataka.

LOCATION OF THE PROJECT

State	Karnataka
District	Udupi
Village	Yelluru (in Padubidri Industrial Area)
Geographical Coordinates	$13^0 9' 00''$ N $74^0 47' 00''$ E $13^0 10' 30''$ N $74^0 48' 40''$ E

Both units of 600 MW at UPCL has sub critical coal fired steam generator each connected to a reheat type condensing steam turbine and generator with water cooled condenser and all other required auxiliaries. Each steam generator of 600MW is rated to generate about 2028 tons/hour of superheated steam at a pressure of about 175 kg/cm^2 and superheat temperature of 540^{0}C. The steam generators are equipped with facilities for HFO/LDO firing for startup and flame stabilization at low loads. Each steam turbine is 3000 rpm rated speed, tandem compound, single re-heat, condensing type machine with extractions for regenerative feed water heating. The turbine is designed for main stream pressure of 170 kg/cm^2 (a) and inlet temperature of 537^{0}C.

Being coastal area with perennial availability of seawater, usage of seawater is envisaged for condenser cooling and fresh water requirement. Re-circulating type of circulating water (CW) system with natural draft cooling towers is installed. Due to availability of Fresh water in this area is seasonal and limited; desalination of seawater is installed for meeting the freshwater requirement for the plant. About 10000 m^3/hr of makeup sea water is required for both the Unit-1 & Unit-2.

The plant has all latest Pollution Control Equipment like, High Efficiency ESP's, Flue gas desulphurization plant, Low NO_x burners and 275 m height chimney.

UPCL has obtained Environmental Clearances from Ministry of Environment & Forest (MoEF&CC), Consent to Establish and Consent for Operation (CFO) from Karnataka State Pollution Control Board (KSPCB). UPCL has also obtained all necessary statutory/mandatory clearances.

Ambient Air quality Monitoring Stations were established in 4 locations inside the plant area for continuous monitoring of Ambient Air Quality. One meteorological station has also been installed for monitoring of meteorological data. UPCL is monitoring the environmental parameters in and around the plant area through NABL accredited Laboratory.

Environmental clearance was accorded to the project for 2x500 MW fully imported coal based units on 20 March 1997. This EC was amended on 25 Jan 1999 and 09 Sept 2009 permitting enhancement of capacity to 2x507.5 MW and subsequently to 2x600 MW. These amendments in EC were consolidated on 01 Sept 2011 by MoEF&CC.

Detailed compliance status of Consolidated Environment Clearance from MoEF&CC for 2X600 MW Coal based Subcritical Thermal Power plant and CRZ clearance from State Coastal Zone Management Authority for Sea Water Pipeline is being furnished herewith.

S.NO	Conditions	Compliance
A	**Specific Conditions**	
(I)	All the conditions stipulated by the Karnataka State Pollution Control Board issued from time to time should be strictly implemented including the installation of Flue Gas Desulphurization (FGD) Plant. The status of implementation of FGD shall be submitted to the Regional Office of the Ministry at Bangalore.	Complied. All the conditions stipulated by KSPCB are implemented. FGD units are commissioned and are in operation from the inception of Unit-1 & Unit-2 boilers. Unit-I :11th November 2010 Unit-II :19th August 2012
(II)	Sulphur and ash contents in the coal to be used in the project shall not exceed 0.8% and 12 % (average) respectively at any given time. In case of variation of coal quality at any point of time, fresh reference shall be made to the Ministry	Complied for both Sulphur and Ash contents. Average Sulphur and Ash content in coal used for the period of October 2021 to March 2022 is as below: 1. Sulphur Content : **0.60 %** 2. Ash Content : **9.54 %**
(III)	A single bi-flue stack of 275 m height shall be provided with continuous online monitoring equipment's of SO_x, NO_x and Particulate Matter ($PM_{2.5}$ & PM_{10}). Exit velocity of flue gases shall not be less than 22 m/sec. Mercury emissions from stack shall also be monitored on periodic basis.	A Single bi-flue stack of 275 m height is provided with continuous online monitoring for SO_2, NO_x, Particulate matter and Mercury. Exit velocity of the flue gases from the stack for the period of October 2021 to March 2022 was **22.5 to 26.3 m/s**.
(IV)	An instrumented meteorological tower shall be set up for collecting on-site meteorological data.	Complied with. An instrumented meteorological tower is established for online meteorological data. Meteorological data for the period of October 2021 to March 2022 is enclosed as ***Annexure-I*** for reference.
(V)	High Efficiency Electrostatic Precipitators (ESPs) shall be installed to ensure that particulate emission from the proposed plant does not exceed	Complied with. High Efficiency Electrostatic Precipitators and low NOx Burners are installed.

	50 mg / NM^3. Low NO_x Burners shall be installed.	Particulate emissions from the plant are well within the limits. Monitoring values for the period of October 2021 to March 2022 is enclosed as ***Annexure-II*** for reference.
(VI)	Adequate dust extraction system such as cyclones / bag 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.	Complied with. Water Sprinklers are provided in coal yard, coal unloading and coal conveyor systems. Dust Extraction system has been provided at Junction towers. Dry Fog dust suppression system is provided in track hopper and bunkers. Wind Shield has been provided, photograph enclosed in ***Annexure-III*** for reference.
(VII)	Transportation of coal from Mangalore Port to the project site shall be undertaken by rail with adequate provisions to prevent fugitive emissions	Complied with. Coal is transported from Mangalore port to plant site is only through rail by BORBN wagons. Wagons are covered with tarpaulin sheets to avoid fugitive emission during transportation.
(VIII)	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. 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. To prevent ground water contamination, the ash pond area should be lined with impervious layer.	Complied with. Fly ash is collected in dry form and stored in ash silos. All the generated fly ash is issued to the end users like Cement, RMC, Brick manufactures etc. Fly Ash Utilization details enclosed as ***Annexure-IV***. Ash pond is lined with LDPE film as impervious layer to avoid ground water contamination. Mercury and other heavy metals are monitored in the bottom ash through NABL accredited laboratory. No effluent is emanated from ash pond. No ash is disposed in the low lying areas. Test wells are constructed around the ash pond area for water monitoring and monitoring reports for the period of October 2021 to March 2022 is enclosed as ***Annexure-V*** for reference.
(IX)	The transportation of dry fly ash to the ash disposal area	Complied with.

	through closed bulkers shall be allowed till 30.03.2012 till the Cement Grinding unit of M/s ACC Ltd. is set up. Monitoring of particulate emissions along the route of transportation shall be carried out	Cement blending unit has installed within the UPCL plant near to Ash silos and ash is transferred from silos to blending unit through closed conduit only. Monitoring is carried out in transportation route. Four numbers of online ambient air quality monitoring stations are established for ambient air quality (AAQ) monitoring. AAQ monitoring is also done in transportation route and buffer zone through MoEF and NABL accredited laboratory. Air monitoring reports for the period of October 2021 to March 2022 is enclosed as ***Annexure-VI*** for reference.
(X)	Extensive monitoring of air quality in and around the power plant and extending up to Western Ghat should be carried out and records should be scientifically maintained. The monitoring Programme should cover the key stone species for any potential acid deposition effects.	Complied with. Air quality monitoring is carried through MoEF and NABL accredited laboratory at 8 locations (extending up to Western Ghats) which is finalized in consultation with KSPCB and the monitoring reports are submitted to the KSPCB office monthly. The Monitoring programme covers till western Ghats and measure Sulphur dioxide and Nitrogen dioxide, as main precursors for acid rain. Key Stone Species Monitoring is carried once in six months. There is no change noticed. Air quality monitoring reports for the period of October 2021 to March 2022 is enclosed as ***Annexure-VI*** for reference.
(XI)	No leachate shall take place at any point of time from the Coal storage area and Ash Pond and adequate safety measures such as lining with impermeable membrane / liner shall be adopted. Precautionary measure shall be taken to protect the ash dyke from getting breached and in-built monitoring mechanism shall be formulated.	Complied with. LDPE film is used as impervious layer to avoid ground water contamination from Coal storage and Ash Pond area. Test wells are constructed around the ash pond area for water monitoring and monitoring reports for the period of October 2021 to March 2022 is enclosed as ***Annexure-V*** for reference.

(XII)	Fugitive emission of fly ash (dry or wet) shall be controlled so that no agricultural or non-agricultural land is affected. Damage to any land shall be mitigated and suitable compensation provided in consultation with the local Panchayat.	Complied with. Disposal of fly ash is handled through closed conduit within plant. No damage has happened to any land.
(XIII)	COC of at least 1.25 shall be adopted	Complied with.
(XIV)	Closed Circuit Cooling Tower shall be installed and sea water shall be used for cooling purpose. The sweet water requirement shall be met from the desalination plant.	Complied with. Closed circuit cooling tower is provided and sea water is used for cooling purpose. Desalination plant is provided for sweet water requirement.
(XV)	No effluent will be discharged into the Mulki River. The treated effluents shall be discharged through a pipeline in the Arabian Sea ensuring that the differential temperature is maintained at 5^0 C. The area and location of the intake and discharge point shall be finalized in consultation with the National Institute of Oceanography (NIO), Goa/Central Water and Power Research Station, Pune.	Complied with. No effluent is discharged into the Mulki River and there is no connection of UPCL with Mulki River. All the cooling tower blow down and water outlets are discharged back to the sea from Guard Pond through Coro-coated MS-Pipe line at designated place which is finalized in consultation with NIO. The differential temperature is maintained within 5^0 C. All the intake and outfall sea water points are finalized as per recommendations of NIO, Goa.
(XVI)	Brine management from desalination plant, its disposal mechanism and status of implementation shall be submitted to the Regional Office of the Ministry from time to time.	Complied with. Guard pond has been established to collect all the water outlets. Brine from desalination plant is sent to Guard pond and discharged to Sea. Continuous online monitoring system implemented in Guard pond, in addition to that water sample is being collected and analyzed once a week by MoEF&CC and NABL accredited laboratory.

		Guard pond effluent monitoring reports for the period of October 2021 to March 2022 is enclosed as ***Annexure-VII*** for your reference.
(XVII)	Possibility for setting up transit storage within plant site for temperature control of effluent before discharging to the sea shall be examined and details submitted to the Ministry **within six months.**	Complied with. Guard pond has been established to collect all the water outlets. Treated effluents, including blow down from the cooling towers are sent back to sea via Guard pond. Effluent temperature maintained within 5^0 C before discharge.
(XVIII)	Monitoring of ground and surface water quality nearby shall be regularly conducted and records maintained. The monitored data shall be submitted to the Ministry regularly. Further, monitoring points shall be located between the plant and drainage in the direction of flow of ground water and or advised by the State Pollution Control Board and records maintained. Monitoring for heavy metals in ground water shall be undertaken.	Complied with. Ground water and Surface water monitoring is carried regularly in the locations finalized in consultation with KSPCB and records are maintained. Monitoring reports are sent to KSPCB once in every month. Monitoring of heavy metals in ground water is carried out monthly. Water monitoring reports for the period of October 2021 to March 2022 is enclosed as ***Annexure-VIII*** for reference.
(XIX)	A well designed rain water harvesting system shall be put in place which shall comprise of rain water collection from the built up and open area in the plant premises. Action plan and road map for implementation shall be submitted to the Regional Office of Ministry.	Three Numbers of Rain water harvesting ponds are constructed to harvest rain water. (***Annexure – IX*** - Photos Attached)
(XX)	The project proponent shall not hamper the vocation of the fishing community in the area (if any) and it shall be ensured that local fishing community shall be allowed to carry out their vocation. Clearance from the Department of Fisheries in	Complied with. Fishing activity is not hampered. Monitoring of sea water around the intake and outfall points is carried regularly through College of Fisheries, Mangalore. NOC obtained from department of Fisheries, State government of Karnataka.

<table>
<tr><td></td><td colspan="2">the State Govt. shall be obtained.</td><td colspan="2">Clearance letter from department of Fisheries Karnataka state government is enclosed as Annexure-X for reference.</td></tr>
<tr><td rowspan="7">(XXI)</td><td colspan="2">Acquisition of land should be restricted to 550 ha as per the following breakup:</td><td colspan="2">Complied with.
Following is the current status:</td></tr>
<tr><td>Plant area</td><td>180 Ha</td><td>Plant area</td><td>170 Ha</td></tr>
<tr><td>Ash Disposal Area</td><td>150 Ha</td><td>Ash Disposal Area</td><td>46 Ha</td></tr>
<tr><td>Colony Area</td><td>45 Ha</td><td>Colony Area</td><td>-</td></tr>
<tr><td>In take pipe route</td><td>25 Ha</td><td>In take pipe route</td><td>15 Ha</td></tr>
<tr><td>Other requirements</td><td>50 Ha</td><td>Other requirements</td><td>8 Ha</td></tr>
<tr><td>Rehabilitation, Green belts, Ash utilizations etc.</td><td>100 Ha</td><td>Rehabilitation, Green belts, Ash utilizations etc.,</td><td>82 Ha</td></tr>
<tr><td>(XXII)</td><td colspan="2">Green belt of adequate width and density with suitably selected native species should be developed all around the plant area and the ash disposal site. Density of trees shall not be less than 2000 per ha and survival rate not less than 80%. It shall be ensured that at least 1/3rd of the total area is utilized for creation of green belt. Adequate financial provision should be made for this purpose.</td><td colspan="2">Complied with.
Green belt of about 369405 saplings in 195 acres have been planted.
Survival rate of the plantation is ensured more than 80% by taking appropriate after care methods like Watering, apply manure etc.
Snapshots of Plantation are enclosed as Annexure-XI for reference.
Adequate financial provision for the plantation under Environment budget is made separately. The amount spent for various activities under Environment for the period of October 2021 to March 2022.
<table>
<tr><th>Description</th><th>Amount (Rs.)</th></tr>
<tr><td>Afforestation</td><td>50,92,951.96</td></tr>
<tr><td>Environment Monitoring</td><td>48,23,653.21</td></tr>
<tr><td>General Environment Management</td><td>2,44,40,121.71</td></tr>
<tr><td>Total</td><td>3,43,56,726.88</td></tr>
</table></td></tr>
<tr><td>(XXIII)</td><td colspan="2">Local employable youth from Project Affected Family shall be trained in skills relevant to the project for eventual</td><td colspan="2">Complied with.
As per the recommendations from KIADB, project affected families are taken on</td></tr>
</table>

	employment in the project itself. The action taken report and details thereof to this effect shall be submitted to the Regional Office of the Ministry and the State Govt. Dept. concerned from time to time.	employment and provided required trainings and skill developments. The copy of the letter submitted to KIADB is enclosed as ***Annexure-XII*** for your reference.
(XXIV)	The project affected people should be rehabilitated and resettled in consultation with the State Govt. of Karnataka. A Rehabilitation Committee should be constituted with representatives from the state of Govt. of Karnataka, affected people, local recognized NGOs, technical institutions, experts etc.	Complied with. Rehabilitation and Resettlement is already provided to the project affected people as per R&R policy of Government of Karnataka.
(XXV)	Status of implementation of R&R including its financial component spent and action pending shall be submitted to the regional Office of the Ministry from time to time.	Complied with.
(XXVI)	Financial requirements for implementations of the environmental mitigative measures should be earmarked and shall not be diverted for the other purposes. Adequate provision should be ensured for enhancement of funds required, if any, in future.	Complied with Financial requirement for Environmental mitigative measures was earmarked at the time of project as per EIA report and measures have been implemented. Operating expenses are earmarked in operation budget on yearly basis. In case of any future requirement funds will be provided as when required.
(XXVII)	The project proponent shall also adequately contribute in the development of the neighboring villages. Special package with implementation schedule for free potable drinking water supply in the nearby villages and schools shall be undertaken in a time bound manner.	Complied with. Potable drinking water supply through RO plant is done. The company is also providing assistance in Medical, Education and Infrastructural facilities etc., to the neighboring villages. Scholarships, green nurturing and school grants are also providing to nearby villages.

(XXVIII)	The project proponent shall formulate sustainable livelihood scheme for landless and marginalized section of society (such as landless farmers) in the area who are directly or indirectly affected due to power project.	Complied with. The Company has engaged local people for various activities like Green belt Development, Area development and other service works like catering etc.,
(XXIX)	At least three nearest village shall be examined for possible adoption and basic amenities like development of roads; drinking water supply, primary health centre, primary school etc shall be developed in co-ordination with the district administration	Complied with. UPCL along with the District Administration has identified various schools in the neighboring villages for adoption and for providing basic amenities like toilet facilities, drinking water, green nurturing, etc.
(XXX)	An amount of Rs. 5.0 Crores shall be earmarked as one time capital cost for CSR programme. Subsequently a recurring expenditure of Rs. 1.0 Crores per annum till the life the plant 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.	Complied with. Rs.5 crore was earmarked onetime cost for CSR during the project phase stage of 2x600 MW plant. Over Rs.1 crore is earmarked and used for all CSR activities every year.
(XXXI)	CSR scheme shall be identified based on need based assessment in and around the villages within 5.0 km of the site and in constant consultation with the village Panchayat and the District Administration. As part of CSR prior identification of local employable youth and eventual employment in the project as required after imparting relevant training shall be also undertaken as necessary.	Complied with. CSR schemes are identified based on need assessment and constant consultation with village Panchayat and the District Administration. CSR team is engaged for assessment and consultation with local villages for CSR activities on a continuous basis. For local youth, scholarships and various other schemes including trainings are provided so as to get them proper education and getting eventual employment opportunities.

		Snapshots of CSR activities are enclosed as ***Annexure-XIII*** for reference.
(XXXII)	It 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.	Complied with. Socio Economic study was carried at the project time as a part of EIA study. Impact assessment of CSR interventions is periodically done internally.
(XXXIII)	A Monitoring Committee should be constituted for reviewing the compliance to various safeguard measures by involving recognized local NGOs. Pollution Control Board, Institutions, Experts etc.	Monitoring Committee is framed comprises of NGO, College Experts and Institution Experts to review Safeguard measures implemented by UPCL.
B	**General Conditions:**	
(I)	A Corporate Environmental Policy shall be formulated and after due approval of the Board of Directors of the Company shall be submitted to the Ministry **with six months.** The policy shall specifically address issues of adherence to environmental policy so formulated and environmental clearance conditions stipulated for the power project and also others including matters related to violations of stipulated conditions (if any) to the Board.	Complied with.
(II)	The treated effluents confirming to the prescribed standards only shall be re-circulated and reused within the plant. Arrangements shall be made that effluents and storm water do not get mixed.	Complied with. All the Effluents are treated through ETP (Effluent Treatment Plant) to meet the effluent standards and the treated water is used for Green belt development/dust suppression.

(III)	A sewage treatment plant shall be provided (as applicable) and the treated sewage shall be used for raising greenbelt / plantation.	Complied. Modular STP has been installed treating sewage water and discharging for green belt development.
(IV)	A well designed rainwater harvesting shall be constructed. Central Groundwater Authority / Board shall be consulted for finalization of appropriate rainwater harvesting technology within **a period of three months** from the date of issue of clearance and details shall be furnished to the Regional Office of the Ministry.	Three numbers of Rain water harvesting ponds are constructed to harvest rain water. (**Annexure *IX*** - Photos Attached)
(V)	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.	Complied with. Adequate safety measures like fire hydrant, fire extinguishers, smoke detectors, hose reel, hose house, water monitor, D.V system, Fire water pump house, fire tenders are available to prevent from spontaneous fires.
(VI)	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.	Storage facilities in the plant for auxiliary liquid fuel are provided and the facilities are approved by Department of Explosives, Nagpur. Liquid fuel is procured from Oil Companies (GOI Undertakings) and Sulphur content condition is complied with. Environment and disaster preparedness plan is in place and approved by Inspector of Factories and Boilers.
(VII)	Regular monitoring of ground water level shall be carried out by establishing a network of existing wells and constructing new piezometers. Monitoring around the ash pond area shall be carried out particularly for heavy	Complied with. Regular monitoring is being carried in existing wells and test wells constructed around ash pond area and reports are submitted monthly to KSPCB office and the same is submitted to RO-MoEF&CC once in six months.

	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.	Monitoring reports are enclosed as ***Annexure-V*** *and* ***Annexure-VIII*** for reference. The compared baseline data for the period of March 2022 for water quality and ambient air quality is enclosed as ***Annexure-XIV***
(VIII)	Monitoring surface water quantity and quality shall also be regularly conducted and records maintained. The monitored data shall be submitted to the Ministry regularly. Further, monitoring points shall be located between the plant and drainage in the direction of flow of ground water and records maintained. Monitoring for heavy metals in ground water shall be undertaken.	Complied with, Surface water monitoring is carried regularly in the monitoring points finalized in consultation with KSPCB. Monitoring reports are submitted regularly to RO-KSPCB and same is submitted to RO-MoEF&CC once in six months. Monitoring reports for the period of October 2021 to March 2022 is enclosed as ***Annexure-VIII*** for reference. However, surface water Quantity measurement is not applicable.
(IX)	First Aid and sanitation arrangements shall be made for the drivers and other contract workers during construction phase	Complied with. All the arrangements are made during the construction phase.
(X)	Noise levels emanating from turbines 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 / ear muffs 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 / noise less areas.	Complied with. Enclosures are provided for turbines to control the noise. The persons working in the high noise area are provided with ear plugs/ear muffs All the employees working in the area are examined periodically for audiometric and records are maintained.

(XI)	Regular monitoring of ground level concentration of SO_2, NO_x, $PM_{2.5}$ & 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.	Complied with. Regular monitoring is carried as per NAAQ standards in all the locations finalized by KSPCB. Ambient Air Quality Monitoring stations are established in the plant for continuous monitoring of pollution levels. Monitoring reports are regularly submitted to KSPCB and RO-MoEF&CC and copy of the report along with the data is being kept on company website in six monthly compliance reports http://www.adanipower.com/downloads
(XII)	Provision shall be made for the housing of construction labor (as applicable) 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	Complied with. All the arrangements are made during the construction phase
(XIII)	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	Complied with
(XIV)	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parisad / Municipal Corporation, urban local Body and the Local NGO, if any, from whom suggestions / representations, if	Complied with Clearance letter is displayed in company website as part of the Six monthly compliance report of EC conditions. http://www.adanipower.com/downloads

	any, received while processing the proposal. The clearance letter shall also be put on the website of the Company by the project proponent.	
(XV)	An Environmental Cell shall be created at the project site itself and shall be headed by an officer of appropriate seniority and qualification. It shall be ensured that the head of the Cell shall directly report to the Head of the Organization. The status report on the functioning of the Cell shall be submitted to the regional office of the Ministry periodically. The Cell shall comprise of an expert in Marine Biology, Fishery and Mangroves preservation.	Complied with. A well-qualified Environment cell is established. Head of the Environment department is directly reporting to station head. Director & Research Karnataka Veterinary, Animal & Fisheries Sciences University Bidar, is a member of Environmental Monitoring committee is providing necessary technical assistance in Marine Biology, Fishery and Mangroves preservation issues.
(XVI)	The proponent shall upload the status of compliance of the stipulated environmental clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MOEF, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; SPM, RSPM ($PM_{2.5}$ & 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 public domain.	Complied with. Status of compliance of the stipulated environmental clearance conditions including results of monitored data is kept website and shall update on Six monthly bases. http://www.adanipower.com/downloads Monitoring parameters are displayed near main gate. Online Continuous emission monitoring (CEMS) data is supplied to CPCB and displayed in the public domain through the below said website. URL: http://cpcbrtdms.nic.in/ Regularly monitoring data is submitted to Regional Office of MoEF&CC, Regional Office of KSPCB and Zonal Office of CPCB.
(XVII)	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	Complied with. Copy of Environmental statement for the Financial Year 2020-21 is submitted to RO-MoEF&CC and RO-KSPCB. Copy is enclosed as ***Annexure-XV*** for reference.

	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 environmental clearance conditions and shall also be sent to the respective Regional Offices of the Ministry by e-mail.	The copy of Environmental statement is kept in six monthly EC compliance report to MoEF&CC. Six monthly report is displayed through company website. http://www.adanipower.com/downloads
(XVIII)	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	Complied with. Six monthly compliance reports are regularly submitted to Regional Office of MoEF&CC, Regional Office of KSPCB and Zonal Office of CPCB. The same is displayed in the company website. http://www.adanipower.com/downloads
(XIX)	Regional Office of the Ministry of Environment & Forests will monitor the implementation of the stipulated conditions. A complete set of documents including Environmental Impact 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 up-load the compliance status in their	Point is noted. Complied with. Complete set of document including EIA/EMP report was submitted to MoEF&CC and KSPCB for project approval. Status of compliance of the stipulated environmental clearance conditions including results of monitored data is kept

<table>
<tr><td></td><td>website and up-date 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.</td><td>on website and shall be updated on Six monthly basis.
http://www.adanipower.com/downloads

Environmental Monitoring parameters are displayed near the main gate.</td></tr>
<tr><td>(XX)</td><td>Separate funds shall be allocated for implantation 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 should be reported to the Ministry.</td><td>Complied with.
Funds for Environmental protection measures were earmarked at the time of project as per EIA report and measures have been implemented.
Yearly environmental budget is part of the yearly operating cost of the project.
The total Environment Expenditure for the period of October 2021 to March 2022 included the following:
<table>
<tr><th>S.No</th><th>Detail Description</th><th>Amount (Rs)</th></tr>
<tr><td>1</td><td>Afforestation</td><td>50,92,951.96</td></tr>
<tr><td>2</td><td>Environment Monitoring</td><td>48,23,653.21</td></tr>
<tr><td>3</td><td>General Environment Management</td><td>2,44,40,121.71</td></tr>
<tr><td></td><td>Total</td><td>3,43,56,726.88</td></tr>
</table></td></tr>
<tr><td>(XXI)</td><td>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</td><td>Complied with</td></tr>
<tr><td>(XXII)</td><td>Full cooperation shall be extended to the Scientists/ Officers from the Ministry/ Regional Office of the Ministry at Bangalore/ CPCB/ SPCB who would be monitoring the</td><td>Condition is Noted for compliance.</td></tr>
</table>

	compliance of environmental status	
(5)	The Ministry of Environment and Forests reserves the right to revoke the clearance if conditions stipulated are not implemented to the satisfaction of the Ministry. The Ministry may also impose additional environmental conditions or modify the existing ones, if necessary.	Condition is Noted
(6)	Concealing factual data or submission of false / fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of Environment (Protection) Act, 1986	Condition is Noted
(7)	In case of any deviation or alteration in the project a fresh reference should be made to the Ministry to assess the adequacy of the condition(s) imposed and to add additional environmental protection measures required	Condition is Noted
(8)	The above stipulations would be enforced among others under the Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and rules there under, Hazardous Wastes (Management and Handling) Rules, 2008 and its amendments, the Public Liability Insurance Act, 1991 and its amendments.	Condition is Noted & complied.

SIX MONTHLY COMPLIANCE STATUS FOR THE PERIOD OCTOBER 2021 to MARCH 2022 OF CONDITIONS IN CRZ CLEARANCE NO. 11-14/2010-IA-III dated 18.05.2010 FOR SEA WATER PIPELINE OF 2x600 MW UDUPI POWER CORPORATION LIMITED

S.NO	Conditions	Compliance
5	**Specific Conditions**	
I	**Construction phase:**	
(I)	All the conditions stipulated by the Karnataka State Coastal Zone Management Authority vide letter No. FEE 25 CRZ 2009, dated 16.02.2010 and the commitments/details submitted to KSCZMA shall be strictly complied with.	Condition is noted & complied.
(II)	Regular monitoring shall be carried out before discharging into sea.	All the used water is directed to Guard pond and regular monitoring is done and reports are submitted on monthly basis to KSPCB also.
(III)	A joint meeting of both the monitoring groups every year shall be carried out and send the report to MoEF.	Complied with. Regular joint meeting of UPCL monitoring team and third party MoEF&CC and NABL approved lab is conducted and monitoring reports are submitted to MoEF&CC on six monthly basis.
(IV)	It should be ensured that there shall not be any disturbance to fishing activity.	Condition is noted & complied.
(V)	All safety precautionary measures viz. stability of the pipe line, signal for fishing boats etc. shall be installed.	Sea water Pipe line is in fenced area and Emergency contact number is displayed in critical areas like Road Crossing, Village areas. 3 No's of Safety buoys are provided in the underwater pipeline area for safety of fishing boats.
(VI)	There shall be display boards at critical locations along the pipe line giving emergency instructions. Emergency information board shall contain emergency instructions in additions to contact details	Sea water Pipe line is in fenced area and caution boards provided with Emergency contact number is displayed in critical areas like Road Crossing, Village areas. Photos of display boards are enclosed as ***Annexure-XVI***
(VII)	The project shall be implemented in such a manner that there is no damage to the mangroves/other sensitive coastal ecosystems	The pipeline area does not include any mangroves/other sensitive coastal eco systems.
(VIII)	A continuous and comprehensive post-project marine quality monitoring programme shall be taken up. This shall include monitoring of water quality, sediment quality and biological	Monitoring is carried for sea water quality at intake and outfall points by Fisheries college, Mangalore. Reports are regularly submitted.

	characteristics and the report shall be submitted every six month to Ministry's Regional Office at Bangalore.	Monitoring Reports for the period of October 2021 to March 2022 is enclosed as ***Annexure-XVII*** for reference.
(IX)	It shall be ensured that there is no displacement of people and the houses as a result of the project.	Condition is noted & complied.
(X)	There shall be no withdrawal of ground water in CRZ area, for the project.	Condition is noted & complied.
(XI)	Provision shall be made for the housing of construction labor within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	All the arrangements were made during the construction phase.
(XII)	A First Aid Room will be provided in the project both during construction and operation of the project	Complied with. All the arrangements are made during the construction phase.
(XIII)	Soil and ground water samples will be tested to ascertain that there is no threat to ground water quality	Complied with. All the construction activities are completed.
(XIV)	Any hazardous waste generated during construction phase, should be disposed off as per applicable rules and norms with necessary approvals of the KSPCB.	Complied with. No hazardous waste was generated during construction phase.
(XV)	The diesel generator sets to be used during construction phase should be low Sulphur diesel type and should confirm to Environment (Protection) Rules prescribed for air and noise emission standards.	Construction work involves only excavation and pipe laying work, so DG sets were not used.
(XVI)	The diesel required for operating DG sets shall be stored in underground tanks and if required, clearance from Chief Controller of Explosives shall be taken.	Construction work involves only excavation and pipe laying work, so DG sets were not used.
(XVII)	Vehicles hired for bringing construction material to the site	Complied with condition.

	should be in good condition and should have a pollution check certificate and should confirm to applicable air and noise emission standards and should be operated only during non-peak hours.	
(XVIII)	Ambient noise levels should confirm to residential standards both during day and night. Incremental pollution loads on the ambient air and noise quality should be closely monitored during construction phase. Adequate measures should be made to reduce ambient air and noise level during construction phase, so as to confirm to the stipulated standards by CPCB/KSPCB	Condition is noted & complied.
(XIX)	Storm water control and its re-use as per CGWB and BIS standards for various applications.	Work involved only in lying of pipeline underground and back filling.
(XX)	Regular supervision of the above and other measures for monitoring should be in place all through the construction phase, so as to avoid disturbance to the surroundings	Condition is noted & complied.
(II)	**OPERATION PHASE**	
(I)	Noise should be controlled to ensure that it does not exceed the prescribed standards. During night time the noise levels measured shall be restricted to the permissible levels to comply with the prevalent regulations	Not applicable in the area because no structure is available in the area.
(II)	The green belt of the adequate width and density preferably with local species along the periphery of the power plant shall be raised so as to provide protection against particulates and noise as suggested by KSCZMA.	Green belt is developed in the power plant area in accordance with environmental clearance.
(III)	Project proponent shall support afforestation activities by way of raising and supply of required seedling by the locals within 5KM radius of the plant as suggested by KSCZMA	Condition is noted & complied.

<table>
<tr><td>(IV)</td><td>The ground water level and its quality should be monitored regularly</td><td>The work involves only laying of pipeline and no other industrial activities are involved. However regular water monitoring is being carried in the test wells constructed in the pipeline area.
Monitoring reports for the period of October 2021 to March 2022 is enclosed as Annexure-XVIII for reference</td></tr>
<tr><td>(V)</td><td>The mangroves, if any, on the site should not be disturbed in anyway</td><td>Complied with at the time of pipe line construction.</td></tr>
<tr><td>(VI)</td><td>The environmental safeguards contained in the application should be implemented in letter and spirit</td><td>Complied with.</td></tr>
<tr><td>(VII)</td><td>A separate Environment management Cell with suitably qualified staff to carry out various environment related functions shall be set up under the charge of a Senior Executive who will report directly to the Chief Executive of the Company.</td><td>Well qualified environment cell is established which is headed by HOD-Environment who is directly reporting to station head.</td></tr>
<tr><td>(VIII)</td><td>The funds earmarked for environment protection measures shall be maintained in a separate account and there shall be no diversion of these funds for any purpose. A year wise expenditure on environmental safeguards shall be reported to this Ministry's Regional Office at Bangalore.</td><td>Noted and Complied. Funds for Environmental protection measures were earmarked at the time of project as per EIA report and measures have been implemented.

Yearly environmental budget is part of the yearly operating cost of the project.

The Environment Expenditure for the period of October 2021 to March 2022 included the following:
<table>
<tr><th>S.No</th><th>Detail Description</th><th>Amount (Rs.)</th></tr>
<tr><td>1</td><td>Afforestation</td><td>50,92,951.96</td></tr>
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<tr><td>4</td><td>Total</td><td>3,43,56,726.88</td></tr>
</table></td></tr>
<tr><td>(IX)</td><td>In case of deviation or alteration in the project including the implementing agency, a fresh</td><td>Condition is noted & compliance.</td></tr>
</table>

	reference shall be made to this Ministry for modification in the clearance conditions or imposition of new one for ensuring environmental protection. The project proponents shall be responsible for implementing the suggested safeguard measures.	
(X)	This Ministry reserves the right to revoke this clearance, if any of the conditions stipulated are not complied with to the satisfaction of this Ministry	Condition is noted & compliance.
(6)	**GENERAL CONDITIONS**	
(I)	Adequate provision for infrastructure facilities including water supply, fuel and sanitation must be ensured for construction workers during the construction phase of the project to avoid any damage to the environment.	Complied with. All the arrangements are made during the construction phase.
(II)	Appropriate measures must be taken while undertaking digging activities to avoid any likely degradation of water quality.	Condition is noted & complied.
(III)	Borrow sites for each quarry sites for road construction material and dump sites must be identified keeping in view the following	Not Applicable since no road construction work involved in the CRZ area.
(a)	No excavation or dumping on private property is carried out without written consent of the owner	Condition is noted & complied.
(b)	No excavation or dumping shall be allowed on wetlands, forest areas or other ecologically valuable or sensitive locations.	Condition is noted & complied.
(c)	Excavation work shall be done in close consultation with the Soil Conservation and Watershed Development Agencies working in the area, and	Condition is noted & complied.
(d)	Construction spoils including bituminous material and other hazardous materials must not be allowed to contaminate water courses and the dump sites for	Condition is noted & complied.

	such materials and the dump sites for such materials must be secured so that they shall not leach into the ground water	
(IV)	Adequate precautions shall be taken during transportation of the construction material so that it does not affect the environment adversely	Complied with. All the precautionary measures are taken during construction time.
(V)	Borrow pits and other scars created during the laying of cable shall be properly leveled and treated	Complied with. Was not applicable.
(VI)	Adequate financial provision must be made in the project to implement the aforesaid safeguards.	Complied with.
(VII)	The project proponent will set up separate environmental management cell for effective implementation of the stipulated environmental safeguards under the supervision of a Senior Executive.	Well qualified Environment cell is established which is headed by HOD-Environment who is directly reporting to Station Head.
(VIII)	Full support shall be extended to the officers of this Ministry/Regional Office at Bangalore by the project proponent during inspection of the project for monitoring purposes by furnishing full details and action plan including action taken reports in respect of mitigation measures and other environmental protection activities.	Noted for compliance.
(IX)	MoEF or any other competent authority may stipulate any additional conditions or modify the existing ones, if necessary in the interest of environment and the same shall be complied with.	Noted for compliance.
(X)	The Ministry reserves the right to revoke this clearance if any of the conditions stipulated are not complied with the satisfaction of the Ministry	Noted for compliance.

(XI)	In the event of a change in the project profile or change in the implementation agency, a fresh reference shall be made to the MoEF	Noted for compliance.
(XII)	The project proponents 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 and the date of start of land development work	The pipeline activity is a part of the total power project. The date of financial closure for the total project was 13.06.2007. The MOEF clearance was originally received on 20.03.1997 and the clearance for augmented capacity (from 2 x 507.5 to 2 x 600 MW) was received on 09.09.2009. Consolidated Environmental clearance received on 01.09.2011. The land development work for the pipeline activity was commenced in March 2009.
(XIII)	KSPCB shall display a copy of the clearance letter at the Regional Office, District Industries Center and Collector's office/Tahsildar's office for 30 days.	Noted as related to KSPCB.
7	These stipulations would be enforced among others under the provisions of Water Act, 1974, Air Act, 1981, Environment Act, 1986, Public Liability Act, 1991 and EIA Notification 2006, including the amendments and rules made thereafter.	Noted for compliance.
8	All other statutory clearances such as the approvals for storage of diesel from CCE, Fire Department, Civil Aviation Dept, Forest Conservation Act, 1980 and Wild life Act, 1972, etc shall be obtained, as applicable by project proponents from the respective competent authorities	Noted. These clearances were not applicable for sea water pipe line work.
9	The project proponent shall advertise in at least two local newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded EC and copies of clearance letters are available with the KSPCB and may also be seen on the website of	Complied with. A copy of advertisement in local newspaper is submitted to RO-MoEF vide ref letter No: UPCL/B04/2010/1990 dated: 29.05.2010.

	MoEF at http://www.envfor.nic.in. The advertisement should be made within 10 days from the date of receipt of the Clearance letter and a copy of the same should be forwarded to the Regional Office of this Ministry at Bangalore.	
10	EC is subject to final order of the Honorable Supreme Court of India in the matter of Goa Foundation Vs Union of India in Writ Petition (Civil) No.460 of 2004 as may be applicable to this project.	Noted for compliance.
11	Any appeal against this EC shall lie with National Environment Appellate Authority, if preferred, within a period of 30 days as prescribed under Section 11 of the National Environment Appellate Act, 1997.	Noted for compliance.
12	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zilla Parishad/Municipal Corporation, Urban Local Body and the local NGO, if any, from whom suggestions/representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent.	This is to clarify that the pipeline activity is a part of the main plant for which there was no need for public hearing as mentioned in MOEF letter.113011/23/96-IA-II (T) Part dated 31.01.2005. Hence no representations were received and therefore this clause is not applicable.
13	The proponent shall upload the status of compliance of 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 at Bangalore, the respective Zonal Office of CPCB and the KSPCB. The criteria pollutant levels namely; SPM, RSPM, SO2, NOx (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the project shall be monitored and	Compliance status of the stipulated conditions uploaded on the website. However, results of monitoring data is not applicable since the activity involved is only laying of the water pipeline and no industrial activity involved in the area under discussion (CRZ). The monitoring data of the main plant is uploaded on the website and displayed near the main gate of the project. Reports are displayed in company website. http://www.adanipower.com/downloads

	displayed at a convenient location near the main gate of the company in the public domain.	
14	The project proponent shall also submit six monthly reports on the status of compliance of the stipulated EC conditions including results of monitored data (both in hard copies as well as by e-mail) to the respective Regional Office of MoEF, the respective Zonal Office of CPCB and SPCB	Complied with. Six Monthly reports are regularly submitted to RO-MoEF&CC, RO-KSPCB and ZO-CPCB.
15	The Environmental Statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned KSPCB 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 Office of MoEF at Bangalore by email.	Complied with. Copy of Environmental statement for the Financial Year 2020-21 is submitted to RO-MoEF&CC and RO-KSPCB is enclosed as ***Annexure-XV*** for reference. The copy of the same is displayed through company website as part of the six monthly EC compliance report. http://www.adanipower.com/downloads

METEOROLOGICAL DATA ***Annexure-I***

UPCL is having own Continuous Meteorological Observatory Station at site to observe below parameters:

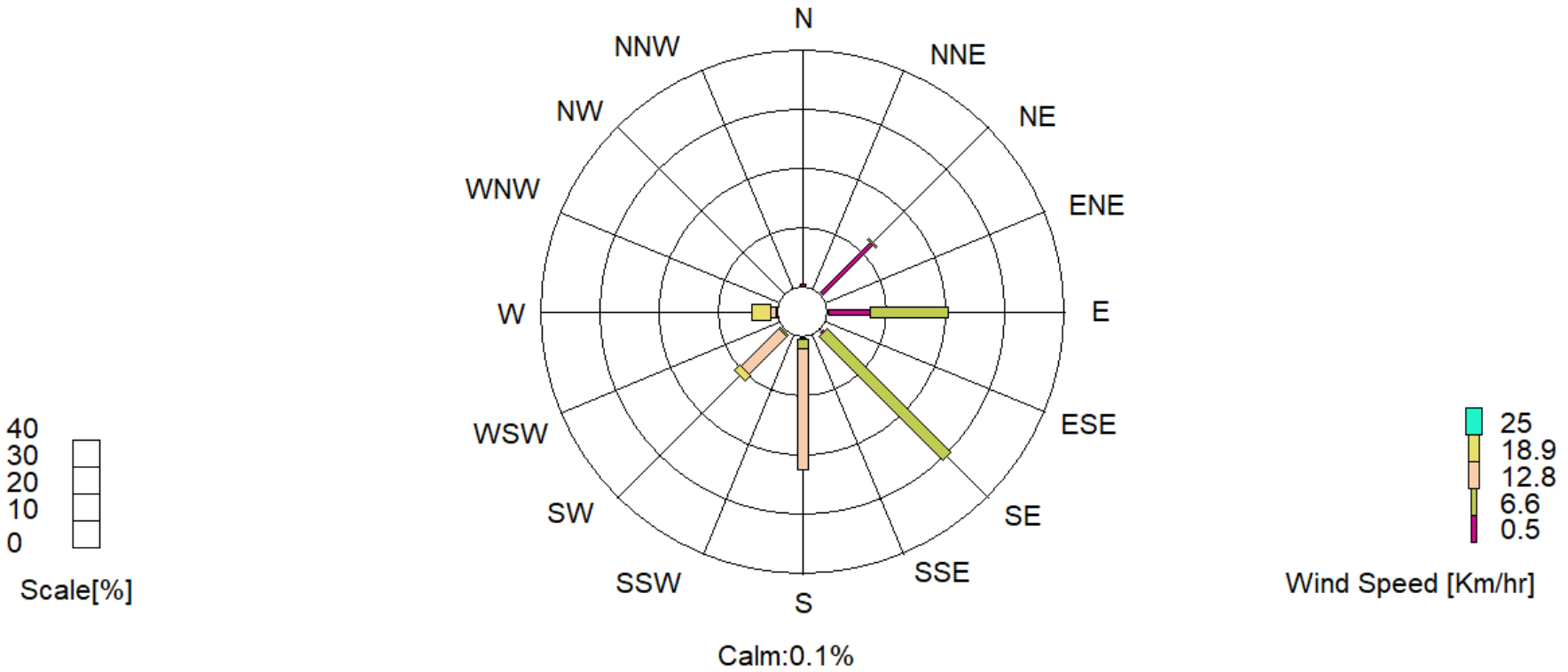
- Temperature
- Humidity
- Wind Speed
- Wind Direction
- Rain fall

Table-1: AVERAGE DAILY METEOROLOGICAL DATA OF OCT-2021

Date	Temperature (°C)		Relative Humidity (%)		Rain Fall (mm)
	Min	Max	Min	Max	
1/Oct/2021	25.2	32.3	41.78	90.99	19.7
2/Oct/2021	24.5	33.1	42.72	93.12	24.7
3/Oct/2021	22.4	31.6	56.27	92.62	0
4/Oct/2021	25.2	31.5	51.57	90.36	0
5/Oct/2021	25.3	35.8	40.43	92.98	14.5
6/Oct/2021	23.6	27.4	78.47	94.26	3.2
7/Oct/2021	25.3	29.8	65.16	94.91	0
8/Oct/2021	24.5	29.9	56.81	92.22	3.9
9/Oct/2021	24.2	29.5	66.24	94.81	6.6
10/Oct/2021	24.0	30.3	46.65	94.59	0
11/Oct/2021	24.3	32.0	53.63	95.39	34.3
12/Oct/2021	23.6	27.7	56.78	95.77	115.9
13/Oct/2021	23.0	27.2	77.02	96.32	1.6
14/Oct/2021	25.1	30.2	61.42	89.78	0
15/Oct/2021	25.8	30.5	51.16	91.60	0
16/Oct/2021	24.1	32.4	63.34	93.91	47.9
17/Oct/2021	24.0	27.9	78.38	95.50	13.1
18/Oct/2021	25.2	31.6	69.89	92.98	3.5
19/Oct/2021	25.8	31.0	48.40	93.65	0
20/Oct/2021	25.7	32.5	48.83	91.68	38.6
21/Oct/2021	22.3	30.3	73.46	95.43	11.5
22/Oct/2021	24.6	31.6	60.33	94.73	14.8
23/Oct/2021	24.7	27.3	76.34	91.60	0
24/Oct/2021	25.3	32.0	44.44	94.67	0
25/Oct/2021	24.9	32.5	40.59	91.75	0.6
26/Oct/2021	24.9	29.2	71.03	92.18	0
27/Oct/2021	26.3	33.6	49.55	91.38	0
28/Oct/2021	25.9	31.7	59.26	89.56	0
29/Oct/2021	27.0	34.0	52.51	90.09	0
30/Oct/2021	25.7	33.5	51.70	93.60	2.8
31/Oct/2021	25.7	33.7	45.82	94.57	3.4
Min	**22.3**	**27.2**	**40.4**	**89.6**	**360.60**
Max	**27.0**	**35.8**	**78.5**	**96.3**	
Average	**24.8**	**31.1**	**57.4**	**93.1**	

Periodic Wind Rose Met Station 10/1/2021 01:00-10/31/2021 24:00

Station:Met Station AVG:1 Hour



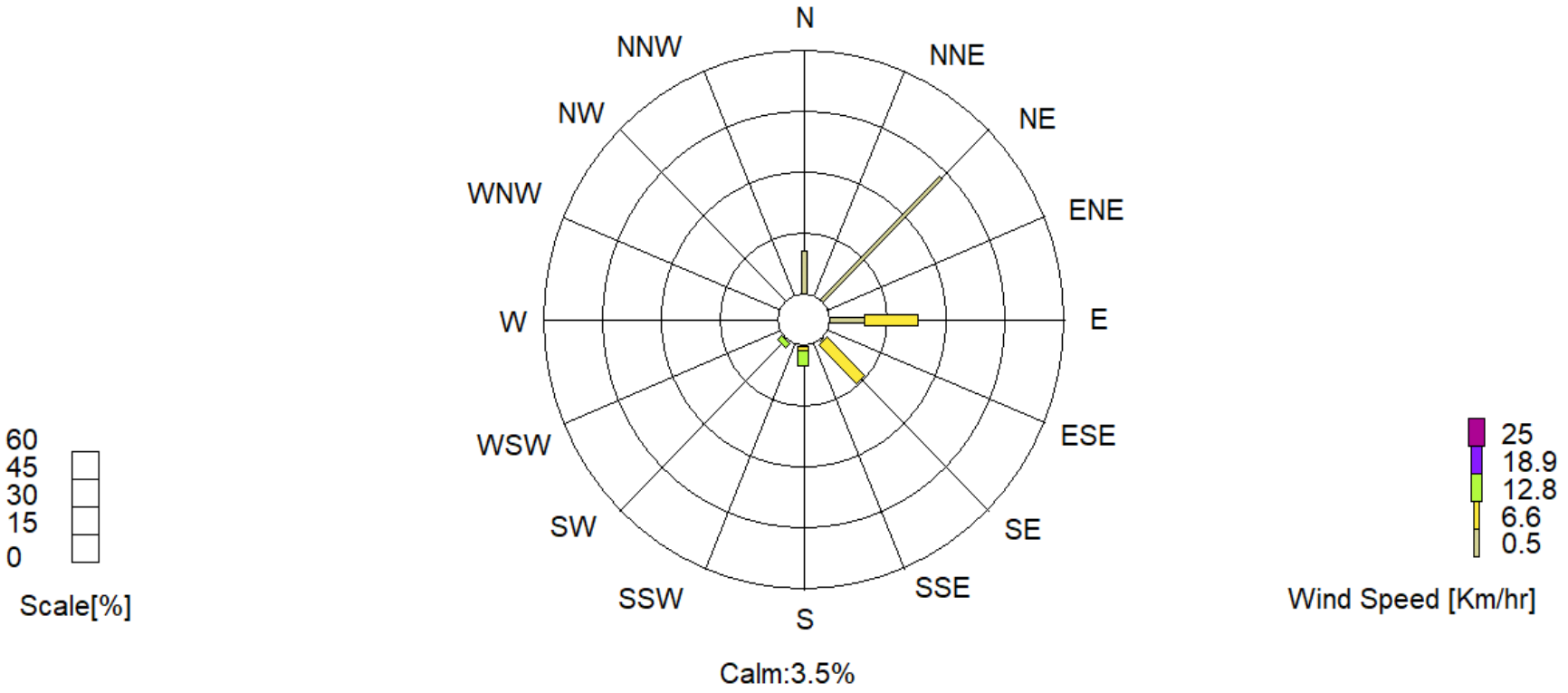
Calm:0.1%

Table-2: AVERAGE DAILY METEOROLOGICAL DATA OF NOV- 2021

Date	Temperature (°C)		Relative Humidity (%)		Rain Fall (mm)
	Min	Max	Min	Max	
1/Nov/2021	25.2	32.9	44.84	93.49	5.6
2/Nov/2021	25.5	32.5	53.88	93.57	3.6
3/Nov/2021	25.5	32.3	45.23	93.51	10.9
4/Nov/2021	25.4	33.5	42.48	92.38	12.5
5/Nov/2021	24.7	29.6	62.73	91.68	55.7
6/Nov/2021	22.8	30.6	63.66	95.09	3.6
7/Nov/2021	23.7	30.5	48.41	93.43	0
8/Nov/2021	24.0	32.1	57.41	91.48	0
9/Nov/2021	24.2	31.4	61.24	89.51	0
10/Nov/2021	25.7	32.7	48.55	92.09	0
11/Nov/2021	25.7	32.0	53.90	91.59	2.2
12/Nov/2021	23.8	28.9	60.38	85.73	0
13/Nov/2021	25.4	31.4	63.26	92.00	40.2
14/Nov/2021	23.3	28.1	74.63	96.62	61.6
15/Nov/2021	23.3	30.2	67.39	96.49	0
16/Nov/2021	24.7	29.9	54.12	93.52	0
17/Nov/2021	25.4	30.6	54.53	87.58	0
18/Nov/2021	25.2	32	57.62	90.09	0
19/Nov/2021	25.5	29.1	66.76	91.48	44.8
20/Nov/2021	23.2	28.4	73.15	95.18	14.8
21/Nov/2021	23.8	31.3	53.66	93.83	12.3
22/Nov/2021	23.9	31.5	57.24	94.56	2.9
23/Nov/2021	25.1	33.8	39.65	94.09	0
24/Nov/2021	25.5	34.5	43.41	93.52	29.4
25/Nov/2021	26.4	32.9	40.05	92.14	0
26/Nov/2021	26.0	33.8	58.11	90.37	0
27/Nov/2021	26.0	34.5	37.57	89.27	0
28/Nov/2021	26.4	32.7	38.77	72.66	0
29/Nov/2021	27.3	33.4	38.58	88.90	0
30/Nov/2021	24.8	32.8	40.61	92.56	17.8
Min	**22.8**	**28.1**	**37.6**	**72.7**	**317.90**
Max	**27.3**	**34.5**	**74.6**	**96.6**	
Average	**24.9**	**31.7**	**53.4**	**91.6**	

Periodic Wind Rose Met Station 11/1/2021 01:00-11/30/2021 24:00

Station:Met Station AVG:1 Hour



Calm:3.5%

Table-3: AVERAGE DAILY METEOROLOGICAL DATA OF DEC-2021

Date	Temperature (°C)		Relative Humidity (%)		Rain Fall (mm)
	Min	Max	Min	Max	
1/Dec/2021	23.1	30.58	68.25	87.5	9.9
2/Dec/2021	24.06	30.98	68.82	86.74	0
3/Dec/2021	24.42	31.01	66.94	85.77	0
4/Dec/2021	24.57	30.9	71.14	86.29	0
5/Dec/2021	23.54	31.01	69.36	84.02	0
6/Dec/2021	21.87	31.61	46.8	73.76	0
7/Dec/2021	19.74	30.58	54.32	76.72	0
8/Dec/2021	21.39	31.19	55.43	79.95	0
9/Dec/2021	22.96	31.94	61.86	82.66	0
10/Dec/2021	24.45	31.21	64.44	83.51	0
11/Dec/2021	23.78	32.68	53.96	79.45	0
12/Dec/2021	25.55	33.02	55.04	78.85	0
13/Dec/2021	23.84	31.24	63.24	80.84	0
14/Dec/2021	23.9	31.86	61.87	80.35	0.5
15/Dec/2021	23.57	31.77	61.03	79.64	0
16/Dec/2021	24.24	31.31	62.5	79.11	0
17/Dec/2021	23.48	32.06	50.08	79.43	0
18/Dec/2021	21.98	31.52	55.61	78.59	0
19/Dec/2021	20.19	31.69	50.58	73.31	0
20/Dec/2021	19.13	31.53	44.95	70.58	0
21/Dec/2021	20.7	30.44	51.36	75.55	0
22/Dec/2021	20.79	29.83	60.79	82.32	0
23/Dec/2021	21.72	30.08	61.91	81.88	0
24/Dec/2021	21.54	29.94	67.17	84.98	0
25/Dec/2021	21.94	30.51	63.30	82.28	0
26/Dec/2021	21.49	29.74	72.46	87.29	0
27/Dec/2021	22.77	30.56	66.74	86.42	0
28/Dec/2021	22.24	32.11	49.05	80.76	0
29/Dec/2021	21.80	31.07	54.35	80.09	0
30/Dec/2021	21.02	31.85	49.92	77.82	0
31/Dec/2021	21.37	32.91	49.12	75.61	0
Min	**19.1**	**29.7**	**45.0**	**70.6**	**10.40**
Max	**25.6**	**33.0**	**72.5**	**87.5**	
Average	**22.5**	**31.2**	**59.1**	**80.7**	

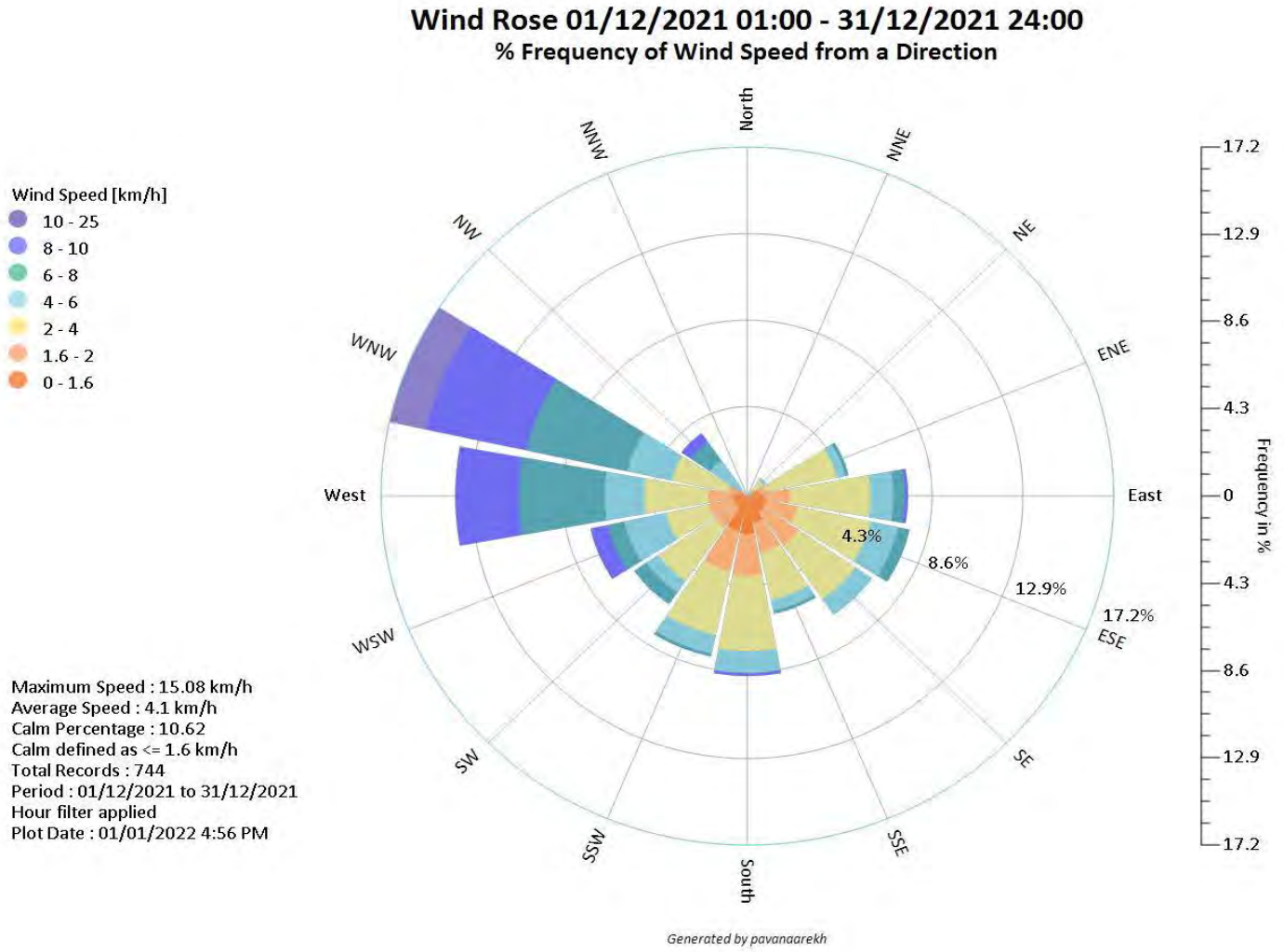

Wind Rose 01/12/2021 01:00 - 31/12/2021 24:00
% Frequency of Wind Speed from a Direction
Wind Speed [km/h]
10 - 25
8 - 10
6 - 8
4 - 6
2 - 4
1.6 - 2
0 - 1.6
North
NNE
NE
ENE
East
ESE
SE
SSE
South
SSW
SW
WSW
West
WNW
NW
NNW
4.3%
8.6%
12.9%
17.2%
17.2
12.9
8.6
4.3
0
4.3
8.6
12.9
17.2
Frequency in %
Maximum Speed : 15.08 km/h
Average Speed : 4.1 km/h
Calm Percentage : 10.62
Calm defined as <= 1.6 km/h
Total Records : 744
Period : 01/12/2021 to 31/12/2021
Hour filter applied
Plot Date : 01/01/2022 4:56 PM
Generated by pavanaarekh

Table-4: AVERAGE DAILY METEOROLOGICAL DATA OF JAN- 2022

Date	Temperature (°C)		Relative Humidity (%)		Rain Fall (mm)
	Min	Max	Min	Max	
1/Jan/2022	32.96	27.12	88.20	74.54	0
2/Jan/2022	31.63	27.05	90.40	77.04	0
3/Jan/2022	31.80	26.69	93.70	77.23	0
4/Jan/2022	31.82	26.24	92.30	77.18	0
5/Jan/2022	31.20	25.80	92.50	78.07	0
6/Jan/2022	30.06	25.05	94.50	81.73	0
7/Jan/2022	30.33	25.29	94.80	81.46	0
8/Jan/2022	30.64	25.42	92.50	76.74	0
9/Jan/2022	30.73	25.06	90.70	74.60	0
10/Jan/2022	30.00	25.25	92.20	78.48	0
11/Jan/2022	29.05	24.55	91.80	79.52	0
12/Jan/2022	28.71	23.76	89.30	77.57	0
13/Jan/2022	29.87	24.07	91.80	72.81	0
14/Jan/2022	29.63	24.05	87.50	76.18	0
15/Jan/2022	30.21	24.38	92.20	73.93	0
16/Jan/2022	30.76	24.84	88.70	72.36	0
17/Jan/2022	31.06	26.16	87.80	75.18	0
18/Jan/2022	32.05	26.42	91.2	76.69	0
19/Jan/2022	31.07	25.63	94.2	77.17	0
20/Jan/2022	31.19	25.23	92.6	79.52	0
21/Jan/2022	30.45	24.95	96.3	81.53	0
22/Jan/2022	29.54	24.98	94.6	80.86	0
23/Jan/2022	29.77	24.85	92.5	77.13	0
24/Jan/2022	28.89	24.34	91.8	74.39	0
25/Jan/2022	28.70	23.58	88.4	72.56	0
26/Jan/2022	28.54	23.91	86.9	74.96	0
27/Jan/2022	29.93	25.36	86.8	75.35	0
28/Jan/2022	32.11	26.79	90.8	75.97	0
29/Jan/2022	32.18	26.87	94.1	73.91	0
30/Jan/2022	32.94	27.13	89.3	76.99	0
31/Jan/2022	30.98	26.53	92.5	80.40	0
Min	**28.5**	**23.6**	**86.8**	**72.4**	**0.00**
Max	**33.0**	**27.1**	**96.3**	**81.7**	
Average	**30.6**	**25.4**	**91.4**	**76.8**	

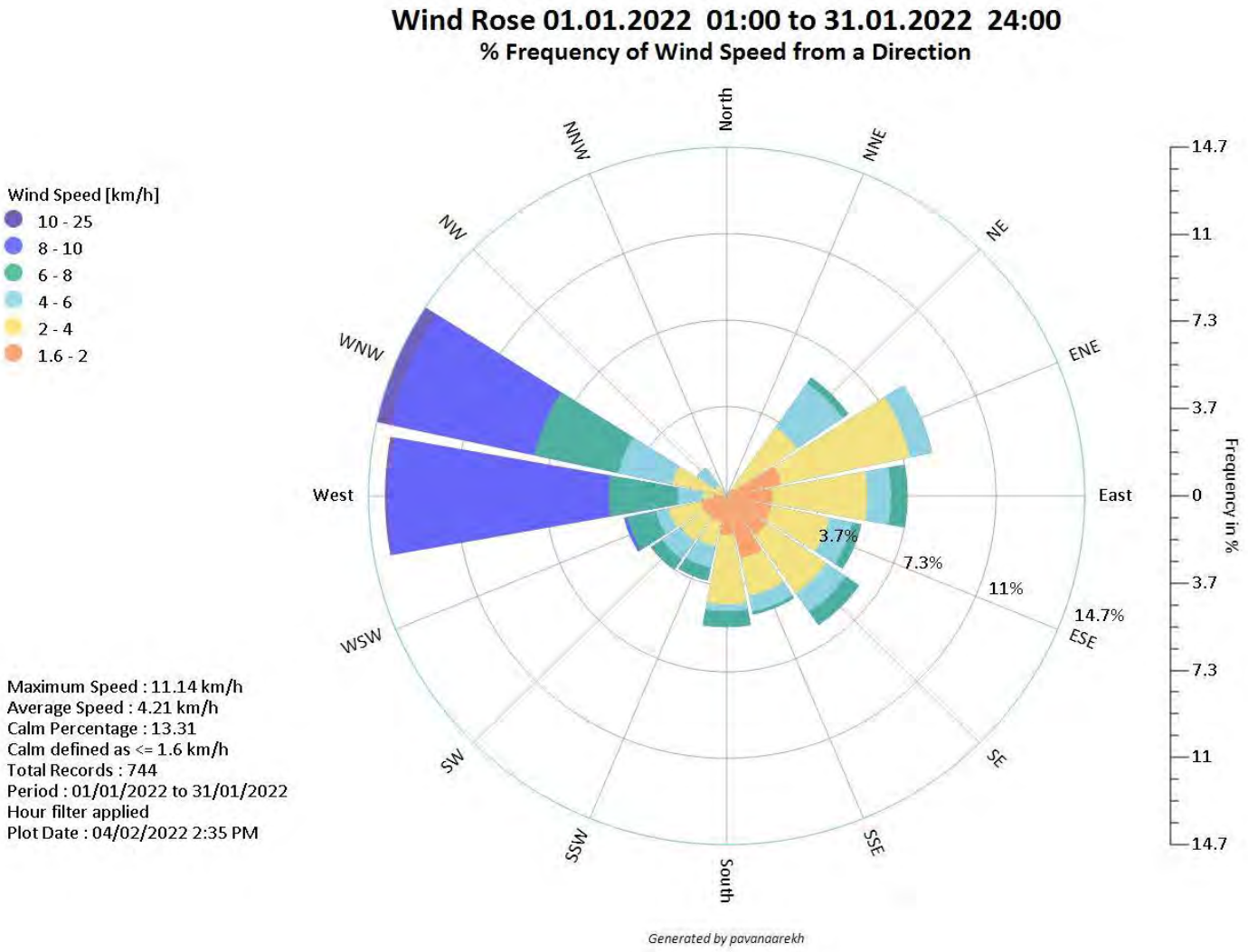

Wind Rose 01.01.2022 01:00 to 31.01.2022 24:00
% Frequency of Wind Speed from a Direction
Wind Speed [km/h]
10 - 25
8 - 10
6 - 8
4 - 6
2 - 4
1.6 - 2
North
NNE
NE
ENE
East
ESE
SE
SSE
South
SSW
SW
WSW
West
WNW
NW
NNW
3.7%
7.3%
11%
14.7%
14.7
11
7.3
3.7
0
3.7
7.3
11
14.7
Frequency in %
Maximum Speed : 11.14 km/h
Average Speed : 4.21 km/h
Calm Percentage : 13.31
Calm defined as <= 1.6 km/h
Total Records : 744
Period : 01/01/2022 to 31/01/2022
Hour filter applied
Plot Date : 04/02/2022 2:35 PM
Generated by pavanaarekh

Table-5: AVERAGE DAILY METEOROLOGICAL DATA OF FEB-2022

Date	Temperature (°C)		Relative Humidity (%)		Rain Fall (mm)
	Min	Max	Min	Max	
1/Feb/2022	33.2	26.35	92.90	78.66	0
2/Feb/2022	32.4	26.17	93.50	81.87	0
3/Feb/2022	31.7	25.9	94.60	81.74	0
4/Feb/2022	30.9	24.49	93.60	78.04	0
5/Feb/2022	30.1	23.83	91.10	79.38	0
6/Feb/2022	30.3	24.44	93.80	80.98	0
7/Feb/2022	31.2	25.26	93.50	78.91	0
8/Feb/2022	31.3	25.47	92.80	80.35	0
9/Feb/2022	31.2	25.48	62.60	79.54	0
10/Feb/2022	31.9	25.81	92.40	81.55	0
11/Feb/2022	36.4	26.47	93.30	70.21	0
12/Feb/2022	33.7	26.04	87.90	73.72	0
13/Feb/2022	33.2	26.38	92.80	78.28	0
14/Feb/2022	33.4	26.76	93.40	81.45	0
15/Feb/2022	32.4	26.5	94.00	82.41	0
16/Feb/2022	32	26.19	94.10	80.90	0
17/Feb/2022	33.7	26.19	90.70	77.14	0
18/Feb/2022	32.1	26.4	87.60	76.53	0
19/Feb/2022	33.7	26.92	90.50	78.50	0
20/Feb/2022	33.5	26.79	95.80	81.50	0
21/Feb/2022	32.9	26.45	97.90	80.52	0
22/Feb/2022	32.7	26.01	91.80	74.56	0
23/Feb/2022	34.6	26.91	92.70	75.29	0
24/Feb/2022	32.5	26.74	92.30	80.74	0
25/Feb/2022	33.7	27	93.60	81.61	0
26/Feb/2022	34.9	26.75	97.40	80.59	0
27/Feb/2022	33.6	27.31	95.20	81.18	0
28/Feb/2022	32.4	26.88	95.10	81.69	0
Min	**30.1**	**23.8**	**62.6**	**70.2**	**0.00**
Max	**36.4**	**27.3**	**97.9**	**82.4**	
Average	**32.7**	**26.1**	**92.0**	**79.2**	

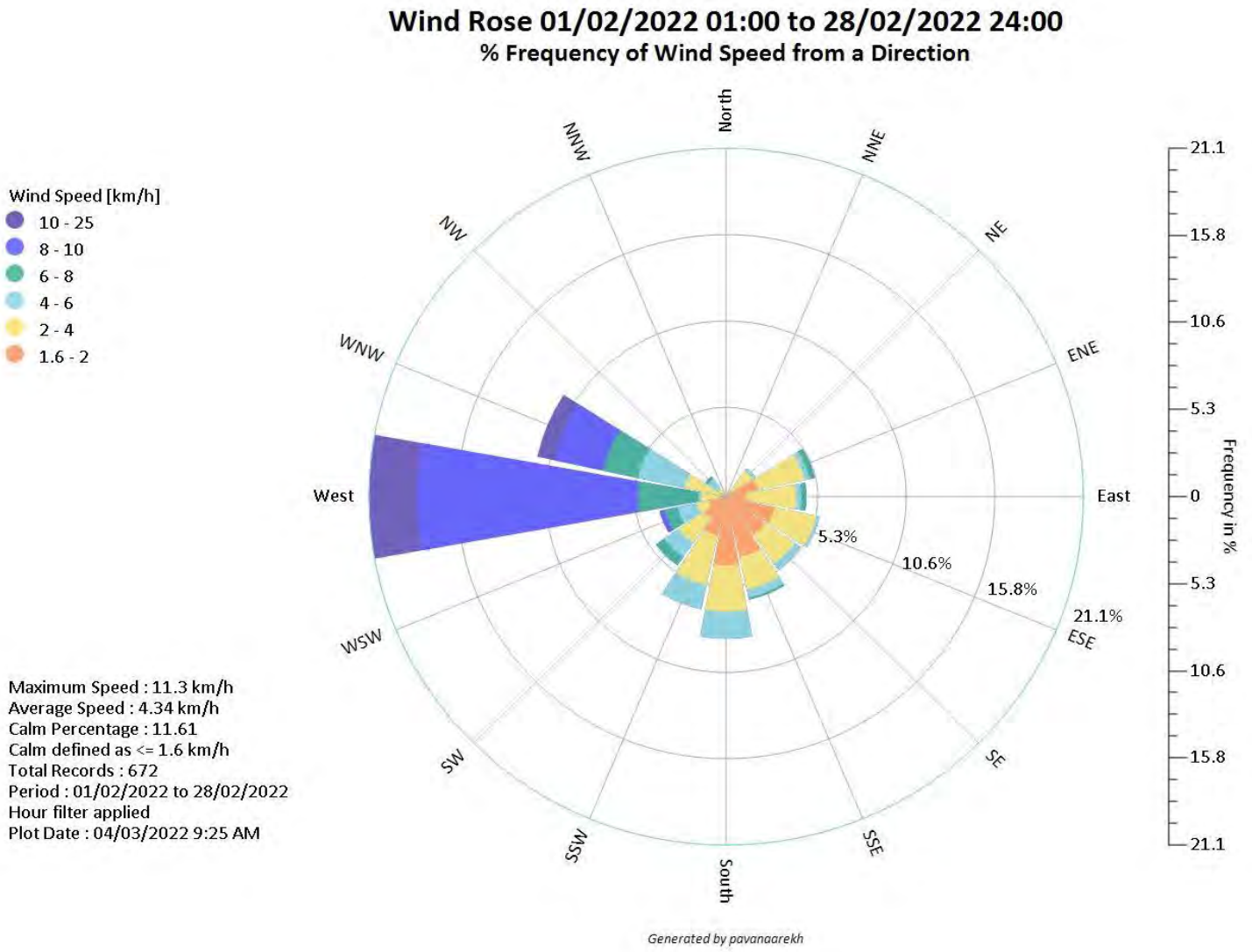
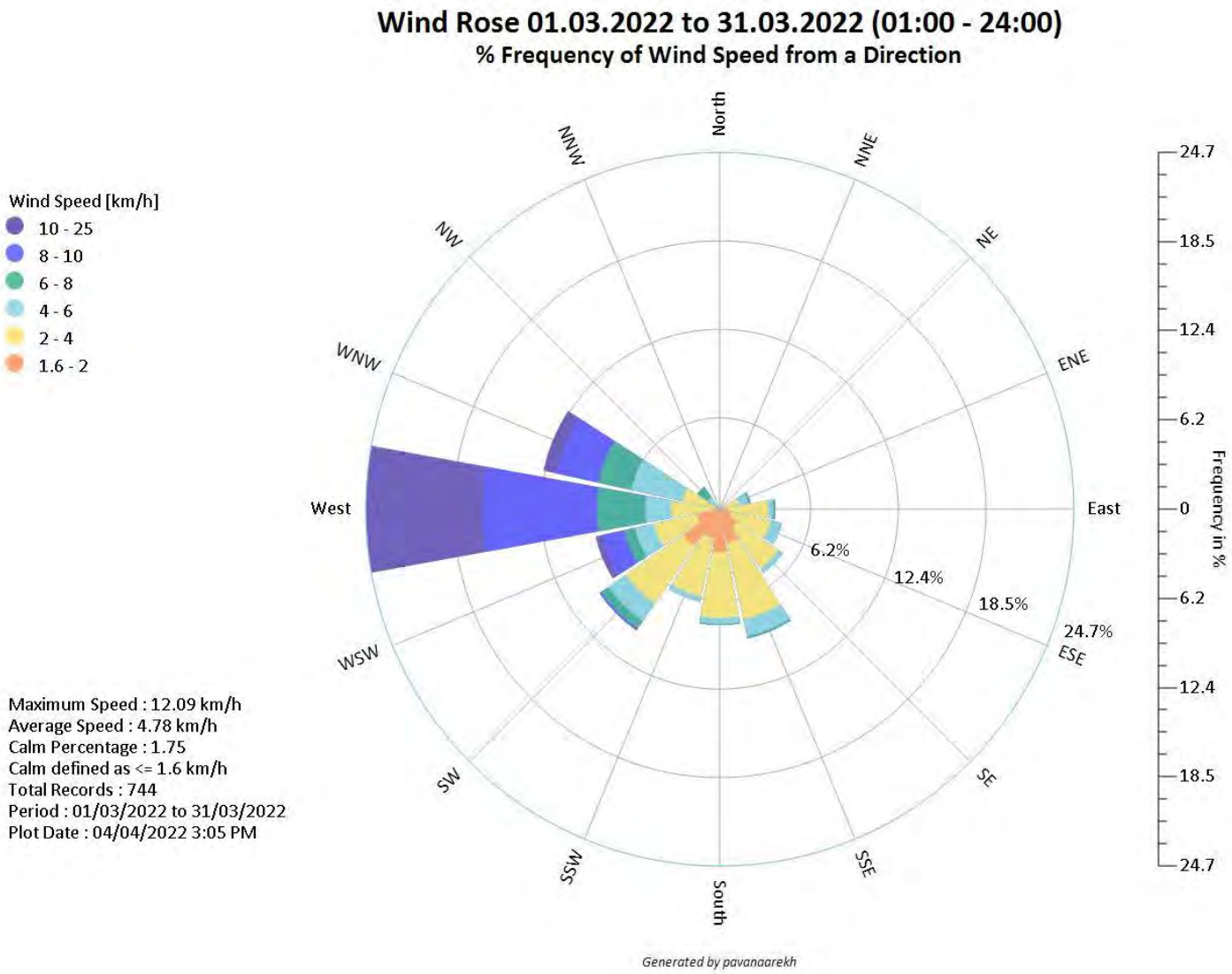

Wind Rose 01/02/2022 01:00 to 28/02/2022 24:00
% Frequency of Wind Speed from a Direction
Wind Speed [km/h]
10 - 25
8 - 10
6 - 8
4 - 6
2 - 4
1.6 - 2
North
NNE
NE
ENE
East
ESE
SE
SSE
South
SSW
SW
WSW
West
WNW
NW
NNW
5.3%
10.6%
15.8%
21.1%
21.1
15.8
10.6
5.3
0
5.3
10.6
15.8
21.1
Frequency in %
Maximum Speed : 11.3 km/h
Average Speed : 4.34 km/h
Calm Percentage : 11.61
Calm defined as <= 1.6 km/h
Total Records : 672
Period : 01/02/2022 to 28/02/2022
Hour filter applied
Plot Date : 04/03/2022 9:25 AM
Generated by pavanaarekh

Table-6: AVERAGE DAILY METEOROLOGICAL DATA OF MAR-2022

Date	Temperature (°C)		Relative Humidity (%)		Rain Fall (mm)
	Min	Max	Min	Max	
1/Mar/2022	22.3	32.4	56.9	97.7	0
2/Mar/2022	22.4	33	59.5	98.1	0
3/Mar/2022	22	36.3	23.9	98.5	0
4/Mar/2022	20.2	35.2	28.7	96.2	0
5/Mar/2022	19.6	35.5	27.7	89.9	0
6/Mar/2022	20.2	34.8	28.7	92.4	0
7/Mar/2022	21.9	34.7	41.8	100	0
8/Mar/2022	22.4	33.7	49.3	93.8	0
9/Mar/2022	23.3	34.1	48.5	90.2	0
10/Mar/2022	25.1	33.2	60.1	90.9	0
11/Mar/2022	23.5	32.8	62.9	94.1	0
12/Mar/2022	24.3	33.5	58.7	97.7	0
13/Mar/2022	23.8	34.7	43.7	100	0
14/Mar/2022	23.6	34.6	41.1	97.7	0
15/Mar/2022	23.1	35.8	40.9	93.4	0
16/Mar/2022	24.4	33.9	59.4	98.1	0
17/Mar/2022	25.6	33.6	64.8	95.1	0
18/Mar/2022	25.5	32.7	69.6	94.3	5.2
19/Mar/2022	21.4	33.4	63.9	100	0
20/Mar/2022	24.1	32.8	64.7	90.4	0
21/Mar/2022	24.4	33.7	57.5	89.3	1.4
22/Mar/2022	24.9	33.3	60.1	94.8	0
23/Mar/2022	24.2	32.7	68.4	97.8	5.7
24/Mar/2022	23.6	33.3	65.7	99.1	0
25/Mar/2022	23.7	32.6	69	98	0
26/Mar/2022	24.8	33.4	62.1	92.9	0
27/Mar/2022	25.4	34	58.9	94.7	0
28/Mar/2022	25.2	33.8	63.8	91.6	0
29/Mar/2022	24.6	33.2	63.4	88.6	0
30/Mar/2022	25.9	34.1	62.8	91.7	0
31/Mar/2022	25.3	34.4	60.6	92.6	0
Min	**19.6**	**32.4**	**23.9**	**88.6**	**12.30**
Max	**25.9**	**36.3**	**69.6**	**100.0**	
Average	**23.6**	**33.8**	**54.4**	**94.8**	


Wind Rose 01.03.2022 to 31.03.2022 (01:00 - 24:00)
% Frequency of Wind Speed from a Direction
Wind Speed [km/h]
10 - 25
8 - 10
6 - 8
4 - 6
2 - 4
1.6 - 2
North
NNE
NE
ENE
East
ESE
SE
SSE
South
SSW
SW
WSW
West
WNW
NW
NNW
6.2%
12.4%
18.5%
24.7%
24.7
18.5
12.4
6.2
0
6.2
12.4
18.5
24.7
Frequency in %
Maximum Speed : 12.09 km/h
Average Speed : 4.78 km/h
Calm Percentage : 1.75
Calm defined as <= 1.6 km/h
Total Records : 744
Period : 01/03/2022 to 31/03/2022
Plot Date : 04/04/2022 3:05 PM
Generated by pavanaarekh

STACK MONITORING

Annexure-II

Stack Monitoring has been carried out by NABL accredited laboratory in the frequency of once in fifteen days per month.
The monitoring reports for both the units during the period of October 2021 to March 2022 are as Table-1 below.

Table-1: Stack monitoring report for the period of October 2021 to March 2022

Stack	Parameters	Oct-21		Nov-21		Dec-21		Jan-22		Feb-22		Mar-22		Average
											26.02.2022	03.03.2022	29.03.2022	
Boiler -I	Particulate Matter (mg/Nm³)	SD	SD	SD	SD	SD	SD	SD	SD	SD	26.4	27.6	26.3	**26.8**
	SO2 (mg/Nm³)	SD	SD	SD	SD	SD	SD	SD	SD	SD	719.3	736.4	738.7	**731.5**
	NOx (mg/Nm³)	SD	SD	SD	SD	SD	SD	SD	SD	SD	124.7	129.3	139.1	**131.0**
	Mercury mg/Nm³)	SD	SD	SD	SD	SD	SD	SD	SD	SD	BLQ	BDL	BDL	**0.0**
	Flue Gas Velocity (m/s)	SD	SD	SD	SD	SD	SD	SD	SD	SD	22.5	23.1	25.2	**23.6**
	Flow Rate (Nm³/hr)	SD	SD	SD	SD	SD	SD	SD	SD	SD	2135860.1	2203291.6	2422368.86	**2253840.2**
Boiler -II	Particulate Matter (mg/Nm³)	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	27.1	**27.1**
	SO2 (mg/Nm³)	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	744.2	**744.2**
	NOx (mg/Nm³)	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	143.6	**143.6**
	Mercury (mg/Nm³)	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	BDL	**0.0**
	Flue Gas Velocity (m/s)	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	26.3	**26.3**
	Flow Rate (Nm³/hr)	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	2470211.6	**2470211.6**

Note: SD = Shut down

ANNEXURE - 2

Coal Handling Plant – Wind Shield

Annexure - III

ANNEXURE - 4

Annexure-IV

Fly Ash Generation & Utilization for the period of October 2021 to March 2022

Month	Ash Generation			Ash Utilization		
	Fly Ash (MT)	Bottom Ash (MT)	Total Ash Generation (MT)	Fly Ash (MT)	Bottom Ash (MT)	Total Ash Utilization (MT)
Oct 2021	0	0	0	0	816	816
Nov 2021	0	0	0	0	1,692	1,692
Dec 2021	0	0	0	0	924	924
Jan 2022	0	0	0	0	2,570	2,570
Feb 2022	780	36	816	161	1,162	1,323
Mar 2022	15232	1273	16505	9,027	1,903	10,930
Total	**16012**	**1309**	**17321**	**9188**	**9067**	**18255**

TEST WELLS MONITORING AROUND ASH POND ***Annexure-V***

Ash pond is lined with LDPE film of 500 µ thickness as an impervious layer to avoid ground water leachate contamination.

Water samples from Test wells (4 No's) around the ash pond area are analyzed for Ground water monitoring.

Monitoring reports for the period of Oct 2021 to Mar 2022 is presented in the Table-1 to Table-4 as shown in below:

The nomenclature for test wells are as below:

1. Test well constructed on North Side of the Ash Pond
2. Test well constructed on South side of the Ash Pond
3. Test well constructed on East Side of the Ash Pond
4. Test well constructed on West Side of the Ash Pond

Table-1: Results of Water Sample from Test Well constructed in North side of Ash Pond sampling period of Oct 2021 to Mar 2022

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Min	Max	Average
1	Color	Hazen	5	15	2.00	4.00	2.10	4.00	BLQ	2.10	2.00	4.00	2.84
2	pH	-	6.5 - 8.5	No Relaxation	6.83	6.86	6.74	6.98	6.89	6.75	6.74	6.98	6.84
3	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5	Turbidity	NTU	1	5	3.50	3.70	0.90	2.00	2.10	2.60	0.90	3.70	2.47
6	TDS	mg/l	500	2000	73.20	82.80	75.20	99.20	273.00	98.00	73.20	273.00	116.90
7	Alkalinity as $CaCO_3$	mg/l	200	600	42.70	62.80	53.06	95.21	10.00	48.00	10.00	95.21	51.96
8	Total Hardness	mg/l	200	600	29.80	29.00	33.60	81.24	110.00	62.00	29.00	110.00	57.61
9	Calcium as Ca	mg/l	75	200	6.80	8.30	8.41	19.53	18.03	7.61	6.80	19.53	11.45
10	Magnesium as Mg	mg/l	30	100	3.10	2.00	3.06	7.89	15.79	2.91	2.00	15.79	5.79
11	Iron as Fe	mg/l	0.3	No relaxation	0.24	0.23	0.26	0.25	0.27	0.26	0.23	0.27	0.25
12	Sulphate as SO_4	mg/l	200	400	5.30	8.60	7.56	10.08	BLQ	10.50	5.30	10.50	8.41
13	Chloride as Cl	mg/l	250	1000	14.60	12.50	12.45	10.50	141.04	35.63	10.50	141.04	37.79
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	0.22	BLQ	0.22	0.22	0.22
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BLQ	0.61	0.57	0.41	0.38	1.47	0.38	1.47	0.69
20	Arsenic as As	mg/l	0.01	0.05	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3-N	mg/l	45	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	1.09	1.09	1.09	1.09
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Note: BLQ- Below Limit of Quantification

Table-2: Results of Water Sample from Test Well constructed in South side of Ash Pond sampling period of Oct 2021 to Mar 2022

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Min	Max	Average
1	Color	Hazen	5	15	3.00	3.50	2.00	4.00	2.00	2.80	2.00	4.00	2.88
2	pH	-	6.5 - 8.5	No Relaxation	6.89	6.77	6.84	6.79	6.75	6.57	6.57	6.89	6.77
3	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5	Turbidity	NTU	1	5	3.40	3.90	0.90	2.50	2.60	3.10	0.90	3.90	2.73
6	TDS	mg/l	500	2000	91.20	70.80	150.00	109.60	128.00	140.00	70.80	150.00	114.93
7	Alkalinity as $CaCO_3$	mg/l	200	600	64.00	51.40	110.21	86.56	116.00	108.00	51.40	116.00	89.36
8	Total Hardness	mg/l	200	600	81.00	20.70	100.80	69.05	98.00	88.00	20.70	100.80	76.26
9	Calcium as Ca	mg/l	75	200	22.20	5.00	18.51	24.42	26.45	19.23	5.00	26.45	19.30
10	Magnesium as Mg	mg/l	30	100	6.20	2.00	13.26	BLQ	7.78	9.72	2.00	13.26	7.79
11	Iron as Fe	mg/l	0.3	No relaxation	0.23	0.24	0.23	0.27	0.28	0.27	0.23	0.28	0.25
12	Sulphate as SO_4	mg/l	200	400	BLQ	BLQ	8.62	5.43	BLQ	4.54	4.54	8.62	6.20
13	Chloride as Cl	mg/l	250	1000	8.30	10.50	14.53	10.50	5.94	8.91	5.94	14.53	9.78
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BLQ	0.51	1.20	0.52	0.65	1.62	0.51	1.62	0.90
20	Arsenic as As	mg/l	0.01	0.05	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3-N	mg/l	45	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	1.06	1.06	1.06	1.06
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Note: BLQ- Below Limit of Quantification

Table-3: Results of Water Sample from Test Well constructed in East side of Ash Pond sampling period of Oct 2021 to Mar 2022

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Min	Max	Average
1	Color	Hazen	5	15	1	3	BLQ	BLQ	3	2.1	1.00	3.00	2.28
2	pH	-	6.5 - 8.5	No Relaxation	6.83	6.86	6.79	6.79	6.95	6.75	6.75	6.95	6.83
3	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5	Turbidity	NTU	1	5	2.7	4.0	0.8	2.5	2.3	2.6	0.80	4.00	2.48
6	TDS	mg/l	500	2000	290	78.4	320	102	108.4	86	78.40	320.00	164.13
7	Alkalinity as $CaCO_3$	mg/l	200	600	8.5	62.8	12.24	99.54	99.16	54	8.50	99.54	56.04
8	Total Hardness	mg/l	200	600	140.8	29	138.6	77.17	102.43	32	29.00	140.80	86.67
9	Calcium as Ca	mg/l	75	200	54.7	8.3	28.61	27.67	23.94	7.21	7.21	54.70	25.07
10	Magnesium as Mg	mg/l	30	100	BLQ	2	16.32	BLQ	10.37	3.4	2.00	16.32	8.02
11	Iron as Fe	mg/l	0.3	No relaxation	0.23	0.18	0.26	0.26	0.26	0.26	0.18	0.26	0.24
12	Sulphate as SO_4	mg/l	200	400	20.7	BLQ	19.74	6.44	BLQ	17.2	6.44	20.70	16.02
13	Chloride as Cl	mg/l	250	1000	37.7	10.5	33.21	12.6	10.54	9.89	9.89	37.70	19.07
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BLQ	0.62	2.02	1.55	0.86	1.47	0.62	2.02	1.30
20	Arsenic as As	mg/l	0.01	0.05	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3-N	mg/l	45	No relaxation	BLQ	BLQ	1.04	1.02	BLQ	2.06	1.02	2.06	1.37
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Note: BLQ- Below Limit of Quantification

Table-4: Results of Water Sample from Test Well constructed in West side of Ash Pond sampling period of Oct 2021 to Mar 2022

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Min	Max	Average
1	Color	Hazen	5	15	3.0	4.0	1.8	3.0	BLQ	2.3	1.80	4.00	2.82
2	pH	-	6.5 - 8.5	No Relaxation	6.9	6.8	6.81	6.93	6.7	6.72	6.70	6.93	6.81
3	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5	Turbidity	NTU	1	5	3.6	4	0.8	3.4	BLQ	3.1	0.80	4.00	2.98
6	TDS	mg/l	500	2000	73.2	81.6	74	103.2	138	92	73.20	138.00	93.67
7	Alkalinity as $CaCO_3$	mg/l	200	600	68.3	57.1	57.14	99.54	20	55	20.00	99.54	59.51
8	Total Hardness	mg/l	200	600	81	33.1	33.6	81.24	82.52	35	33.10	82.52	57.74
9	Calcium as Ca	mg/l	75	200	22.2	11.6	13.46	27.67	36.07	7.21	7.21	36.07	19.70
10	Magnesium as Mg	mg/l	30	100	6.2	BLQ	BLQ	2.96	21.45	4.13	2.96	21.45	8.69
11	Iron as Fe	mg/l	0.3	No relaxation	0.23	0.22	0.24	0.26	0.025	0.27	0.025	0.27	0.21
12	Sulphate as SO_4	mg/l	200	400	BLQ	BLQ	BLQ	6.9	BLQ	13.44	6.90	13.44	10.17
13	Chloride as Cl	mg/l	250	1000	8.3	8.4	10.37	10.5	16.9	19.79	8.30	19.79	12.38
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	0.28	BLQ	BLQ	BLQ	BLQ
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BLQ	0.92	1.08	0.85	BLQ	1.16	0.85	1.16	1.00
20	Arsenic as As	mg/l	0.01	0.05	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3-N	mg/l	45	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	1.09	1.09	1.09	1.09
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Note: BLQ- Below Limit of Quantification

Annexure - 6

AMBIENT AIR QUALITY MONITORING *Annexure-VI*

The Ambient Air Quality samples were collected by representative from NABL accredited laboratory.

Method of Analysis

Pollutants	Method of Measurement
Particulate Matter (PM_{10}) , µg/m^3	Gravimetric
Particulate Matter ($PM_{2.5}$), µg/m^3	Gravimetric
Sulphur dioxide (SO_2), µg/m^3	Improved west and Geake method
Nitrogen Dioxide (NO_2), µg/m^3	Modified Jacob & Hochheiser
Carbon Monoxide (CO), mg/m^3	Non Dispersive Infra-Red

AMBIENT AIR QUALITY MONITORING LOCATIONS

Ambient Air Quality Monitoring (PM_{10}, $PM_{2.5}$, SO_2, NO_X & CO) was done twice a week at following locations:

1. Near DM Plant (Inside Plant)
2. Near Admar Village
3. Near Inna Village
4. Near Hejmady Village
5. Near Baikampady Village
6. Near Paradka Village
7. Near Mudarangadi Village
8. Near Adani Pump House
9. Near Ash Pond

The Monitoring values for the period from October 2021 to March 2022 in the above said locations are presented in Table-1 to Table-9 as below.

Table-1: Ambient Air Quality Monitoring in Plant Site (Near DM Plant) for the period of Oct 2021 to Mar 2022

Location	Month	PM_{10} (100 µg/m^3)			$PM_{2.5}$ (60 µg/m^3)			SO_2 (80 µg/m^3)			NO_x (80 µg/m^3)			CO (2.0 mg/m^3)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Near DM Plant (A1)	Oct 2021	37.3	38.5	37.9	20.5	22.5	21.8	7.5	8.6	8.1	8.9	9.8	9.4	BLQ	BLQ	BLQ
	Nov 2021	38.4	39.7	39.1	21.8	23.7	23.0	7.8	8.9	8.4	9.2	9.9	9.7	BLQ	BLQ	BLQ
	Dec 2021	39.2	40.4	39.8	23.2	24.6	23.8	9.2	9.6	9.4	10.2	10.6	10.4	BLQ	BLQ	BLQ
	Jan 2022	40.4	41.8	41.0	24.4	25.7	24.8	9.5	9.9	9.7	10.5	10.9	10.8	BLQ	BLQ	BLQ
	Feb 2022	42.3	43.9	43.0	25.9	26.8	26.5	9.8	10.3	10.0	10.8	11.3	11.1	BLQ	BLQ	BLQ
	Mar 2022	43.7	45.1	44.3	27.4	28.9	28.2	10.1	10.7	10.4	11.1	11.7	11.4	BLQ	BLQ	BLQ
	Avg	**40.2**	**41.6**	**40.9**	**23.9**	**25.4**	**24.7**	**9.0**	**9.7**	**9.3**	**10.1**	**10.7**	**10.5**	**BLQ**	**BLQ**	**BLQ**

[BLQ-Below Limit of Quantification]

Table-2: Ambient Air Quality Monitoring at Admar village for the period of Oct 2021 to Mar 2022

Location	Month	PM_{10} (100 µg/m³)			$PM_{2.5}$ (60 µg/m³)			SO_2 (80 µg/m³)			NO_x (80 µg/m³)			CO (2.0 mg/m³)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Near Admar Village (A2)	Oct 2021	38.2	40.2	39.4	23.6	24.7	24.2	7.3	8.1	7.7	8.6	9.6	9.1	BLQ	BLQ	BLQ
	Nov 2021	39.4	41.3	40.6	24.7	25.8	25.3	7.4	8.4	7.9	8.9	9.9	9.5	BLQ	BLQ	BLQ
	Dec 2021	40.2	41.8	41.0	24.8	26.8	25.8	8.2	9.2	8.7	9.2	10.7	10.1	BLQ	BLQ	BLQ
	Jan 2022	41.5	42.8	42.2	25.9	27.9	26.9	8.5	9.5	8.9	9.7	10.9	10.4	BLQ	BLQ	BLQ
	Feb 2022	43.2	44.6	43.9	27.1	29.1	28.4	8.8	9.8	9.2	10.0	11.3	10.8	BLQ	BLQ	BLQ
	Mar 2022	44.2	46.9	45.7	27.1	31.5	29.6	8.8	9.9	9.5	10.1	11.7	11.1	BLQ	BLQ	BLQ
	Avg	**41.1**	**42.9**	**42.1**	**25.5**	**27.6**	**26.7**	**8.2**	**9.2**	**8.7**	**9.4**	**10.7**	**10.2**	**BLQ**	**BLQ**	**BLQ**

[BLQ-Below Limit of Quantification]

Table-3: Ambient Air Quality Monitoring at Inna village for the period of Oct 2021 to Mar 2022

Location	Month	PM_{10} (100 µg/m³)			$PM_{2.5}$ (60 µg/m³)			SO_2 (80 µg/m³)			NO_x (80 µg/m³)			CO (2.0 mg/m³)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Near Inna Village (A3)	Oct 2021	35.7	36.9	36.4	21.9	22.7	22.3	8.1	8.7	8.4	9.1	9.9	9.5	BLQ	BLQ	BLQ
	Nov 2021	35.7	36.9	36.4	21.9	22.7	22.3	8.1	8.7	8.4	9.1	9.9	9.5	BLQ	BLQ	BLQ
	Dec 2021	37.2	38.6	37.9	23.2	24.8	24.0	9.2	10.8	10.0	10.2	11.8	11.0	BLQ	BLQ	BLQ
	Jan 2022	38.4	39.7	39.1	24.3	25.9	25.1	9.4	11.1	10.2	10.5	12.1	11.2	BLQ	BLQ	BLQ
	Feb 2022	39.8	41.9	40.7	25.6	27.2	26.4	9.8	11.5	10.6	10.8	12.5	11.6	BLQ	BLQ	BLQ
	Mar 2022	41.5	43.8	42.7	26.8	28.7	27.8	10.3	11.9	11.0	11.3	12.9	12.0	BLQ	BLQ	BLQ
	Avg	**38.1**	**39.6**	**38.9**	**24.0**	**25.3**	**24.7**	**9.2**	**10.5**	**9.8**	**10.2**	**11.5**	**10.8**	**BLQ**	**BLQ**	**BLQ**

[BLQ-Below Limit of Quantification]

Table-4: Ambient Air Quality Monitoring at Hejmady Village for the period of Oct 2021 to Mar 2022

Location	Month	PM_{10} (100 µg/m³)			$PM_{2.5}$ (60 µg/m³)			SO_2 (80 µg/m³)			NO_x (80 µg/m³)			CO (2.0 mg/m³)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Near Hejamady Village (A4)	Oct 2021	37.5	39.6	38.5	19.6	20.7	20.2	7.6	8.4	8	10.1	11.5	11	BLQ	BLQ	BLQ
	Nov 2021	38.7	40.2	39.5	20.7	21.6	21.2	7.9	8.7	8.3	10.4	11.8	11.4	BLQ	BLQ	BLQ
	Dec 2021	40.4	41.8	41.1	22.2	25.4	23.6	8.8	11.6	9.9	11.4	13.6	12.5	BLQ	BLQ	BLQ
	Jan 2022	41.8	42.9	42.4	23.1	24.8	24.1	9.1	10.4	9.8	11.7	13.2	12.6	BLQ	BLQ	BLQ
	Feb 2022	43.2	44.3	43.8	24.5	26.1	25.4	9.4	10.9	10.2	12.1	13.5	12.9	BLQ	BLQ	BLQ
	Mar 2022	43.5	46.8	45.2	25.4	28.4	27	9.9	11.4	10.6	11.5	13.9	13	BLQ	BLQ	BLQ
	Avg	**40.9**	**42.6**	**41.8**	**22.6**	**24.5**	**23.6**	**8.8**	**10.2**	**9.5**	**11.2**	**12.9**	**12.2**	**BLQ**	**BLQ**	**BLQ**

[BLQ-Below Limit of Quantification]

Table-5: Ambient Air Quality Monitoring at Baikampady Village for the period of Oct 2021 to Mar 2022

Location	Month	PM_{10} (100 µg/m³)			$PM_{2.5}$ (60 µg/m³)			SO_2 (80 µg/m³)			NO_x (80 µg/m³)			CO (2.0 mg/m³)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Near Baikampady Village (A5)	Oct 2021	46.2	47.7	47	24.1	25.8	25.2	14.2	15.4	14.8	18.6	20.4	19.6	BLQ	BLQ	BLQ
	Nov 2021	47.4	48.9	48.2	25.3	26.9	26.3	14.5	15.7	15.2	19.8	21.6	20.8	BLQ	BLQ	BLQ
	Dec 2021	48.6	49.8	49.2	26.2	28.6	27.4	16.2	17.3	16.7	21.3	22.8	22.1	BLQ	BLQ	BLQ
	Jan 2022	49.8	51.2	50.5	27.3	29.7	28.5	16.6	17.6	17.1	21.6	22.9	22.3	BLQ	BLQ	BLQ
	Feb 2022	51.6	52.6	52.1	28.9	31.1	29.9	16.9	17.9	17.4	21.9	23.5	22.7	BLQ	BLQ	BLQ
	Mar 2022	51.9	55.4	53.8	28.9	31.8	30.5	16.8	18.4	17.8	22.6	24.9	23.6	BLQ	BLQ	BLQ
	Avg	**49.3**	**50.9**	**50.1**	**26.8**	**29.0**	**28.0**	**15.9**	**17.1**	**16.5**	**21.0**	**22.7**	**21.9**	**BLQ**	**BLQ**	**BLQ**

[BLQ-Below Limit of Quantification]

Table-6: Ambient Air Quality Monitoring at Paradka Village for the period of Oct 2021 to Mar 2022

Location	Month	PM_{10} (100 µg/m³)			$PM_{2.5}$ (60 µg/m³)			SO_2 (80 µg/m³)			NO_x (80 µg/m³)			CO (2.0 mg/m³)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Near Paradka Village (A6)	Oct 2021	24.6	26.9	25.4	15.2	16.8	16	7.7	8.4	8.1	8.3	9.6	9.1	BLQ	BLQ	BLQ
	Nov 2021	25.6	27.8	26.5	16.3	17.4	16.8	7.9	8.7	8.4	8.6	9.9	9.4	BLQ	BLQ	BLQ
	Dec 2021	27.2	28.6	28	17.4	18.8	18.1	9.1	10.6	9.8	9.9	11.6	10.7	BLQ	BLQ	BLQ
	Jan 2022	29.3	30.4	29.9	18.5	19.7	19.1	9.5	10.9	10.2	10.3	11.6	10.9	BLQ	BLQ	BLQ
	Feb 2022	31.2	32.4	31.7	19.7	21.2	20.4	9.9	11.3	10.5	10.8	11.9	11.3	BLQ	BLQ	BLQ
	Mar 2022	32.5	34.5	33.4	21.4	23.6	22.6	10.3	11.8	11	11.4	12.5	11.9	BLQ	BLQ	BLQ
	Avg	**28.4**	**30.1**	**29.2**	**18.1**	**19.6**	**18.8**	**9.1**	**10.3**	**9.7**	**9.9**	**11.2**	**10.6**	**BLQ**	**BLQ**	**BLQ**

[BLQ-Below Limit of Quantification]

Table-7: Ambient Air Quality Monitoring at Mudarangadi Village for the period of Oct 2021 to Mar 2022

Location	Month	PM_{10} (100 µg/m³)			$PM_{2.5}$ (60 µg/m³)			SO_2 (80 µg/m³)			NO_x (80 µg/m³)			CO (2.0 mg/m³)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Near Mudarangadi Village (A7)	Oct 2021	34.6	36.2	35.3	15.1	17.1	16.4	8.1	9.1	8.5	9.7	10.5	10.1	BLQ	BLQ	BLQ
	Nov 2021	35.7	37.4	36.5	15.9	17.6	17	8.4	9.4	8.8	9.9	10.8	10.4	BLQ	BLQ	BLQ
	Dec 2021	37.2	39.2	38.1	17.2	18.8	18	9.3	10.8	10.1	11.2	12.3	11.7	BLQ	BLQ	BLQ
	Jan 2022	38.4	40.3	39.3	18.3	19.7	18.9	9.7	11.1	10.2	11.5	12.4	11.9	BLQ	BLQ	BLQ
	Feb 2022	40.2	41.9	41.2	19.7	20.9	20.2	10.1	11.5	10.7	11.9	12.8	12.3	BLQ	BLQ	BLQ
	Mar 2022	40.5	42.5	41.6	19.2	21.7	20.7	10.4	11.8	11.1	12.2	13.7	12.8	BLQ	BLQ	BLQ
	Avg	**37.8**	**39.6**	**38.7**	**17.6**	**19.3**	**18.5**	**9.3**	**10.6**	**9.9**	**11.1**	**12.1**	**11.5**	**BLQ**	**BLQ**	**BLQ**

[BLQ-Below Limit of Quantification]

Table-8: Ambient Air Quality Monitoring at Adani Pump House for the period of Oct 2021 to Mar 2022

Location	Month	PM_{10} (100 µg/m³)			$PM_{2.5}$ (60 µg/m³)			SO_2 (80 µg/m³)			NO_x (80 µg/m³)			CO (2.0 mg/m³)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Near Adani Pump House (A8)	Oct 2021	30.3	31.6	30.9	20.3	21.4	21	8.1	8.7	8.4	10.2	11.1	10.5	BLQ	BLQ	BLQ
	Nov 2021	31.5	32.8	32.0	21.5	22.4	22.0	8.3	8.9	8.7	10.5	11.4	10.8	BLQ	BLQ	BLQ
	Dec 2021	32.2	33.8	33.0	22.4	23.8	23.1	9.2	10.7	9.9	11.2	12.6	11.7	BLQ	BLQ	BLQ
	Jan 2022	33.3	34.9	34.2	23.6	25.1	24.4	9.6	10.9	10.3	11.5	12.9	12.1	BLQ	BLQ	BLQ
	Feb 2022	34.8	36.8	35.9	24.9	26.7	25.8	10.0	11.3	10.6	11.8	13.2	12.5	BLQ	BLQ	BLQ
	Mar 2022	36.7	39.1	38.0	26.5	28.6	27.6	10.5	11.7	11.1	12.2	13.6	12.9	BLQ	BLQ	BLQ
	Avg	**33.1**	**34.8**	**34.0**	**23.2**	**24.7**	**24.0**	**9.3**	**10.4**	**9.8**	**11.2**	**12.5**	**11.8**	**BLQ**	**BLQ**	**BLQ**

[BLQ-Below Limit of Quantification]

Table-9: Ambient Air Quality Monitoring at Near Ash Pond for the period of Oct 2021 to Mar 2022

Location	Month	PM_{10} (100 µg/m³)			$PM_{2.5}$ (60 µg/m³)			SO_2 (80 µg/m³)			NO_x (80 µg/m³)			CO (2.0 mg/m³)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Near Ash Pond (A9)	Oct 2021	34.8	37.8	36.4	23.4	26.5	25.4	8.1	9.5	9.0	10.0	11.7	11.0	BLQ	BLQ	BLQ
	Nov 2021	35.9	38.7	37.5	24.5	27.6	26.5	8.4	9.8	9.3	10.4	11.9	11.2	BLQ	BLQ	BLQ
	Dec 2021	36.8	39.8	38.6	26.1	29.4	28	9.8	11.7	10.7	11.2	13.4	12.5	BLQ	BLQ	BLQ
	Jan 2022	37.9	41.3	39.8	27.2	30.6	29.2	10.2	11.9	11	11.6	13.7	12.8	BLQ	BLQ	BLQ
	Feb 2022	39.8	42.6	41.3	28.6	31.9	30.5	10.6	12.3	11.4	11.9	13.9	13.1	BLQ	BLQ	BLQ
	Mar 2022	40.2	42.6	41.5	29.1	32.9	31.3	11.2	12.6	11.8	12.3	14.3	13.5	BLQ	BLQ	BLQ
	Avg	**37.6**	**40.5**	**39.2**	**26.5**	**29.8**	**28.5**	**9.7**	**11.3**	**10.5**	**11.2**	**13.2**	**12.4**	**BLQ**	**BLQ**	**BLQ**

[BLQ-Below Limit of Quantification]

Annexure - 7

GUARD POND EFFLUENT WATER MONITORING

Annexure-VII

All the effluents like condenser cooling water, cooling tower blow down and brine discharge from desalination plant is directly discharged to Guard pond, from where the water is going back to the Sea through Coro-coated MS Pipeline. Final discharge point is through guard pond.

Boiler Blowdown, Coal Settling Pond water and Floor washings are treated in ETP and reused in the areas including greenbelt development/ dust suppression.

Continuous Online Monitoring setup is installed in the Guard pond & ETP discharge line to monitor Temp, pH, DO and TSS.

Ash Pond is covered with green belt and the runoff due to rain is collected in the adjacent pond and used for dust suppression within ash pond area. There is no provision of any outlet from Ash pond, Hence there is no effluent generated from the Ash Pond.

Samples are collected weekly and the monitoring values for the period of Oct 2021 to Mar 2022 are presented in Table-1 to Table-3 as below:

Table-1: Guard Pond Effluent sample monitoring for the period of Oct 2021 to Mar 2022

S.No	Parameters	Limits	Units	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Average
1	Temperature	Not more than 5°C higher than intake sea water	°C	28.25	28.25	28.4	28.25	28.00	29.20	28.39
2	pH (at 25 °C)	5.5 – 9.0	-	7.10	7.24	7.15	7.57	7.93	8.71	7.62
3	Colour	-	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	Odour	-	-	A	A	A	A	A	A	A
5	Total Suspended Solids	Not more than 10% higher than intake sea water	mg/l	5.90	BLQ	6.6	BLQ	4.3	BLQ	5.60
6	Oil and Grease	20	mg/l	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
7	Total Residual Chlorine	1	mg/l	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
8	BOD	100	mg/l	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
9	COD	250	mg/l	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
10	Total Chromium	2	mg/l	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
11	Hexavalent Chromium	1	mg/l	BLQ	BLQ	0.06	BLQ	BLQ	BLQ	0.06
12	Phenolic Compounds	5	mg/l	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
13	Mercury as Hg	0.01	mg/l	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
14	Lead as Pb	2	mg/l	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Arsenic as As	0.2	mg/l	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Iron	3	mg/l	0.62	0.75	0.28	0.25	0.78	0.35	0.51

Note: A- Agreeable, BLQ- Below Level of Quantification

Table-2: Cooling Tower Blow down Effluent monitoring for the period of Oct 2021 to Mar 2022

S.No	Parameters	Limits	Units	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Average
1	Available Free Chlorine	0.5	mg/l	SD	SD	SD	SD	BLQ	BLQ	BLQ
2	Zinc	1	mg/l					0.37	0.34	0.36
3	Chromium	0.2	mg/l					0.16	BLQ	0.16
4	Phosphate	5	mg/l					BLQ	BLQ	BLQ

Note: BLQ- Below Level of Quantification, SD-Unit under Shut down

Table-3: Boiler Blow down Effluent sample monitoring for the period of Oct 2021 to Mar 2022

S.No	Parameters	Limits	Units	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Average
1	Oil & Grease	20	mg/l	SD	SD	SD	SD	BLQ	BLQ	BLQ
2	Copper	1	mg/l					BLQ	BLQ	BLQ
3	Suspended Solids	100	mg/l					BLQ	BLQ	BLQ
4	Iron	1	mg/l					0.25	0.18	0.22

Note: BLQ- Below Level of Quantification, SD-Unit under Shut down

WATER QUALITY MONITORING

Annexure-VIII

Water quality monitoring is carried in the eleven locations which are finalized in consultation with KSPCB and monitoring carried for the period of Oct 2021 to Mar 2022 is presented in the Table-1 to Table-11 as below:

Water Quality Sampling Location- Ground/Surface:

S.No	Name of the Location	Code	Source
1	Karnire River near Palimar village	SW-1	River
2	Pangala River Water	SW-2	River
3	Santhoor village	GW-1	Open well
4	Nandikur Village	GW-2	Open well
5	Palimar Village	GW-3	Open well
6	Simanthoor Village	GW-4	Open well
7	Admar Village	GW-5	Open well
8	Bappanadu Village	GW-6	Open well
9	Hejamady Village	GW-7	Open well
10	North Side of the UPCL Plant	GW-8	Open well
11	South Side of the UPCL plant	GW-9	Open well

Water Sample Analysis Parameters:

S.No	Parameters	S.No	Parameters
1	Color	16	Fluoride
2	pH	17	Phenolic Compounds
4	Taste	18	manganese
5	Turbidity	19	zinc
6	TDs	20	Arsenic
7	Alkalinity	21	cyanide
8	Total Hardness as $CaCO_3$	22	cadmium
9	Calcium as Ca	23	chromium
10	Magnesium	24	Aluminium
11	Iron	25	Selenium
12	Sulphate as SO_4	26	Lead
13	Chloride	27	Mercury
14	Boron	28	Nitrate nitrogen
15	Residual Free Chlorine	29	Ecoli

The Water Quality test results for the period of Oct 2021 to Mar 2022 is presented in the Table-1 to Table-11 as below.

Table-1: Water Quality Monitoring carried out in Karnire River (Back Water) (SW-1) for the period of Oct 2021 to Mar 2022

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Min	Max	Average
1	Color	Hazen	5	15	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
2	pH	-	6.5 - 8.5	No Relaxation	6.94	6.96	6.78	6.83	8.13	7.12	6.78	8.13	7.13
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	2.9	1.2	BLQ	BLQ	0.1	1.2	0.10	2.90	1.35
6	TDS	mg/l	500	2000	50.4	48.8	85.2	90.7	170.0	160.0	48.80	170.00	100.85
7	Alkalinity as $CaCO_3$	mg/l	200	600	8.5	17.1	16.3	20.4	24.5	80.0	8.50	80.00	27.80
8	Total Hardness	mg/l	200	600	17.0	20.7	50.4	53.9	60.4	60.4	17.00	60.35	43.78
9	Calcium as Ca	mg/l	75	200	3.4	5.0	10.1	12.8	13.2	13.2	3.40	13.18	9.60
10	Magnesium as Mg	mg/l	30	100	2.0	2.0	6.1	8.2	10.2	10.4	2.00	10.41	6.50
11	Iron as Fe	mg/l	0.3	No relaxation	0.1	0.2	0.2	0.2	0.2	0.1	0.12	0.20	0.16
12	Sulphate as SO_4	mg/l	200	400	7.2	BLQ	10.1	13.6	28.7	26.3	7.20	28.68	17.17
13	Chloride as Cl	mg/l	250	1000	18.9	18.8	35.29	37.41	43.65	34.52	18.80	43.65	31.43
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	0.75	0.98	0.75	0.98	0.87
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BLQ	BLQ	0.94	0.44	2.82	0.43	0.43	2.82	1.16
20	Arsenic as As	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3.N	mg/l	45	No relaxation	BLQ	BLQ	BLQ	1.6	BLQ	1.04	1.04	1.60	1.32
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Note: A- Agreeable, BLQ- Below Level of Quantification

Table-2: Water Quality Monitoring carried out in Pangala River (SW-2) for the period of Oct 2021 to Mar 2022

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Min	Max	Average
1	Color	Hazen	5	15	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
2	pH	-	6.5 - 8.5	No Relaxation	6.83	6.77	6.88	6.83	7.10	6.87	6.77	7.10	6.88
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	3.3	0.4	BLQ	3.2	1.8	2.9	0.40	3.30	2.32
6	TDS	mg/l	500	2000	54	52	71.2	34	40	47	34.00	71.20	49.70
7	Alkalinity as $CaCO_3$	mg/l	200	600	8.5	17.1	32.65	30.29	20.66	22	8.50	32.65	21.87
8	Total Hardness	mg/l	200	600	17	16.6	40.82	24.37	17.07	19	16.60	40.82	22.48
9	Calcium as Ca	mg/l	75	200	3.4	5.0	11.45	4.88	5.13	5.61	3.40	11.45	5.91
10	Magnesium as Mg	mg/l	30	100	2.0	BLQ	2.97	2.96	BLQ	1.2	1.20	2.97	2.28
11	Iron as Fe	mg/l	0.3	No relaxation	0.21	0.2	0.18	0.15	0.25	0.24	0.15	0.25	0.21
12	Sulphate as SO_4	mg/l	200	400	BLQ	BLQ	9.88	BLQ	BLQ	1.6	1.60	9.88	5.74
13	Chloride as Cl	mg/l	250	1000	23.0	20.9	20.75	12.6	10.54	11.38	10.54	23.00	16.53
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BLQ	BLQ	0.45	0.35	0.29	0.24	0.24	0.45	0.33
20	Arsenic as As	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3-N	mg/l	45	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Note: A- Agreeable, BLQ- Below Level of Quantification

Table-3: Water Quality Monitoring Carried out at Open well in Santhoor Village (GW-1) for the period of Oct 2021 to Mar 2022

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Min	Max	Average
1	Color	Hazen	5	15	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
2	pH	-	6.5 - 8.5	No Relaxation	7.18	6.87	6.85	6.84	6.81	6.85	6.81	7.18	6.9
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	0.6	BLQ	BLQ	BLQ	BLQ	BLQ	0.6	0.6	0.6
6	TDS	mg/l	500	2000	39.2	36.8	42.8	54.0	87.6	69.0	36.8	87.6	54.9
7	Alkalinity as $CaCO_3$	mg/l	200	600	12.8	17.1	BLQ	21.64	20.66	19.0	12.8	21.64	18.24
8	Total Hardness	mg/l	200	600	8.5	12.4	25.2	20.31	29.87	23.0	8.5	29.87	19.88
9	Calcium as Ca	mg/l	75	200	3.4	3.3	5.05	6.5	6.84	7.21	3.3	7.21	5.38
10	Magnesium as Mg	mg/l	30	100	BLQ	BLQ	3.06	BLQ	3.11	1.2	1.2	3.11	2.45
11	Iron as Fe	mg/l	0.3	No relaxation	0.23	0.18	0.23	0.19	0.21	BLQ	0.18	0.23	0.20
12	Sulphate as SO_4	mg/l	200	400	BLQ	BLQ	2.54	6.86	BLQ	1.07	1.07	6.86	3.49
13	Chloride as Cl	mg/l	250	1000	12.5	12.9	21.5	12.6	16.87	16.33	12.5	21.5	15.45
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
20	Arsenic as As	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3-N	mg/l	45	No relaxation	BLQ	BLQ	1.07	1.04	3.45	3.04	1.04	3.45	2.15
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Note: A- Agreeable, BLQ- Below Level of Quantification

Table-4: Water Quality Monitoring Carried out at Open well in Nandikur Village (GW-2) for the period of Oct 2021 to Mar 2022

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Min	Max	Average
1	Color	Hazen	5	15	1.00	BLQ	BLQ	BLQ	BLQ	BLQ	1.00	1.00	1.00
2	pH	-	6.5 - 8.5	No Relaxation	6.83	6.77	6.88	6.83	7.10	6.87	6.77	7.10	6.88
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	3.30	0.40	BLQ	3.20	1.80	2.90	0.40	3.30	2.32
6	TDS	mg/l	500	2000	54.00	52.00	71.20	34.00	40.00	47.00	34.00	71.20	49.70
7	Alkalinity as $CaCO_3$	mg/l	200	600	8.50	17.10	32.65	30.29	20.66	22.00	8.50	32.65	21.87
8	Total Hardness	mg/l	200	600	17.00	16.60	40.82	24.37	17.07	19.00	16.60	40.82	22.48
9	Calcium as Ca	mg/l	75	200	3.40	5.00	11.45	4.88	5.13	5.61	3.40	11.45	5.91
10	Magnesium as Mg	mg/l	30	100	2.00	BLQ	2.97	2.96	BLQ	1.20	1.20	2.97	2.28
11	Iron as Fe	mg/l	0.3	No relaxation	0.21	0.20	0.18	0.15	0.25	0.24	0.15	0.25	0.21
12	Sulphate as SO_4	mg/l	200	400	BLQ	BLQ	9.88	BLQ	BLQ	1.60	1.60	9.88	5.74
13	Chloride as Cl	mg/l	250	1000	23.00	20.90	20.75	12.60	10.54	11.38	10.54	23.00	16.53
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	0.00	0.00	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BDL	BDL	0.45	0.35	0.29	0.24	0.24	0.45	0.33
20	Arsenic as As	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3-N	mg/l	45	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	1.05	1.05	1.05	1.05
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Note: A- Agreeable, BLQ- Below Level of Quantification

Table-5: Water Quality Monitoring carried out at Open well in Palimar Village (GW-3) for the period of Oct 2021 to Mar 2022

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Min	Max	Average
1	Color	Hazen	5	15	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
2	pH	-	6.5 - 8.5	No Relaxation	6.82	6.89	6.83	6.87	6.78	6.72	6.72	6.89	6.82
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	1.3	BLQ	BLQ	BLQ	BLQ	0.40	0.40	1.30	0.85
6	TDS	mg/l	500	2000	150.8	160.8	150	101.2	78.8	84.0	78.80	160.80	120.93
7	Alkalinity as $CaCO_3$	mg/l	200	600	47.0	5.7	48.98	43.28	41.32	2.43	2.43	48.98	31.45
8	Total Hardness	mg/l	200	600	98.1	95.4	88.2	60.93	53.71	48.0	48.00	98.10	74.06
9	Calcium as Ca	mg/l	75	200	32.5	29.9	26.93	14.64	14.9	15.23	14.64	32.50	22.35
10	Magnesium as Mg	mg/l	30	100	4.1	5.0	5.1	5.92	4.01	2.43	2.43	5.92	4.43
11	Iron as Fe	mg/l	0.3	No relaxation	0.22	0.21	0.21	0.17	BLQ	0.06	0.06	0.22	0.17
12	Sulphate as SO_4	mg/l	200	400	8.5	13.5	10.26	7.23	BLQ	5.28	5.28	13.50	8.95
13	Chloride as Cl	mg/l	250	1000	39.9	37.7	35.29	16.81	23.2	19.79	16.81	39.90	28.78
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BLQ	0.62	BLQ	0.22	BLQ	0.22	0.22	0.62	0.35
20	Arsenic as As	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3-N	mg/l	45	No relaxation	BLQ	BLQ	1.12	1.07	1.17	1.08	1.07	1.17	1.11
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Note: A- Agreeable, BLQ- Below Level of Quantification

Table-6: Water Quality Monitoring carried out at Open well in Simanthoor Village (GW-4) for the period of Oct 2021 to Mar 2022

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Min	Max	Average
1	Color	Hazen	5	15	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
2	pH	-	6.5 - 8.5	No Relaxation	7.26	6.79	6.90	6.85	6.85	6.57	6.57	7.26	6.87
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	3.1	3.6	BLQ	BLQ	BLQ	2.4	2.40	3.60	3.03
6	TDS	mg/l	500	2000	100.4	130.4	58.0	150	84.4	158	58.00	158.00	113.53
7	Alkalinity as $CaCO_3$	mg/l	200	600	59.8	91.4	16.32	103.87	33.05	106	16.32	106.00	68.41
8	Total Hardness	mg/l	200	600	64.00	83.00	21.00	89.36	59.75	74.00	21.00	89.36	65.19
9	Calcium as Ca	mg/l	75	200	22.2	31.6	8.41	27.67	17.1	22.48	8.41	31.60	21.58
10	Magnesium as Mg	mg/l	30	100	2.0	BLQ	BLQ	BLQ	4.14	4.37	2.00	4.37	3.50
11	Iron as Fe	mg/l	0.3	No relaxation	0.17	0.24	0.24	0.22	BLQ	0.11	0.11	0.24	0.20
12	Sulphate as SO_4	mg/l	200	400	7.8	8.6	5.55	14.71	5.03	18.02	5.03	18.02	9.95
13	Chloride as Cl	mg/l	250	1000	16.8	10.5	18.68	33.62	23.2	52.45	10.50	52.45	25.88
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	BLQ	0.24	0.24	0.24	0.24
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BLQ	BLQ	BLQ	0.20	BLQ	BLQ	0.20	0.20	0.20
20	Arsenic as As	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3.N	mg/l	45	No relaxation	BLQ	1.24	BLQ	1.03	1.09	2.52	1.03	2.52	1.47
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Note: A- Agreeable, BLQ- Below Level of Quantification

Table-7: Water Quality Monitoring carried out at Open well in Admar Village (GW-5) for the period of Oct 2021 to Mar 2022

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Min	Max	Average
1	Color	Hazen	5	15	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
2	pH	-	6.5 - 8.5	No Relaxation	6.86	6.81	6.79	6.86	6.85	6.87	6.79	6.87	6.84
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	0.7	BLQ	BLQ	BLQ	BLQ	2.8	0.70	2.80	1.75
6	TDS	mg/l	500	2000	24.0	27.6	30.0	34.0	89.2	40.8	24.00	89.20	40.93
7	Alkalinity as $CaCO_3$	mg/l	200	600	8.5	17.1	12.24	21.64	24.79	40.0	8.50	40.00	20.71
8	Total Hardness	mg/l	200	600	8.5	4.1	16.8	16.24	12.8	21.2	4.10	21.20	13.27
9	Calcium as Ca	mg/l	75	200	BLQ	BLQ	6.73	4.88	3.41	56.11	3.41	56.11	17.78
10	Magnesium as Mg	mg/l	30	100	BLQ	BLQ	BLQ	BLQ	BLQ	5.37	5.37	5.37	5.37
11	Iron as Fe	mg/l	0.3	No relaxation	0.14	0.22	0.17	0.17	0.24	0.27	0.14	0.27	0.20
12	Sulphate as SO_4	mg/l	200	400	BLQ	BLQ	BLQ	5.24	BLQ	3.45	3.45	5.24	4.35
13	Chloride as Cl	mg/l	250	1000	12.6	10.5	12.45	14.71	10.54	14.86	10.50	14.86	12.61
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BLQ	BLQ	BLQ	0.13	BLQ	0.12	0.12	0.13	0.13
20	Arsenic as As	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3-N	mg/l	45	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Note: A- Agreeable, BLQ- Below Level of Quantification

Table-8: Water Quality Monitoring carried out at Open well in Bappanadu Village (GW-6) for the period of Oct 2021 to Mar 2022

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Min	Max	Average
1	Color	Hazen	5	15	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
2	pH	-	6.5 - 8.5	No Relaxation	7.27	6.78	6.88	6.79	6.87	6.55	6.55	7.27	6.86
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	0.3	2.4	BLQ	BLQ	BLQ	2.2	0.30	2.40	1.63
6	TDS	mg/l	500	2000	104.4	130.4	121.3	150.0	87.2	127.4	87.20	150.00	120.12
7	Alkalinity as $CaCO_3$	mg/l	200	600	55.5	85.7	66.54	108.2	28.92	102	28.92	108.20	74.48
8	Total Hardness	mg/l	200	600	64.0	78.8	159.6	101.55	59.75	106	59.75	159.60	94.95
9	Calcium as Ca	mg/l	75	200	23.9	21.6	32.08	29.3	17.1	30.1	17.10	32.08	25.68
10	Magnesium as Mg	mg/l	30	100	BLQ	6.1	13.26	6.91	4.14	1.46	1.46	13.26	6.37
11	Iron as Fe	mg/l	0.3	No relaxation	0.23	0.23	0.12	0.19	BLQ	0.13	0.12	0.23	0.18
12	Sulphate as SO_4	mg/l	200	400	11.8	10.3	33.33	20.78	BLQ	12.8	10.30	33.33	17.80
13	Chloride as Cl	mg/l	250	1000	18.9	14.6	24.91	23.11	14.76	48.49	14.60	48.49	24.13
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
20	Arsenic as As	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3-N	mg/l	45	No relaxation	BLQ	1.12	1.65	1.02	1.2	2.32	1.02	2.32	1.46
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Note: A- Agreeable, BLQ- Below Level of Quantification

Table-9: Water Quality Monitoring carried out at Open well in Hejamady Village (GW-7) for the period of Oct 2021 to Mar 2022

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Min	Max	Average
1	Color	Hazen	5	15	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
2	pH	-	6.5 - 8.5	No Relaxation	6.81	6.82	6.70	6.82	6.79	6.67	6.67	6.82	6.77
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	2.6	2.3	BLQ	BLQ	BLQ	2.6	2.30	2.60	2.50
6	TDS	mg/l	500	2000	100.0	130.4	130	150	83.2	91.5	83.20	150.00	114.18
7	Alkalinity as $CaCO_3$	mg/l	200	600	59.8	91.4	77.5	103.87	28.92	106	28.92	106.00	77.92
8	Total Hardness	mg/l	200	600	72.5	74.7	84.0	93.42	59.75	108	59.75	108.00	82.06
9	Calcium as Ca	mg/l	75	200	22.2	28.2	23.56	27.67	15.39	39.27	15.39	39.27	26.05
10	Magnesium as Mg	mg/l	30	100	4.1	BLQ	6.12	6.92	5.18	2.43	2.43	6.92	4.95
11	Iron as Fe	mg/l	0.3	No relaxation	0.16	0.2	0.14	0.2	BLQ	0.16	0.14	0.20	0.17
12	Sulphate as SO_4	mg/l	200	400	BLQ	8.7	20.66	21.97	BLQ	13.04	8.70	21.97	16.09
13	Chloride as Cl	mg/l	250	1000	16.7	12.5	16.6	25.21	14.76	17.8	12.50	25.21	17.26
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
20	Arsenic as As	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3.N	mg/l	45	No relaxation	BLQ	1.07	1.54	1.09	1.05	2.31	1.05	2.31	1.41
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Note: A- Agreeable, BLQ- Below Level of Quantification

Table-10: Water Quality Monitoring carried out at North Side of UPCL Plant site (GW-8) for the period of Oct 2021 to Mar 2022

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Min	Max	Average
1	Color	Hazen	5	15	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
2	pH	-	6.5 - 8.5	No Relaxation	6.81	6.89	6.82	6.9	6.93	6.98	6.81	6.98	6.89
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
6	TDS	mg/l	500	2000	91.2	27.2	40.0	83.2	81.6	19.0	19.00	91.20	57.03
7	Alkalinity as $CaCO_3$	mg/l	200	600	8.5	17.1	8.16	60.59	20.66	8.0	8.00	60.59	20.50
8	Total Hardness	mg/l	200	600	8.5	8.3	21.0	60.93	12.8	6.0	6.00	60.93	19.59
9	Calcium as Ca	mg/l	75	200	3.4	BLQ	5.05	9.76	3.41	1.2	1.20	9.76	4.56
10	Magnesium as Mg	mg/l	30	100	BLQ	BLQ	2.04	8.88	1.03	BLQ	1.03	8.88	3.98
11	Iron as Fe	mg/l	0.3	No relaxation	0.14	0.20	0.13	0.18	0.26	BLQ	0.13	0.26	0.18
12	Sulphate as SO_4	mg/l	200	400	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
13	Chloride as Cl	mg/l	250	1000	46.1	8.4	22.83	16.81	12.65	7.42	7.42	46.10	19.04
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
20	Arsenic as As	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3.N	mg/l	45	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Note: A- Agreeable, BLQ- Below Level of Quantification

Table-11: Water Quality Monitoring carried out at South Side of UPCL plant site (GW-9) for the period of Oct 2021 to Mar 2022

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Min	Max	Average
1	Color	Hazen	5	15	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
2	pH	-	6.5 - 8.5	No Relaxation	7.55	6.85	6.87	6.81	6.78	6.75	6.75	7.55	6.94
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	1.4	0.5	0.8	BLQ	BLQ	2.8	0.50	2.80	1.38
6	TDS	mg/l	500	2000	96.0	86.4	150.0	23.2	90.0	89.5	23.20	150.00	89.18
7	Alkalinity as $CaCO_3$	mg/l	200	600	64.0	51.4	8.2	17.3	8.3	15.0	8.16	64.00	27.36
8	Total Hardness	mg/l	200	600	64.0	62.2	33.6	12.2	8.5	30.0	8.53	64.00	35.09
9	Calcium as Ca	mg/l	75	200	15.4	18.3	6.7	3.3	3.4	8.0	3.25	18.30	9.18
10	Magnesium as Mg	mg/l	30	100	6.2	4.0	4.08	BLQ	BLQ	2.43	2.43	6.20	4.18
11	Iron as Fe	mg/l	0.3	No relaxation	0.2	0.16	0.18	0.2	0.27	0.27	0.16	0.27	0.21
12	Sulphate as SO_4	mg/l	200	400	BLQ	7.5	BLQ	BLQ	BLQ	3.8	3.80	7.50	5.65
13	Chloride as Cl	mg/l	250	1000	14.7	12.5	66.43	8.4	12.65	28.92	8.40	66.43	23.93
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
20	Arsenic as As	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3-N	mg/l	45	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	1.05	1.05	1.05	1.05
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Note: A- Agreeable, BLQ- Below Level of Quantification

Three Numbers of Rain Water Harvesting Ponds constructed to conserve Rain Water

Annexure - 10

Annexure - X

सत्यमेव जयते

INDIA NON JUDICIAL

Government of Karnataka

e-Stamp

Certificate No.	:	IN-KA18483757771281M
Certificate Issued Date	:	14-Aug-2014 01:01 PM
Account Reference	:	NONACC (BK)/ kakscub08/ BANGALORE4/ KA-BA
Unique Doc. Reference	:	SUBIN-KAKAKSCUB08905649827764 31M
Purchased by	:	UDUPI POWER CORPORATION LIMITED
Description of Document	:	Article 12 Bond
Description	:	AGREEMENT
Consideration Price (Rs.)	:	0 (Zero)
First Party	:	GOVERNMENT OF KARNATAKA DEPARTMENT OF FISHERIES
Second Party	:	UDUPI POWER CORPORATION LIMITED
Stamp Duty Paid By	:	UDUPI POWER CORPORATION LIMITED
Stamp Duty Amount(Rs.)	:	200 (Two Hundred only)

For Karnataka State Co-operative Urban Banks Federation Ltd.
Authorised Signatory

Please write or type below this line

AMENDMENT TO AGREEMENT

This Amendment to the Agreement dated 9th March 2000 is made on 14th August 2014 by and between:

Government of Karnataka, Department of Fisheries, represented by the Deputy Director of Fisheries, Mangalore, hereinafter referred to as **"Grantor"** of the one part.

1

(SECOND COPY OF THE AGREEMENT)

Statutory Alert
1. The authenticity of this Stamp Certificate should be verified at 'www.shcilestamp.com'. Any discrepancy in the details on this Certificate and as available on the website renders it invalid.
2. The onus of checking the legitimacy is on the users of the certificate.

AND

Udupi Power Corporation Limited (formerly known as Nagarjuna Power Corporation Limited), a Company incorporated under the Companies Act, 1956 and having its Registered Office at 2nd Floor, 'Le-Parc Richmonde', No. 51, Richmond Road, Bangalore – 560 025, hereinafter referred to as **"Grantee"** of the other part,

The terms "Grantor and Grantee", individually referred to as Party and collectively as Parties, which includes their successors and assignees.

WHEREAS:

(A) The Grantee was initially establishing 2 x 507.5MW coal fired thermal power station in Udupi District, Karnataka. Subsequently the capacity of the power project of the Grantee was augmented from 2 x 507.5MW to 2 x 600 MW with necessary approvals from Government of Karnataka, Ministry of Environment and Forests (Government of India) and Karnataka State Pollution Control Board.

(B) The parties have entered into an Agreement dated 9th March 2000 (hereinafter referred to as **Agreement**)

(C) Subsequent to entering of the Agreement, the Grantee had sought certain amendments to conditions imposed in the Agreement, for which, the Grantor, after examining the amendments sought, has approved the amendments vide its letter bearing No. ಪಸಂಮೀ:24:ಮಿಪಿ:2010 dated 19.06.2014.

(D) The parties have agreed to amend the Agreement to incorporate the amendments approved by the Grantor.

(SECOND COPY OF THE AGREEMENT)

NOW THEREFORE IT IS HEREBY AGREED BY AND BETWEEN THE PARTIES HERETO AS FOLLOWS:

Item No.4, page 2 of the Agreement be read as follows:

"4. Sea water intake point shall be located at a depth of not less than 6.97 m and at a distance of 1430 m inside the sea from the coast."

Item No.5, page 2 of the Agreement be read as follows:

"5. The effluent from the power station shall be discharged at depth of minimum 4.99 m and 670 m inside the Sea from the coast."

All other terms and conditions in the Agreement that are not hereby amended are to remain in full force and effect.

IN WITNESS WHEREOF the parties herein have signed this Agreement on the day, month and year first above written, in the presence of:

Deputy Director of Fisheries
Mangalore

Deputy Director of Fisheries, Mangalore
On behalf of Governor of Karnataka

UPC POWER CORPORATION Ltd.,

M. CHANDRASEKHAR REDDY
Director & COO

Director & Chief Operating Officer for and on behalf of Udupi Power Corporation Ltd.,

Witnesses:

1. Sunil L Naik
504, 10th 'A' Main
4th Block 3rd Stage
Basaveshwaranagar, Blore-79

2. SUSHMITHA RAO,
ASST DIR OF FISHERIES,
o/o DY. DIR. OF FISHERIES,
MANGALORE

(SECOND COPY OF THE AGREEMENT)

Annexure - 11

Annexure - XI

Green Belt development:

Plantation was carried in and around plant premises with local species. Total plantation carried so far is around 369405 No's in 195 acres.

Plantation Details	Area (Acres)
369405	**195**

List of the Plant Species planted in and around the UPCL plant premises

S.No	Species
1	Honge
2	Neem
3	Mahagani
4	T. Rosea
5	Melengia
6	Seetha Ashoka
7	Alstonia
8	T. Arjuna
9	Honne
10	Kadu Badami
11	Lebeka
12	Leqestonia
13	Nerale
14	Peltaform
15	Rain Tree
16	Gulmava
17	Beete
18	Cassurina
19	Holenandi
20	May Flower
21	Palaksha
22	Garige
23	Budubende
24	Surage
25	Dhupa
26	Basavanapada
27	Jack Fruit
28	Ramatre
29	Coconut Plant

Road Side Plantation

Thick plantation near Coal Handling Plant on both sides of the Road

Plantation developed all along the Outside boundary

Plantation developed all along the Inside boundary

Gardening Plantation developed

Vegetable & Fruit Plantation developed

Plantation near Fly Ash silo




Plantation developed Surrounding Guest House




Annexure - 12

Annexure - XII

Udupi Power Corporation Limited
(Formerly Nagarjuna Power Corporation Limited)

LANCO
INSPIRING GROWTH

Ref: UPCL/HR/R&R/2011/3898 dated 26th March, 2011

The Special Land Acquisition Officer
Karnataka Industrial Area Development Board
Baikampady Industrial Area
MANGALORE.

Dear Sir,

Subject: Udupi Power Corporation Limited – 1200 MW Thermal Power Project-Providing of employment under Rehabilitation and Resettlement Policy of Government of Karnataka.

References:
(i) Your Office Letter No. LAQ/SR 1/92-93/1157, dated 18.02.2008
(ii) Your Office Letter No. LAQ/SR/1/2007-08/1294, dated 29.03.2008
(iii) Your Office Letter No. LAQ/SR:1/08-09, dated 08.01.2010
(iv) Your Office Letter No. LAQ/SR/1/2008-09/189, dated 27.04.2010
(v) Your Office Letter No. LAQ/SR/1/2008-09/399, dated 17.06.2010

* * * * *

This is with regard to above subject and with reference to your letters under references. Please note that, in terms of the Government of Karnataka Order bearing No. RD 118 REN 91 dated 30.04.1997 read with Government of Karnataka Order No. RD 118 REN 91, dated 18.12.1992 and as per the letters issued by you, action taken by Udupi Power Corporation Limited on the 36 applications cleared by your office is furnished in the list enclosed herewith as 'Annexure – A'. It may please be noted that since the nominees mentioned as against the Sl. Nos. 6 and 14 are pursuing Diploma and Engineering course respectively, they may take-up employment with us on completion of their studies i.e., by July, 2011. The issue of employment letters to the nominees mentioned against the Sl. Nos. 12, 15 and 34 are under process.

Contd...2

Registered Office : II Floor, 'Le-Parc Richmonde', No.51, Richmond Road, Bangalore - 560 025
T +91-080-40254025, F +91-080-40254000
[illegible] Udupi District, Karnataka

Further it may please be noted that among the applications cleared by your office for providing employment under R&R policy, we found some discrepancies in four applications. The details of the discrepancies and also our observations are given in the 'Annexure-B', which is enclosed herewith. We, therefore, are returning these 4 applications to you along with this letter with a request to provide us necessary clarifications / confirmations so as to consider these applications for employment at the earliest.

We would also request you to inform us of any further applications pending with you for providing employment under R&R Policy and if there are any, the same may be please be forwarded to us with necessary supporting documents.

Thanking you

Yours faithfully
for **UDUPI POWER CORPORATION LIMITED**

M.V. Ramana Rao
Sr. General Manager – H.R

Encl:

1. Annexure – A
2. Annexure – B

Annexure - 13

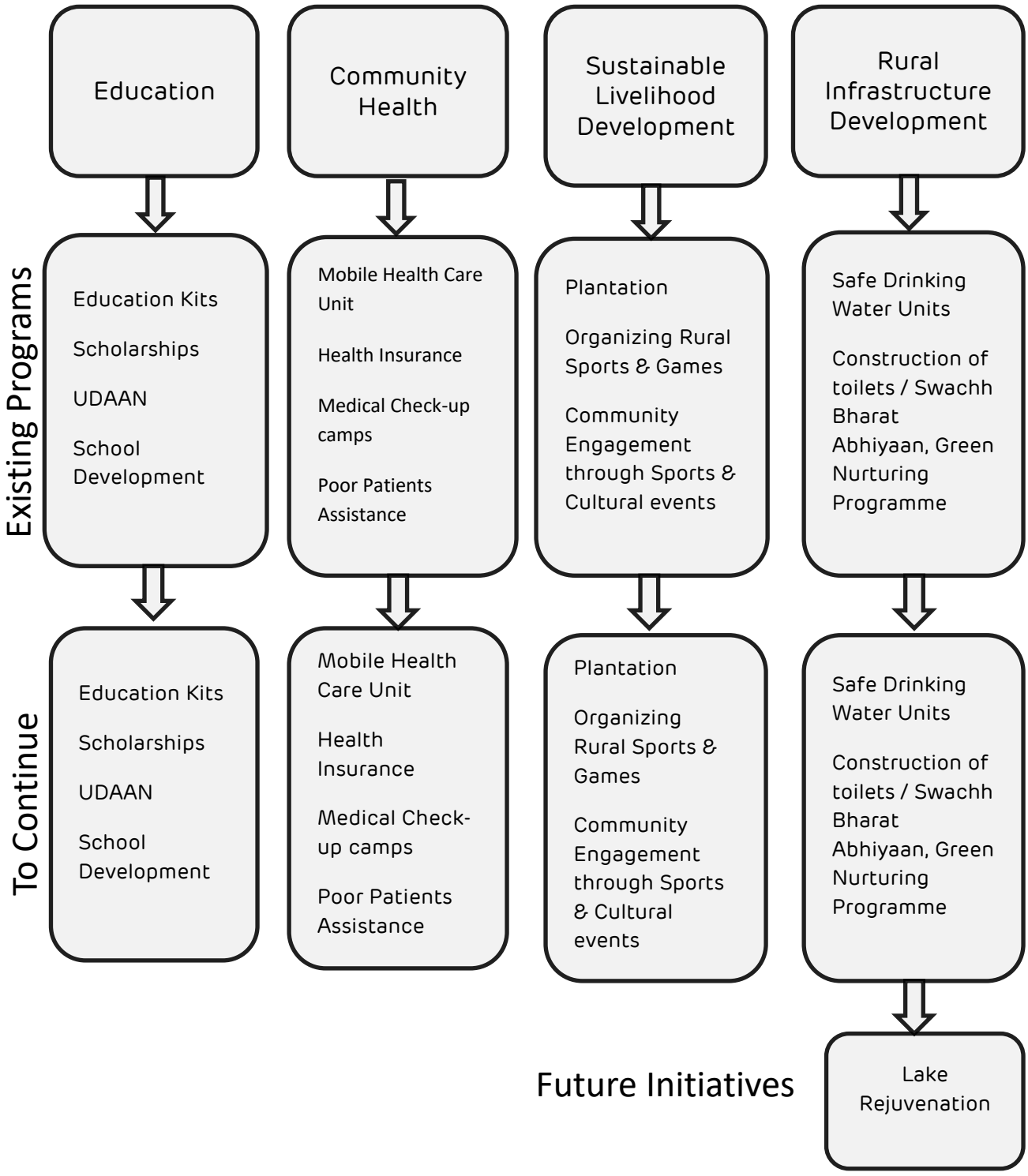
Udupi Power Corporation Limited **CSR Activities**

UPCL is executing CSR activities in the following villages: ***Annexure – XIII***

Sl.No	Name of the Grama Panchayat	District	No. Of Households	Population	Villages
1.	Yellur	Udupi	1483	6404	Yellur, Ullur, Saje, Kemmendelu
2.	Mudarangadi	Udupi	1489	7476	Santhoor & Pilar
3.	Uchila/Bada	Udupi	2201	8770	Yermal, Bada, Bhaskara Nagara, Polya, Mullagudde, Kattinagara, Bada Guthu
4.	Tenka	Udupi	1109	3701	Tenka, Admar
5.	Padubidri	Udupi	5200	12694	Kanchinadka, Nadsal, Nadsal Budu, Nadipatna, Kadipatna, Padebettu
6.	Palimar	Udupi	1600	6761	Mudupalimar, Nandikoor, Avaralumattu.
7.	Belapu	Udupi	1211	4965	Belapu & Paniyuru
8.	Inna	Udupi	632	3864	Kanjarakatte, Inna
9.	Kutyar	Udupi	1376	5231	Kutyar
10.	Hejamadi	Udupi	1578	6630	Hejamadi

CSR FOCUS AREAS

Programs to be continued and new initiatives



Programme – Mobile Health Care Unit:		
Purpose	**Activity**	
To deliver the quality medical services at free of cost to the doorsteps of the villagers. To improve the health condition of the villagers.	The Mobile Health Service ply to 2 villages every day and provides free medical treatment to the villages. As on date it is plying to 13 villages. 66496 villagers cumulative.	
Programme – Community Infrastructure Development:		
Purpose	**Activity**	
Rejuvenation of Lakes	Rejuvenation of Twin Mainda Lake, spread across 5.6 acres in Santuru Village at Mudaragandi Grama Panchayat.	 
Programme – Community Infrastructure Development:		
Purpose	**Activity**	
To support the Scouts and Guides Training Centre	Construction of Compound Wall for the Training Centre of Bharat Scouts and Guides, Karnataka, spread across 26 acres in Pragati Nagar, Udupi District.	 

Programme – Safe Drinking Water Unit		
Purpose	**Activity**	
To ensure potable drinking water to all the surrounding villagers.	Set-up Safe Drinking Water Units of RO based technology in 5 villages, i.e., Yellur, Belapu, Mudarangadi, Tenka and Bada.	
To overcome drinking water problem during summer	No of Beneficiaries is 6,465.	

Expenditures on CSR for the period October-2021 to March-2022

Sl No	Description	Amount in Rs
1	Educational Initiatives	20,00,000
2	Mobile Health Care Unit	12,23,000
3	Setting-up of 10 nos. Pediatric ICU ventilator beds at Karkala Government Hospital	78,18,000
4	Social Afforestation / Plantation Programme	7,05,000
5	Safe Drinking Water Unit	1,67,000
6	Rejuvenation of Mainda Lake	89,76,000
7	Community Infrastructure Development works	49,80,000
8	Administrative Expenses	7,73,000
9	Support to Rural Sports	9,00,000
Total Expenditures		**2,75,42,000**

Comparison of Base Line Data with the analysis report of March 2022:

Annexure-XIV

S.No	Parameters	Karnire (Surface water)		Nandikur Village		Santhoor Village		UNIT	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012
		As Per EIA-507.5 MU	March 2022	As Per EIA-507.5 MU	March 2022	As Per EIA-507.5 MU	March 2022			
1	Color	Colorless	BLQ	Colorless	BLQ	Colorless	BLQ	Hz	5	15
2	Odour		A		A		A	-	Agreeable	Agreeable
3	Taste		A		A		A	-	Agreeable	Agreeable
4	Turbidity		1.2		0.7		BLQ	NTU	1	5
5	TDS	17222	160	8	33	16	69	mg/l	500	2000
6	pH	7.1	7.12	6.2	6.82	6.8	6.85	-	6.5 - 8.5	No relaxation
7	Alkalinity		80		8		19	mg/l	200	600
8	Total Hardness as CaCO3		60.35		10		23	mg/l	200	600
9	Calcium as Ca		13.16		2		7.21	mg/l	75	200
10	Magnesium as Mg		10.41		1.2		1.2	mg/l	30	100
11	Iron as Fe	0.1	0.12	0.3	0.054	1.5	BLQ	mg/l	0.3	No relaxation
12	Sulphate as SO4	1096	26.34	1.9	1.24	2.1	1.07	mg/l	200	400
13	Chloride as Cl	9264	34.52	8.6	11.88	9.6	16.33	mg/l	250	1000
14	Fluoride as F	0.5	0.98	0.05	BLQ	0.1	BLQ	mg/l	1	1.5
15	Phenolic Compounds	0.04	BLQ	0.01	BLQ	0.02	BLQ	mg/l	0.001	0.002
16	Manganese as Mn		BLQ		BLQ		BLQ	mg/l	0.1	0.3
17	Zinc as Zn	0.02	0.431	0.02	BLQ	0.03	BLQ	mg/l	5	15
18	Arsenic as As	ND	BLQ	ND	BLQ	ND	BLQ	mg/l	0.05	No relaxation
19	Cyanide as CN		BLQ	ND	BLQ		BLQ	mg/l	0.05	No relaxation
20	Cadmium as Cd	ND	BLQ	ND	BLQ	ND	BLQ	mg/l	0.003	No relaxation
21	Chromium as Cr6+	ND	BLQ	ND	BLQ	ND	BLQ	mg/l	0.05	No relaxation
22	Aluminium as Al		BLQ	ND	BLQ		BDL	mg/l	0.03	0.2
23	Selenium as Se	ND	BLQ	ND	BLQ	ND	BDL	mg/l	0.01	No relaxation
24	Lead as Pb	ND	BLQ	ND	BLQ	ND	BDL	mg/l	0.01	No relaxation
25	Mercury as Hg	ND	BLQ	ND	BLQ	ND	BDL	mg/l	0.001	No relaxation
26	Boron as B	ND	BLQ	ND	BLQ	ND	BDL	mg/l	0.5	1
27	Residual Free Chlorine	NT	BLQ	ND	BLQ	NT	BDL	mg/l	0.2	1
28	Nitrate as NO3-N		1.04	ND	4.03		3.04	mg/l	45	No relaxation
29	E.Coli	280	Nil	350	Nil	1800	Nil	MPN/100 ml	Shall not be detectable in any 100 ml sample	

Note: A- Agreeable, BLQ – Below Limit of Quantification, Nil– Zero

Comparison of Base Line Data of EIA Report (2009) with the Ambient air quality analysis report of March 2022

Annexure-XIV

Location: Plant Site									
March - 2022					As per EIA Report - 2009				
Date of Sampling	SO_2	NO_2	PM $_{10}$	PM $_{2.5}$	Date of Sampling	SO_2	NO_2	PM $_{10}$	$PM_{2.5}$
	µg/m³					µg/m³			
03.03.2022	10.4	11.7	44.6	27.8	28.04.2007	BDL	12.5	138	45
04.03.2022	10.7	11.5	43.8	28.3	30.04.2007	BDL	9.5	121	41
10.03.2022	10.2	11.6	43.9	27.4	07.05.2007	BDL	15.0	148	47
11.03.2022	10.3	11.4	45.1	28.6	11.05.2007	BDL	8.0	92	35
17.03.2022	10.4	11.2	44.9	28.5	14.05.2007	BDL	9.5	132	43
18.03.2022	10.6	11.3	44.6	28.9	18.05.2007	BDL	8.5	118	38
24.03.2022	10.4	11.6	44.8	28.6	20.05.2007	BDL	10.5	138	45
25.03.2022	10.1	11.2	43.7	28.1	23.05.2007	BDL	8.5	85	30
29.03.2022	10.3	11.5	44.1	27.8					
30.03.2022	10.5	11.1	43.8	28.4					
Min.	**10.1**	**11.1**	**43.7**	**27.4**	**Min.**	**0**	**8.0**	**85.0**	**30.0**
Max.	**10.7**	**11.7**	**45.1**	**28.9**	**Max.**	**0**	**15.0**	**148.0**	**47.0**
Avg.	**10.4**	**11.4**	**44.3**	**28.2**	**Avg.**	**0**	**10.25**	**121.5**	**40.5**
NAAQ Standards (2009)	**80**	**80**	**100**	**60**	**NAAQ Standards (1994)**	**120**	**120**	**500**	**150**

Location: Mudarangadi									
March - 2022					As per EIA Report - 2009				
Date of Sampling	SO_2	NO_2	PM $_{10}$	PM $_{2.5}$	Date of Sampling	SO_2	NO_2	PM $_{10}$	$PM_{2.5}$
	µg/m³				mg/m³	µg/m³			
03.03.2022	10.4	12.3	40.5	19.2	29.04.2007	5.5	31.5	120	65
04.03.2022	10.7	12.9	41.2	19.6	03.05.2007	6.0	34.5	135	72
10.03.2022	10.6	12.9	41.3	20.1	05.05.2007	5.5	30.5	130	68
11.03.2022	10.8	12.6	41.5	20.4	09.05.2007	5.0	28.5	102	57
17.03.2022	11.2	12.4	41.6	20.9	13.05.2007	5.0	32.5	112	60
18.03.2022	10.9	12.8	42.1	21.2	16.05.2007	6.5	38.5	138	72
24.03.2022	11.6	13.1	41.6	21.4	22.05.2007	6.0	36.5	141	74
25.03.2022	11.8	12.2	41.9	21.7	25.02.2007	6.5	32.5	118	68
29.03.2022	11.4	13.2	42.2	21.5					
30.03.2022	11.2	13.7	42.5	20.8					
Min.	**10.4**	**12.2**	**40.5**	**19.2**	**Min.**	**5.0**	**28.5**	**102.0**	**57.0**
Max.	**11.8**	**13.7**	**42.5**	**21.7**	**Max.**	**6.5**	**38.5**	**141.0**	**74.0**
Avg.	**11.1**	**12.8**	**41.6**	**20.7**	**Avg.**	**5.75**	**33.12**	**124.5**	**67.0**
NAAQ Standards (2009)	**80**	**80**	**100**	**60**	**NAAQ Standards (1994)**	**120**	**120**	**500**	**150**

9c

Annexure - 15

adani
Power

REF: UPCL/PLANT/O&M/ENV/2021-22/490 24.09.2021

To,
The Environment Officer,
Karnataka State pollution Control Board,
Regional Office,
Plot No-36-C, Shivalli Industrial Area,
Manipal, Udupi-576104

Sub: Submission of Environment statement for Financial Year 2020-21 in Form-V for 2 X 600 MW coal based Subcritical Thermal Power Plant of Udupi Power Corporation Limited, reg...

Ref: 1) Consent for Operation No: - **AWH - 301645 dated: 15/12/2016.**
2) Environmental Clearance No: - **J-13011/23/1996-IA.II (T) dated: 01.09.2011**

Dear Sir,

With reference to the above cited subject, please find the enclosed Environment Statement in Form-V for the financial year 2020-21 for 2X600 MW coal based Subcritical Thermal Power Plant of Udupi Power Corporation Limited.

Thanking you,

Yours faithfully

Authorized Signatory
Udupi Power Corporation Limited.

ದಿನಾಂಕ: 24/9/2021 ರಂದು ಸ್ವೀಕರಿಸಿದೆ.

Enclosure: Environment Statement in Form-V

Copy to:

Member Secretary, Karnataka State Pollution Control Board, "Parisara Bhavana", 1st to 5th Floor, #49 church street, Bengaluru-560001.

Udupi Power Corporation Limited
Yelluru Village
Pilar Post, Padubidri
Udupi 574113
Karnataka, India
CIN: U31909GJ1996PLC125650

Tel +820 270 3500
Fax +91 820 255 0854 / 270 3345
info@adani.com
www.adanipower.com

Registered Office: Adani Corporate House, Shantigram, Near Vaishno Devi Circle, S. G. Highway, Khodiyar, Ahmedabad – 382421

ANNEXURE

ENVIRONMENTAL STATEMENT FORM-V
(See rule 14)

Environmental Statement for the financial year ending with 31st March 2021

PART-A

i	Name and address of the owner/occupier of the industry	Pravat Kishore Sundaray Station Head Udupi Power Corporation Limited Yelluru Village, Pillar Post Padubidri, Udupi District Karnataka-574113
ii	Industry category Primary-(STC code) Secondary- (STC Code)	Large scale Industry- Red Category
iii	Production category –Units	2X600 MW Imported Coal based Thermal Power Plant
iv	Year of establishment	Unit-I: 11th Nov 2010 Unit-II: 19th Aug 2012
v	Date of the last environmental statement submitted	Letter No: UPCL/PLANT/O&M/ENV/2020-21/346 Dated: 23.09.2020

PART-B

Water and Raw Material Consumption:

i. Water consumption in m^3/d

Process	: 19706.54
Cooling	: 136103.70
Domestic	: 73.54
Total	: 155883.78
Sea Water returned back to Sea	: 81119.18

Name of Products	Process water consumption per unit of products	
	During the previous financial year (2019-20)	During the current financial year (2020-21)
Power Generation (2350.12 MU)	0.00769 kl/kwh	0.00779 kl/kwh

ii. Raw material consumption

Name of raw materials	Name of Products	Consumption of raw material per unit of output	
		During the previous financial year (2019-20)	During the current financial year (2020-21)
Coal	Power Generation	0.430 kg/kWh	0.420 kg/kWh
Heavy Fuel Oil (HFO)	Flame Stabilization during power generation and start-up	Nil	Nil
Light Diesel oil (LDO)		0.000476 ml/kWh	0.000740 ml/kWh

*Industry may use codes if disclosing details of raw material would violate contractual obligations, otherwise all industries have to name the raw materials used.

UDUPI POWER CORPORATION LIMITED YELLUR

PART-C

Pollution discharged to environment/unit of output

(Parameter as specified in the consent issued)

Pollutants	Quantity of Pollutants discharged (mass/day) i.e., (**Kg/day**)			Concentration of Pollutants discharged (**Mass/Volume**)			Percentage of variation from prescribed standards with reasons
a) Water	Parameter		Results	Parameter		Results	No deviation
	Color & Odor		Agreeable	Color & Odor		Agreeable	
	pH		Not Applicable	pH		7.75	
	TSS		1335.2	TSS, mg/l		16.46	
	BOD		269.9	BOD, mg/l		3.66	
	COD		BDL	COD, mg/l		BDL	
	Oil& grease		BDL	Oil & grease		BDL	
	Arsenic		BDL	Arsenic		BDL	
	Lead		BDL	Lead		BDL	
	Mercury		BDL	Mercury		BDL	
	Total Cr		3.2	Total Cr		0.04	
	Hexavalent Cr		5.6	Hexavalent Cr		0.07	
	Phenolic Compounds		BDL	Phenolic Compounds		BDL	
b) Air	Unit-I (kg/day)		Unit-II (kg/day)	Unit-I (mg/Nm^3)		Unit-II (mg/Nm^3)	No deviation
	PM	684.61	907.13	PM	18.51	22.07	
	SO_x	25412.18	32216.98	SO_x	687.11	783.74	
	NO_x	4472.17	5687.30	NO_x	120.92	138.35	

PART-D

HAZARDOUS WASTE

{As specified under the Hazardous and Other wastes (Management and Transboundary Movement) Rules, 2016}

Hazardous Wastes	Total Quantity (MT)			
	During the previous financial year (2019-20)		During the current financial year (2020-21)	
1) From Process	Used Oil	20.52 MT	Used Oil	14.59 MT
	Oil Soaked Cotton waste	3.17 MT	Oil Soaked Cotton waste	2.42 MT
	Discarded Containers	14.36 MT	Discarded Containers	11.14 MT
	Spent Ion exchange resins containing toxic metals	Nil	Spent Ion exchange resins containing toxic metals	7.22 MT
	Paint Residue	Nil	Paint Residue	1.5 MT
2) From Pollution Control Facilities	Not Applicable		Not Applicable	

PART-E

*SOLID WASTES**

Solid Wastes	Total Quantity (MT)			
	During the previous financial year (2019-20)		During the current financial year (2020-21)	
a)From Process	Bottom Ash	10748.87	Bottom Ash	7369.00
b)From Pollution Control Facility	Fly Ash	76637.11	Fly Ash	61957.00
	Gypsum	1678.23	Gypsum	1041.73
c) Quantity recycled or reutilized	Fly Ash	73919.95	Fly Ash	53589.00
	Bottom Ash	14209.56	Bottom Ash	15915.00
	Gypsum	1533.55	Gypsum	1244.59

UDUPI POWER CORPORATION LIMITED YELLUR

PART-F

Please specify the characteristics (in terms of concentration and quantum) of hazardous as well as solid wastes and indicate disposal practice adopted for both these categories of wastes.

a) Hazardous waste: As per Hazardous and Other Wastes (Management & Transboundary Movement) Rules 2016, hazardous wastes generated in the industry are of five categories i.e., 5.1 Used Oil, 5.2 Oil soaked Cotton Waste, 21.1 Paint Sludge, 33.1 Discarded Containers and 35.2 Spent Ion Exchange resin. All these generated wastes are stored on the concrete platform in designated location and disposed to KSPCB/CPCB authorized vendors.

b) Solid Waste: Solid waste in the industry is generated from process and pollution control facilities.

i. Bottom Ash is generated from the process of burning coal and is collected in the water impounding basin and the same is disposed to brick manufacturers & disposal to ash pond which is 3 km away from the plant.

ii. Fly Ash is generated from the process is trapped in the electro static precipitators (ESPs) in dry form and stored in silos. Fly ash is disposed to various end users like cement manufacturers, brick manufacturers and Ready Mix Concrete works.

iii. Gypsum is generated from the FGD (flue gas desulphurization) units when flue gas is passed through wet lime to remove Sulphur Di-oxides. Generated gypsum is disposed to end users like cement manufacturers, fertilizers industries and plasterboard manufacturers.

iv. Sludge generated from the STP was utilized as manure after drying and composting along with garden waste.

PART-G

Impact of the pollution control measures taken on conservation of natural resources and consequently on the cost of production

a) The Ambient Air Quality surrounding the coal handling facility is monitored through Online Continuous Ambient Air Quality Monitoring Stations and the Ambient Air Quality is within the prescribed limits throughout the year.

b) The coal conveyor belts are fully covered and installed with Dust Suppression system at transfer points for arresting the fugitive emissions.

c) The Units are equipped with Pollution Control Equipment such as Low NOx Burner, ESP & FGD (flue gas desulphurization) for controlling the Stack Emission.

d) Fly Ash generated is conveyed in dry form through conduits and stored in silos. Fly Ash is utilized by cement manufacturers, brick manufacturers and RMC works.

e) Gypsum generated is stored in closed yard and disposed to end users like cement manufacturers, fertilizers industries and plasterboard manufacturers.

f) ETP of 7200 KLD is in operation and treated water is reused for green belt development/ gardening.

g) Water Sprinkling is undertaken in the Ash Pond for suppression of dust.

PART-H

Additional measures/investment proposal for environmental protection including abatement of pollution

a) Wind shield installed in the coal handling plant for controlling fugitive emissions.

b) Rain Harvesting Ponds of capacities 70000 m^3 and 72000 m^3 are constructed for harvesting rain water during rainy season and utilization in Cooling Tower and other purposes.

c) Organic Waste Converter is installed for converting food and green waste into compost and used in green belt/ gardening.

d) Deployment of Road Sweeping machine to reduce fugitive dust emissions.

UDUPI POWER CORPORATION LIMITED
UDUPUR

PART-I

Any other particulars in respect of environmental protection and abatement of pollution

a) UPCL is certified with ISO 9001, ISO 14001 & ISO 45001
b) UPCL is certified with ISO 50001
c) World Environment Day celebration to create Environmental awareness among employees and community by conducting various environmental competitions, workshops & presentations.
d) Nearly 2000 saplings were planted inside and outside the plant on the occasion of world Environment Day -2021.
e) As a CSR activity for COVID-19 vaccination Rs. 40 Lakhs been handed over to Udupi District Commissioner.
f) Certified as SuP (Single Use Plastic) free plant by CII (Confederation of Indian Industry) as a initiative to mitigate the problems caused by single use of Plastic to environment.

CAUTION BOARDS AT PIPE LINE CORRIDOR ***Annexure-XVI***

Caution Boards are installed at every 500 meters length throughout the 6 km pipe line corridor. Snapshots of the caution boards are placed below:

Annexure - 17

Table 1. Data on water quality parameters off Padubidri during October, 2021

Sl. No.	Parameters		Stations							
			1	2	3	4	5	6	7	8
1	Water Temperature (^{0}C)	S	30.10	30.50	31.50	31.00	31.00	31.00	31.10	31.10
		SS	29.10	30.70	29.20	29.40	28.60	28.70	29.20	29.10
2	pH	S	7.89	7.98	8.00	7.97	7.96	7.70	7.92	8.00
		SS	7.93	7.97	7.99	7.98	7.98	7.94	7.99	7.93
3	Salinity (psu)	S	31.56	31.63	32.19	32.31	31.25	32.01	31.90	31.14
		SS	30.63	31.15	31.45	31.41	31.52	31.60	32.14	31.24
4	Dissolved Oxygen (mg/l)	S	4.30	3.99	4.11	5.65	4.61	5.21	5.85	5.08
		SS	4.10	5.21	5.00	5.78	4.91	4.75	5.22	5.76
5	BOD_3 at 27^{0}C	S	-	1.75	-	-	2.40	-	2.22	-
		SS		1.36			1.64		2.30	
6	COD (mg/l)	S	-	23	-	-	19	-	18	-
		SS		20			17		15	
7	Transparency (m)		3.25	2.25	3.45	4.00	5.04	2.26	4.3.93	4.02
8	Total Suspended Solids (mg/l)		-	68	-	-	120	-	114	-
9	Total Dissolved Solids (mg/l)		-	1200	-	-	1805	-	1850	-
10	Ammonia (µg-at/l)	S	3.11	2.83	4.21	5.95	4.31	5.80	4.68	3.37
		SS	3.88	2.24	4.14	5.77	4.10	5.21	4.84	4.14
11	Nitrite (µg-at/l)	S	0.14	0.28	0.64	0.32	0.42	0.35	0.18	0.21
		SS	0.12	0.23	0.91	0.28	0.32	0.28	0.17	0.24
12	Nitrate (µg-at/l)	S	1.10	1.05	0.92	1.34	0.86	1.37	0.67	1.43
		SS	1.04	1.28	1.09	1.45	1.24	1.95	1.89	1.44
13	Phosphate (µg-at/l)	S	1.05	0.70	1.03	0.85	0.85	0.90	0.75	0.45
		SS	0.94	0.89	0.84	0.55	0.70	0.57	0.60	1.25
14	Silicate (µg-at/l)	S	12.71	11.32	12.1 0	11.18	16.28	14.97	13.92	15.64
		SS	17.23	14.54	14.64	17.75	15.95	12.32	15.62	12.52
15	Oil and Grease (mg/l)	S	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

BDL: Below Detectable Level

Table 2. Phytoplankton diversity (no/m^3) and Biomass (mg/m^3) in the coastal waters off Padubidri during October, 2021

Sl. No.	Flora	Depth (m)		
		4	8	12
I	**Diatoms**			
1	*Asterionella*			
	a. *A. japonica*	250	110	500
	b. Others	-	-	-
2	*Bacteriastrum*			
	a. *B. varians*	-	500	100
	b. Others	400	1000	300
3	*Biddulphia*			
	a. *Biddulphiaregia*	7500	4500	2000
	b. *B.sinensis*	3000	1400	1000
	c. *Biddulphiamobiliensis*	500	300	600
	d. Others	100	500	600
4	*Cerataulina*			
	a. *C. perlagica*	100	100	200
	b. Others	-	-	-
5	*Chaetoceros*			
	a. *C. lorenzianus*	-	7500	1200
	b. *C. decipiens*	1200	1200	950
	c. *C. compressus*	-	1200	1400
	d. *C. curvisetus*	400	-	300
	e. Others	200	100	200
6	*Coscinodiscus*			
	a. *C. oculus iridis*	600	1700	1100
	b. *C. lineatus*	1000	900	600
	c. *C. excentricus*	1300	400	500
	d. Others	200	-	200
7	*Cyclotella*			
	a. *C. stelligera*	400	-	200
	b. Others	-	-	-
8	*Dynobryonsetularia*	-	-	-
9	*Ditylum*			
	a. *D. brightwelli*	1200	6000	4900
	b. Others	-	-	-
10	*Eucamphia*			
	a. *E. zoodiacus*	-	-	-
	b. Others	-	-	-

11	*Fragillaria*			
	a. *F. oceanica*	1500	600	1200
	b. Others	-	-	-
12	*Gyrosigma*			
	a. *G. balticum*	1400	2700	3200
	b. Others	-	-	-
13	*Lauderia*			
	a. *L. borealis*	-	-	-
	b. Others	16000	3000	7500
14	*Leptocylindricus*			
	a. *L. danicus*	5000	120	100
	b. Others	200	300	300
15	*Melosira*			
	a. *M. monilifornas*	3000	100	300
	b. Others	-	-	-
16	*Navicula*			
	a. *N. longa*	-	-	-
	b. Others	120	100	-
17	*Nitzschia*			
	a. *N. closterium*	-	-	-
	b. *N. striata*	-	-	-
	c. *N. longissima*	-	-	-
	d. Others	1500	1800	1200
18	*Planktoniella*			
	a. *P. sol*	-	-	-
	b. Others	-	-	-
19	*Pleurosigma*			
	a. *P. normanii*	1700	500	800
	b. *P. elongatum*	2500	3500	1500
	c. Others	4500	5100	1300
20	*Rhizosolenia*			
	a. *R. stolterfothii*	5000	2500	700
	b. *R. shrubsolei*	-	-	600
	c. *R. stliformis*	-	-	100
	d. Others	300	-	500
21	*Skeletonema*			
	a. *S. costatum*	-	-	-
	b. Others	1500	-	700
22	*Staurastrum*sp.	300	-	500
23	*Streptotheca*			
	a. *S. thamensis*	2000	1400	1600
	b. Others	1200	1200	1400
24	*Thalassiothrix*			
	a. *T. decipiens*	1200	800	-
	b. *T. longissima*	1200	1500	300

	c. Others	-	-	-
25	*Triceratium*			
	a. *T. reticulate*	1200	2000	3000
	b. *T. favus*	800	-	-
	c. Others	-	-	-
26	*Diatoma*			
	a. Diatoma vulgare	-	-	-
27	Other diatoms	1400	1200	500
II	**Dinoflagellates**			
1	*Ceratium*			
	a. *C. macroceros*	100	1200	2500
	b. *C. fusus*	7500	5500	1200
	c. *C. longipes*	1200	800	400
	d. others	1000	200	1400
2	*Dinophysis*			
	a. *D. acuta*	-	-	-
	b. Others	-	-	-
3	*Gymnodinium*			
	a. *G. splendens*	-	-	-
	b. *G. rhombodes*	100	800	400
	c. Others	-	-	-
4	*Ornithocerosmagnificus*	-	-	-
5	*Peridinium*			
	a. *P. depressum*	4500	3200	5200
	b. *P. divergens*	1400	-	1000
	c. *P. granii*	-	-	-
	d. *P. excentricum*	-	-	-
	e. Others	900	200	300
6	*Preperidinium*	3200	2200	3000
7	*Noctiluca*			
	a. *N. Scintillans*	15000	2000	6000
	b. Others	1800	1500	1200
III	**Blue green algae**	-	-	-
1	Blue Green Algae	-	-	-
Biomass [wet weight - mg/m^3]		**265.47**	**232.09**	**197.43**

-: Absent

Table 3. Zooplankton diversity (no/m^3) and Biomass (mg/m^3) in the coastal waters off Padubidri during October, 2021

Sl. No.	Fauna	Depth (m)		
		4	8	12
1	**Tintinids**			
	a. *Tintinopsis*sp.	9500	12000	8000
	b. *Rabdonella*sp.	1500	-	-
	c. *Favella*sp.	1200	800	500
2	**Radiolarians**	400	100	600
3	**Medusae**			
	a. *Obelia* sp.	1200	3200	5400
	b. *Octocostatum*sp.	-	-	-
	c. *Quadrata*sp.	-	-	-
4	**Siphonophores**			
	a. *Lensia* sp.	-	-	-
	b. *Diphysis*sp.	300	250	360
5	**Ctenophores**			
	a. *Plurobranchia* sp.	-	-	-
6	**Chaetognaths**			
	a.*Sagittaenflata*	-	-	-
	b. *Pterosagittadraco*	-	-	-
	c. *Krohnitta subtilis*	-	-	-
7	**Polychaetes**	150	140	500
8	**Cladocerans**			
	a. *Peniliaavirostris*	1200	2500	1500
	b. *Evadnaenordmanni*	1500	2500	1700
9	**Copepods**			
	a. *Calanusfinmarchicus*	1500	1000	2500
	b. *Tamoralongicornis*	1200	1500	1600
	c. *Parapontellabrevicornis*	1700	3400	800
	d. *Oithonahelgolandica*	-	-	-
10	**Copepod nauplius**	1200	6500	1000
11	**Lucifer**	-	-	-
12	**Planktonic Urochordates**			
	a. *Frililliaria*sp.	-	-	-
	b. *Oikopleura*sp.	1900	1000	1200
	c. *Doliolom*sp.	-	-	-
13	**Fish Eggs**	700	500	4600
14	**Copepod egg**	1200	3000	2500
15	**Echinoderm Larvae**	-	-	-
16	**Decapod Larvae**	1500	2500	2500
17	**Bivalve Larvae**	100	300	50
18	**Fish Larvae**	-	-	-
19	**Polychaete Larvae**	-	-	-
20	**Chaetognath Larvae**	-	-	-
21	Others	60	50	32
Biomass [wet weight - mg/m^3]		**232.32**	**242.65**	**254.42**

Table 4. Macrobenthos diversity (no/m^2) in the coastal waters off Padubidri during October, 2021

Sl. No.	Fauna	Depth (m)		
		4	8	12
I	**Molluscs**			
A	**Bivalves**			
1	*Arca* sp.	-	-	-
2	*Anadora*sp.	20	10	10
3	Bivalve Spats	50	40	50
4	*Cardium* sp.	40	34	20
5	*Donax* sp.	30	20	55
6	*Katalysia*sp.	-	-	-
7	*Meritrix* sp.	10	40	50
8	*Perna sp*	30	40	40
9	*Modiolus*sp.	-	-	-
10	*Pecten sp.*	-	-	-
B	**Gastropods**			
1	*Babylonia* sp.	-	60	10
2	*Cavolinia*sp.	-	-	-
3	*Cerithedia*sp.	25	60	90
4	*Conus* sp.	-	-	-
5	*Oliva* sp.	-	-	-
6	*Patella* sp.	20	60	65
7	*Surcula* sp.	-	-	-
8	*Telescopium* sp.	10	-	-
9	*Trochus* sp.	-	20	-
10	*Turitella* sp.	20	-	-
11	*Umbonium* sp.	40	30	30
C	**Scaphopods**			

1	*Dentalium* sp.	40	80	20
D	**Other Molluscs**	-	-	-
II	**Echinodermata**			
1	*Astropecten* sp.	-	-	-
2	*Ophiocoma* sp.	10	-	-
3	*Holothuria*sp.	-	-	-
III	**Echiuroids**	-	10	30
IV	**Sipunculids**	-	-	-
V	**Polychaetes**	100	120	80
VI	**Coelenterates**	-	-	20
VII	**Miscellaneous**			
1	Crabs	-	-	-
2	Shrimps	70	20	10
3	Fishes	-	-	-
4	Mud tubes	20	80	70
5	Sand tubes	40	80	30
6	Egg Cases	30	10	20
Density (Individuals/m^2)		**855.00**	**760.00**	**770.00**

- : Absent

Table 5. Results of Bioassay experiment for the coastal waters off Padubidri during October, 2021

1.	Organism Used for the Test	: *Perna viridis* (Green mussel)
2.	Length of the Test Organism	: 3.96cms (Average)
3.	Weight of the Test Organism	: 1.24gms (Average)
4.	Test Medium	: Sea water collected from the vicinity of effluentfallout from UPCL, Padubidri
5.	Control	: Filtered sea water
6.	Container	: Glass aquarium of 20 ltr. capacity
7.	Number of Organisms	: 10 in each container
8.	Number of Experiments	: Two
9.	Duration of the Test	: 96 hrs.
10.	Methodology	: Static bioassay

EXPERIMENT

MEDIUM	HOUR / MORTALITY (%)			
	24	**48**	**72**	**96**
CONTROL	Nil	Nil	Nil	Nil
TEST MEDIUM	Nil	Nil	Nil	Nil

Result: No mortality

Inference:

The inferences drawn on the various physical, chemical and biological parameters for the month of October, 2021are given below.

The water temperature varied from 29.10^{0}C to 31.50^{0}C. The pHvalues ranged between 7.70 and 8.00. The salinity varied from 31.14psu to 32.41 psu. The dissolved oxygen (DO) varied between 3.99 mg/l and 5.85 mg/l. The biochemical oxygen demand (BOD_3) is an empirical biological test in which the water conditions such as temperature; dissolved oxygen and microbial flora play a decisive role. The BOD_3 values ranged from 1.36 mg/l to 2.40 mg/l in the study region. The COD values ranged between 15.00 mg/l and 23.00 mg/l. The total suspended solids (TSS) ranged between 68.0 mg/l and 120.0 mg/l and the total dissolved solids (TDS) ranged between 1200 mg/l and 1850 mg/l. The transparency values varied from 2.25 m to 5.04 m.

Nutrients play a vital role in the biogeochemical cycles in the marine environment. The concentrations of nitrite (NO_2-N) varied from 0.14 µg-at/l to 0.94 µg-at/l, while nitrate (NO_3-N) varied between 0.67 µg-at/l and 1.95 µg-at/l, which are within the acceptable limits of coastal environment. Ammonia content (NH_3-N) varied between 2.24 µg-at/l and 5.59 µg-at/l. Inorganic phosphate (PO_4-P) was in the range of 0.45 µg-at/l and 1.25 µg-at/l. Silicate – Silicon (SiO_2-Si), one of the major nutrients for phytoplankton growth ranged between 11.32 and 17.75 µg-at/l in the coastal waters off Padubidri. The oil and grease content was below detectable limits.

Phytoplankton:

The relative abundance of various forms of phytoplankton is depicted inrespective Table.Phytoplankton's were dominant in the study area with 19 different genera with the abundance of*Laudaria, Ceratium*and *Biddulphia.* The phytoplankton species recorded in this area are common types occurring along the west coast of India. The biomass varied from 197.43 mg/m^3 to 265.47mg/m^3.

Zooplankton:

The qualitative analyses revealed the presence of 15 different groups of zooplankton. Among zooplankton,Copepods, Cladocerans and Copepod nauplius were dominant. The biomass ranged from 232.32 mg/m^3 to 254.42 mg/m^3.

Macrobenthos:

The qualitative analyses revealed the presence of 20 different groups of macrobenthos. Bivalve spats dominated the macrobenthos, followed byCoelenterates and*Meritrix.* Thedensity ranged from 760.00 no/m^2 to 855.00 no/m^2.

Bioassay:

The bioassay studies indicated no mortality of mussels in the seawater samples collected from effluent discharge location in the Padubidri region.

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Table 1. Data on water quality parameters off Padubidri during December, 2021

Sl. No.	Parameters		Stations							
			1	2	3	4	5	6	7	8
1	Water Temperature (^{0}C)	S	30.70	30.80	31.10	31.60	31.30	31.50	31.70	31.70
		SS	29.00	29.20	30.00	30.20	30.50	30.20	30.40	30.00
2	pH	S	8.10	8.44	8.23	8.14	8.20	8.26	8.24	8.20
		SS	8.12	8.45	8.09	8.16	8.30	8.24	8.28	8.10
3	Salinity (psu)	S	30.10	30.20	30.29	30.46	30.22	31.22	30.80	31.10
		SS	30.54	31.36	32.38	32.48	31.11	31.42	30.91	30.54
4	Dissolved Oxygen (mg/l)	S	4.89	5.02	5.19	5.29	5.42	5.10	5.44	4.80
		SS	4.98	5.42	5.16	5.23	5.46	5.22	5.45	4.91
5	BOD_3 at 27^{0}C	S	-	2.35	-	-	2.31	-	2.26	-
		SS		2.30			1.65		2.35	
6	COD (mg/l)	S	-	18	-	-	22	-	18	-
		SS		23			16		16	
7	Transparency (m)		2.77	4.98	3.09	2.22	2.59	2.89	1.22	3.77
8	Total Suspended Solids (mg/l)		-	125.66	-	-	192.31	-	97.50	-
9	Total Dissolved Solids (mg/l)		-	900	-	-	873	-	1040	-
10	Ammonia (µg-at/l)	S	0.098	0.081	0.112	0.164	0.136	0.220	0.114	0.052
		SS	0.078	0.114	0.154	0.156	0.129	0.198	0.098	0.028
11	Nitrite (µg-at/l)	S	0.20	0.19	0.39	0.22	0.15	0.19	0.22	0.60
		SS	1.34	0.30	0.32	0.23	0.18	0.82	0.32	0.44
12	Nitrate (µg-at/l)	S	1.10	0.53	1.13	1.97	1.98	1.13	1.22	1.10
		SS	1.09	2.89	1.02	1.21	1.79	1.89	1.67	0.79
13	Phosphate (µg-at/l)	S	0.97	0.99	0.22	0.63	0.32	0.71	0.28	0.91
		SS	0.98	0.53	0.29	0.25	0.19	0.79	0.75	0.88
14	Silicate (µg-at/l)	S	11.09	11.06	11.02	12.44	12.32	14.12	15.21	11.79
		SS	13.43	09.12	12.11	12.56	13.09	14.02	15.68	11.01
15	Oil and Grease (mg/l)	S	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

BDL: Below Detectable Level

Table 2. Phytoplankton diversity (no/m^3) and Biomass (mg/m^3) in the coastal waters off Padubidri during December, 2021

Sl. No.	Flora	Depth (m)		
		4	8	12
I	**Diatoms**			
1	*Asterionella*			
	a. *A. japonica*	1300	1500	1300
	b. Others	-	-	-
2	*Bacteriastrum*			
	a. *B. varians*	4060	6950	1850
	b. Others	-	-	-
3	*Biddulphia*			
	a. *Biddulphiaregia*	1540	1550	1590
	b. *B.sinensis*	-	-	1600
	c. *Biddulphiamobiliensis*	1400	1600	1500
	d. Others	1650	1360	2650
4	*Cerataulina*			
	a. *C. perlagica*	1750	2500	1400
	b. Others	-	-	-
5	*Chaetoceros*			
	a. *C. lorenzianus*	4000	4300	1200
	b. *C. decipiens*	1750	2500	1400
	c. *C. compressus*	-	-	-
	d. *C. curvisetus*	1650	1780	1240
	e. Others	-	-	-
6	*Coscinodiscus*			
	a. *C. oculus iridis*	13800	15300	14000
	b. *C. lineatus*	-	-	-
	c. *C. excentricus*	-	-	-
	d. Others	1750	-	1400
7	*Cyclotella*			
	a. *C. stelligera*	1590	2320	5430
	b. Others	1000	1600	1500
8	*Dynobryonsetularia*	1090	1590	850
9	*Ditylum*			
	a. *D. brightwelli*	100	100	450
	b. Others	-	-	-
10	*Eucamphia*			
	a. *E. zoodiacus*	-	-	-
	b. Others	-	-	-

11	*Fragillaria*			
	a. *F. oceanica*	1250	1380	1650
	b. Others	-	-	-
12	*Gyrosigma*			
	a. *G. balticum*	250	280	480
	b. Others	-	-	-
13	*Lauderia*			
	a. *L. borealis*	1380	2340	2080
	b. Others	-	-	-
14	*Leptocylindricus*			
	a. *L. danicus*	4000	1200	100
	b. Others	1200	1300	300
15	*Melosira*			
	a. *M. monilifornas*	3000	100	300
	b. Others	-	-	-
16	*Navicula*			
	a. *N. longa*	-	-	-
	b. Others	1200	1000	1300
17	*Nitzschia*			
	a. *N. closterium*	890	1500	1790
	b. *N. striata*	1200	2540	2250
	c. *N. longissima*	2100	3200	4600
	d. Others	-	-	-
18	*Planktoniella*			
	a. *P. sol*	1200	800	1000
	b. Others	-	-	-
19	*Pleurosigma*			
	a. *P. normanii*	1700	5500	800
	b. *P. elongatum*	2500	4500	1200
	c. Others	3500	2000	1800
20	*Rhizosolenia*			
	a. *R. stolterfothii*	250	280	480
	b. *R. shrubsolei*	-	-	-
	c. *R. stliformis*	-	-	-
	d. Others	-	-	-
21	*Skeletonema*			
	a. *S. costatum*	1590	2320	5430
	b. Others	1000	1600	1200
22	*Staurastrum*sp.	1090	1590	850
23	*Streptotheca*			
	a. *S. thamensis*	-	-	-
	b. Others	-	-	-
24	*Thalassiothrix*			
	a. *T. decipiens*	890	1500	1790
	b. *T. longissima*	1200	2540	2250

	c. Others	2100	3200	4600
25	*Triceratium*			
	a. *T. reticulate*	3200	1800	6000
	b. *T. favus*	-	-	-
	c. Others	3200	1800	6000
26	*Diatoma*			
	a. Diatoma vulgare	1200	2000	3500
27	Other diatoms	-	-	-
II	**Dinoflagellates**			
1	*Ceratium*			
	a. *C. macroceros*	1500	1000	3200
	b. *C. fusus*	2000	1300	1500
	c. *C. longipes*	1500	1000	1800
	d. others	-	-	-
2	*Dinophysis*			
	a. *D. acuta*	-	-	-
	b. Others	-	-	-
3	*Gymnodinium*			
	a. *G. splendens*	-	-	-
	b. *G. rhombodes*	3400	9500	7500
	c. Others	140	200	180
4	*Ornithocerosmagnificus*	-	-	-
5	*Peridinium*			
	a. *P. depressum*	1690	1570	1300
	b. *P. divergens*	-	-	-
	c. *P. granii*	-	-	-
	d. *P. excentricum*	-	-	-
	e. Others	300	500	700
6	*Preperidinium*	100	400	150
7	*Noctiluca*			
	a. *N. Scintillans*	1400	1500	500
	b. Others	1300	-	1200
III	**Blue green algae**	-	-	-
1	Blue Green Algae	-	-	-
Biomass [wet weight - mg/m^3]		**361.48**	**318.41**	**312.43**

-: Absent

Table 3. Zooplankton diversity (no/m^3) and Biomass (mg/m^3) in the coastal waters off Padubidri during December, 2021

Sl. No.	Fauna	Depth (m)		
		4	8	12
1	**Tintinids**			
	a. *Tintinopsis*sp.	1560	1200	2500
	b. *Rabdonella*sp.			
	c. *Favella*sp.	-	-	-
2	**Radiolarians**	-	-	-
3	**Medusae**			
	a. *Obelia* sp.	1700	1400	1540
	b. *Octocostatum*sp.	1500	1950	1800
	c. *Quadrata*sp.	-	-	-
4	**Siphonophores**			
	a. *Lensia* sp.	950	1600	700
	b. *Diphysis*sp.	-	-	-
5	**Ctenophores**			
	a. *Plurobranchia* sp.	1500	1800	1500
6	**Chaetognaths**			
	a.*Sagittaenflata*	-	-	-
	b. *Pterosagittadraco*	-	-	
	c. *Krohnitta subtilis*	1800	2500	4000
7	**Polychaetes**	150	140	500
8	**Cladocerans**			
	a. *Peniliaavirostris*	1510	1320	2310
	b. *Evadnaenordmanni*	3400	3600	4200
9	**Copepods**			
	a. *Calanusfinmarchicus*	-	-	-
	b. *Tamoralongicornis*	-	-	-
	c. *Parapontellabrevicornis*	3540	4200	4500
	d. *Oithonahelgolandica*	1800	2150	1450
10	**Copepod nauplius**	-	-	-
11	**Lucifer**	1350	1250	1300
12	**Planktonic Urochordates**			
	a. *Frililliaria*sp.	-	-	-
	b. *Oikopleura*sp.	6600	3700	5100
	c. *Doliolom*sp.	-	-	-
13	**Fish Eggs**	-	-	-
14	**Copepod egg**	200	170	100
15	**Echinoderm Larvae**	-	-	-
16	**Decapod Larvae**	-	-	-
17	**Bivalve Larvae**	-	-	-
18	**Fish Larvae**	-	-	-
19	**Polychaete Larvae**	1500	1200	2150
20	**Chaetognath Larvae**	-	-	-
21	Others	6600	3700	5100
Biomass [wet weight - mg/m^3]		**258.72**	**201.43**	**230.18**

Table 4. Macrobenthos diversity (no/m^2) in the coastal waters off Padubidri during December, 2021

Sl. No.	Fauna	Depth (m)		
		4	8	12
I	**Molluscs**			
A	**Bivalves**			
1	*Arca* sp.	13	41	10
2	*Anadora*sp.	20	45	32
3	Bivalve Spats	-	-	-
4	*Cardium* sp.	02	10	20
5	*Donax* sp.	32	15	24
6	*Katalysia*sp.	-	-	-
7	*Meritrix* sp.	33	60	19
8	*Perna sp*	20	-	20
9	*Modiolus*sp.	-	-	-
10	*Pecten sp.*	10	71	50
B	**Gastropods**			
1	*Babylonia* sp.	-	-	20
2	*Cavolinia*sp.	12	14	-
3	*Cerithedia*sp.	13	12	20
4	*Conus* sp.	-	-	-
5	*Oliva* sp.	-	-	-
6	*Patella* sp.	50	40	30
7	*Surcula* sp.	-	-	-
8	*Telescopium* sp.	22	45	32
9	*Trochus* sp.	-	-	-
10	*Turitella* sp.	52	13	20
11	*Umbonium* sp.	30	35	45
C	**Scaphopods**			

1	*Dentalium* sp.	79	80	39
D	**Other Molluscs**	10	19	10
II	**Echinodermata**			
1	*Astropecten* sp.	-	-	-
2	*Ophiocoma* sp.	19	12	11
3	*Holothuria*sp.	-	-	-
III	**Echiuroids**	-	-	-
IV	**Sipunculids**	-	-	-
V	**Polychaetes**	80	120	70
VI	**Coelenterates**	-	-	-
VII	**Miscellaneous**			
1	Crabs	-	-	-
2	Shrimps	-	-	-
3	Fishes	-	2	-
4	Mud tubes	20	80	29
5	Sand tubes	45	82	35
6	Egg Cases	-	12	25
Density (Individuals/m^2)		**959**	**843**	**910**

- : Absent

Table 5. Results of Bioassay experiment for the coastal waters off Padubidri during December, 2021

1.	Organism Used for the Test	: *Perna viridis* (Green mussel)
2.	Length of the Test Organism	: 3.80cms (Average)
3.	Weight of the Test Organism	: 1.30gms (Average)
4.	Test Medium	: Sea water collected from the vicinity of effluentfallout from UPCL, Padubidri
5.	Control	: Filtered sea water
6.	Container	: Glass aquarium of 20 ltr. capacity
7.	Number of Organisms	: 10 in each container
8.	Number of Experiments	: Two
9.	Duration of the Test	: 96 hrs.
10.	Methodology	: Static bioassay

EXPERIMENT

MEDIUM	HOUR / MORTALITY (%)			
	24	48	72	96
CONTROL	Nil	Nil	Nil	Nil
TEST MEDIUM	Nil	Nil	Nil	Nil

Result: No mortality

Inference:

The inferences drawn on the various physical, chemical and biological parameters for the month of December, 2021are given below.

The water temperature varied from 29.00^{0}C to 31.70^{0}C. The pHvalues ranged between 8.10 and 8.45. The salinity varied from 30.10psu to 32.48 psu. The dissolved oxygen (DO) varied between 4.80 mg/l and 5.46 mg/l. The biochemical oxygen demand (BOD_3) is an empirical biological test in which the water conditions such as temperature; dissolved oxygen and microbial flora play a decisive role. The BOD_3 values ranged from 1.65 mg/l to 2.35 mg/l in the study region. The COD values ranged between 16.00 mg/l and 23.00 mg/l. The total suspended solids (TSS) ranged between 97.50 mg/l and 192.31 mg/l and the total dissolved solids (TDS) ranged between 873 mg/l and 1040 mg/l. The transparency values varied from 1.22 m to 4.98 m.

Nutrients play a vital role in the biogeochemical cycles in the marine environment. The concentrations of nitrite (NO_2-N) varied from 0.15 µg-at/l to 1.34 µg-at/l, while nitrate (NO_3-N) varied between 0.53 µg-at/l and 2.89 µg-at/l, which are within the acceptable limits of coastal environment. Ammonia content (NH_3-N) varied between 0.028 µg-at/l and 0.156 µg-at/l. Inorganic phosphate (PO_4-P) was in the range of 0.19 µg-at/l and 0.99 µg-at/l. Silicate – Silicon (SiO_2-Si), one of the major nutrients for phytoplankton growth ranged between 09.12 and 15.68 µg-at/l in the coastal waters off Padubidri. The oil and grease content was below detectable limits.

Phytoplankton:

The relative abundance of various forms of phytoplankton is depicted inrespective Table.Phytoplanktons were dominant in the study area with 20 different genera with the abundance of*Laudaria, Ceratium*and *Biddulphia.* The phytoplankton species recorded in this area are common types occurring along the west coast of India. The biomass varied from 312.43 mg/m^3 to 361.48mg/m^3.

Zooplankton:

The qualitative analyses revealed the presence of 15 different groups of zooplankton. Among zooplankton,Copepods, Cladocerans and Copepod nauplius were dominant. The biomass ranged from 201.43 mg/m^3 to 258.72 mg/m^3.

Macrobenthos:

The qualitative analyses revealed the presence of 21 different groups of macrobenthos. Bivalve spats dominated the macrobenthos, followed byCoelenterates and*Meritrix*. Thedensity ranged from 843.00 no/$m^2$to 910.00 no/m^2.

Bioassay:

The bioassay studies indicated no mortality of mussels in the seawater samples collected from effluent discharge location in the Padubidri region.

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Table 1. Data on water quality parameters off Padubidri during March, 2022

Sl. No.	Parameters		Stations						
			1	2	3	4	5	6	7
1	Water Temperature (^{0}C)	S	29.70	29.90	31.50	31.70	31.10	31.90	31.10
		SS	29.10	30.70	30.20	29.40	30.80	30.70	30.50
2	pH	S	7.98	7.88	8.00	7.90	7.86	7.87	7.98
		SS	7.95	7.87	7.98	7.90	7.88	7.97	7.72
3	Salinity (psu)	S	31.96	31.65	32.43	32.54	31.25	31.76	31.70
		SS	31.63	31.45	31.47	31.23	31.52	31.64	31.54
4	Dissolved Oxygen (mg/l)	S	5.20	4.54	5.13	5.32	4.54	5.65	5.76
		SS	4.70	5.54	5.87	5.65	4.23	4.65	5.98
5	BOD_3 at 27^{0}C	S	-	2.55	-	-	3.43	-	2.76
		SS		2.36			2.64		2.87
6	COD (mg/l)	S	-	18	-	-	36	-	17
		SS		25			24		16
7	Transparency (m)		3.65	3.54	3.54	4.65	5.76	2.22	4.91
8	Total Suspended Solids (mg/l)		-	54	-	-	97	-	76
9	Total Dissolved Solids (mg/l)		-	1197	-	-	1545	-	1540
10	Ammonia (µg-at/l)	S	2.43	2.85	2.54	4.54	2.65	4.85	5.66
		SS	2.54	2.76	3.54	3.65	2.16	4.54	4.86
11	Nitrite (µg-at/l)	S	0.78	0.65	0.65	0.35	0.43	0.12	0.19
		SS	0.76	0.43	0.95	0.26	0.35	0.26	0.15
12	Nitrate (µg-at/l)	S	2.10	1.32	0.95	1.87	1.84	1.33	0.54
		SS	2.32	1.43	1.54	1.68	2.25	1.94	1.84
13	Phosphate (µg-at/l)	S	0.98	0.75	1.98	0.76	0.86	0.92	0.76
		SS	1.20	1.85	0.65	0.50	0.76	0.67	0.76
14	Silicate (µg-at/l)	S	14.73	10.33	12.76	12.14	13.54	13.98	15.12
		SS	13.24	12.55	12.65	17.75	14.43	12.37	15.78
15	Oil and Grease (mg/l)	S	BDL	BDL	BDL	BDL	BDL	BDL	BDL

BDL: Below Detectable Level

Table 2. Phytoplankton diversity (no/m^3) and Biomass (mg/m^3) in the coastal waters off Padubidri during March, 2022

Sl. No.	Flora	Depth (m)		
		4	8	12
I	**Diatoms**			
1	*Asterionella*			
	a. *A. japonica*	1000	1400	1200
	b. Others	-	-	-
2	*Bacteriastrum*			
	a. *B. varians*	-	-	-
	b. Others	1200	1500	450
3	*Biddulphia*			
	a. *Biddulphiaregia*	1200	3500	1200
	b. *B.sinensis*	-	-	-
	c. *Biddulphiamobiliensis*	1200	4300	1200
	d. Others	-	-	-
4	*Cerataulina*			
	a. *C. perlagica*	100	100	200
	b. Others	5000	4300	4500
5	*Chaetoceros*			
	a. *C. lorenzianus*	-	-	-
	b. *C. decipiens*	1500	1200	4350
	c. *C. compressus*	-	1500	1600
	d. *C. curvisetus*	400	300	600
	e. Others	1540	1000	1200
6	*Coscinodiscus*			
	a. *C. oculus iridis*	2600	1500	1300
	b. *C. lineatus*	-	-	-
	c. *C. excentricus*	-	-	-
	d. Others	-	-	-
7	*Cyclotella*			
	a. *C. stelligera*	1200	4300	2000
	b. Others	-	-	-
8	*Dynobryonsetularia*	-	-	-
9	*Ditylum*			
	a. *D. brightwelli*	1500	6500	4800
	b. Others	-	-	-
10	*Eucamphia*			
	a. *E. zoodiacus*	-	-	-
	b. Others	-	-	-

11	*Fragillaria*			
	a. *F. oceanica*	1200	4300	1500
	b. Others	-	-	-
12	*Gyrosigma*			
	a. *G. balticum*	1500	2800	5400
	b. Others	-	-	-
13	*Lauderia*			
	a. *L. borealis*	-	-	-
	b. Others	-	-	-
14	*Leptocylindricus*			
	a. *L. danicus*	3200	1200	1000
	b. Others	2500	1300	5300
15	*Melosira*			
	a. *M. monilifornas*	3500	1000	3000
	b. Others	-	-	-
16	*Navicula*			
	a. *N. longa*	4300	6500	5400
	b. Others	-	-	-
17	*Nitzschia*			
	a. *N. closterium*	1500	1800	1200
	b. *N. striata*	1200	1000	800
	c. *N. longissima*	-	-	-
	d. Others	-	-	-
18	*Planktoniella*			
	a. *P. sol*	450	500	750
	b. Others	-	-	-
19	*Pleurosigma*			
	a. *P. normanii*	1500	5000	1800
	b. *P. elongatum*	2000	2800	1900
	c. Others	-	-	-
20	*Rhizosolenia*			
	a. *R. stolterfothii*	1200	2500	700
	b. *R. shrubsolei*	4300	5400	2600
	c. *R. stliformis*	3200	-	100
	d. Others	-	-	-
21	*Skeletonema*			
	a. *S. costatum*	-	-	-
	b. Others	800	4500	1200
22	*Staurastrum*sp.	300	4300	500
23	*Streptotheca*			
	a. *S. thamensis*	4300	1200	5400
	b. Others	1000	1300	1600
24	*Thalassiothrix*			
	a. *T. decipiens*	1200	800	750
	b. *T. longissima*	1250	1400	1200
	c. Others	-	-	-

25	*Triceratium*			
	a. *T. reticulate*	4300	3200	3100
	b. *T. favus*	800	200	430
	c. Others	-	-	-
26	*Diatoma*			
	a. Diatoma vulgare	1400	1200	800
27	Other diatoms	-	-	500
II	**Dinoflagellates**			
1	*Ceratium*			
	a. *C. macroceros*	1200	1800	2100
	b. *C. fusus*	1200	4300	500
	c. *C. longipes*	5400	8000	1200
	d. others	-	-	-
2	*Dinophysis*			
	a. *D. acuta*	4300	2600	1500
	b. Others	-	-	-
3	*Gymnodinium*			
	a. *G. splendens*	-	-	-
	b. *G. rhombodes*	-	-	-
	c. Others	-	-	-
4	*Ornithocerosmagnificus*	-	-	-
5	*Peridinium*			
	a. *P. depressum*	3400	1200	6200
	b. *P. divergens*	1500	3200	1100
	c. *P. granii*	-	-	-
	d. *P. excentricum*	-	-	-
	e. Others	3200	2190	1200
6	*Preperidinium*	-	-	-
7	*Noctiluca*			
	a. *N. Scintillans*	6700	3200	3400
	b. Others	-	-	-
III	**Blue green algae**	-	-	-
1	Blue Green Algae	-	-	-
Biomass [wet weight - mg/m^3]		**295.54**	**272.34**	**201.09**

-: Absent

Table 3. Zooplankton diversity (no/m^3) and Biomass (mg/m^3) in the coastal waters off Padubidri during March, 2022

Sl. No.	Fauna	Depth (m)		
		4	8	12
1	**Tintinids**			
	a. *Tintinopsis*sp.	1200	1400	3400
	b. *Rabdonella*sp.	-	-	-
	c. *Favella*sp.	-	-	-
2	**Radiolarians**	450	120	680
3	**Medusae**			
	a. *Obelia* sp.	1200	3200	5400
	b. *Octocostatum*sp.	320	200	450
	c. *Quadrata*sp.	-	-	-
4	**Siphonophores**			
	a. *Lensia* sp.	400	150	430
	b. *Diphysis*sp.	-	-	-
5	**Ctenophores**			
	a. *Plurobranchia* sp.	200	340	400
6	**Chaetognaths**			
	a.*Sagittaenflata*	500	540	600
	b. *Pterosagittadraco*	-	-	-
	c. *Krohnitta subtilis*	-	-	-
7	**Polychaetes**	250	100	300
8	**Cladocerans**			
	a. *Peniliaavirostris*	1100	2300	1600
	b. *Evadnaenordmanni*	1600	2600	1000
9	**Copepods**			
	a. *Calanusfinmarchicus*	1800	1200	2700
	b. *Tamoralongicornis*	1600	1100	1700
	c. *Parapontellabrevicornis*	1900	4300	5000
	d. *Oithonahelgolandica*	-	-	-
10	**Copepod nauplius**	1100	1200	1000
11	**Lucifer**	-	-	-
12	**Planktonic Urochordates**			
	a. *Frililliarias*p.	1900	1000	1200
	b. *Oikopleura*sp.	1200	1800	-
	c. *Doliolom*sp.	-	-	-
13	**Fish Eggs**	200	350	400
14	**Copepod egg**	1000	3500	600
15	**Echinoderm Larvae**	-	-	-
16	**Decapod Larvae**	100	200	500
17	**Bivalve Larvae**	50	300	500
18	**Fish Larvae**	-	-	-
19	**Polychaete Larvae**	-	-	-
20	**Chaetognath Larvae**	-	-	-
21	Others	-	-	-
Biomass [wet weight - mg/m^3]		**248.54**	**290.32**	**301.54**

Table 4. Macrobenthos diversity (no/m^2) in the coastal waters off Padubidri during March, 2022

Sl. No.	Fauna	Depth (m)		
		4	8	12
I	**Molluscs**			
A	**Bivalves**			
1	*Arca* sp.	50	100	90
2	*Anadora*sp.	-	-	-
3	Bivalve Spats	40	10	50
4	*Cardium* sp.	20	-	10
5	*Donax* sp.	80	100	350
6	*Katalysia*sp.	-	-	-
7	*Meritrix* sp.	-	-	-
8	*Perna sp*	-	-	-
9	*Modiolus*sp.	-	-	-
10	*Pecten sp.*	12	40	20
B	**Gastropods**			
1	*Babylonia* sp.	-	-	-
2	*Cavolinia*sp.	-	-	-
3	*Cerithedia*sp.	80	40	75
4	*Conus* sp.	12	60	54
5	*Oliva* sp.	-	-	-
6	*Patella* sp.	-	-	-
7	*Surcula* sp.	-	-	-
8	*Telescopium* sp.	12	32	10
9	*Trochus* sp.	-	20	-
10	*Turitella* sp.	20	30	50
11	*Umbonium* sp.	-	-	-
C	**Scaphopods**			

1	*Dentalium* sp.	50	20	80
D	**Other Molluscs**	-	-	-
II	**Echinodermata**			
1	*Astropecten* sp.	-	-	-
2	*Ophiocoma* sp.	10	30	45
3	*Holothuria*sp.	-	-	-
III	**Echiuroids**	-	-	-
IV	**Sipunculids**	-	-	-
V	**Polychaetes**	130	150	100
VI	**Coelenterates**	-	-	-
VII	**Miscellaneous**			
1	Crabs	-	-	-
2	Shrimps	-	-	-
3	Fishes	-	-	-
4	Mud tubes	70	40	50
5	Sand tubes	-	-	-
6	Egg Cases	35	12	24
Density (Individuals/m^2)		**635.00**	**521.00**	**440.00**

- : Absent

Table 5. Results of Bioassay experiment for the coastal waters off Padubidri during March, 2022

1.	Organism Used for the Test	: *Perna viridis* (Green mussel)
2.	Length of the Test Organism	: 3.96cms (Average)
3.	Weight of the Test Organism	: 1.24gms (Average)
4.	Test Medium	: Sea water collected from the vicinity of effluentfallout from UPCL, Padubidri
5.	Control	: Filtered sea water
6.	Container	: Glass aquarium of 20 ltr. capacity
7.	Number of Organisms	: 10 in each container
8.	Number of Experiments	: Two
9.	Duration of the Test	: 96 hrs.
10.	Methodology	: Static bioassay

EXPERIMENT

MEDIUM	HOUR / MORTALITY (%)			
	24	48	72	96
CONTROL	Nil	Nil	Nil	Nil
TEST MEDIUM	Nil	Nil	Nil	Nil

Result: No mortality

Inference:

The inferences drawn on the various physical, chemical and biological parameters for the month of March, 2022are given below.

The water temperature varied from 29.10^{0}C to 31.70^{0}C. The pHvalues ranged between 7.72 and 8.00. The salinity varied from 31.23psu to 32.54 psu. The dissolved oxygen (DO) varied between 4.23 mg/l and 5.87 mg/l. The biochemical oxygen demand (BOD_3) is an empirical biological test in which the water conditions such as temperature; dissolved oxygen and microbial flora play a decisive role. The BOD_3 values ranged from 2.36 mg/l to 3.43 mg/l in the study region. The COD values ranged between 16.00 mg/l and 36.00 mg/l. The total suspended solids (TSS) ranged between 54.0 mg/l and 97.0 mg/l and the total dissolved solids (TDS) ranged between 1197 mg/l and 1545 mg/l. The transparency values varied from 2.22 m to 5.76 m.

Nutrients play a vital role in the biogeochemical cycles in the marine environment. The concentrations of nitrite (NO_2-N) varied from 0.12 µg-at/l and 0.95µg-at/l, while nitrate (NO_3-N) varied between 0.54 µg-at/l and 2.32 µg-at/l, which are within the acceptable limits of coastal environment. Ammonia content (NH_3-N) varied between 2.16 µg-at/l and5.66. Inorganic phosphate (PO_4-P) was in the range of 0.50 µg-at/l and 1.85 µg-at/l. Silicate – Silicon (SiO_2-Si), one of the major nutrients for phytoplankton growth ranged between 10.33 and 17.75 µg-at/l in the coastal waters off Padubidri. The oil and grease content was below detectable limits.

Phytoplankton:

The relative abundance of various forms of phytoplankton is depicted inrespective Table.Phytoplankton's were dominant in the study area with 18 different genera with the abundance of*Laudaria,Ceratium*and *Biddulphia.* The phytoplankton species recorded in this area are common types occurring along the west coast of India. The biomass varied from 201.09mg/m^3 to 295.54mg/m^3.

Zooplankton:

The qualitative analyses revealed the presence of 15 different groups of zooplankton. Among zooplankton,Copepods, Cladocerans and Copepod nauplius were dominant. The biomass ranged from 248.54mg/m^3 to 301.54 mg/m^3.

Macrobenthos:

The qualitative analyses revealed the presence of 20 different groups of macrobenthos. Bivalve spats dominated the macrobenthos, followed byCoelenterates and*Meritrix*. Thedensity ranged from 440.00 no/m^2 to 635.00no/m^2.

Bioassay:

The bioassay studies indicated no mortality of mussels in the seawater samples collected from effluent discharge location in the Padubidri region.

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Annexure - 18

TEST WELL MONITORING: ***Annexure-XVIII***

Test Wells are installed in the Sea Water Pipe line fenced area and the monitoring is carried for the period from Oct 2021 to Mar 2022 is presented in the Table-1 to Table-6 as below:

The locations of test wells are:

S.NO	Name of the Location	Code	Source
1	Pipe line Corridor test well	PC-1	Test Well
2	Pipe line Corridor test well	PC-2	Test Well
3	Pipe line Corridor test well	PC-3	Test Well
4	Pipe line Corridor test well	PC-4	Test Well
5	Pipe line Corridor test well	PC-5	Test Well
6	Pipe line Corridor test well	PC-6	Test Well

Water Sample Analysis Parameters:

S.No	Parameters	S.No	Parameters
1	Color	16	Fluoride
2	pH	17	Phenolic Compounds
3	Odor	18	manganese
4	Taste	19	zinc
5	Turbidity	20	Arsenic
6	TDs	21	cyanide
7	Alkalinity	22	cadmium
8	Total Hardness as $CaCO_3$	23	chromium
9	Calcium as Ca	24	Aluminium
10	Magnesium	25	Selenium
11	Iron	26	Lead
12	Sulphate as SO_4	27	Mercury
13	Chloride	28	Nitrate nitrogen
14	Boron	29	E.coli
15	Residual Free Chlorine		

Table-1: Pipe line corridor test well (PC-1) for the period of Oct 2021 to Mar 2022

S.No	PARAMETERS	UNIT	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Min	Max	Average
1	Color	Hazen	5	15	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
2	pH	-	6.5 - 8.5	No Relaxation	6.92	6.87	6.90	6.83	6.83	6.59	6.59	6.92	6.82
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	0.4	BLQ	BLQ	BLQ	0.4	2.4	0.40	2.40	1.07
6	TDS	mg/l	500	2000	25.2	30.4	32	109.2	29.6	32	25.20	109.20	43.07
7	Alkalinity as $CaCO_3$	mg/l	200	600	8.5	5.7	4.08	38.95	8.26	7	4.08	38.95	12.08
8	Total Hardness	mg/l	200	600	4.2	8.3	16.8	64.99	12.8	5	4.20	64.99	18.68
9	Calcium as Ca	mg/l	75	200	BLQ	BLQ	3.36	19.53	3.41	1.2	1.20	19.53	6.88
10	Magnesium as Mg	mg/l	30	100	BLQ	BLQ	2.04	3.94	1.03	BLQ	1.03	3.94	2.34
11	Iron as Fe	mg/l	0.3	No relaxation	0.1	0.23	0.21	0.2	BLQ	0.27	0.10	0.27	0.20
12	Sulphate as SO_4	mg/l	200	400	BDL	8.4	9.28	30.38	BLQ	2.65	2.65	30.38	12.68
13	Chloride as Cl	mg/l	250	1000	12.6	8.4	12.45	35.72	12.65	11.87	8.40	35.72	15.62
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
20	Arsenic as As	mg/l	0.01	0.05	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3-N	mg/l	45	No relaxation	BLQ	BLQ	BLQ	BLQ	1.3	1.85	1.30	1.85	1.58
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

A- Agreeable; BDL– Below Limit of Quantification

Table-2: Pipe line corridor test well (PC-2) for the period of Oct 2021 to Mar 2022

S.No	PARAMETERS	UNIT	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Min	Max	Average
1	Color	Hazen	5	15	1.0	1.0	1.0	BLQ	BLQ	BLQ	1.00	1.00	1.00
2	pH	-	6.5 - 8.5	No Relaxation	6.83	6.84	6.74	6.88	6.75	6.95	6.74	6.95	6.83
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	3.2	BDL	0.9	1.0	1.1	2.5	0.90	3.20	1.74
6	TDS	mg/l	500	2000	190.4	33.6	116	120	28.4	34	28.40	190.40	87.07
7	Alkalinity as $CaCO_3$	mg/l	200	600	25.6	5.7	32.65	38.95	8.26	7.0	5.70	38.95	19.69
8	Total Hardness	mg/l	200	600	51.2	4.1	29.4	56.86	8.53	5.0	4.10	56.86	25.85
9	Calcium as Ca	mg/l	75	200	10.2	BLQ	6.73	13.02	BLQ	1.2	1.20	13.02	7.79
10	Magnesium as Mg	mg/l	30	100	6.2	BLQ	3.06	5.92	1.03	BLQ	1.03	6.20	4.05
11	Iron as Fe	mg/l	0.3	No relaxation	0.2	0.2	0.25	0.22	BLQ	0.25	0.20	0.25	0.22
12	Sulphate as SO_4	mg/l	200	400	30.8	9.2	35.83	33.81	BLQ	2.85	2.85	35.83	22.50
13	Chloride as Cl	mg/l	250	1000	38.7	10.5	29.06	33.62	12.65	11.87	10.50	38.70	22.73
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
20	Arsenic as As	mg/l	0.01	0.05	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3-N	mg/l	45	No relaxation	BLQ	1.02	BLQ	BLQ	1.4	1.98	1.02	1.98	1.47
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

A- Agreeable; BDL– Below Limit of Quantification

Table-3: Pipe line corridor test well (PC-3) for the period of Oct 2021 to Mar 2022

S.No	PARAMETERS	UNIT	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Min	Max	Average
1	Color	Hazen	5	15	1.0	1.0	1.0	2.0	BLQ	BLQ	1.00	2.00	1.25
2	pH	-	6.5 - 8.5	No Relaxation	6.93	6.80	6.81	6.79	6.89	6.95	6.79	6.95	6.86
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	1.2	3.7	0.8	3.2	0.3	2.5	0.30	3.70	1.95
6	TDS	mg/l	500	2000	150.8	120.8	118	120	180	82.1	82.10	180.0	128.62
7	Alkalinity as $CaCO_3$	mg/l	200	600	BLQ	22.8	32.65	73.12	70.24	15.0	15.00	73.12	42.76
8	Total Hardness	mg/l	200	600	34.1	29.0	29.4	69.05	81.09	75.0	29.00	81.09	52.94
9	Calcium as Ca	mg/l	75	200	6.8	6.6	6.73	13.02	13.68	16.03	6.60	16.03	10.48
10	Magnesium as Mg	mg/l	30	100	4.1	3.0	3.06	8.88	11.4	8.51	3.00	11.40	6.49
11	Iron as Fe	mg/l	0.3	No relaxation	0.24	0.16	0.22	0.23	0.20	0.28	0.16	0.28	0.22
12	Sulphate as SO_4	mg/l	200	400	0.33	30.8	28.84	30.37	35.63	39.45	0.33	39.45	27.57
13	Chloride as Cl	mg/l	250	1000	39.0	27.2	29.06	151.3	145.58	24.61	24.61	151.30	69.46
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	0.32	0.32	0.29	0.29	0.32	0.31
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BLQ	BLQ	0.62	0.14	BLQ	BLQ	0.14	0.62	0.38
20	Arsenic as As	mg/l	0.01	0.05	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3-N	mg/l	45	No relaxation	BLQ	BLQ	BLQ	1.2	3.9	4.15	1.20	4.15	3.08
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

A- Agreeable; BDL– Below Limit of Quantification

Table-4: Pipe line corridor test well (PC-4) for the period of Oct 2021 to Mar 2022

S.No	PARAMETERS	UNIT	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Min	Max	Average
1	Color	Hazen	5	15	1.0	1.0	BLQ	BLQ	BLQ	2.0	1.00	2.00	1.33
2	pH	-	6.5 - 8.5	No Relaxation	6.86	6.82	6.76	6.85	6.81	6.76	6.76	6.86	6.81
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	3.6	4.1	BLQ	BLQ	BLQ	2.1	2.10	4.10	3.27
6	TDS	mg/l	500	2000	62.8	120.8	32.0	101.2	32.4	22.01	22.01	120.80	61.87
7	Alkalinity as $CaCO_3$	mg/l	200	600	42.7	28.6	8.16	77.9	8.26	92.0	8.16	92.00	42.94
8	Total Hardness	mg/l	200	600	46.9	29.0	12.6	97.48	12.8	90.0	12.60	97.48	48.13
9	Calcium as Ca	mg/l	75	200	15.4	6.6	3.36	34.18	3.41	28.05	3.36	34.18	15.17
10	Magnesium as Mg	mg/l	30	100	2.0	3.0	BLQ	2.95	1.03	4.86	1.03	4.86	2.77
11	Iron as Fe	mg/l	0.3	No relaxation	0.13	0.24	0.22	0.25	0.05	0.27	0.05	0.27	0.19
12	Sulphate as SO_4	mg/l	200	400	6.4	33.8	9.25	27.04	BLQ	13.6	6.40	33.80	18.02
13	Chloride as Cl	mg/l	250	1000	12.6	25.1	14.53	12.6	10.54	12.87	10.54	25.10	14.71
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BDL	BDL	0.15	0.71	BLQ	BLQ	0.15	0.71	0.43
20	Arsenic as As	mg/l	0.01	0.05	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3-N	mg/l	45	No relaxation	BLQ	1.06	1.49	BLQ	1.52	1.2	1.06	1.52	1.32
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

A- Agreeable; BDL– Below Limit of Quantification

Table-5: Pipe line corridor test well (PC-5) for the period of Oct 2021 to Mar 2022

S.No	PARAMETERS	UNIT	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Min	Max	Average
1	Color	Hazen	5	15	BLQ	BLQ	1.0	BLQ	BLQ	BLQ	1.00	1.00	1.00
2	pH	-	6.5 - 8.5	No Relaxation	6.88	6.78	6.72	6.82	6.85	6.75	6.72	6.88	6.80
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	1.6	2.8	0.9	1.5	BLQ	2.7	0.90	2.80	1.90
6	TDS	mg/l	500	2000	66	170.8	91.2	240	172	78	66.00	240.00	136.33
7	Alkalinity as $CaCO_3$	mg/l	200	600	55.5	17.1	61.23	21.64	10	58	10.00	61.23	37.25
8	Total Hardness	mg/l	200	600	42.7	95.4	46.2	150.29	86	50	42.70	150.29	78.43
9	Calcium as Ca	mg/l	75	200	13.7	21.6	11.78	32.56	20.04	17.63	11.78	32.56	19.55
10	Magnesium as Mg	mg/l	30	100	2.0	10.0	4.08	16.77	8.74	1.46	1.46	16.77	7.18
11	Iron as Fe	mg/l	0.3	No relaxation	0.21	0.17	0.23	0.24	BLQ	0.27	0.17	0.27	0.22
12	Sulphate as SO_4	mg/l	200	400	BLQ	9.5	5.92	13.37	BLQ	5.82	5.82	13.37	8.65
13	Chloride as Cl	mg/l	250	1000	16.8	77.4	14.53	132.39	87.09	8.91	8.91	132.39	56.19
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BDL	0.93	0.35	BLQ	0.19	BLQ	0.19	0.93	0.49
20	Arsenic as As	mg/l	0.01	0.05	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3-N	mg/l	45	No relaxation	BLQ	1.17	BLQ	BLQ	BLQ	1.04	1.04	1.17	1.11
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

A- Agreeable; BDL– Below Limit of Quantification

Table-6: Pipe line corridor test well (PC-6) for the period of Oct 2021 to Mar 2022

S.No	PARAMETERS	UNIT	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Min	Max	Average
1	Color	Hazen	5	15	1.0	1.0	BLQ	BLQ	BLQ	BLQ	1.00	1.00	1.00
2	pH	-	6.5 - 8.5	No Relaxation	6.87	6.89	6.92	6.87	6.89	6.81	6.81	6.92	6.88
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	2.5	3.8	0.9	3.1	0.4	2.8	0.40	3.80	2.25
6	TDS	mg/l	500	2000	140.4	170	190	140	183	95.4	95.40	190.00	153.13
7	Alkalinity as $CaCO_3$	mg/l	200	600	12.8	17.1	20.41	20.29	15.0	15.0	12.80	20.41	16.77
8	Total Hardness	mg/l	200	600	64	83	88.3	80.29	27.0	97.2	27.00	97.20	73.30
9	Calcium as Ca	mg/l	75	200	13.7	18.3	30.3	29.3	30.08	14.63	13.70	30.30	22.72
10	Magnesium as Mg	mg/l	30	100	7.3	9.1	3.06	8.75	5.51	3.65	3.06	9.10	6.23
11	Iron as Fe	mg/l	0.3	No relaxation	0.23	0.18	0.24	0.24	0.06	0.27	0.06	0.27	0.20
12	Sulphate as SO_4	mg/l	200	400	5.8	6.0	7.93	10.48	BLQ	4.51	4.51	10.48	6.94
13	Chloride as Cl	mg/l	250	1000	39.3	75.3	89.26	78.29	89.0	12.38	12.38	89.26	63.92
14	Boron as B	mg/l	0.5	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Residual Free Chlorine	mg/l	0.2	1	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Fluoride as F	mg/l	1	1.5	BDL	BDL	BLQ	0.25	0.27	0.36	0.25	0.36	0.29
17	Phenolic Compounds	mg/l	0.001	0.002	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
18	Manganese as Mn	mg/l	0.1	0.3	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
19	Zinc as Zn	mg/l	5	15	BDL	0.61	0.53	0.25	0.20	0.16	0.16	0.61	0.35
20	Arsenic as As	mg/l	0.01	0.05	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
21	Cyanide as CN	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
22	Cadmium as Cd	mg/l	0.003	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
23	Chromium as Cr	mg/l	0.05	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
24	Aluminium	mg/l	0.03	0.2	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
25	Selenium as Se	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
26	Lead as Pb	mg/l	0.01	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
27	Mercury as Hg	mg/l	0.001	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
28	Nitrate as NO_3-N	mg/l	45	No relaxation	BLQ	BLQ	BLQ	BLQ	BLQ	1.23	1.23	1.23	1.23
29	E.Coli	MPN/ 100 ml	Should Not be Detectable		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

A- Agreeable; BDL– Below Limit of Quantification