SIX MONTHLY COMPLIANCE REPORT OF ENVIRONMENTAL CLEARANCE (EC)

1600 (2×800) MW THERMAL POWER PLANT

At

GODDA TALUKA, GODDA DISTRICT JHARKHAND

Submitted to:

Regional Office, East Central Zone
Ministry of Environment, Forests & Climate Change,
Central Pollution Control Board, New Delhi &
Jharkhand State Pollution Control Board, Ranchi

Submitted By:

Environment Management Department

Adani Power (Jharkhand) Limited

Motia, Patwa & Adjacent Villages,
Godda Taluka, Godda District
Jharkhand

PERIOD: October'2019 – March'2020

CONTENTS

Introduction

Adani Power (Jharkhand) Ltd. AP(J)L, a wholly owned company of Adani Power Limited, is developing 1600 (2x800) MW Coal-based Ultra Supercritical Thermal Power Plant at Village Motia, Patwa and adjacent villages of Godda & Poraiyahaat Blocks of Godda District in Jharkhand. The power plant is based on ultra-supercritical, energy efficient & environment friendly technology.

AP(J)L has been granted Environmental Clearances & Consent to Establish by Ministry of Environment & Forest and Jharkhand state Pollution Control Board and AP(J)L has also obtained all necessary statutory / mandatory clearance respectively.

India and Bangladesh desire to enhance traditional ties of friendship, through economic cooperation. Realizing the ever increasing demand of electricity for the socio-economic development and progress, the Government of India (GoI) and Government of Bangladesh (GoB) have signed a Memorandum of Understanding (MoU) on 11 January, 2010.

As provided in the MoU, GoB and GoI shall inter-alia undertake to encourage and facilitate joint co-operation between the parties in Power generation, transmission, energy efficiency and development of various types of renewable energy;

Accordingly, Adani Power Limited (APL) on 11.08.2015 signed a MoU with Bangladesh Power Development Board (BPDB), to develop a 2x800 MW thermal power plant on BOO basis in India and supply the entire power generated to Bangladesh Power Development Board (BPDB) through a dedicated Transmission Line.

Status of the Project:

AP(J)L has been granted Environment Clearances (EC) vide Letter no: J-13012/01/2016-IA.I (T) dated: 31.08.2017 and amendment in EC vide letter dated 03.09.2019 for change in source of water form Chir River to Ganga River. AP(J)L has also been granted amended in EC vide Letter no: J-13012/01/2016-IA. I (T) dated 27.02.2020 to incorporate sector specific Special Economic Zone for Power under Sl.No.7(c) of Schedule as mentioned in EIA Notification, 2006

ADANI POWER (JHARKHAND) LIMITED

Compliance Status of Environmental Clearance

1600 MW (2×800 MW) Godda Thermal Power Plant

Environment Clearance Letter no: J-13012/01/2016-IA.I (T) dated: 31.08.2017 & Its Subsequent Amendment Letter no. J-13012/01/2016-IA.I (T) dated 03.09.2019 and 27.02.2020.

Si. No.	Specific Conditions	Compliance Status
(i)	Total Ash and Sulphur content in the imported coal shall not exceed 25% and 0.5% respectively.	Noted & compliance assured during operation stage of plant.
(ii)	Land acquisition shall be carried out by the State Govt. in accordance with Santhal Pargana Tenancy Act, 1949, Right of Fair Compensation and Transparency in the Land Acquisition, Rehabilitation Act, 2013 and other prevailing laws. Documents in support of land acquisition after completion acquisition process shall be submitted to this Ministry as well as concerned Regional Office.	Complied. Land already acquired & Land possession documents has already been submitted along with Oct'17 to March'2018 compliance report. However, proposed land for thermal power project has been optimized and the same has been amended vide Environment clearance letter J-13012/01/2016-IA.I(T) dated 03.09.2019.
(iii)	As per the Revised Tariff Policy notified by Minister of Power vide dated 28.01.2016, project proponent shall explore the use of treated sewage water from the Sewage treatment plant of Municipality / local / similar organization located within 50 km radius of the proposed power project to minimize the water drawl from surface water bodies.	Compliance assured. There are no STPs of municipality/local bodies within 50 KM of the site.
(iv)	Compliance of EC conditions, E(P) Act 1986, Rules and MoEF&CC Notifications issued time to time shall be achieved by a qualified environment officer to be nominated by the Project Head of the company who shall be responsible for implementation and necessary compliance.	Compliance assured. We have established Environment Management Department with Senior Management at Corporate level as well as at site
(v)	MoEF&CC Notification S.O. 3305 (E) dated 07.12.2015 and subsequent notifications issued time to time shall be implemented with respect to specific water consumption, zero liquid discharge and revised emission standards. The PM, SO_2, NOx and Hg emissions shall not exceed 30 mg/Nm^3, 100 mg/Nm^3, 100 mg/Nm^3 and 0.03 mg/Nm^3 respectively. The specific water consumption exceed shall not exceed 2.5 m^3/MWh and zero wastewater discharge shall be achieved.	Compliance assured. High efficiency Electrostatic Precipitators (ESP) has been considered to meet revised emission standard of <30 mg/ Nm^3 for PM. FGD & SCR are proposed to meet revised standard of SOx & NOx Emission. TPP has been designed to meet the Specific Water consumption of less than 2.5 m^3/MWh

(vi)	MoEF&CC Notifications on Fly ash utilization S.O. 763(E) dated 14.09.1999, S.O. 979(E) dated 27.08.2003, S.O. 2804 (E) dated 3.11.2009, S.O. 254(E) dated 25.01.2016 and subsequent amendments shall be complied with.	Compliance assured once the project takes off. As per Fly Ash notification, Half yearly & Annual Ash generation and utilization will be submitted to MoEF&CC, CEA, CPCB & JSPCB during operational phase of the plant.
(vii)	Separate Environmental Clearance may be obtained for the proposed Township as applicable under EIA notification 2006.	Separate Environment Clearance has been granted by SEIAA, Jharkhand for Residential Township vide letter No. EC/SEIAA/2017-18/2070/2017/207 dated 31/08/2018.
(viii)	Solar rooftops shall be installed in the surrounding villages as part of CSR activities.	Noted. It is proposed to provide Solar lights in surrounding villages wherever feasible through Adani Foundation as part of CSR activity. CSR activities report are enclosed as **Annexure-II.**
(ix)	Skill mapping of the Project affected people (PAF) be carried out on a long-term basis for their livelihood generation. A report is to be submitted within 3 months to the Ministry from the date of issuance of environmental clearance.	Complied. Skill Mapping Report prepared by M/s Indian Institute of Social Welfare & Business Management (IISWBM) Kolkata has already been submitted along with Oct'17 to March'2018 compliance report. Skill Development Centres: Adani Skill Development Centre- ASDC, Godda Sakhsam Training Centres Motia, Rangania, Nayabad, Patwa, Sondiha, Basantpur, Sarba, Bahuriya and Dumariya village.
(x)	Modern methods of agriculture organic forming, compost / vermiculture making and utilization, drip/direct to root irrigation to be promoted in and around the Project area.	Being complied. A one-day Village level training program was organized at Panchayat Bhawan in Motia village with participation of 50 farmers of nearby villages on promotion of organic farming and vermicomposting. Adani Foundation supported farming communities by promoting production of organic manure by installation of Vermi-Compost Bag/Vermibed across the core and pipeline village. Adani Foundation supported 69 small and marginal farmers by providing vermi-bags and educates them about the concept of manure making process at their doorsteps. These prepared vermicompost will be helpful for their farm during Paddy cultivation in month of June – July. Please refer **Annexure- II.**
(xi)	While implementing CSR, • Women empowerment is important.	Being Complied. • SuPoshan and Saksham, two

	Therefore, proper skill based training/long term livelihood revenue generation be created for all of them. • Computer facilities may be provided in the school along with a trained computer teacher to inculcate computer skill among the youths. • Water supply provisions shall be made for all the bio-toilets under Swachh Bharat Abhiyan. • Preventive health programme may be preferred than the curative health programme such as nutrition development of small children and around the project.	programmes are under implementation to empower girls and women through improvisation of their health and nutrition intake as well as skill training to make women self-reliant economically. • Computer Learning Centers are operational in Motia, Rangania, Pathergama & sunderpahari villages. • We have constructed model bathrooms with soak pit in various villages towards creating awareness for cleanliness and hygiene by our program named "SWACCHAGRIH". • Curative health program being taken care under "SuPoshan" program. CSR progress report is enclosed as **Annexure – II**.
(xii)	Vision document specifying prospective plan for the site shall be formulated and submitted to the Regional Office of the Ministry within six months.	Complied. Vision document has already been submitted along with Oct'17 to March'2018 compliance report.
(xiii)	Harnessing solar power within the premises of the plant particularly at available roof tops shall be carried out and the status of implementation including actual generation of solar power shall be submitted along with half yearly monitoring report.	Noted. It is proposed to utilize the roof tops of buildings which are feasible for installation of solar panels.
(xiv)	A long term study of radio activity and heavy metals content on coal to be used shall be carried out through a reputed institute and results thereof analyzed every two year and reported along with monitoring reports. Thereafter mechanism for an in-built continuous monitoring for radio activity and heavy metals in coal and fly ash (including bottom ash) shall be put in place.	Noted. Radioactivity testing result/report of two Coal samples (testing done by Board of Radiation and Isotope technology, Mumbai) from the source area already submitted along with EIA report. Further, Radioactivity Test and Heavy Metal study report will be submitted during the plant operation. Technology not available for continuous monitoring. Periodic test report will be submitted during operational phase of the plant.
(xv)	Online continuous monitoring system for stack emission, ambient air and effluent shall be installed.	Noted & Compliance assured. AP(J)L has proposed to install Online Continuous Emission Monitoring System & Effluent monitoring system. The monitoring system will be installed before COD.
(xvi)	High Efficiency Electrostatic Precipitators (ESPs) shall be installed to ensure that a	Noted. High efficiency Electrostatic Precipitators

	particulate emission does not exceed 30 mg/Nm^3 as would be notified by the Ministry, whichever is stringent. 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 along with an environment friendly sludge disposal system.	(ESP) will be installed in each boiler to meet PM emission of less than 30 mg/Nm^3. Dust extraction system (Cyclone followed by bag filters) in coal crusher and coal transfer area (JNTs), rain gun type dust suppression system in coal yard and dry fog type dust suppression system in belt conveyor have been proposed.
(xvii)	Adequate dust extraction system such as cyclones / bag filters and water spray system in dusty areas in coal handling and ash handling points, transfer areas and other vulnerable dusty areas shall be provided.	Dust extraction system with Bag filter in Crusher House is proposed. Pneumatic ash handling system with bag filters for ash handling & water sprinkling system will be provided in Coal yard.
(xviii)	Monitoring of surface water quantity and quality shall be regularly conducted and records maintained shall be submitted to the Ministry regularly. Further, monitoring system shall be placed between the plant and drainage in the direction of flow of ground water and records maintained. Monitoring for heavy metals in ground water shall also be undertaken and results/findings submitted along with half yearly monitoring report.	Being Complied. Baseline data was collected during EIA study & Regular monitoring of Air, Water (surface & ground) is being carried out. Environmental parameters monitoring results submitted periodically to RO, MoEF&CC Ranchi, MS JSPCB, Ranchi & RO JSPCB, Dumka. Environment Monitoring reports are enclosed as **Annexure – I**
(xix)	A well designed rain water harvesting system shall be put in place within six months, which shall comprise of rain water collection from the built up and open area in the plant premises and detailed report kept of the quantity of water harvested every year and its use.	Rain Water Harvesting (RWH) study carried out along with EIA study and already submitted. RWH plan will be implemented along with project construction & operation phase.
(xx)	No water bodies including natural drainage system in the area shall be distributed due to activities associated with the setting up/operation of the power plant.	Noted & compliance assured. There are some first order streams, which will be altered. The drainage profile will be maintained from SE to NW direction along the natural drainage profile. There is an unlined (kachcha) canal passing through the site, which is diverted along the Project boundary without disturbing flow and natural drainage pattern.
(xxi)	Additional soil for leveling of the proposed site shall be generated within the sites (to the extent possible) so that natural drainage system of the area is protected and improved.	Noted & agreed. Being followed.
(xxii)	Fly ash shall be collected in dry form and storage facility (silos) shall be provided. Mercury and other heavy metals (As, Hg, Cr, Pb, etc.) shall be monitored in the bottom ash. No	Compliance assured during operational phase of the plant. Dry Ash collection, pneumatic conveying and storage are proposed for utilization.

	ash shall be disposed off in low lying area.	Unutilized ash will be disposed off in the ash dyke through HCSD.
(xxiii)	No mine void filling will be undertaken as an option for ash utilization without adequate lining of mine with suitable media such that no leachate shall take place at any point of time. In case, the option of mine void filling is to be adopted, prior detailed study of soil characteristics of the mine area shall be undertaken from an institute of repute and adequate clay lining shall be ascertained by the state pollution control board and implementation done in close co-ordinate with the State Pollution Control Board.	Noted & agreed. In case of mine void filling option undertaken during operational phase of the plant, detailed study from reputed institute shall be undertaken, adequate lining will be done and state Pollution Control Board will be consulted.
(xxiv)	Fugitive emission of fly ash (dry and wet) shall be controlled such that no agricultural or non-agricultural land is affected. Damage to any land shall be mitigated and suitable compensation provided with the local Panchayats.	Compliance assured To control fugitive emission, adequate water sprinkling arrangements will be made in fly ash area AP(J)L will provide suitable compensation, if any damage in future.
(xxv)	Green belt consisting of three tiers of plantation of native species all around plant and at least 50 m width shall be raised. Wherever 50 m width is not feasible a 20 m width shall be raised and adequate justification shall be submitted to the Ministry. Tree density shall not be less than 2500 per ha with survival rate not less than 80%.	Compliance assured. Green belt development / plantation is being developed along with project construction and efforts are being made to develop more greenery in & around the plant with survival rate of more than 80%.
(xxvi)	Green belt shall also be developed around the Ash Pond over and above the Green Belt around the plant boundary.	Noted and compliance assured.
(xxvii)	The project proponent shall formulate a well laid Corporate Environment Policy and identify and designate responsible officers at all levels of its hierarchy for ensuring adherence to the policy and compliance with the conditions stipulated in this clearance letter and other applicable environmental laws and regulations.	Corporate HSE policy is already in place & signed by the Chairman. IMS implementation & certification for the project will be implemented during plant operation.
(xxviii)	CSR schemes identified based on need assessment shall be implemented in consultation with the village Panchayat and the District Administration starting from the development of project itself. As part of CSR prior identification of local employable youth and eventual employment in the project after imparting relevant training shall be also undertaken. Company shall provide separate budget for community development activities	CSR activities are implemented in consultation and collaboration with the community & community leaders as well as District Administration. Regular community meetings are organized in all the villages to understand the issues of community. Social development activities have been carried out for Need Based families under the CSR activities by **Adani Foundation.**

	and income generating programmes.	Need Based Assessment Study and Development of CSR report has already been submitted along with Oct'17 to March'2018 compliance report. **CSR report is enclosed as Annexure- II.**
(xxix)	For proper and periodic monitoring of CSR activities, a CSR committee or a Social Audit committee or a suitable external agency shall be appointed. CSR activates shall be evaluated by an independent external agency. This evaluation shall be both concurrent and final.	Social development activities have been carried out for Need Based families under the CSR activities by **Adani Foundation.** Evaluation of CSR activities will be done during plant operation by external agency every three years. However, an Annual Audit Plan is in place in the company which is conducted at all the sites. An internal Audit team undertakes review of the systems, process and also verifies on ground implementation of CSR activities as well as the systems. CSR progress report is enclosed as **Annexure- II.**
S.N	**General Conditions:**	**Compliance Status**
(i)	The treated effluents conforming 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.	Noted. Plant layout has been designed with separate system for Storm Water drain and Effluent.
(ii)	A sewage treatment plant shall be provided (as applicable) and the treated sewage shall be used for raising greenbelt/plantation.	Compliance assured. Decentralized Sewage Treatment Plants are proposed & treated water will be reused suitably within the plant premises for green belt development. One STP of 10 KLD capacity is operational near Security Barrage. Treated water is being used for Green Belt Development.
(iii)	Adequate safety measures shall be provided in the plant area to check/minimize spontaneous fires in coal yard, especially during summer season. Copy of these measures with full details along with location plant layout shall be submitted to the Ministry as well as to the Regional Office of the Ministry.	Fire Safety Management Plan is prepared and being implemented. Fire Safety Management Plan already submitted with compliance report of October 2018 to March 2019.
(iv)	Storage facilities for auxiliary liquid fuel such as LDO/ 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	Noted. The LDO/HFO/LSHS will be properly stored in designated location & minimum risk area and Department of explosive will be consulted. Mock drills are being conducted periodically. DMP already submitted with compliance

	place due to storage of oil.	report of October 2018 to March 2019.
(v)	First aid and sanitation arrangements shall be made for the drivers and other contract workers during construction phase.	Being Complied. First aid facilities, drinking water facility, Sanitation facility, Waste water disposal, solid wastes management and primary health facilities are being ensured at site.
(vi)	Noise levels emanating from turbine shall be so controlled such that the noise in the work zone shall be limited to 85 dB(A) from source. 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 periodically examined to maintain audiometric record and for treatment for any hearing loss including shifting to non-noisy/less noisy areas.	Necessary action/prevention measures have been taken care off while designing to maintain noise levels within 85 dBA at source. High Noise areas are identified. The working personnel are being provided with appropriate Personnel Protective Equipment (PPE's). A complete medical check-up with audiometric test of workers & employees is being carried out prior their joining in the organization
(vii)	Regular monitoring of ambient air ground level concentration of SO_2, NOx, $PM_{2.5}$ and 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 limit, necessary control measures shall be provided immediately. The location of the monitoring stations and frequency of monitoring shall be decided in consultation with SPCB. Periodic reports shall be submitted to the regional office of this ministry. The data shall also be put on the website of the company.	Being Complied. Regular monitoring of Ambient Air ground level concentration of SO2, NOx, PM2.5 and PM10 and Hg is being carried out and monthly reports are being submitted to the MS, SEIAA & JSPCB Ranchi & RO JSPCB, Dumka. For selection of monitoring location and monitoring frequency intimation already submitted to the board. Monitoring frequencies are as below: - Ambient Air twice in a week, - Water quality, Noise once in Month and - Soil Quality once in a season. Periodic Environmental monitoring report is enclosed, Please refer **Annexure- I**. Data along with EC compliance report is uploaded on the company website.
(viii)	Utilization of 100 % Fly ash generated shall be made from 4^{th} year of operation. Status of implementation shall be reported to the regional office of the Ministry from time to time.	Noted. Ash utilization plan/schedule has been incorporated in the EIA report. Status of implementation will be reported to the Regional office, MoEF&CC regularly during plant operation.
(ix)	Provision shall be made for housing of the construction labour (as applicable) within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets. Mobile STPs, safe drinking water, medical health care, crèche etc. The housing	Required hutment, drinking water, Mobile Toilets. Mobile STPs, Safe Drinking Water & Medical health care facilities, Fuel for cooking and other infrastructure has been arranged on temporary basis. However, local manpower is preferred

	may be in the form of temporary structures to be removed after the construction of the project.	during Construction phase so there may be less necessity to build housing for the construction labour.
(x)	The project proponent shall advertise in at least two local newspapers widely circulated in the region around the project, one of which shall be in the vernacular language of the locality concerned within seven days from the date of this clearance letter, informing that the project has been accorded environmental clearance and copies of clearance letter are available with the State Pollution Control Board/Committee and may also be seen at Website of the Ministry of Environment and Forests at http://envfor.nic.in	Complied. Advertisement in 10 Local News Papers was published in Hindi & English. Copy of News Paper cutting already submitted along with Oct'17 to March'2018 compliance report.
(xi)	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 any, received while processing the proposal. The clearance letter shall also be put on the website of the Company by the proponent.	Complied. A copy of the Environment Clearance letter was provided to Panchayats, Zila Parisad and local Body. copy acknowledgement was submitted along with Oct'17 to March'2018 compliance report The clearance letter has been uploaded on the company website http://www.adanipower.com/
(xii)	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 pollutants levels namely SPM, RSPM ($PM_{2.5}$ & PM_{10}), SO2, NOx (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.	Being complied. Six monthly compliance status reports are being submitted to MoEF&CC, CPCB & JSPCB. Compliance status uploaded on Company's website. Digital display board will be installed at the main gate of the power plant, before COD of the power plant. However, Display board is already provided at main gate information on Ambient Air Quality is being displayed at main gate which is maintained and updated periodically. Environmental monitoring report is enclosed, as **Annexure- I.**
(xiii)	The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently shall also be put on the website of the company along with the status of compliance of environmental clearance	Noted. Environment statement will be submitted to JSPCB, after obtaining the Consent to Operate (CTO).

	conditions and shall also be sent to the respective Regional Offices of the Minister by e-mail.	
(xiv)	The project proponent shall submit six monthly reports on the status of the implementation of the stipulated environmental safeguards to the Ministry of Environment and Forests, its Regional Office, Central Pollution Control Board and State Pollution Control Board. The project: proponent shall upload the status of compliance of the environment of the environmental clearance conditions on their website and update the same periodically and simultaneously send the same by e-mail to the Regional Office, Ministry of Environment and Forests.	Six monthly compliance status reports are regularly submitted to MoEF&CC, CPCB & JSPCB. The same is sent by email also. Last six monthly compliance report for the period of April'19 to Sep'19 submitted to your good office vide our letter no. APL/APJL/EMD/EC/MoEF/171/11/19 dated 29.11.2019. Compliance status updated on Company's website. http://www.adanipower.com/
(xv)	The progress of the project shall be submitted to CEA on six monthly basis.	Report Submission to CEA is not applicable as Project is dedicated to Bangladesh Govt. and it is not connected to Indian Grid.
(xvi)	Regional Office of the MoEF&CC 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 reference during monitoring. Criteria pollutants levels including NO_x (from stack & ambient air) shall be displayed at the main gate of the power plant.	Noted. Copies of Environment Impact Assessment report (EIA) with Environment Management Plan already sent to Regional Office, Ranchi, vide our letter no. APJL/ENV/EC/SMR/175 /05/2018, dated 14.05.2018 Digital display board will be installed at the main gate of the power plant, before COD of the power plant. However, Display board is already provided at main gate information on Ambient Air Quality is being displayed at main gate which is maintained and updated periodically.
(xvii)	Separate funds shall be allocated for implementation of environmental protection measures along with item-wise break-up. These cost shall be included as part of the project cost. The funds earmarked for the environment protection measures shall not be diverted for other purposes and year-wise expenditure should be reported to the Ministry.	Separate budget has already been allocated for Environmental protection measures. Fund for Environment management: Capital Cost: Rs. 2,225.68 Crores
(xviii)	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	Financial Closure has been achieved and disclosed. Construction work for Site development, Boundary wall, Site office, Stores and other facilities started. Main Plant area Civil works

	development work and commissioning of plant.	already started. Commissioning of the Plant was expected by May'2022, however due to current pandemic scenario of COVID 19 it may get delayed.
(xix)	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 compliance of environmental status.	Noted. Full co-operation shall be extended all time.
Conditions of EC Amendment		
(i)	Stage-I Forest Clearance for diversion of 13.3293 ha for laying pipeline shall be submitted. As per Ministry's guidelines, a formal amendment will be issued after furnishing the Stage-I Clearance.	Stage-I Forest Clearance has already been submitted to MoEF&CC vide letter no. AP(J)L/ENV/EC/Amnd/682/19 dated 29.06.2019 Copy of the same submitted vide our last compliance report for the period of April'19 to Sep'19. Stage I Compliance report is enclosed as **Annexure-III.**
(ii)	In line with Ministry's OM dated 11.3.2010 in regard to Oil and Gas pipelines, in a similar manner, 10 trees to be planted for every tree cut in the non-forest area.	Noted. As per OM dated 11.03.2010, 10 trees will be planted along the pipeline route in non-forest area in consultation with the respective Local DFO(s). Compliance report of Stage-1 Forest clearance which is uploaded to https://parivesh.nic.in/
(iii)	There will be storage reservoirs for storing 15 MCM water to cater during lean season.	Noted & agreed Compliance assured.
(iv)	Daily quantity (Average, minimum and maximum) of fresh water withdrawn from Ganga River near Sahebganj for the Power Plant shall be recorded and data base be preserved to ensure permissible drawl of fresh water from Ganga River. The source sustainability reports for withdrawal of water from Chir River and from the Ganga River shall be placed in the public domain by the proponent, either by uploading to the PARIVESH portal or its own website.	Noted & Agreed. Compliance assured once the project takes off. Source sustainability reports for withdrawal of water from Chir River and from the Ganga River has been uploaded and is already available on https://parivesh.nic.in/
(v)	As per the original EC, 33% greenbelt of plant area shall be developed. In case of any shortage of land, additional land shall be acquired to meet the condition.	Noted. Green belt development / plantation are being developed along with project construction & will be done during operation phase also. Efforts will be made to develop more greenery in & around the plant with survival rate of more than 80%.
(vi)	The conditions specified in the In-Principle	Compliance of conditions mentioned in the

	(Stage-I) Forest Clearance dated 28.6.2019 shall be complied with. A compliance to these conditions shall also be submitted along with Six monthly compliance report. Further, copy of Formal (Stage-II) Approval shall be submitted as and when it is obtained.	In-Principle approval (Stage-I) Forest Clearance dated 28.06.2019 has been uploaded on https://parivesh.nic.in/ Compliance report of Stage I Forest Clearance is enclosed **as Annexure III**
(vii)	The total project area has now been reduced to 558 acres from 1255 acres. The remaining area (if acquired) shall be developed as greenbelt.	Noted, Compliance assured. Power Plant Facilities have been reworked and total project area has now been optimized to 558 acres from 1255 acres.
(viii)	All the conditions prescribed in the permission granted by National Mission for Clean Ganga (NMCG), Ministry of Water Resources, River Development & Ganga Rejuvenation vide their letters dated 8.8.2018 and 16.11.2018 for withdrawal of 36 MCM of water from River Ganga during June to December, shall be complied with.	Noted and will be complied.
Additional Conditions (EC Amendment)		
(i)	The area of 7.7 acres (Originally proposed: 558 acres & Notified SEZ land: 550.23 acres) shall be developed with greenbelt. Demarcation of this land with co-ordinates and progress of greenbelt is to be submitted in the compliance report,	Noted & agreed. Green belt development / plantation are being developed and efforts are being made to develop more greenery in & around the plant with survival rate of more than 80%.
(ii)	In para 5 of amended EC dated 3.9.2019, the period of '6 months' be read as '07 months'	Noted.

Annexure I

ADANI POWER (JHARKHAND) LTD.

2*800 MW Godda Thermal Power Project

Village: Motia, Dist: Godda, Jharkhand

ENVIRONMENTAL MONITORING REPORT
PERIOD: OCTOBER'19 – DECEMBER'19

Go Green Mechanisms Pvt. Ltd.

Head Office & Lab: Dayal Estate, National Highway No. 8, Opp. APMC Market Gate – 1, Jetalpur, Ahmedabad – 382426

Contact: 7069072001/02

Email: lab@gogreenmechanisms.com

REPORT TITLE

COMPANY NAME:	**Adani Power (Jharkhand) Ltd.**
SITE LOCATION:	2*800 MW Godda Thermal Power Plant Village: Motia, Dist: Godda, Jharkhand
BASELINE PERIOD:	Oct'19 to Dec'19
REPORT DATE:	03.03.2020
ORIGINATED BY:	Environmental Monitoring and Analytical Team Go Green Mechanisms Pvt. Ltd.
REVIEWED BY:	Amit Badlani Director, Go Green Mechanisms Pvt. Ltd.
PREPARED BY:	Go Green Mechanisms Pvt. Ltd (GGMPL) Dayal Estate, Opp AMPC Market Gate No.1, Jetalpur-382426 Ahmedabad

TABLE OF CONTENT

LIST OF GRAPH

LIST OF FIGURE

SECTION 1: FOREWORD

The protection of environment plays a crucial role in maintain the local environment quality for any industry, throughout their production. Hence compliance of the statutory requirements becomes very important to conserve the ecological balance within and surrounding the plant area. Therefore, environment protection is becoming a prerequisite for sustainable development. In line with this requirement, the management of Adani Power (Jharkhand) Ltd. has adopted a corporate responsibility of development and top priority is given for environment protection.

In order to comply with the Environment protection act, to fulfil statutory requirement and to be in tune with Environmental Preservation and sustainable development Adani Power (Jharkhand) Ltd., has retained M/S. Go Green Mechanisms Pvt. Ltd. As Environment Consultants and for various Environmental issues related to their Power Plant.

Environmental Quality Monitoring Report for the Month October'19 to December'19 has been collected.

We are thankful to Adani Power (Jharkhand) Ltd. for the opportunity provided to be associated in this endeavour.

SECTION 2: LIST OF EQUIPMENTS

The list of Equipments used in the project is delineated in the following table.

Sr. No.	Name of Equipments	Make/Model
1	Respirable Dust Sampler	Ecotech Instruments / AAS 217BL
2	$PM_{2.5}$ Sampler	Ecotech Instruments & Eonair Technologies/AAS 127 & AQS 235
3	Gaseous Attachment with RDS	Ecotech Instruments / AAS 217BL
4	Sound Level Meter	Hemsun / HDB 2202
5	Weather Monitoring Station	Ambient Weather Station
6	Weighing Balance	Shimadzu /AUW220D
7	UV Visible Spectrophotometer	Systronics
8	Hot Air Oven	Patel Scientific Instruments
9	Filtration Assembly	Labline
10	Water Analysis Kit	Systronics
11	Bacteriological Incubator	Labline
12	Centi-micro Balance	Shimadzu /ATX224
13	Dissolved Oxygen Test Kit	Lutron
14	Autoclave	Patel Scientific Instruments
15	Laminar Air Flow	Labline
16	Muffle Furnace	Patel Scientific Instruments
17	Flame Photometer	Systronics /128
18	Digital colony counter	Labline
19	Microscope	Patel Scientific Instruments
20	Orbital Shaker	Labline
21	Centrifuge	Bio Lab
22	Simple Distillation Assembly	Labline
23	ICP-OES/AES	Thermo Fisher Scientific /iCAP 7400 SERIES
24	AAS	Thermo Fisher Scientific / AA 303
25	Ion Chromatography	Metrohm Herisau / 1.925.0020

SECTION 3: LIST OF PROJECT PERSONNEL

Sr. No.	Name	Qualification	Experience (Yrs)	Designation
1.	Amit Badlani	B.E. (Chemical) M.S.(Energy & Environmental Technology) M.S. (Pollution Control)	15 Yrs	Managing Director
2.	R.K.Pandey	B.Sc. Biology	15 Yrs	Project In-charge
3.	Payal Patel	M Sc. (Env. Sci.)	04 Yrs	Lab Manager
4.	Satyam Kumar	M Sc. (Env. Mgmt)	03 Yrs	Technical Manager
5.	Yash Goswami	Dip. Env. Engineer	10 Yrs	Field Operation - Manger
6.	Tantan Kumar	M Sc. (Env. Mgmt)	03 Yrs	Lab Chemist
7.	Pooja Parekh	B.Sc. (Microbiology) & DMLT	05 Month	Lab Chemist
8.	Chandan Kumar	B.Sc. Chemistry	05 Month	Field Assistant

For Go Green Mechanisms Pvt. Ltd.

Amit Badlani
Managing Director

SECTION 4: EXECUTIVE SUMMARY

Adani Power (Jharkhand) Limited has undertaken the task of preparing EMP report for its 1600 (2x800) MW Godda Thermal Power Plant & Residential Township which is within the premises of TPP.

M/s. Go Green Mechanisms Private Limited, got the opportunity to prepare the Environmetal monitoring Data on the basis of actual field monitoring with respect to Group I Parameters i.e. Air, Water, Soil, Noise & Meteorological on behalf of HTG Engineering Pvt. Ltd.

A Meteorological station was set up on the terrace of "Hostel Block" & Micrometeorological parameters like Ambient Temperature, Relative Humidity, Wind direction, Wind Speed, Rain fall & Barometric Pressure etc were recorded on hourly basis during the study period.

On the basis of wind direction pattern, the three locations of AAQM were selected. The concentration of gaseous pollutants, $PM_{2.5}$ were sampled and analysed for compliance to GSR 826(E) vide Notification Dated 16/11/2009.

Four numbers of Ground water samples were collected to understand the overall water quality of the project area. The water parameters were sampled and analysed to check for compliance to the specifications of (IS 10500:2012 & I 2296:1982 Inland surface water Class C).

The noise level was monitored at 06 locations on Day & Night time basis, monthly as per IS 9989: RA 2001.

The main aim of the soil testing is to assess the soil quality of the area to define the present status of soil. It helps in the assessment of impact if any, due to the project activities and selection of suitable species of plants for green belt development at the project area as it works as an anti-pollution tools.

SECTION 5: CONCEPTS & METHODOLOGY

5.1 METHODOLOGY

In the present study the following are the standard methods used for collection, analysis & interpretation of data:

AAQM Sampling & analysis: "Indian Standards (IS 5182)", "Guidelines for the measurement of Ambient Air Pollutants, Vol-I, CPCB" & "USEPA" methods were used for Ambient Air sampling and analysis to study the present pollution load around the Proposed Project location.

Parameters of AAQM	Standard Methods	Analytical Instruments
PM_{10}	IS 5182 (P-23):2006	Weighing Balance
$PM_{2.5}$	GGMPL/SOP/AA/60	Weighing Balance
Oxides of Nitrogen(NOx)	IS 5182 (P-6):2006	Spectrophotometer
Oxides of Sulphur(SO_2)	IS 5182 (P-2):2001	Spectrophotometer
Mercury	317 B James Edition	ICP OES/AES /AAS (Hydride Generator)

Water Sampling & analysis: Similarly "Indian Standards (IS 3025)", "USEPA" and "APHA 23rd Edition were used for water sample collection and analysis.

Parameters of Water Samples	Standard Methods	Analytical Instruments
Taste	IS 3025 (Pt 08): RA 2006	-
Turbidity	APHA 23rd Edn 2017 2130 B	Turbidity Meter
Total Dissolve Solid	APHA 23rd Edn 2017 2540 C	Hot air Oven
Boron(B)	APHA 23rd Edn 2017 4500 B C	Spectrophotometer
Calcium(Ca)	APHA 23rd Edn 2017 3500 Ca B	-
Chloride(Cl)	IS 3025 (Pt 32): RA 2007	-
Fluoride(F)	APHA 23rd Edn 2017 4500 F D	Spectrophotometer
Residual Chlorine	APHA 23rd Edn 2017 4500 Cl B	
Nitrate (NO_3)	IS 3025 (Pt 34): RA 2017	Spectrophotometer
Phenolic Compounds	IS 3025 (Pt 43): RA 2003	Spectrophotometer
Sulphate (SO_4)	APHA 23rd Edn 2017 4500 SO_4 E	Spectrophotometer
Total hardness ($CaCO_3$)	APHA 23rd Edn 2017 2340 C	-
Cyanide (CN)	APHA 23rd Edn 2017 4500 CN C ,E	Spectrophotometer/ Ion Chromatography
Selenium (Se)	IS 3025 (Pt 56): 2003	
pH	IS 3025 (Pt 11): RA 2006	pH Meter
Colour	IS 3025 (Pt 04): RA 2017	
Odour	IS 3025 (Pt 05): RA 2006	-
Alkalinity	APHA 23rd Edn 2017 2320 B	-
Temperature	APHA 23rd Edn 2017 2550 B	-
Magnesium (Mg)	APHA 23rd Edn 2017 3500 Mg B	ICP OES/AES /AAS
Copper (Cu)	APHA 23rd Edn 2017 3111 B	ICP OES/AES /AAS

Iron (Fe)	APHA 23rd Edn 2017 3500 Fe B	ICP OES/AES /AAS
Manganese (Mn)	APHA 23rd Edn 2017 3111 B	ICP OES/AES /AAS
Mercury (Hg)	APHA 23rd Edn 2017 3112 B	ICP OES/AES /AAS (Hydride Generator)
Lead (Pb)	APHA 23rd Edn 2017 3111 B	ICP OES/AES /AAS
Arsenic (As)	APHA 23rd Edn 2017 3111 B	ICP OES/AES /AAS (Hydride Generator)
Cadmium (Cd)	APHA 23rd Edn 2017 3111 B	ICP OES/AES /AAS
Zinc (Zn)	APHA 23rd Edn 2017 3111 B	ICP OES/AES /AAS
Hexavalent Chromium	APHA 23rd Edn 2017 3500 Cr B	Spectrophotometer
Detergent	Annex K of IS 13428	Gas Stripping apparatus/ Spectrophotometer
Aluminum	IS 3025 (Pt 55): RA 2009	ICP OES/AES /AAS
E. Coli	IS 1622-1981: RA 2009	Bacteriological incubater/ Autoclave/ Laminar flow
Total Coliform	IS 1622: RA 2009	Bacteriological incubater/ Autoclave/ Laminar flow

Noise Level Monitoring: "Protocol for Ambient Level Noise Monitoring, IS 9989: RA 2001" was followed to monitor the Ambient Noise level surrounding the Project Site.

Parameters	Standard Methods	Analytical Instruments
Leq	IS 9989: RA 2001	Noise Level Meter

Weather Monitoring: "EPA-454/R-99-005, February 2000" was followed for micro-meteorological data collection result interpretation.

Parameters	Standard Methods	Analytical Instruments	Make/Model
Air Temperature	EPA-454/R-99-005	Digital sensor	Ambient Weather Station
Relative Humidity	EPA-454/R-99-005	Digital Sensor(Hygrometer)	
Wind Speed	EPA-454/R-99-005	3 Cup anemometer	
Wind Direction	EPA-454/R-99-005	Hall Effect (Wind Vane)	
Rain Fall	EPA-454/R-99-005	Tipping Bucket	

Soil sampling & analysis: "Indian Standard Method of Test for Soils (IS: 2720, IS: 14767 and IS: 5949)" were followed for soil sample collection, sample conditioning and analysis of physical chemical parameters. Hand boring method using spiral Auger was used for collection of soil samples.

Parameters	Standard Methods	Analytical Instruments
Magnesium	IS 5949:2003	ICP OES/AES
Calcium	IS 5949:2003	ICP OES/AES
Manganese	EPA 200.8	ICP OES/AES
Boron	EPA 200.2:1994/EPA2008: 1994	ICP OES/AES
Copper	EPA 200.8	ICP OES/AES

Sulphur	IS 14685	ICP OES/AES
Chloride	GGMPL/SOP/SOIL/45	ICP OES/AES
Zinc	EPA 200.8	ICP OES/AES
Nitrogen	IS 14684: 2005	ICP OES/AES
Phosphorous	GGMPL/SOP/SOIL/44	ICP OES/AES
Potassium	GGMPL/SOP/SOIL/47	ICP OES/AES
Iron	EPA 200.8	ICP OES/AES
Molybdenum	EPA 200.8	ICP OES/AES

A brief account of the methodologies and matrices followed in the present study is given under different headings. All the methods were structured for the identification, collection and organization of environmental impacts data. The information, thus gathered, had been analyzed and presented in the form of a number of visual formats for easy interpretation and decision making.

SECTION 6: PLAN FOR SAMPLING LOCATIONS

Site selection criteria play an important role in the initiation of "baseline data generation" as it provides an outlook on the type of environmental compliance and management to be adopted by the project proponent. The locations were selected on the basis of "joint site survey", "examination of toposheet of the project area", "secondary micro-meteorological data analysis" and "availability of resources" for ambient air quality monitoring & micro-meteorological monitoring.

A synopsis about the locations is as follows:

AAQM Locations	
Code	**Name of Location**
L1	Near Motia Village
L2	Near Mali Village
L3	Near Nayabad Village

Met Data Station	
Code	**Name of Location**
M1	Hostel Block

Water Samples	
Code	**Name of Location**
G/W-1	Motia Village
G/W-2	Mali Village
G/W-3	Nayabad Village
G/W-4	Patwa Village

Noise Monitoring Locations	
Code	**Name of Location**
L1	Near Motia Village
L2	Near Mali Village
L3	Near Nayabad Village
L4	Near Patwa Village
L5	Near HTG Residential Area
L6	Near Adani Office

Soil Samples	
Code	**Name of Location**
S-1	Near Mali Village
S-2	Near Nayabad Village
S-3	Near Patwa Village

SECTION 7: METEOROLOGICAL DATA

Weather monitoring would help in keeping track of different parameters like temperature, humidity, rainfall, wind direction, wind speed & barometric pressure. Real time meteorological data is used to support a number of programs including public aviation, agricultural activity, digester management etc.

In the present study we monitored the "ambient temperature, relative humidity, wind speed, wind direction, barometric pressure etc.

Figure 1: Weather Monitoring Station at Hostel Block

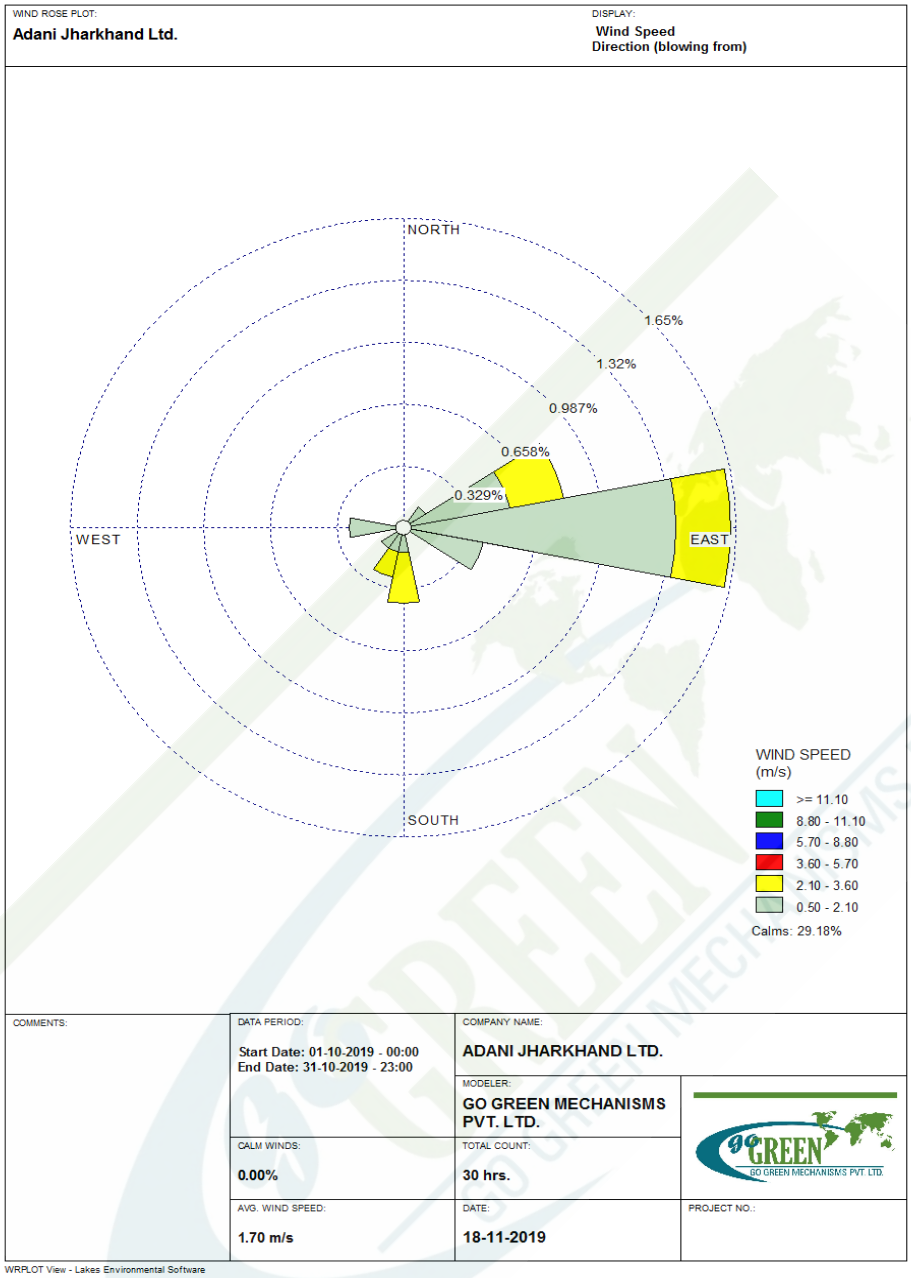


Figure 2: Windrose diagram for the month of October - 2019

It is observed from the windrose diagram for the month of October'19 the predominant wind direction is East.

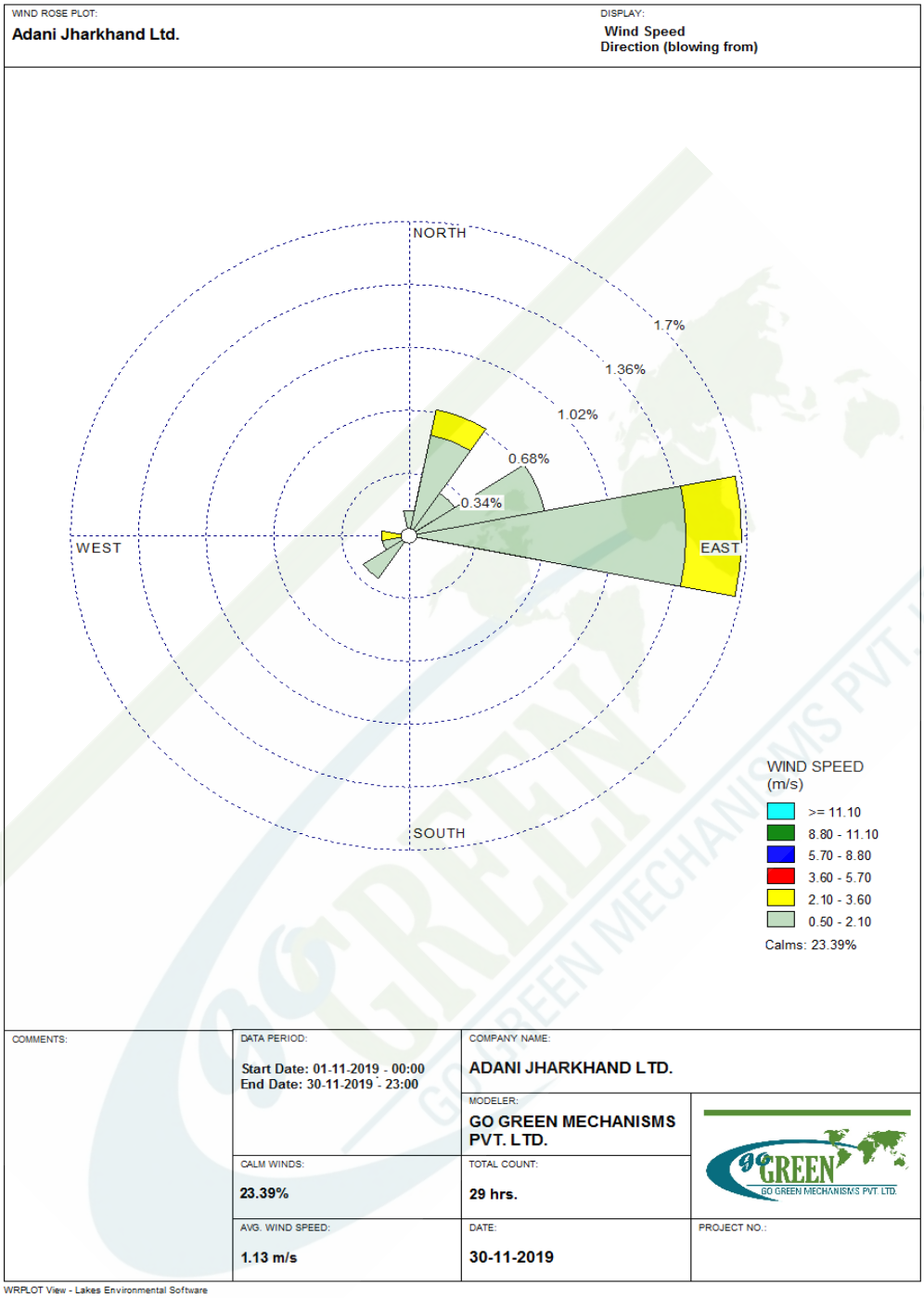


Figure 3: Windrose diagram for the month of November - 2019

It is observed from the windrose diagram for the month of November'19 the predominant wind direction is East.

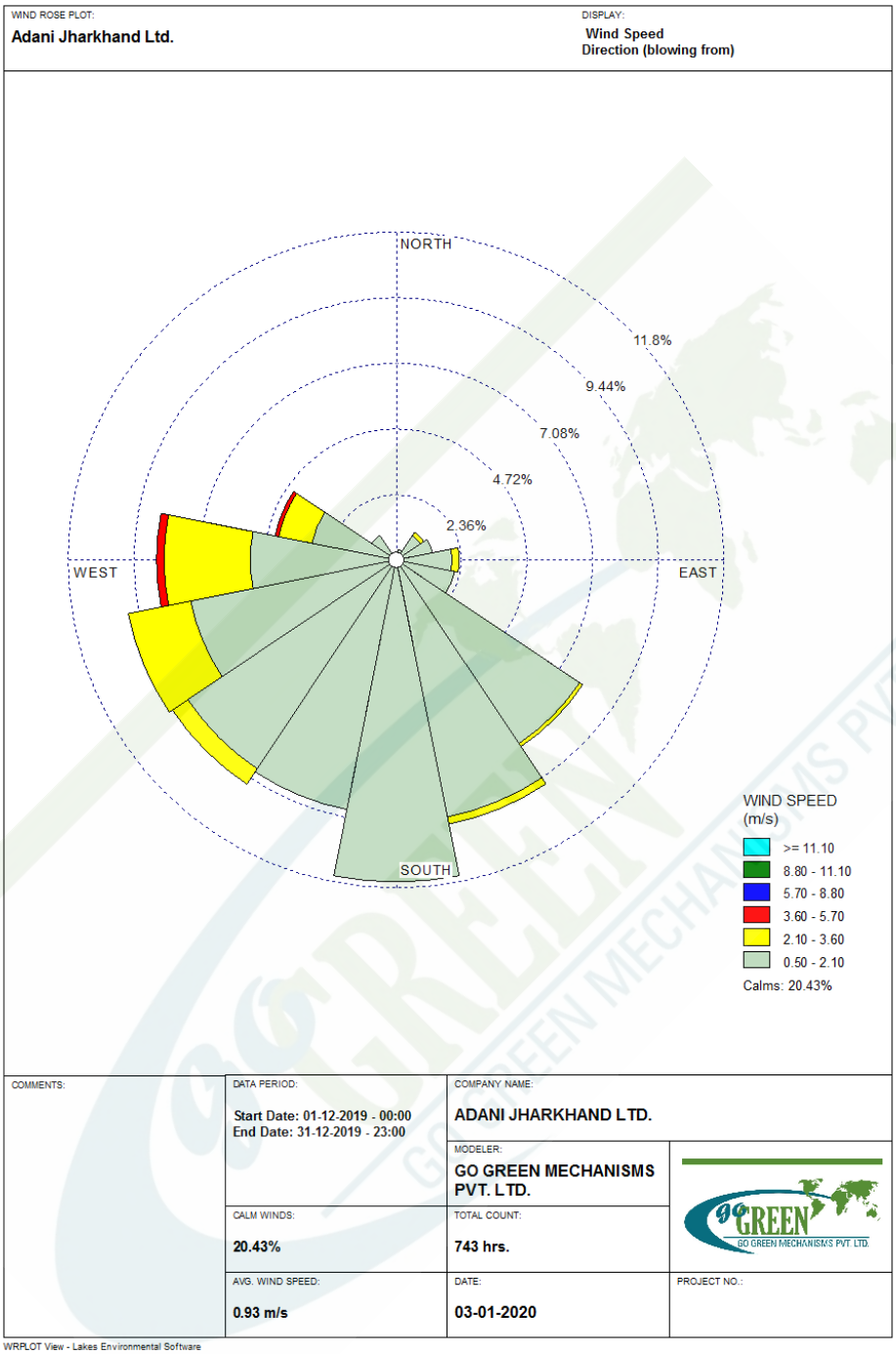


Figure 4: Windrose diagram for the month of December - 2019

It is observed from the windrose diagram for the month of December'19 the predominant wind direction is South.

METEOROLOGICAL OBSERVATIONS DATA AT ADANI POWER JHARKHAND LTD. GODDA

LOCATION: Hostel Block

Month: October-2019

Date	Temperature (Deg C)			Relative Humidity (%)			Wind Speed (M/Sec)			Atmospheric Pressure (mbar)			Rainfall (mm)
	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	Total
01-10-2019	20.0	25	22.6	52	93	74	0.0	1.2	0.5	995	1004	999	0.0
02-10-2019	22.3	27.3	24.8	43	83	65	0.1	1.9	0.9	996	1002	1000	0.0
03-10-2019	21.0	29.2	25.9	45	80	62	0.1	1.8	0.8	996	1001	998	0.0
04-10-2019	20.5	29.5	26.4	41	85	66	0.3	2.2	1.1	996	1005	1000	0.0
05-10-2019	22.9	29.8	25.3	48	83	65	0.2	2.1	1.0	995	997	996	0.0
06-10-2019	23.7	29	25.4	52	86	68	0.1	1.8	0.9	994	996	995	0.0
07-10-2019	22.6	28	24.9	51	89	69	0.0	1.4	0.8	998	1002	1000	0.0
08-10-2019	19.5	25.5	21.6	63	91	75	0.0	1.9	1.1	996	998	997	0.0
09-10-2019	19.0	25.8	21.4	68	89	77	0.0	1.8	1.0	1000	1005	1002	0.0
10-10-2019	20.1	27.8	23.8	56	82	70	0.1	1.5	0.9	999	1001	1000	0.0
11-10-2019	23.6	28	26.2	43	86	65	0.1	1.6	1.1	999	1003	1001	0.0
12-10-2019	24.7	29	26.8	40	81	59	0.2	1.3	1.0	998	1002	1000	0.0
13-10-2019	22.9	28	26.7	38	79	58	0.2	1.2	0.9	1000	1004	1001	0.0
14-10-2019	21.9	27.5	23.3	44	80	61	0.2	1.1	0.6	997	1001	998	0.0
15-10-2019	22.6	28.8	24.8	49	77	62	0.4	1.4	0.7	994	997	996	0.0
16-10-2019	23.7	29	24.9	51	81	65	0	1.2	0.5	992	996	993	0.0
17-10-2019	22.4	28.7	24.6	47	82	66	0	1.8	0.7	994	999	996	0.0
18-10-2019	26.8	31.4	27.9	34	81	58	0	2.2	1.2	996	1001	998	0.0
19-10-2019	25.1	29	25.6	38	82	59	0.1	2.3	1.5	1001	1004	1002	0.0
20-10-2019	24.5	28	26.8	40	82	62	0.2	1.6	1.1	995	997	996	0.0
21-10-2019	26.7	30	28.9	33	84	59	0.1	1.1	0.7	997	1002	998	0.0
22-10-2019	25.8	31	27.4	37	84	62	0.1	1.8	0.9	998	1004	1002	0.0
23-10-2019	22.4	27	24.6	42	78	63	0	1.2	0.9	996	1001	998	0.0
24-10-2019	23.6	30	25.8	40	87	64	0	1.3	1.0	998	1003	1000	0.0
25-10-2019	20.1	21	22.6	53	92	74	0	2.1	1.4	997	1002	999	0.0
26-10-2019	19.4	23.3	21.7	58	86	75	0	2.6	1.1	994	996	995	0.0
27-10-2019	19.8	24.8	22.0	56	85	70	0	2.4	1.4	994	997	995	0.0
28-10-2019	20.3	23.4	22.1	48	81	64	0	0.9	0.6	996	1002	1000	0.0
29-10-2019	20.4	26.3	23.4	46	82	63	0.1	1.2	0.8	997	1003	1000	0.0
30-10-2019	22.9	26.5	23.9	41	82	60	0.3	1.9	1.4	996	1002	1000	0.0
31-10-2019	21.3	25.2	24.6	45	78	63	0.3	1.7	1.3	997	1001	998	0.0

For Go Green Mechanisms Pvt. Ltd.

METEOROLOGICAL OBSERVATIONS DATA AT ADANI POWER JHARKHAND LTD. GODDA

LOCATION: Hostel Block

Month: November-2019

Date	Temperature (Deg C)			Relative Humidity (%)			Wind Speed (M/Sec)			Atmospheric Pressure (mbar)			Rainfall (mm)
	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	Total
01-11-2019	20.0	27.3	23.4	51	83	66	0.0	1.1	0.5	1003	1011	1006	0.0
02-11-2019	21.4	26.4	23.6	49	77	64	0.0	1.2	0.7	1005	1012	1008	0.0
03-11-2019	22.3	26.1	24.0	47	84	66	0.0	0.5	0.4	1002	1010	1006	0.0
04-11-2019	19.8	25.6	22.4	64	80	73	0.0	1.1	0.7	1002	1009	1005	0.0
05-11-2019	20.5	26.7	23.1	47	58	51	0.0	0.8	0.5	1002	1010	1006	0.0
06-11-2019	20.1	25.6	23.0	44	85	66	0.1	2.3	1.0	1006	1009	1007	0.0
07-11-2019	21.6	26.1	24.1	41	86	64	0.1	1.8	1.1	1007.0	1010	1008	0.0
08-11-2019	22.7	27	24.7	52	80	67	0.3	2.5	1.3	1006.0	1011	1008	0.0
09-11-2019	23.6	26.4	24.8	48	84	68	0.2	0.9	0.5	1002	1012	1008	0.0
10-11-2019	21.0	24	22.4	56	87	73	0.3	1.5	0.7	1005	1010	1008	0.0
11-11-2019	22.7	25.5	24.6	52	80	69	0.1	1.1	0.5	1004	1012	1007	0.0
12-11-2019	21.4	26	23.4	62	83	70	0.0	2.6	1.2	1006	1010	1007	0.0
13-11-2019	21.9	25.7	23.3	58	84	74	0.0	0.5	0.4	1004	1012	1008	0.0
14-11-2019	22.4	25.2	23.1	60	83	75	0.0	1.1	0.7	1004	1014	1010	0.0
15-11-2019	20.6	26.5	22.6	66	80	70	0.0	1.3	0.8	1001	1015	1011	0.0
16-11-2019	19.9	26.5	22.8	62	78	68	0.1	2.2	1.0	1007	1012	1010	0.0
17-11-2019	21.9	25	23.1	53	80	64	0	0.7	0.4	1005	1010	1008	0.0
18-11-2019	19.7	24.2	21.9	56	77	63	0	0.5	0.4	1000	1012	1006	0.0
19-11-2019	19.1	23.2	22.0	55	80	62	0.1	0.7	0.3	1004	1013	1008	0.0
20-11-2019	20.4	23	21.9	48	80	62	0.1	0.8	0.4	1007	1014	1011	0.0
21-11-2019	19.7	23.7	21.5	49	78	60	0	0.9	0.6	1007	1012	1010	0.0
22-11-2019	20.7	24.2	22.3	42	80	59	0	0.6	0.4	1010	1015	1013	0.0
23-11-2019	21.5	24	22.4	39	81	61	0.2	1.2	0.7	1008	1014	1011	0.0
24-11-2019	20.1	23.5	22.0	42	83	64	0.2	1.7	1.4	1006	1010	1007	0.0
25-11-2019	18.9	22.5	20.5	47	86	66	0.1	0.5	0.3	1010	1015	1013	0.0
26-11-2019	20.7	23.5	22.0	44	85	65	0	0.8	0.4	1007	1014	1011	0.0
27-11-2019	21.3	24	22.4	49	81	67	0	0.5	0.3	1008	1015	1012	0.0
28-11-2019	20.8	23.4	21.6	46	81	68	0	0.9	0.5	1000	1002	1001	0.0
29-11-2019	22.4	26.3	23.5	44	82	60	0	1.2	0.8	1000	1003	1001	0.0
30-11-2019	23.6	26.5	25.0	42	82	65	0	1.9	1.1	1000	1002	1001	0.0

For Go Green Mechanisms Pvt. Ltd.

METEOROLOGICAL OBSERVATIONS DATA AT ADANI POWER JHARKHAND LTD. GODDA

LOCATION: Hostel Block

Month: December-2020

Date	Temperature (Deg C)			Relative Humidity (%)			Wind Speed (M/Sec)			Atmospheric Pressure (mbar)			Rainfall (mm)
	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	Total
01-10-2019	17.0	26.0	21.0	44	86	68	1.0	4.0	1.0	754.8	758.7	756.5	0.0
02-10-2019	16.0	25.0	20.0	41	85	67	1.0	3.0	1.0	755.5	759.0	756.7	0.0
03-10-2019	16.0	25.0	20.0	45	86	71	0.3	2.9	1.4	751.7	757.0	753.6	0.0
04-10-2019	13.0	24.0	18.0	41	92	68	0.2	1.4	0.9	752.3	755.3	753.8	0.0
05-10-2019	13.0	25.0	19.0	52	87	71	0.1	2.1	1.0	752.1	756.0	753.8	0.0
06-10-2019	14.0	26.0	20.0	52	90	74	0.1	1.6	0.7	754.1	756.7	755.3	0.0
07-10-2019	16.0	26.0	21.0	52	91	74	0.2	2.5	0.7	753.7	757.6	755.1	0.0
08-10-2019	17.0	26.0	21.0	50	88	70	0.1	1.3	0.6	753.3	756.7	754.4	0.0
09-10-2019	15.0	25.0	20.0	46	86	68	0.1	1.5	0.7	753.6	756.4	754.8	0.0
10-10-2019	15.0	24.0	19.0	47	86	68	0.2	2.9	1.0	753.8	758.3	755.6	0.0
11-10-2019	14.0	24.0	19.0	52	87	73	0.1	1.4	0.6	755.4	758.5	756.6	0.0
12-10-2019	15.0	24.0	19.0	58	87	77	0.1	1.5	0.6	752.0	758.3	754.4	0.0
13-10-2019	16.0	23.0	20.0	67	89	79	0.1	2.1	0.9	752.8	755.6	754.2	0.0
14-10-2019	16.0	22.0	18.0	77	95	88	0.2	2.4	0.9	753.5	757.3	754.7	0.0
15-10-2019	13.0	20.0	17.0	77	97	91	0.0	1.4	0.7	753.5	756.4	754.6	0.0
16-10-2019	16.0	23.0	19.0	61	97	85	0.1	2.1	1.0	752.9	755.7	754.2	0.0
17-10-2019	15.0	22.0	18.0	59	95	80	0.9	3.5	1.9	753.5	756.7	754.8	0.0
18-10-2019	13.0	16.0	14.0	67	84	74	1.7	3.8	2.6	754.9	757.8	756.1	0.0
19-10-2019	9.0	17.0	13.0	62	91	79	0.5	2.9	1.7	752.6	756.9	754.6	0.0
20-10-2019	8.0	18.0	13.0	61	92	79	0.2	2.4	0.9	751.7	755.3	753.4	0.0
21-10-2019	10.0	18.0	14.0	67	94	83	0.2	1.7	0.9	752.3	755.3	753.7	0.0
22-10-2019	12.0	21.0	15.0	55	94	81	0.0	1.4	0.6	752.1	756.1	753.9	0.0
23-10-2019	11.0	17.0	14.0	79	97	91	0.0	1.8	0.7	753.3	756.8	754.8	0.0
24-10-2019	9.0	21.0	14.0	51	98	83	0.0	1.4	0.5	753.7	757.6	755.3	0.0
25-10-2019	12.0	19.0	15.0	55	85	72	0.1	1.3	0.7	753.3	756.7	754.6	0.0
26-10-2019	10.0	16.0	13.0	67	97	85	0.1	1.3	0.8	753.6	756.3	754.5	0.0
27-10-2019	10.0	16.0	12.0	62	90	80	0.4	2.1	1.3	753.8	756.8	755.1	0.0
28-10-2019	7.0	18.0	12.0	54	94	78	0.2	1.5	0.8	755.3	758.5	756.5	0.0
29-10-2019	7.0	15.0	10.0	66	97	86	0.1	2.1	1.0	754.8	758.4	756.5	0.0
30-10-2019	6.0	13.0	9.0	77	97	90	0.0	1.8	0.7	755.5	759.0	756.7	0.0
31-10-2019	7.0	21.0	13.0	59	97	81	0.2	1.8	0.7	754.8	758.7	756.5	0.2

For Go Green Mechanisms Pvt. Ltd.

SECTION 8: AMBIENT AIR MONITORING REPORT

8.1 CONCEPT & SCOPE

The Ambient Air monitoring encompasses the results and statistical evaluation of the data monitored at three different locations.

Different parameters like PM_{10}, $PM_{2.5}$, Oxides of Sulphur, Oxides of Nitrogen and Mercury are monitored for representing the ambient air quality within the study area.

8.2 FREQUENCY OF SAMPLING

The frequency of the sampling for AAQM was as follows:

PARAMETERS	FREQUENCY OF EACH LOCATION
PM10, PM2.5, Oxides of Sulphur, Oxides of Nitrogen	Twice in a week
Mercury	Once in a month

8.3 SAMPLING DURATION AS PER NAAQMs 2009

Sr. No.	Parameters	Sampling Duration (Hr.)
1	Particulate Matter (PM_{10})	24
2	Particulate Matter ($PM_{2.5}$)	24
3	Oxides of Sulphur (SO_2)	24
4	Oxides of Nitrogen (NOx)	24
5	Mercury	-

8.4 AAQM METHODOLOGY

PARAMETERS	METHODOLOGY/PRINCIPLE
Particulate Matter (PM_{10})	Air is drawn through a size-selective inlet and through a 20.3 X 25.4 cm (8 X 10 in) filter at a flow rate, which is typically 1132 L/min. Particles with aerodynamic diameter less than the cut-point of the inlet are collected, by the filter. The mass of these particles is determined by the difference in filter weights prior to and after sampling. The concentration of PM_{10} in the designated size range is calculated by dividing the weight gain of the filter by the volume of air sampled.
Particulate Matter ($PM_{2.5}$)	An electrically powered air sampler draws ambient air at a constant volumetric flow rate (16.7 lpm) maintained by a mass flow / volumetric flow controller coupled to a microprocessor into specially designed inertial particle-size separator (i.e. cyclones or impactors) where the suspended particulate matter in the $PM_{2.5}$ size ranges is separated for collection on a 47 mm polytetrafluoroethylene (PTFE) filter over a specified sampling period. Each filter is weighed before and after sample collection to determine the net gain due to the particulate matter. The mass concentration in the ambient air is computed as the total mass of collected particles in the $PM_{2.5}$ size ranges divided by the actual volume of air sampled, and is expressed in $\mu g/m^3$. The microprocessor reads averages and stores five-minute averages of ambient temperature, ambient pressure, filter temperature and volumetric flow rate.
Sulphur Dioxide (SO_2)	Sulphur dioxide from air is absorbed in a solution of potassium tetrachloromercurate (TCM). The impingers setup for the absorbance of Sulphur Dioxide from air is shown in Figure 15. A dichlorosulphitomercurate complex, which resists oxidation by the oxygen in the air, is formed. Once formed, this complex is stable to strong oxidants such as ozone and oxides of nitrogen and therefore, the absorber solution may be stored for some time prior to analysis. The complex is made to react with para-rosaniline and formaldehyde to form the intensely coloured pararosaniline methylsulphonic acid. The absorbance of the solution is measured by means of a suitable spectrophotometer.
Nitrogen Dioxide	Ambient nitrogen dioxide (NO_2) is collected by bubbling air through a solution of sodium hydroxide and sodium arsenite. The concentration of nitrite ion (NO_2) produced during sampling is determined colorimetrically by reacting the nitrite ion with phosphoric acid, sulfanilamide, and N-(1-naphthyl)-ethylenediamine dihydrochloride (NEDA) and measuring the absorbance of the highly coloured azo-dyeat 540 nm.

Figure 5: Ambient air Motoring Near Mali Village

Figure 6: Ambient air Monitoring Near Motia Village

8.5 ANALYTICAL RESULTS

Results & statistical calculations for Location- L1:

Name of Location (L1)		Near Motia Village			
Sr. No.	**Date of Sampling**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**NOx**
Unit		µg/m³	µg/m³	µg/m³	µg/m³
GSR 826 (E)		100	60	80	80
1.	01.10.2019	51.2	17.0	7.2	14.8
2.	03.10.2019	49.5	15.8	8.1	13.7
3.	07.10.2019	53.4	18.1	10.3	15.9
4.	10.10.2019	56.4	19.3	14.8	10.6
5.	14.10.2019	55.7	18.4	16.9	9.7
6.	17.10.2019	52.7	16.2	12.1	10.7
7.	21.10.2019	56.8	18.7	14.5	12.0
8.	24.10.2019	50.3	16.9	15.6	12.1
9.	28.10.2019	51.4	18.1	14.8	11.5
10.	01.11.2019	52.7	15.2	6.7	13.4
11.	04.11.2019	48.4	13.6	6.2	12.5
12.	07.11.2019	51.4	16.4	8.8	13.7
13.	11.11.2019	58.7	14.1	12.2	11.5
14.	14.11.2019	56.4	19.8	17.2	12.4
15.	18.11.2019	54.4	19.8	15.7	13.3
16.	21.11.2019	58.3	21.4	16.9	14.2
17.	25.11.2019	53.6	20.4	16.4	14.3
18.	28.11.2019	56.1	23.8	18.2	15.6
19.	02.12.2019	64.4	25.4	7.4	14.3
20.	05.12.2019	59.7	27.9	9.9	16.4
21.	09.12.2019	60.8	30	8.5	15.8
22.	12.12.2019	63.8	26.2	9.3	17.2
23.	16.12.2019	54.8	18.9	5.5	12.2
24.	19.12.2019	64.9	23.3	7.7	15.4
25.	23.12.2019	58.4	35.0	6.5	12.6
26.	27.12.2019	62.5	30.1	8.6	15.2
27.	30.12.2019	57.7	27.4	8.1	12.5

RESULT INTERPRETATION				
No. of Observations	27	27	27	27
Min Concentration	48.4	13.6	5.5	9.7
Max Concentration	64.9	35.0	18.2	17.2
Average	56.1	21.0	11.3	13.5

Results & statistical calculations for Location- L2:

Name of Location (L2)		Near Mali Village			
Sr. No.	**Date of Sampling**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**NOx**
Unit		µg/m³	µg/m³	µg/m³	µg/m³
GSR 826 (E)		100	60	80	80
1.	01.10.2019	42.8	16.1	7.7	14.0
2.	03.10.2019	50.7	18.1	5.9	11.4
3.	07.10.2019	49.7	14.2	8.8	10..4
4.	10.10.2019	52.4	17.7	9.3	12.1
5.	14.10.2019	50.8	16.4	12.9	14.2
6.	17.10.2019	54.6	18.9	14.2	11.5
7.	21.10.2019	58.4	21.9	16.7	14.0
8.	24.10.2019	57.9	19.4	15.3	13.7
9.	28.10.2019	59.7	20.5	16.1	14.4
10.	01.11.2019	53.6	17.2	8.2	14.8
11.	04.11.2019	55.9	20.6	9.4	14.8
12.	07.11.2019	52.2	16.8	10.1	12.9
13.	11.11.2019	53.6	18.5	10.7	14.5
14.	14.11.2019	52.7	19.5	14.8	16.2
15.	18.11.2019	55.1	19.2	17.4	15.8
16.	21.11.2019	60.6	23.7	18.1	17.5
17.	25.11.2019	62.6	24.7	28.9	15.3
18.	28.11.2019	57.8	22.4	16.2	11.7
19.	02.12.2019	63.9	27.1	10.2	16.5
20.	05.12.2019	65.1	33.7	9.6	17.3
21.	09.12.2019	59.9	24.2	11.3	14.8
22.	12.12.2019	60.1	27.1	8.8	13.2
23.	16.12.2019	56.3	19.3	6.2	10.8
24.	19.12.2019	62.7	29.6	9.2	16.9
25.	23.12.2019	65.2	31.6	10.1	14.8
26.	27.12.2019	60.8	24.2	8.6	17.3
27.	30.12.2019	58.7	30.1	11.1	13.8

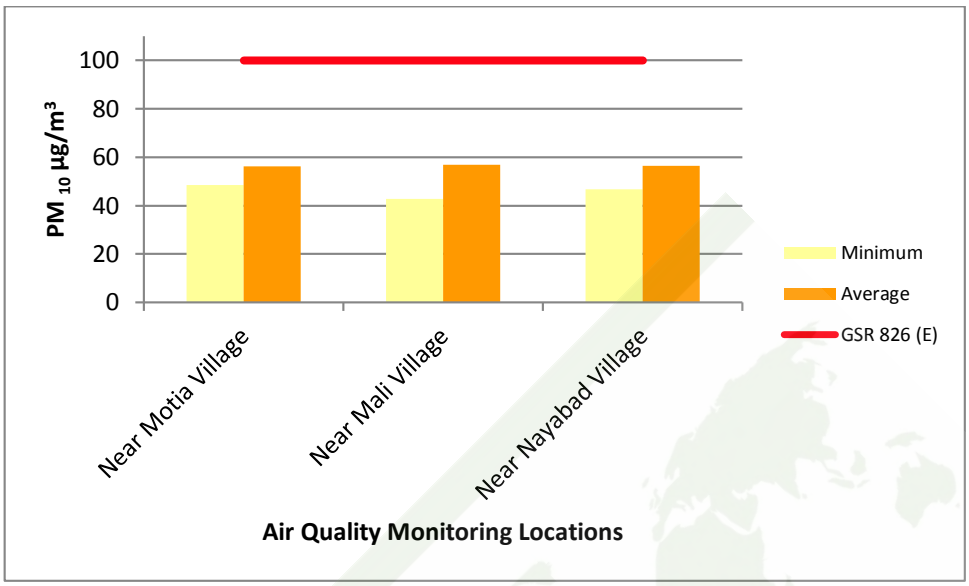
RESULT INTERPRETATION				
No. of Observations	27	27	27	27
Min Concentration	42.8	14.2	5.9	10.8
Max Concentration	65.2	33.7	28.9	17.5
Average	56.8	22.0	12.1	14.4

Results & statistical calculations for Location- L3:

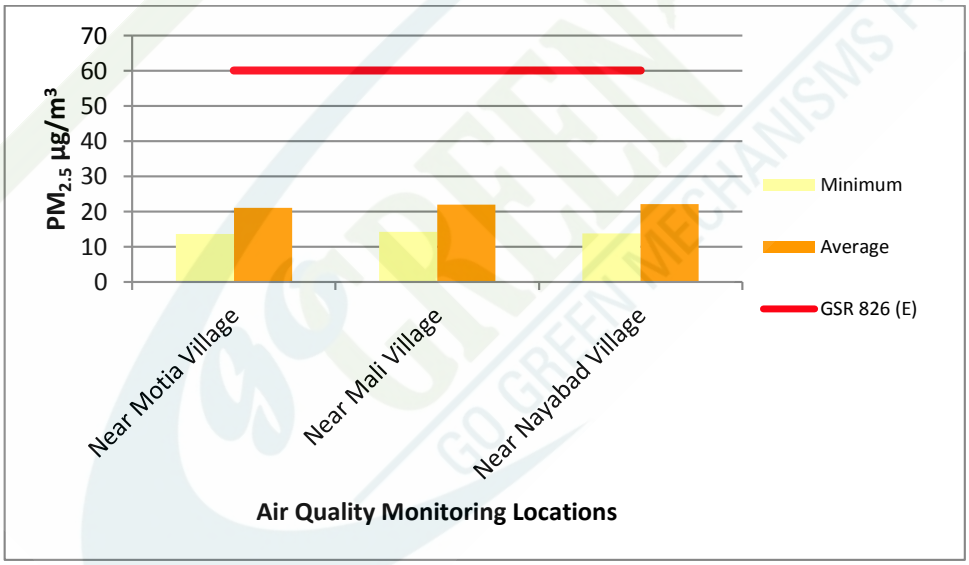
Name of Location (L3)		Near Nayabad Village			
Sr. No.	**Date of Sampling**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**NOx**
Unit		µg/m³	µg/m³	µg/m³	µg/m³
GSR 826 (E)		100	60	80	80
1.	01.10.2019	49.5	16.2	8.1	11.6
2.	03.10.2019	46.8	18.2	6.6	14.1
3.	07.10.2019	53.4	15.0	7.2	10.9
4.	10.10.2019	50.0	13.7	8.5	15.0
5.	14.10.2019	56.7	14.1	6.6	12.9
6.	17.10.2019	59.8	21.3	8.1	11.9
7.	21.10.2019	55.8	24.1	12.9	10.5
8.	24.10.2019	50.6	18.1	15.2	10.6
9.	28.10.2019	52.8	19.1	16.5	9.8
10.	01.11.2019	51.8	17.9	9.6	12.6
11.	04.11.2019	48.2	20.3	8.9	16.4
12.	07.11.2019	57.6	19.4	13.6	19.8
13.	11.11.2019	52.3	16.8	10.6	18.3
14.	14.11.2019	59.1	17.2	9.2	15.7
15.	18.11.2019	60.7	22.4	10.6	13.9
16.	21.11.2019	57.2	26.4	13.6	11.8
17.	25.11.2019	53.4	20.5	17.6	10.7
18.	28.11.2019	58.3	23.6	15.5	9.4
19.	02.12.2019	58.3	28.3	9.4	12.8
20.	05.12.2019	62.4	30.4	10	14.8
21.	09.12.2019	65.1	27.5	8.6	16.4
22.	12.12.2019	60.9	26.5	7.5	15.7
23.	16.12.2019	55.8	17.9	6.1	11.8
24.	19.12.2019	61.8	32.5	8.4	14.1
25.	23.12.2019	55.5	29.4	10.2	17.3
26.	27.12.2019	64.7	31.6	9.4	15.5
27.	30.12.2019	61.9	28.3	11.2	14.7

RESULT INTERPRETATION				
No. of Observations	27	27	27	27
Min Concentration	46.8	13.7	6.1	9.4
Max Concentration	65.1	32.5	17.6	19.8
Average	56.3	22.1	10.4	13.7

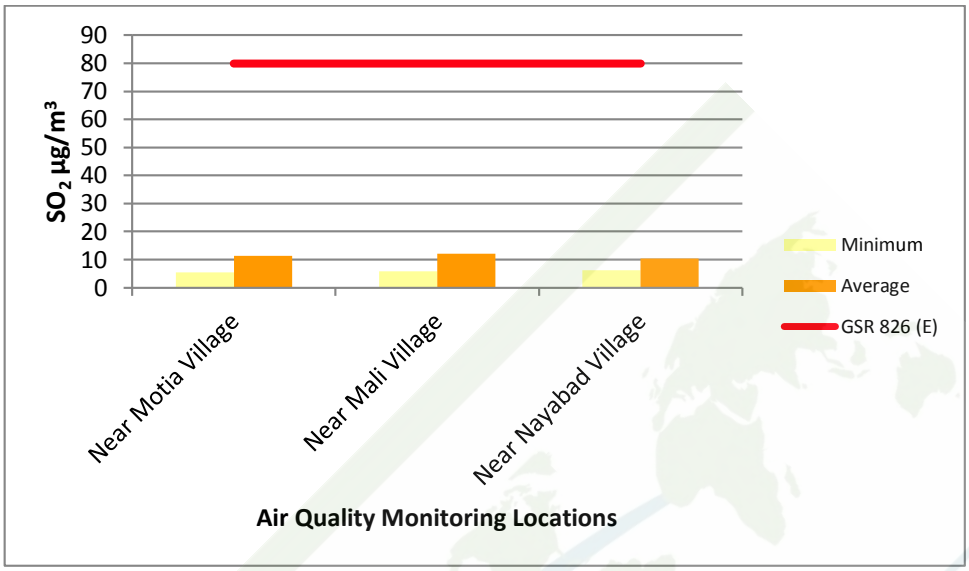
8.6 GRAPHICAL REPRESENTATION OF THE RESULTS



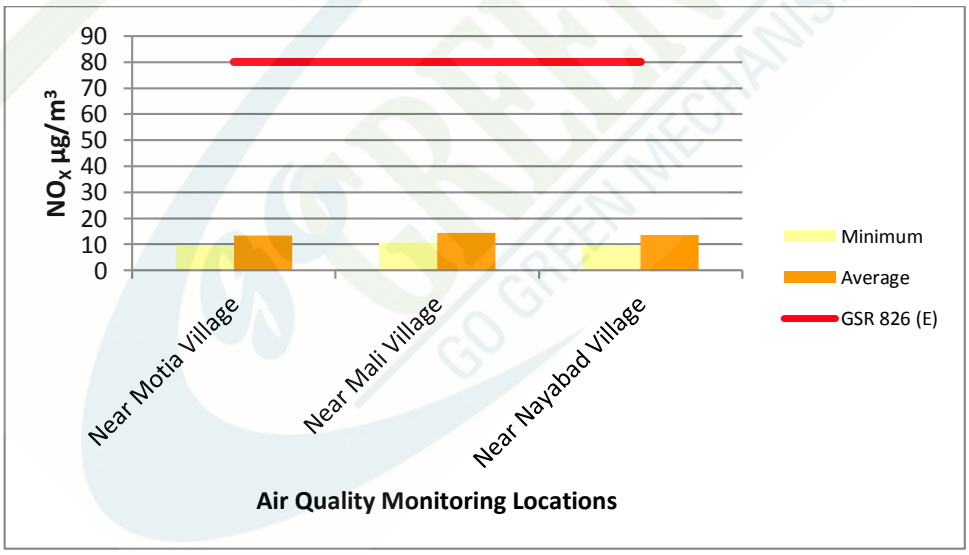
Particulate Matter (PM_{10})



Particulate Matter ($PM_{2.5}$)



Sulphur Dioxide (SO_2)



Oxides of Nitrogen (NO_x)

8.7 EXECUTIVE SUMMARY OF AAQM RESULTS

Particulate Matter (PM_{10})				
Site	**Minimum**	**Maximum**	**Average**	**GSR 826 (E)**
Near Motia Village	48.4	64.9	56.1	100
Near Mali Village	42.8	65.2	56.8	100
Near Nayabad Village	46.8	65.1	56.3	100

Particulate Matter ($PM_{2.5}$)				
Site	**Minimum**	**Maximum**	**Average**	**GSR 826 (E)**
Near Motia Village	13.6	35.0	21.0	60
Near Mali Village	14.2	33.7	22.0	60
Near Nayabad Village	13.7	32.5	22.1	60

Sulphur Dioxide (SO_2)				
Site	**Minimum**	**Maximum**	**Average**	**GSR 826 (E)**
Near Motia Village	5.5	18.2	11.3	80
Near Mali Village	5.9	28.9	12.1	80
Near Nayabad Village	6.1	17.6	10.4	80

Oxides of Nitrogen (NO_x)				
Site	**Minimum**	**Maximum**	**Average**	**GSR 826 (E)**
Near Motia Village	9.7	17.2	13.5	80
Near Mali Village	10.8	17.5	14.4	80
Near Nayabad Village	9.4	19.8	13.7	80

From all the above graphical representation it is clearly interpreted that all the values of PM_{10}, $PM_{2.5}$, SO_2 and NO_X were lower than the prescribed limits for all the stated locations.

8.8 ANALYTICAL RESULTS OF MERCURY

In this study, we also monitored some other critical pollutants like Mercury to assess the existing levels of air pollutants as well as the regional background concentration of the cluster area.
Beside these, some Heavy metal concentration in the ambient air were also monitored in and around the project area. The following tabulated pollutants were monitored once in a month.

Location	Sampling Month	Mercury (Hg)
Unit		µg/m^3
Limits as per GSR 826 Standard		NS
Near Motia Village	Oct'19	BQL(QL=0.02)
	Nov'19	BQL(QL=0.02)
	Dec'19	BQL(QL=0.02)
Near Mali Village	Oct'19	BQL(QL=0.02)
	Nov'19	BQL(QL=0.02)
	Dec'19	BQL(QL=0.02)
Near Nayabad Village	Oct'19	BQL(QL=0.02)
	Nov'19	BQL(QL=0.02)
	Dec'19	BQL(QL=0.02)

Note: NS= Not Specified

SECTION 9: WATER ANALYSIS REPORT

9.1 CONCEPT & SCOPE

Water quality of the project area plays an important role on the socio economy of the Project. The higher concentrations of the water pollutants have serious impacts on the environment. Hence, it becomes important to assess the water quality periodically in the project vicinity.

Thus to assess the water quality of the project area, 04 locations were selected for Ground water sampling.

The quality of Ground water samples were compared with respect to IS 3025/APHA specification, the concentration of the target analytes are within the prescribed limits.

Bacterial examination was also carried out to find out the E-Coli & Total Coliform contamination in water sources.

9.2 METHODOLOGY

PARAMETER	PRINCIPLE OF METHEDOLOGY
PH	Measurement of pH is one of the most important and frequently used test in water chemistry. Practically every phase of water supply and wastewater treatment, e.g., acid-base neutralization, Water softening, precipitation, coagulation, disinfection and corrosion control, is pH dependent. pH is used in alkalinity and carbon dioxide measurements and many other acid-base equilibria. At a given temperature the intensity of the acid or basic character of a solution is indicated by pH or hydrogen ion activity. Alkalinity and acidity are the acid and base neutralizing capacities of a water and usually expressed in mole per liter, needed to change the pH value of a 1-L sample by 1 unit. pH as defined by Sorenson is –log $[H^+]$; it is the "intensity" factor of acidity
Turbidity	The method is based on a comparison of the intensity of light scattered by a standard reference suspension under the same condition. Higher the intensity of scattered light, the higher the turbidity of particular sample. Formazin polymer is used as the primary standard reference suspension. The turbidity of a specify concentration of formalin suspension is defined as 4000 NTU.
Chloride	In a neutral or slightly alkaline solution, potassium chromate can indicate the endpoint of the silver nitrate titration of chloride. Silver chloride is precipitated quantitatively before red silver chromate is formed.
Fluoride	The SPANDS colorimetric method is based on the reaction between fluoride and a zirconium-dye lake. Fluoride reacts with the dye lake, dissociating a portion of it into a colorless complex anion (ZrF_6^{-2}) and the dye. As the amount of fluoride increase, the color produced becomes progressively lighter. The reaction rate between fluoride and zirconium ions is influenced greatly by the acidity of the reaction mixture. If the proportion of acid in the reagent is increased, the reaction can be made almost instantaneous. Under such condition, however, the effect of various ions differs from that in the conventional alizarin methods. The selection of dye for this rapid fluoride method is governed largely by the resulting tolerance to these ions.
Sulphate	Sulphate ion (SO_4^{2-}) is precipitated in an acetic acid medium with barium chloride ($BaCl_2$) so as to form barium sulphate ($BaSO_4$) crystals of uniform size. Light absorbance of the $BaSO_4$ suspension is measured by a photometer and the SO_4^{2-} concentration is determined by comparison of the reading with a standard curve SO_4^{2-}. The absorbance of the barium sulphate formed is measured by a spectrophotometer at 450 nm.
Cd, Cu, As, Pb, Hg, Zn, Mn	Atomic absorption spectroscopy is based on absorption by ground state atoms of an element present in the sample which is atomized in the flame or graphic furnace. Depending on absorption of selected wavelength of the element the concentration is estimated. The technique provides valuable information on concentration of required elements present in the sample. Concentration are in ppm or ppb levels depending on source of sample excitation.
Iron	Iron is brought into solution, reduced to the ferrous state by boiling with acid and hydroxylamine and treated with 1,10-phenanthroline at pH 3.2 to 3.3 Three molecules of phenanthroline chelate each atom of ferrous iron to form an orange-red complex. The colored solution obeys beer's law; its intensity is independent of pH from 3 to 9. A pH between 2.9 and 3.5 insures rapid color development in the presence of an excess of phenanthroline. Color standards are stable for at least 6 months.

Hexavalent Chromium (As Cr^{+6})	This procedure measures only hexavalent chromium, Cr^{+6}. For total chromium, Determination, acid-digest the sample and follow with a suitable instrumental analysis technique. The hexavalent chromium is determined calorimetrically by reaction with diphenylcarbazide in acid solution. A red-violet colored complex of unknown composition is produced which is measured at 540 nm.
Calcium (As Ca)	When EDTA is added to water containing both calcium and magnesium it combines first with the calcium. Calcium can be determined directly with EDTA, when the pH is made sufficiently high that the magnesium is largely precipitated as the hydroxide and an indicator is used that combines with calcium only. Several indicators give a Colour change when all of the calcium has been complexed by the EDTA at a pH of 12 to 13.
Total Hardness (As $CaCO_3$)	This method depends on ability of EDTA or its disodium salt to form stable complexes with calcium and magnesium ions. When the dye Eriochrome black T (EBT) is added to a solution containing calcium and magnesium ions at pH 10.0 a wine red complex is formed. This solution is titrated with standard solution of disodium salt of EDTA, which extracts calcium and magnesium from the dye complex and the dye is changed back to its original blue Colour. Eriochrome black T is used to indicate the end-point for the titration of calcium and magnesium together.
Residual Chloride	Chlorine will liberate free iodine from potassium iodide (KI) solution at pH 8 or less. The liberated iodine is titrated with a standard solution of sodium thiosulfate ($Na_2S_2O_3$) with starch as the indicator. Titrate at pH 3 to 4 because the reaction is not stoichiometric at neutral pH due to partial oxidation of thiosulfate to sulfate.
Boron (As B)	In the presence of boron, a solution of carmine or carminic acid in concentrated sulphuric acid changes from a bright red to a bluish red or blue, Depending on the concentration of boron present.
Total Dissolved Solids	A well-mixed sample is filtered through a standard filter and the filtrate is evaporated to dryness in a weighed dish and dried to constant weight at 180°C. The increase in dish weight represents the total dissolved solids.
Nitrate	Two moles of nitrate nitrogen react with one mole of chromotropic acid to form a yellow reaction product having maximum absorbance at 410 nm.
Alkalinity (As $CaCO_3$)	Hydroxyl ions present in a sample as a result of dissociation or hydrolysis of solutes react with addition of standard acid. Alkalinity thus depends on the end point pH used. For method of determining inflection points from titration curves and the rationale for titrating to fixed pH endpoints.

Figure 7: Water Sampling Near Motia Village

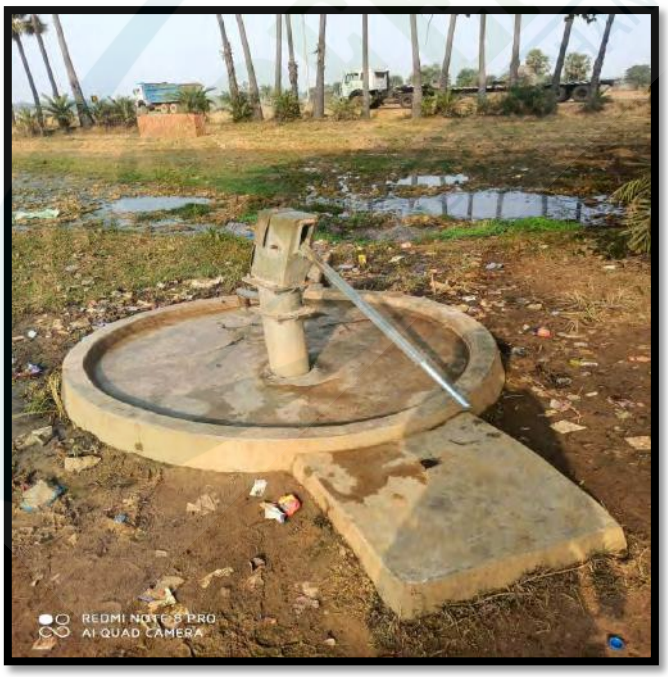


Figure 8: Water Sampling Near Mali Village

Figure 9: Water Sampling Near Nayabad Village

Figure 10: Water Sampling Near Patwa Village

9.3 ANALYTICAL RESULTS

Date of Sampling: 21.10.2019

Sr. No.	Parameter	Unit	Locations	As Per IS 10500:2012	
			Motia Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.34	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	29	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	321	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	159	200	600
9.	Alkalinity as $CaCo_3$	mg/L	108	200	600
10.	Calcium as Ca	mg/L	48	75	200
11.	Chloride	mg/L	14	250	1000
12.	Sulphate	mg/L	22.2	200	400
13.	Nitrate	mg/L	8.5	45	No Relaxation
14.	Iron	mg/L	0.15	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	0.3	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.01)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	0.25	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	20.0	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 21.10.2019

Sr. No.	Parameter	Unit	Location	As Per IS 10500:2012	
			Mali Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.31	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	28	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	344	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	1876	200	600
9.	Alkalinity as $CaCo_3$	mg/L	237	200	600
10.	Calcium as Ca	mg/L	40.8	75	200
11.	Chloride	mg/L	22	250	1000
12.	Sulphate	mg/L	34	200	400
13.	Nitrate	mg/L	12.4	45	No Relaxation
14.	Iron	mg/L	0.25	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	0.21	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.01)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	0.28	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	24.6	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 21.10.2019

Sr. No.	Parameter	Unit	Locations	As Per IS 10500:2012	
			Nayabad Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.41	6.5 to 8.5	No Relaxation
4.	Temperature $^{\circ}$C	$^{\circ}$C	29	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	424	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	214	200	600
9.	Alkalinity as $CaCo_3$	mg/L	168	200	600
10.	Calcium as Ca	mg/L	52	75	200
11.	Chloride	mg/L	46	250	1000
12.	Sulphate	mg/L	34.2	200	400
13.	Nitrate	mg/L	12.8	45	No Relaxation
14.	Iron	mg/L	0.27	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	0.29	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.01)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	0.22	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	19.4	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 21.10.2019

Sr. No.	Parameter	Unit	Location	As Per IS 10500:2012	
			Patwa Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.31	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	28	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	325	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	204	200	600
9.	Alkalinity as $CaCo_3$	mg/L	122	200	600
10.	Calcium as Ca	mg/L	48.6	75	200
11.	Chloride	mg/L	28	250	1000
12.	Sulphate	mg/L	34.8	200	400
13.	Nitrate	mg/L	10.0	45	No Relaxation
14.	Iron	mg/L	0.26	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	0.2	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.01)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	0.29	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	16.4	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 25.11.2019

Sr. No.	Parameter	Unit	Locations	As Per IS 10500:2012	
			Motia Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.28	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	28	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	314	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	154	200	600
9.	Alkalinity as $CaCo_3$	mg/L	104	200	600
10.	Calcium as Ca	mg/L	44	75	200
11.	Chloride	mg/L	12	250	1000
12.	Sulphate	mg/L	24.5	200	400
13.	Nitrate	mg/L	8.1	45	No Relaxation
14.	Iron	mg/L	0.12	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	0.2	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.01)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	0.24	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	18.0	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 25.11.2019

Sr. No.	Parameter	Unit	location	As Per IS 10500:2012	
			Mali Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.35	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	27	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	339	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	1854	200	600
9.	Alkalinity as $CaCo_3$	mg/L	231	200	600
10.	Calcium as Ca	mg/L	38.4	75	200
11.	Chloride	mg/L	24	250	1000
12.	Sulphate	mg/L	37	200	400
13.	Nitrate	mg/L	12.9	45	No Relaxation
14.	Iron	mg/L	0.29	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	0.25	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.01)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	0.21	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	25.8	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 25.11.2019

Sr. No.	Parameter	Unit	Locations	As Per IS 10500:2012	
			Nayabad Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.36	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	29	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	413	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	204	200	600
9.	Alkalinity as $CaCo_3$	mg/L	154	200	600
10.	Calcium as Ca	mg/L	47	75	200
11.	Chloride	mg/L	49	250	1000
12.	Sulphate	mg/L	31.7	200	400
13.	Nitrate	mg/L	12.2	45	No Relaxation
14.	Iron	mg/L	0.24	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	0.33	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.01)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	0.28	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	21.6	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 25.11.2019

Sr. No.	Parameter	Unit	Location	As Per IS 10500:2012	
			Patwa Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.28	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	29	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	317	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	208	200	600
9.	Alkalinity as $CaCo_3$	mg/L	126	200	600
10.	Calcium as Ca	mg/L	47.5	75	200
11.	Chloride	mg/L	26	250	1000
12.	Sulphate	mg/L	33.4	200	400
13.	Nitrate	mg/L	9.4	45	No Relaxation
14.	Iron	mg/L	0.29	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	0.3	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.01)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	0.24	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	15.3	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 12.12.2019

Sr. No.	Parameter	Unit	Locations	As Per IS 10500:2012	
			Motia Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.31	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	30	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	362	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	170	200	600
9.	Alkalinity as $CaCo_3$	mg/L	95	200	600
10.	Calcium as Ca	mg/L	29.6	75	200
11.	Chloride	mg/L	23.5	250	1000
12.	Sulphate	mg/L	30.3	200	400
13.	Nitrate	mg/L	6.6	45	No Relaxation
14.	Iron	mg/L	0.19	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	BQL(QL=0.1)	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.01)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	BQL(QL=0.2)	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	23.8	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 12.12.2019

Sr. No.	Parameter	Unit	Location	As Per IS 10500:2012	
			Mali Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.28	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	28	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	362	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	144	200	600
9.	Alkalinity as $CaCo_3$	mg/L	110	200	600
10.	Calcium as Ca	mg/L	34.5	75	200
11.	Chloride	mg/L	21.0	250	1000
12.	Sulphate	mg/L	31.4	200	400
13.	Nitrate	mg/L	7.7	45	No Relaxation
14.	Iron	mg/L	0.24	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	BQL(QL=0.1)	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.01)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	BQL(QL=0.2)	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	14.1	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 12.12.2019

Sr. No.	Parameter	Unit	Locations	As Per IS 10500:2012	
			Nayabad Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.30	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	29	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	322	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	148	200	600
9.	Alkalinity as $CaCo_3$	mg/L	90	200	600
10.	Calcium as Ca	mg/L	36.8	75	200
11.	Chloride	mg/L	31.0	250	1000
12.	Sulphate	mg/L	32.6	200	400
13.	Nitrate	mg/L	6.5	45	No Relaxation
14.	Iron	mg/L	0.29	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	BQL(QL=0.1)	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.01)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	BQL(QL=0.2)	5	15
30.	Detergent	mg/L	BQL(QL=0.001)	0.2	1
31.	Magnesium As Mg	mg/L	13.6	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 12.12.2019

Sr. No.	Parameter	Unit	Location	As Per IS 10500:2012	
			Patwa Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.22	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	28	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	328	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	128	200	600
9.	Alkalinity as $CaCo_3$	mg/L	81	200	600
10.	Calcium as Ca	mg/L	40.9	75	200
11.	Chloride	mg/L	32.0	250	1000
12.	Sulphate	mg/L	30.2	200	400
13.	Nitrate	mg/L	5.8	45	No Relaxation
14.	Iron	mg/L	0.19	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	BQL(QL=0.1)	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.01)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	BQL(QL=0.2)	5	15
30.	Detergent	mg/L	BQL(QL=0.001)	0.2	1
31.	Magnesium As Mg	mg/L	6.3	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

SECTION 10: NOISE LEVEL MONITORING

To know the background ambient noise level at the project and surrounding environment, noise level were measured at all the ambient air monitoring stations for baseline study.

The Day time & Night time average noise level data are given in tabular formats as well as in graphical form for easy interpretation.

Here, the day time means time from 06:00 am to 10:00 pm & night time means time from 10:00 pm to 06:00 am.

$$Leq = \frac{10\ \text{Log10}\ (\text{t1x10}^{\frac{L1}{10}} + \text{t2 x 10}^{\frac{L2}{10}} + \text{t3 x 10}^{\frac{L3}{10}} + ..)}{T}$$

Where Leq = Equivalent continuous noise level (dB)(A)
t1 = time at L1 (Hours)
t2 = time at L2 (Hours)
L1 = sound pressure level dB (A) at time 1
T = total time over which the Leq is required (Hours)

(L1) Near Motia Village

Sr. No.	Starting Date	Max Day Time	Min Day Time	Leq (Day)	Max Night Time	Min Night Time	Leq (Night)
	Unit	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
CPCB Standard for Industrial Area		75	75		70	70	
1	16.10.2019	58.2	53.7	56.4	50.8	44.3	47.7
2	25.11.2019	60.3	54.1	57.6	48.4	42.6	45.2
3	12.12.2019	53.8	42.9	48.5	48.2	39.6	44.8

(L2) Near Mali Village

Sr. No.	Starting Date	Max Day Time	Min Day Time	Leq (Day)	Max Night Time	Min Night Time	Leq (Night)
	Unit	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
CPCB Standard for Industrial Area		75	75		70	70	
1	16.10.2019	58.4	52.4	55.3	51.6	49.8	50.8
2	25.11.2019	59.5	50.4	54.1	48.3	45.3	47.1
3	12.12.2019	57.3	46.2	51.5	46.8	35.1	39.9

(L3) Near Nayabad Village

Sr. No.	Starting Date	Max Day Time	Min Day Time	Leq (Day)	Max Night Time	Min Night Time	Leq (Night)
	Unit	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
CPCB Standard for Industrial Area		75	75		70	70	
1	16.10.2019	55.2	49.8	53.5	49.8	40.2	46.7
2	25.11.2019	57.7	51.9	54.8	46.2	41.5	44.8
3	12.12.2019	51.7	40.5	46.6	45.1	36.7	40.2

(L4) Near Patwa Village							
Sr. No.	Starting Date	Max Day Time	Min Day Time	Leq (Day)	Max Night Time	Min Night Time	Leq (Night)
	Unit	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
CPCB Standard for Industrial Area		75	75		70	70	
1	16.10.2019	55.4	51.7	53.4	48.1	45.2	46.2
2	25.11.2019	58.4	53.5	56.7	47.2	43.7	45.1
3	12.12.2019	54.9	40.6	49.7	46.9	37.6	43.3

(L5) Near HTG Residential Area							
Sr. No.	Starting Date	Max Day Time	Min Day Time	Leq (Day)	Max Night Time	Min Night Time	Leq (Night)
	Unit	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
CPCB Standard for Industrial Area		75	75		70	70	
1	16.10.2019	66.2	58.3	64.9	49.5	45.2	47.8
2	25.11.2019	68.2	61.4	65.3	53.6	48.7	51.7
3	12.12.2019	62.8	50.7	57.5	46.3	35.7	42.4

(L6) Near Adani Office							
Sr. No.	Starting Date	Max Day Time	Min Day Time	Leq (Day)	Max Night Time	Min Night Time	Leq (Night)
	Unit	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
CPCB Standard for Industrial Area		75	75		70	70	
1	16.10.2019	62.8	54.3	59.1	57.5	46.7	52.8
2	25.11.2019	65.8	57.3	61.6	56.4	49.8	54.7
3	12.12.2019	61.8	49.9	58.2	48.1	37.7	43.3

From above tabulated results it can be concluded that the noise level was within the prescribed limits throughout the monitoring period at the stated locations.

SECTION 11: SOIL ANALYSIS

11.1 CONCEPT & SCOPE

Soil is fundamental & ultimate natural resources that full fill a number of functions & provide various services like agriculture, industrial construction & ecological habitat development etc. Some of the most significant impacts on this resource occur as a result of activities associated with the use of chemical fertilizers, unscientific construction activities, unplanned city design, unscientific land use pattern and land filling by toxic materials.

Soil analysis can determine the fertility or the expected growth potential and the nutrient deficiency and potential toxicity which help in taking cost effective decision for the better soil management.

Location Code	Name of Location
S-1	Near Mali Village
S-2	Near Nayabad Village
S-3	Near Patwa Village

11.2 SOIL ANALYTICAL RESULTS

Date of Sampling: 21.10.2019

Location: Near Mali Village

Date of Sampling: 29.04.2019

Sr. No.	Parameter	Unit	Result	Norms
1.	Magnesium	%	0.5	NS
2.	Calcium	%	1	NS
3.	Manganese	mg/kg	BQL(QL=0.1)	NS
4.	Boron	mg/kg	0.5	NS
5.	Copper	mg/kg	BQL(QL=0.1)	NS
6.	Sulphur	%	0.07	NS
7.	Chloride	%	0.08	NS
8.	Zinc	mg/kg	8.5	NS
9.	Nitrogen	%	1.1	NS
10.	Phosphorous	%	0.05	NS
11.	Potassium	%	0.04	NS
12.	Iron	%	0.05	NS
13.	Molybdnum	mg/kg	BQL(QL=0.1)	NS

Location: Near Nayabad Village

Date of Sampling: 29.04.2019

Sr. No.	Parameter	Unit	Result	Norms
1.	Magnesium	%	0.66	NS
2.	Calcium	%	1.2	NS
3.	Manganese	mg/kg	BQL(QL=0.1)	NS
4.	Boron	mg/kg	0.8	NS
5.	Copper	mg/kg	BQL(QL=0.1)	NS
6.	Sulphur	%	0.09	NS
7.	Chloride	%	0.06	NS
8.	Zinc	mg/kg	4.6	NS
9.	Nitrogen	%	0.9	NS
10.	Phosphorous	%	0.08	NS
11.	Potassium	%	0.06	NS
12.	Iron	%	0.04	NS
13.	Molybdnum	mg/kg	BQL(QL=0.1)	NS

Location: Near Patwa Village				
Date of Sampling: 29.04.2019				
Sr. No.	Parameter	Unit	Result	Norms
1.	Magnesium	%	0.8	NS
2.	Calcium	%	1.5	NS
3.	Manganese	mg/kg	BQL(QL=0.1)	NS
4.	Boron	mg/kg	0.7	NS
5.	Copper	mg/kg	BQL(QL=0.1)	NS
6.	Sulphur	%	0.09	NS
7.	Chloride	%	0.1	NS
8.	Zinc	mg/kg	3.8	NS
9.	Nitrogen	%	1.3	NS
10.	Phosphorous	%	0.07	NS
11.	Potassium	%	0.06	NS
12.	Iron	%	0.02	NS
13.	Molybdnum	mg/kg	BQL(QL=0.1)	NS

Note: NS= Not Specified

ADANI POWER (JHARKHAND) LTD.

2*800 MW Godda Thermal Power Project

Village: Motia, Dist: Godda, Jharkhand

ENVIRONMENTAL MONITORING REPORT
PERIOD: JANUARY'20 – MARCH'20

Go Green Mechanisms Pvt. Ltd.

Head Office & Lab: Dayal Estate, National Highway No. 8, Opp. APMC Market Gate – 1, Jetalpur, Ahmedabad – 382426

Contact: 7069072001/02

Email: lab@gogreenmechanisms.com

REPORT TITLE

COMPANY NAME:	**Adani Power (Jharkhand) Ltd.**
SITE LOCATION:	2*800 MW Godda Thermal Power Plant Village: Motia, Dist: Godda, Jharkhand
BASELINE PERIOD:	Jan'20 to Mar'20
REPORT DATE:	11.05.2020
ORIGINATED BY:	Environmental Monitoring and Analytical Team Go Green Mechanisms Pvt. Ltd.
REVIEWED BY:	Amit Badlani Director, Go Green Mechanisms Pvt. Ltd.
PREPARED BY:	Go Green Mechanisms Pvt. Ltd (GGMPL) Dayal Estate, Opp AMPC Market Gate No.1, Jetalpur-382426 Ahmedabad

TABLE OF CONTENT

LIST OF GRAPH

LIST OF FIGURE

SECTION 1: FOREWORD

The protection of environment plays a crucial role in maintain the local environment quality for any industry, throughout their production. Hence compliance of the statutory requirements becomes very important to conserve the ecological balance within and surrounding the plant area. Therefore, environment protection is becoming a prerequisite for sustainable development. In line with this requirement, the management of Adani Power (Jharkhand) Ltd. has adopted a corporate responsibility of development and top priority is given for environment protection.

In order to comply with the Environment protection act, to fulfil statutory requirement and to be in tune with Environmental Preservation and sustainable development Adani Power (Jharkhand) Ltd., has retained M/S. Go Green Mechanisms Pvt. Ltd. As Environment Consultants and for various Environmental issues related to their Power Plant.

Environmental Quality Monitoring Report for the Month January'20 to March'20 has been collected.

We are thankful to Adani Power (Jharkhand) Ltd. for the opportunity provided to be associated in this endeavour.

SECTION 2: LIST OF EQUIPMENTS

The list of Equipments used in the project is delineated in the following table.

Sr. No.	Name of Equipments	Make/Model
1	Respirable Dust Sampler	Ecotech Instruments / AAS 217BL
2	$PM_{2.5}$ Sampler	Ecotech Instruments & Eonair Technologies/AAS 127 & AQS 235
3	Gaseous Attachment with RDS	Ecotech Instruments / AAS 217BL
4	Sound Level Meter	Hemsun / HDB 2202
5	Weather Monitoring Station	Ambient Weather Station
6	Weighing Balance	Shimadzu /AUW220D
7	UV Visible Spectrophotometer	Systronics
8	Hot Air Oven	Patel Scientific Instruments
9	Filtration Assembly	Labline
10	Water Analysis Kit	Systronics
11	Bacteriological Incubator	Labline
12	Centi-micro Balance	Shimadzu /ATX224
13	Dissolved Oxygen Test Kit	Lutron
14	Autoclave	Patel Scientific Instruments
15	Laminar Air Flow	Labline
16	Muffle Furnace	Patel Scientific Instruments
17	Flame Photometer	Systronics /128
18	Digital colony counter	Labline
19	Microscope	Patel Scientific Instruments
20	Orbital Shaker	Labline
21	Centrifuge	Bio Lab
22	Simple Distillation Assembly	Labline
23	ICP-OES/AES	Thermo Fisher Scientific /iCAP 7400 SERIES
24	AAS	Thermo Fisher Scientific / AA 303
25	Ion Chromatography	Metrohm Herisau / 1.925.0020

SECTION 3: LIST OF PROJECT PERSONNEL

Sr. No.	Name	Qualification	Experience (Yrs)	Designation
1.	Amit Badlani	B.E. (Chemical) M.S.(Energy & Environmental Technology) M.S. (Pollution Control)	15 Yrs	Managing Director
2.	R.K.Pandey	B.Sc. Biology	15 Yrs	Project In-charge
3.	Payal Patel	M Sc. (Env. Sci.)	04 Yrs	Lab Manager
4.	Satyam Kumar	M Sc. (Env. Mgmt)	03 Yrs	Technical Manager
5.	Yash Goswami	Dip. Env. Engineer	10 Yrs	Field Operation - Manger
6.	Tantan Kumar	M Sc. (Env. Mgmt)	03 Yrs	Lab Chemist
7.	Pooja Parekh	B.Sc. (Microbiology) & DMLT	05 Month	Lab Chemist
8.	Chandan Kumar	B.Sc. Chemistry	05 Month	Field Assistant

For Go Green Mechanisms Pvt. Ltd.

Amit Badlani
Managing Director

GO GREEN MECHANISMS PVT. LTD. AHMEDABAD

SECTION 4: EXECUTIVE SUMMARY

Adani Power (Jharkhand) Limited has undertaken the task of preparing EMP report for its 1600 (2x800) MW Godda Thermal Power Plant & Residential Township which is within the premises of TPP.

M/s. Go Green Mechanisms Private Limited, got the opportunity to prepare the Environmental monitoring Data on the basis of actual field monitoring with respect to Group I Parameters i.e. Air, Water, Soil, Noise & Meteorological on behalf of HTG Engineering Pvt. Ltd.

A Meteorological station was set up on the terrace of "Hostel Block" & Micrometeorological parameters like Ambient Temperature, Relative Humidity, Wind direction, Wind Speed, Rain fall & Barometric Pressure etc were recorded on hourly basis during the study period.

On the basis of wind direction pattern, the three locations of AAQM were selected. The concentration of gaseous pollutants, $PM_{2.5}$ were sampled and analysed for compliance to GSR 826(E) vide Notification Dated 16/11/2009.

Four numbers of Ground water samples were collected to understand the overall water quality of the project area. The water parameters were sampled and analysed to check for compliance to the specifications of (IS 10500:2012 & I 2296:1982 Inland surface water Class C).

The noise level was monitored at 06 locations on Day & Night time basis, monthly as per IS 9989: RA 2001.

The main aim of the soil testing is to assess the soil quality of the area to define the present status of soil. It helps in the assessment of impact if any, due to the project activities and selection of suitable species of plants for green belt development at the project area as it works as an anti-pollution tools.

SECTION 5: CONCEPTS & METHODOLOGY

5.1 METHODOLOGY

In the present study the following are the standard methods used for collection, analysis & interpretation of data:

AAQM Sampling & analysis: "Indian Standards (IS 5182)", "Guidelines for the measurement of Ambient Air Pollutants, Vol-I, CPCB" & "USEPA" methods were used for Ambient Air sampling and analysis to study the present pollution load around the Proposed Project location.

Parameters of AAQM	Standard Methods	Analytical Instruments
PM_{10}	IS 5182 (P-23):2006	Weighing Balance
$PM_{2.5}$	GGMPL/SOP/AA/60	Weighing Balance
Oxides of Nitrogen(NOx)	IS 5182 (P-6):2006	Spectrophotometer
Oxides of Sulphur(SO_2)	IS 5182 (P-2):2001	Spectrophotometer
Mercury	317 B James Edition	ICP OES/AES /AAS (Hydride Generator)

Water Sampling & analysis: Similarly "Indian Standards (IS 3025)", "USEPA" and "APHA 23rd Edition were used for water sample collection and analysis.

Parameters of Water Samples	Standard Methods	Analytical Instruments
Taste	IS 3025 (Pt 08): RA 2006	-
Turbidity	APHA 23rd Edn 2017 2130 B	Turbidity Meter
Total Dissolve Solid	APHA 23rd Edn 2017 2540 C	Hot air Oven
Boron(B)	APHA 23rd Edn 2017 4500 B C	Spectrophotometer
Calcium(Ca)	APHA 23rd Edn 2017 3500 Ca B	-
Chloride(Cl)	IS 3025 (Pt 32): RA 2007	-
Fluoride(F)	APHA 23rd Edn 2017 4500 F D	Spectrophotometer
Residual Chlorine	APHA 23rd Edn 2017 4500 Cl B	
Nitrate (NO_3)	IS 3025 (Pt 34): RA 2017	Spectrophotometer
Phenolic Compounds	IS 3025 (Pt 43): RA 2003	Spectrophotometer
Sulphate (SO_4)	APHA 23rd Edn 2017 4500 SO_4 E	Spectrophotometer
Total hardness ($CaCO_3$)	APHA 23rd Edn 2017 2340 C	-
Cyanide (CN)	APHA 23rd Edn 2017 4500 CN C ,E	Spectrophotometer/ Ion Chromatography
Selenium (Se)	IS 3025 (Pt 56): 2003	
pH	IS 3025 (Pt 11): RA 2006	pH Meter
Colour	IS 3025 (Pt 04): RA 2017	
Odour	IS 3025 (Pt 05): RA 2006	-
Alkalinity	APHA 23rd Edn 2017 2320 B	-
Temperature	APHA 23rd Edn 2017 2550 B	-
Magnesium (Mg)	APHA 23rd Edn 2017 3500 Mg B	ICP OES/AES /AAS
Copper (Cu)	APHA 23rd Edn 2017 3111 B	ICP OES/AES /AAS

Iron (Fe)	APHA 23rd Edn 2017 3500 Fe B	ICP OES/AES /AAS
Manganese (Mn)	APHA 23rd Edn 2017 3111 B	ICP OES/AES /AAS
Mercury (Hg)	APHA 23rd Edn 2017 3112 B	ICP OES/AES /AAS (Hydride Generator)
Lead (Pb)	APHA 23rd Edn 2017 3111 B	ICP OES/AES /AAS
Arsenic (As)	APHA 23rd Edn 2017 3111 B	ICP OES/AES /AAS (Hydride Generator)
Cadmium (Cd)	APHA 23rd Edn 2017 3111 B	ICP OES/AES /AAS
Zinc (Zn)	APHA 23rd Edn 2017 3111 B	ICP OES/AES /AAS
Hexavalent Chromium	APHA 23rd Edn 2017 3500 Cr B	Spectrophotometer
Detergent	Annex K of IS 13428	Gas Stripping apparatus/ Spectrophotometer
Aluminum	IS 3025 (Pt 55): RA 2009	ICP OES/AES /AAS
E. Coli	IS 1622-1981: RA 2009	Bacteriological incubater/ Autoclave/ Laminar flow
Total Coliform	IS 1622: RA 2009	Bacteriological incubater/ Autoclave/ Laminar flow

Noise Level Monitoring: "Protocol for Ambient Level Noise Monitoring, IS 9989: RA 2001" was followed to monitor the Ambient Noise level surrounding the Project Site.

Parameters	Standard Methods	Analytical Instruments
Leq	IS 9989: RA 2001	Noise Level Meter

Weather Monitoring: "EPA-454/R-99-005, February 2000" was followed for micro-meteorological data collection result interpretation.

Parameters	Standard Methods	Analytical Instruments	Make/Model
Air Temperature	EPA-454/R-99-005	Digital sensor	Ambient Weather Station
Relative Humidity	EPA-454/R-99-005	Digital Sensor(Hygrometer)	
Wind Speed	EPA-454/R-99-005	3 Cup anemometer	
Wind Direction	EPA-454/R-99-005	Hall Effect (Wind Vane)	
Rain Fall	EPA-454/R-99-005	Tipping Bucket	

Soil sampling & analysis: "Indian Standard Method of Test for Soils (IS: 2720, IS: 14767 and IS: 5949)" were followed for soil sample collection, sample conditioning and analysis of physical chemical parameters. Hand boring method using spiral Auger was used for collection of soil samples.

Parameters	Standard Methods	Analytical Instruments
Magnesium	IS 5949:2003	ICP OES/AES
Calcium	IS 5949:2003	ICP OES/AES
Manganese	EPA 200.8	ICP OES/AES
Boron	EPA 200.2:1994/EPA2008: 1994	ICP OES/AES
Copper	EPA 200.8	ICP OES/AES

Sulphur	IS 14685	ICP OES/AES
Chloride	GGMPL/SOP/SOIL/45	ICP OES/AES
Zinc	EPA 200.8	ICP OES/AES
Nitrogen	IS 14684: 2005	ICP OES/AES
Phosphorous	GGMPL/SOP/SOIL/44	ICP OES/AES
Potassium	GGMPL/SOP/SOIL/47	ICP OES/AES
Iron	EPA 200.8	ICP OES/AES
Molybdenum	EPA 200.8	ICP OES/AES

A brief account of the methodologies and matrices followed in the present study is given under different headings. All the methods were structured for the identification, collection and organization of environmental impacts data. The information, thus gathered, had been analyzed and presented in the form of a number of visual formats for easy interpretation and Marision making.

SECTION 6: PLAN FOR SAMPLING LOCATIONS

Site selection criteria play an important role in the initiation of "baseline data generation" as it provides an outlook on the type of environmental compliance and management to be adopted by the project proponent. The locations were selected on the basis of "joint site survey", "examination of toposheet of the project area", "secondary micro-meteorological data analysis" and "availability of resources" for ambient air quality monitoring & micro-meteorological monitoring.

A synopsis about the locations is as follows:

AAQM Locations	
Code	**Name of Location**
L1	Near Motia Village
L2	Near Mali Village
L3	Near Nayabad Village

Met Data Station	
Code	**Name of Location**
M1	Hostel Block

Water Samples	
Code	**Name of Location**
G/W-1	Motia Village
G/W-2	Mali Village
G/W-3	Nayabad Village
G/W-4	Patwa Village

Noise Monitoring Locations	
Code	**Name of Location**
L1	Near Motia Village
L2	Near Mali Village
L3	Near Nayabad Village
L4	Near Patwa Village
L5	Near HTG Residential Area
L6	Near Adani Office

Soil Samples	
Code	**Name of Location**
S-1	Near Mali Village
S-2	Near Nayabad Village
S-3	Near Patwa Village

SECTION 7: METEOROLOGICAL DATA

Weather monitoring would help in keeping track of different parameters like temperature, humidity, rainfall, wind direction, wind speed & barometric pressure. Real time meteorological data is used to support a number of programs including public aviation, agricultural activity, digester management etc.

In the present study we monitored the "ambient temperature, relative humidity, wind speed, wind direction, barometric pressure etc.

Figure 1: Weather Monitoring Station at Hostel Block

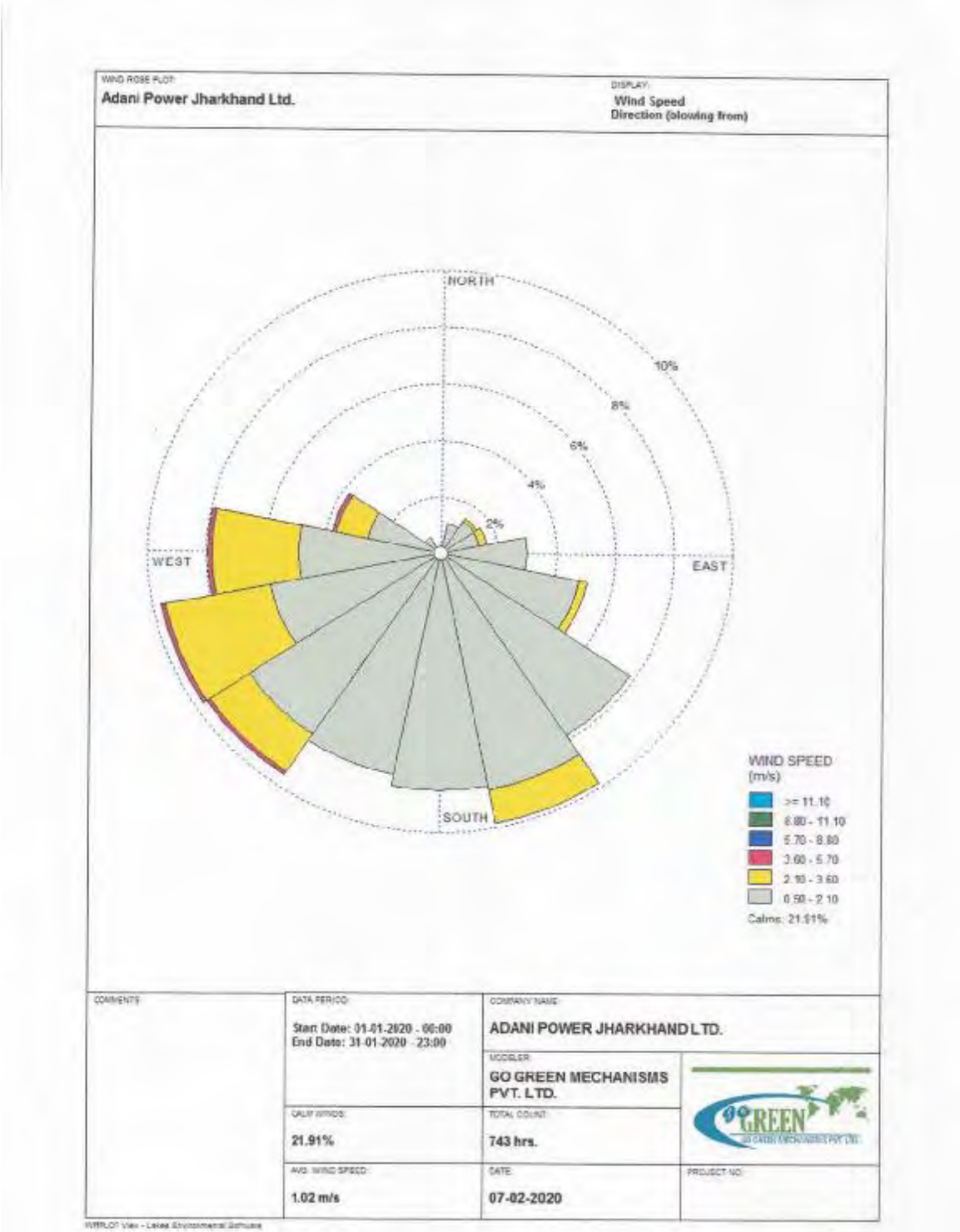


Figure 2: Windrose diagram for the month of January - 2020

It is observed from the windrose diagram for the month of January'20 the predominant wind direction is South.

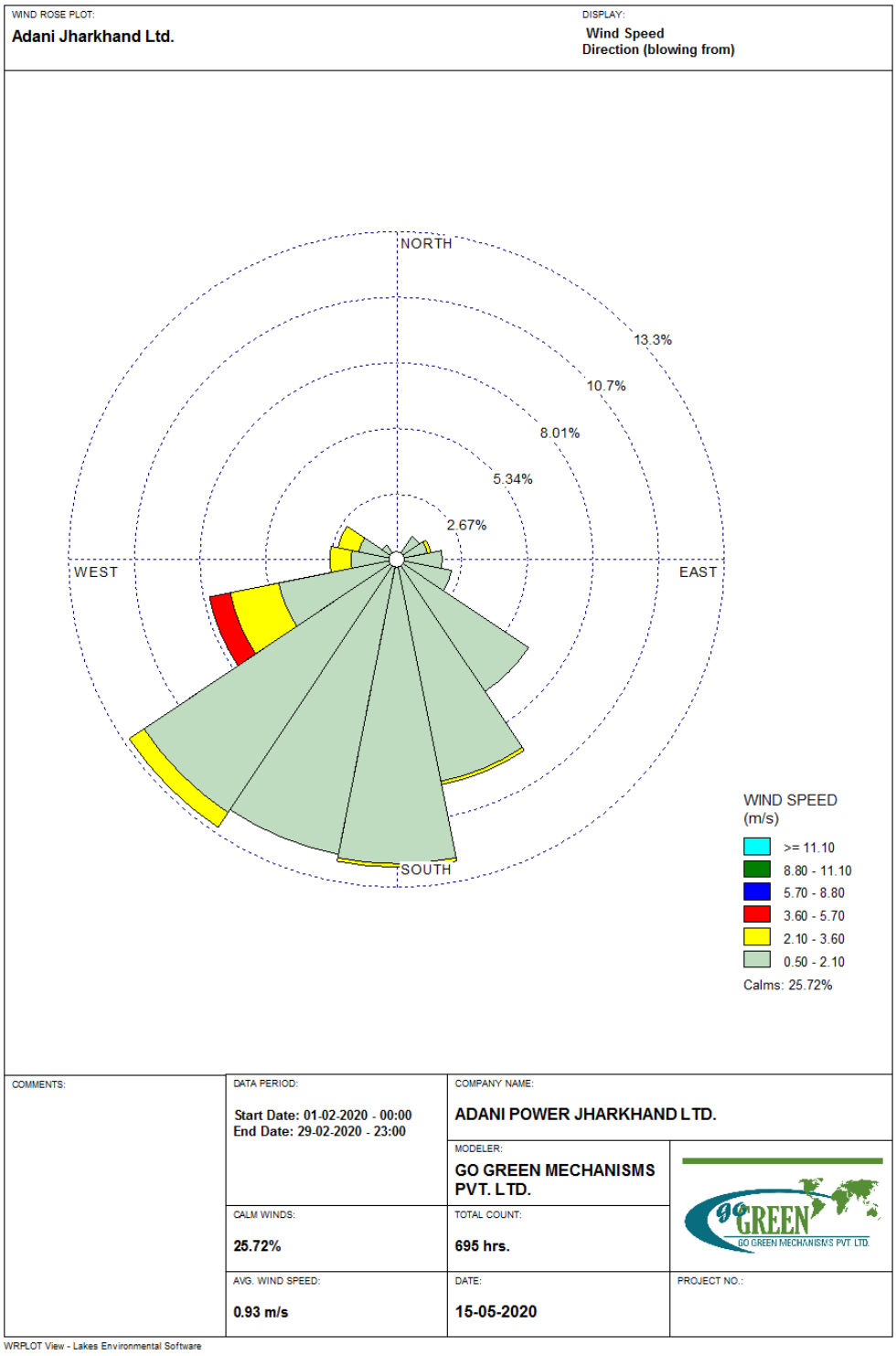


Figure 3: Windrose diagram for the month of February - 2020

It is observed from the windrose diagram for the month of Febember'20 the predominant wind direction is South-West.

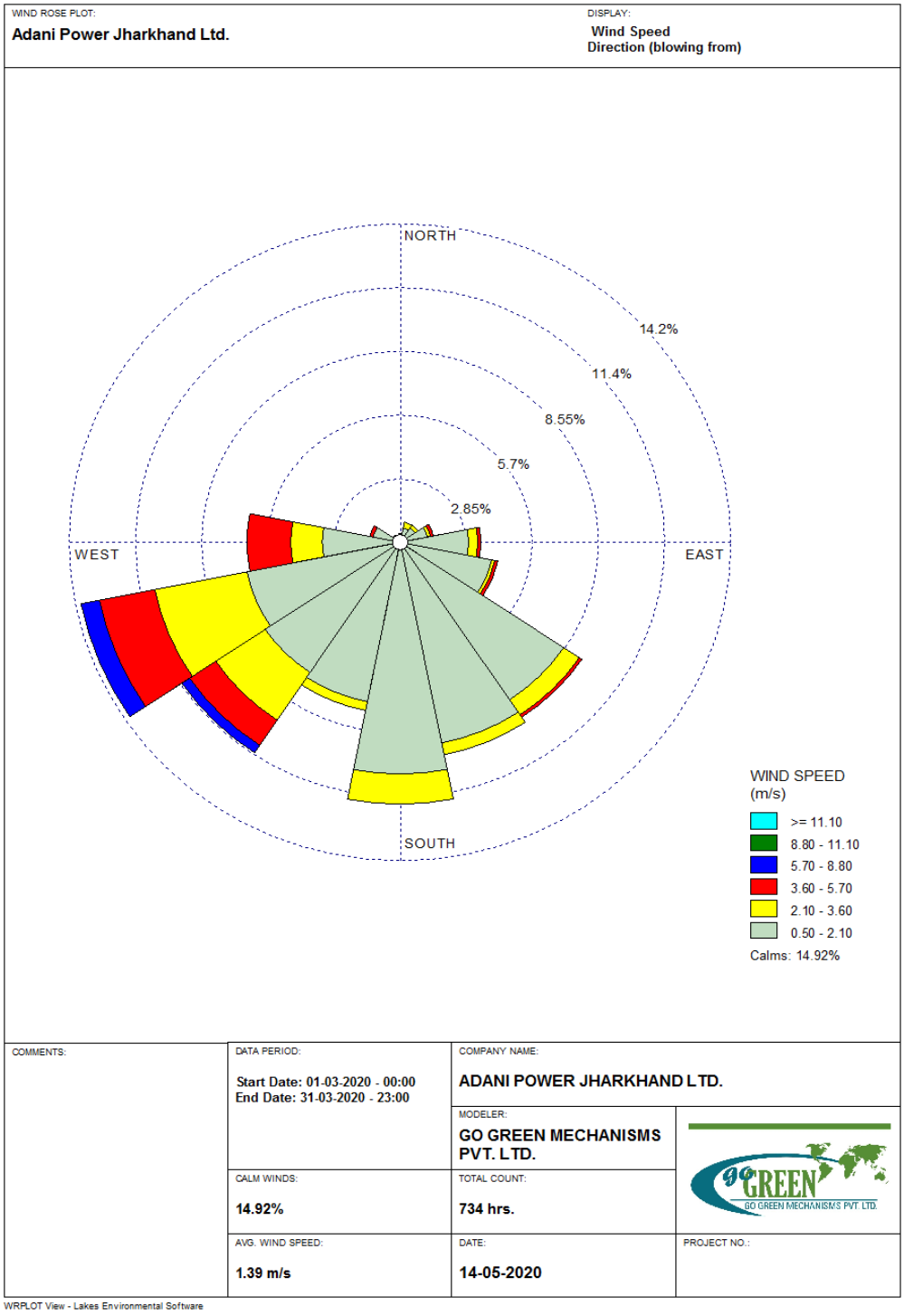


Figure 4: Windrose diagram for the month of March - 2020

It is observed from the windrose diagram for the month of March'20 the predominant wind direction is West.

METEOROLOGICAL OBSERVATIONS DATA AT ADANI POWER JHARKHAND LTD. GODDA

LOCATION: Hostel Block

Month: January-2020

Date	Temperature (Deg C)			Relative Humidity (%)			Wind Speed (M/Sec)			Predominant Wind Direction From			Atmospheric Pressure (mm Hg)			Rainfall (mm)
	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	Total
01.01.2020	17	11	14	94	74	85	2	0.0	1	279	31	181	759.1	755.9	757.4	1.8
02.01.2020	22	11	16	91	64	82	2.2	0.2	0.9	224	66	161	759.2	753.1	756.2	3.3
03.01.2020	23	15	18	93	60	80	2.2	0.5	1.1	300	119	168	756.9	753.1	755.2	0.3
04.01.2020	23	13	18	96	58	81	2.6	0.1	0.7	290	40	170	755.9	751.8	753.6	0.0
05.01.2020	19	13	16	91	66	82	4.3	0.3	2	290	104	241	755.8	752.9	754.1	0.0
06.01.2020	17	10	13	98	72	88	2	0.0	0.8	250	52	138	758.4	755.2	756.4	0.0
07.01.2020	19	9	14	98	56	81	1.4	0.2	0.7	294	17	171	757.2	753.2	755.0	0.2
08.01.2020	23	11	17	91	50	74	1.7	0.1	0.7	165	29	117	755.8	752.3	753.8	0.0
09.01.2020	20	15	17	94	71	84	2.2	0.1	0.8	283	51	163	755.3	752.6	753.6	2.8
10.01.2020	17	13	15	91	71	83	3.2	0.7	2.1	294	172	259	756.5	753.9	755.1	0.0
11.01.2020	19	13	15	61	88	78	3.1	0.2	1.7	351	77	261	757.5	754.4	755.7	0.0
12.01.2020	20	9	14	95	55	78	2.1	0.1	0.9	293	33	174	756.2	752.0	753.9	0.0
13.01.2020	18	8	13	97	67	86	2.2	0.1	0.7	358	70	165	753.6	751.1	752.3	0.0
14.01.2020	19	9	13	98	64	88	1.3	0.1	0.5	947	19	167	754.4	751.4	752.8	0.2
15.01.2020	22	10	15	98	53	82	1.2	0.0	0.5	278	25	143	755.6	752.5	753.7	0.3
16.01.2020	24	12	18	90	53	72	2.2	0	0.9	188	55	117	755.1	751.9	753.3	0.0
17.01.2020	28	16	21	85	44	69	2.7	0.4	1.3	307	60	147	754.9	751.9	753.2	0.0
18.01.2020	22	14	18	97	71	85	1.9	0.1	0.8	318	3	207	754.9	752.6	753.5	0.0
19.01.2020	20	15	17	96	73	87	2.5	0.2	1.1	291	40	229	755.6	752.6	753.9	0.3
20.01.2020	20	12	15	88	56	75	3.4	0	1.6	308	200	255	756.7	753.2	755	0.0
21.01.2020	21	11	15	92	48	76	2.2	0.1	0.9	240	2	162	758.1	754.9	756.2	0.0
22.01.2020	22	10	16	94	55	76	1.7	0.1	0.8	232	25	146	758.3	753.8	755.7	0.0
23.01.2020	22	11	16	92	36	67	3.8	0.1	1.6	284	148	218	756.4	752.3	754.1	0.0
24.01.2020	20	12	16	75	35	59	3.6	0.2	1.8	277	62	202	756.1	752.7	754.2	0.0
25.01.2020	20	8	15	85	46	66	1.4	0.1	0.8	305	103	194	756.1	751.8	753.9	0.0
26.01.2020	20	10	15	88	56	74	1.9	0.1	1.1	311	105	213	754.6	751	752.6	0.0
27.01.2020	21	11	16	91	51	74	2.2	0.2	1.2	274	90	199	754.3	750.3	751.9	0.0
28.01.2020	24	12	18	88	45	70	1.1	0.1	0.6	220	46	148	753.8	750.5	752	0.0
29.01.2020	22	16	18	93	68	78	2.2	0.1	1.3	168	54	124	755.2	751.9	753.2	0.0
30.01.2020	21	16	18	93	82	89	2.4	0.1	1	279	63	186	754.5	751	752.5	0.0
31.01.2020	21	13	17	94	46	71	3	0.2	1.6	286	16	214	755.1	751.8	753.1	0.0

For Go Green Mechanisms Pvt. Ltd.

METEOROLOGICAL OBSERVATIONS DATA AT ADANI POWER JHARKHAND LTD. GODDA

LOCATION: Hostel Block

Month: february-2020

Date	Temperature (Deg C)			Relative Humidity (%)			Wind Speed (M/Sec)			Predominant Wind Direction From			Atmospheric Pressure (mm Hg)			Rainfall (mm)
	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	Total
01.02.2020	10.0	22.0	16.1	45	87	64	0.3	2.0	1.0	138	291	209	753.2	756.4	754.6	0.0
02.02.2020	12.2	21.0	16.1	37	74	57	1.1	4.8	2.5	171	277	224	754.4	757.3	755.7	0.0
03.02.2020	10.6	21.4	15.7	39	77	60	0.0	1.9	1.1	5	248	161	754.3	758.3	756.1	0.0
04.02.2020	9.5	22.3	16.4	30	78	55	0.1	1.6	0.9	48	280	164	752.5	757.1	754.6	0.0
05.02.2020	13.0	23.0	17.6	46	75	62	0.2	2.0	1.1	144	272	212	751.4	754.8	753.1	0.0
06.02.2020	12.5	22.5	17.2	41	83	64	0.4	1.8	1.2	165	271	200	752.9	756.3	754.3	0.0
07.02.2020	11.1	21.5	16.5	44	82	63	0.3	1.4	0.8	97	235	164	754.0	757.1	755.4	0.0
08.02.2020	12.4	19.9	15.9	53	79	70	0.3	1.5	0.8	101	228	177	755.0	757.8	756.4	0.0
09.02.2020	12.9	22.6	17.4	39	80	59	0.3	2.7	1.4	187	292	234	755.2	759.0	756.7	0.0
10.02.2020	10.3	23.2	16.8	40	76	60	0.7	2.6	1.4	146	311	208	754.6	758.0	755.7	0.0
11.02.2020	12.0	23.4	17.5	41	77	61	0.6	2.0	1.3	132	297	210	754.5	757.7	755.8	0.0
12.02.2020	11.9	23.6	17.6	37	75	59	0.2	3.0	1.5	156	305	228	753.2	757	755.1	0.0
13.02.2020	12.7	23.7	18.1	48	76	64	0.2	2.6	1.3	61	323	206	750.5	755.2	752.7	0.0
14.02.2020	13.7	26.0	19.4	52	83	71	0.2	2.6	1.1	49	261	168	747.7	751.0	749.7	0.0
15.02.2020	16.0	25.3	20.0	46	85	67	0.2	3.0	1.5	136	318	230	749.9	753.3	751.5	0.0
16.02.2020	13.5	25.8	19.6	43	79	65	0.3	1.4	1.0	27	295	188	752.3	755.1	753.6	0.0
17.02.2020	14.0	25.7	19.8	48	86	68	0.3	1.4	1.0	131	278	193	752.3	755.9	753.8	0.0
18.02.2020	15.8	26.4	20.4	37	80	60	0.3	3.3	1.7	120	303	216	751	754	752.8	0.0
19.02.2020	13.3	27.1	20.2	33	77	56	0	1.9	1	43	236	164	752.2	755.7	753.7	0.0
20.02.2020	14.7	27.1	20.1	33	84	66	0	1.7	0.6	37	217	139	752.5	755.6	754	0.0
21.02.2020	16.9	28.5	22.6	48	91	71	0	1.4	0.7	75	224	118	754.3	757.6	755.7	0.0
22.02.2020	17.7	24.3	19.9	59	91	80	0.2	2.1	0.8	74	280	178	754.8	758.6	756.3	0.0
23.02.2020	16.9	27.5	21.8	51	93	73	0.1	1.4	0.8	61	263	154	752.6	757	754.5	0.0
24.02.2020	15.9	27.6	21.9	54	91	72	0	1.8	0.1	139	237	229	750.4	754.3	752.3	14.7
25.02.2020	16.8	25.8	20.2	57	93	81	0	0	0	236	237	236	749.4	752.9	751.6	21.0
26.02.2020	15.3	22.3	18.5	69	96	85	0	0	0	47	326	189	751.7	754.5	752.9	0.0
27.02.2020	15	23.7	18.8	62	98	85	0	1.4	0.3	60	263	170	752.1	755.1	753.4	0.0
28.02.2020	15.4	25.5	20.4	52	96	75	0	1.2	0.5	27	269	158	751.5	755	753	0.0
29.02.2020	15.8	26.6	21.3	52	90	72	0	2.2	0.7	41	264	156	750.5	753.3	751.6	0.0

For Go Green Mechanisms Pvt. Ltd.

METEOROLOGICAL OBSERVATIONS DATA AT ADANI POWER JHARKHAND LTD. GODDA

LOCATION: Hostel Block

Month: March-2020

Date	Temperature (Deg C)			Relative Humidity (%)			Wind Speed (M/Sec)			Predominant Wind Direction From			Atmospheric Pressure (mm Hg)			Rainfall (mm)
	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	Total
01.03.2020	27.6	17.0	22.1	87	54	72	1.1	0.0	0.5	267	86	179	753.6	749.7	751.5	0.0
02.03.2020	26.9	17.9	22.4	91	55	74	1.4	0.0	0.7	260	69	172	753.0	749.4	750.9	0.0
03.03.2020	29.6	18.3	23.8	89	44	69	1.4	0.1	0.7	308	20	168	751.9	747.8	749.8	0.0
04.03.2020	26.0	18.6	21.7	87	60	77	3.4	0.1	0.9	196	82	134	752.4	748.6	750.2	2.0
05.03.2020	28.1	16.9	22.4	93	49	73	1.7	0.1	0.8	186	83	125	752.4	748.6	750.4	0.0
06.03.2020	27.3	20.3	23.1	88	58	76	4.5	0.3	1.7	217	60	124	753.2	749.7	751.1	0.2
07.03.2020	27.3	18.8	22.8	88	60	73	3.5	0.3	1.9	227	99	160	753.9	750.3	751.9	0.8
08.03.2020	27.3	18.8	22.2	96	41	72	5.3	0.3	2.0	289	185	237	753.2	749.8	751.3	0.0
09.03.2020	26.9	17.1	21.9	79	36	60	3.6	0.3	19.8	331	111	223	752.6	749.4	750.9	0.0
10.03.2020	27.6	15.3	21.7	81	36	58	2.4	0.4	1.1	288	137	210	753.2	749.4	751.1	0.0
11.03.2020	28.2	17.2	22.9	79	40	60	1.4	0.4	0.8	262	128	193	752.5	749.4	750.9	0.0
12.03.2020	30.5	20.2	25.1	88	54	70	3.0	0.3	0.9	226	17	157	753.6	750.2	751.8	0.3
13.03.2020	30.4	21.2	24.6	92	58	79	4.0	0.1	1.2	261	56	142	754.7	751.3	753.0	27.9
14.03.2020	19.2	18.1	18.6	99	93	96	2.5	0.3	1.2	277	65	161	756.0	752.2	753.9	72.4
15.03.2020	27.7	17.4	22.2	98	57	81	1.2	0.3	0.7	289	55	198	754.9	751.0	752.8	0.2
16.03.2020	29.2	20.2	24.1	88	40	64	2.4	0.4	1.3	322	197	256	754.5	751.6	752.8	0.0
17.03.2020	27.7	19.4	23.6	77	51	64	1.6	0.5	1.0	359	33	221	755.2	752.2	753.5	0.0
18.03.2020	30.6	19.2	24.0	82	38	62	2.1	0.8	1.3	287	20	191	754.4	749.0	751.8	0.0
19.03.2020	29.7	19.2	24.6	76	37	59	1.7	0.2	1.0	294	115	201	753.0	749.0	750.9	0.0
20.03.2020	30.6	19.2	25.0	79	38	58	1.8	0.0	0.9	288	72	166	753.0	748.5	750.5	0.0
21.03.2020	32.4	19.3	25.4	78	32	57	6.9	0.3	1.6	264	78	179	752.0	748.6	750.4	0.0
22.03.2020	28.5	19.6	23.7	83	50	68	2.7	0.1	1.0	177	64	112	753.9	750.3	751.9	0.8
23.03.2020	29.5	19.2	23.9	88	49	70	2.9	0.2	0.9	234	47	133	753.3	749.0	751.3	0.0
24.03.2020	31.5	20.0	25.6	84	38	62	2.2	0.1	0.8	209	25	132	751.9	748.0	750.0	0.0
25.03.2020	31.7	20.6	26.4	80	42	60	1.4	0.0	0.8	318	136	189	750.9	747.1	749.0	0.0
26.03.2020	33.5	22.5	27.9	79	30	51	3.9	0.1	1.8	271	140	213	750.8	748.0	749.3	0.0
27.03.2020	34.5	22.9	28.6	65	32	49	4.1	0.6	1.7	280	166	232	751.5	748.4	750.1	0.0
28.03.2020	32.8	23.5	27.9	65	40	53	5.5	1.2	3.7	268	188	243	750.9	746.6	748.9	0.0
29.03.2020	33.2	22.2	27.6	67	21	41	6.9	1.5	4.0	270	181	238	749.8	747.0	748.3	0.0
30.03.2020	32.6	22.0	27.3	50	20	35	5.7	1.4	3.6	264	187	238	750.7	747.7	749.2	0.0
31.03.2020	33.4	21.3	27.5	55	22	38	4.4	0.2	1.8	272	57	202	752.0	747.8	749.7	0.0

For Go Green Mechanisms Pvt. Ltd.

SECTION 8: AMBIENT AIR MONITORING REPORT

8.1 CONCEPT & SCOPE

The Ambient Air monitoring encompasses the results and statistical evaluation of the data monitored at three different locations.

Different parameters like PM_{10}, $PM_{2.5}$, Oxides of Sulphur, Oxides of Nitrogen and Mercury are monitored for representing the ambient air quality within the study area.

8.2 FREQUENCY OF SAMPLING

The frequency of the sampling for AAQM was as follows:

PARAMETERS	FREQUENCY OF EACH LOCATION
PM10, PM2.5, Oxides of Sulphur, Oxides of Nitrogen	Twice in a week
Mercury	Once in a month

8.3 SAMPLING DURATION AS PER NAAQMs 2009

Sr. No.	Parameters	Sampling Duration (Hr.)
1	Particulate Matter (PM_{10})	24
2	Particulate Matter ($PM_{2.5}$)	24
3	Oxides of Sulphur (SO_2)	24
4	Oxides of Nitrogen (NOx)	24
5	Mercury	-

8.4 AAQM METHODOLOGY

PARAMETERS	METHODOLOGY/PRINCIPLE
Particulate Matter (PM_{10})	Air is drawn through a size-selective inlet and through a 20.3 X 25.4 cm (8 X 10 in) filter at a flow rate, which is typically 1132 L/min. Particles with aerodynamic diameter less than the cut-point of the inlet are collected, by the filter. The mass of these particles is determined by the difference in filter weights prior to and after sampling. The concentration of PM_{10} in the designated size range is calculated by dividing the weight gain of the filter by the volume of air sampled.
Particulate Matter ($PM_{2.5}$)	An electrically powered air sampler draws ambient air at a constant volumetric flow rate (16.7 lpm) maintained by a mass flow / volumetric flow controller coupled to a microprocessor into specially designed inertial particle-size separator (i.e. cyclones or impactors) where the suspended particulate matter in the $PM_{2.5}$ size ranges is separated for collection on a 47 mm polytetrafluoroethylene (PTFE) filter over a specified sampling period. Each filter is weighed before and after sample collection to determine the net gain due to the particulate matter. The mass concentration in the ambient air is computed as the total mass of collected particles in the $PM_{2.5}$ size ranges divided by the actual volume of air sampled, and is expressed in $\mu g/m^3$. The microprocessor reads averages and stores five-minute averages of ambient temperature, ambient pressure, filter temperature and volumetric flow rate.
Sulphur Dioxide (SO_2)	Sulphur dioxide from air is absorbed in a solution of potassium tetrachloromercurate (TCM). The impingers setup for the absorbance of Sulphur Dioxide from air is shown in Figure 15. A dichlorosulphitomercurate complex, which resists oxidation by the oxygen in the air, is formed. Once formed, this complex is stable to strong oxidants such as ozone and oxides of nitrogen and therefore, the absorber solution may be stored for some time prior to analysis. The complex is made to react with para-rosaniline and formaldehyde to form the intensely coloured pararosaniline methylsulphonic acid. The absorbance of the solution is measured by means of a suitable spectrophotometer.
Nitrogen Dioxide	Ambient nitrogen dioxide (NO_2) is collected by bubbling air through a solution of sodium hydroxide and sodium arsenite. The concentration of nitrite ion (NO_2) produced during sampling is determined colorimetrically by reacting the nitrite ion with phosphoric acid, sulfanilamide, and N-(1-naphthyl)-ethylenediamine dihydrochloride (NEDA) and measuring the absorbance of the highly coloured azo-dyeat 540 nm.

Figure 5: Ambient air Motoring Near Mali Village

Figure 6: Ambient air Monitoring Near Motia Village

8.5 ANALYTICAL RESULTS

Results & statistical calculations for Location- L1:

Name of Location (L1)		Near Motia Village			
Sr. No.	**Date of Sampling**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**NOx**
Unit		$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$
GSR 826 (E)		100	60	80	80
1.	02.01.2020	46.5	20.1	7.1	12.7
2.	06.01.2020	58.4	23.6	7.7	15.3
3.	09.01.2020	39.4	21.7	7.2	11.2
4.	13.01.2020	61.4	24.7	7.8	12.5
5.	16.01.2020	59.6	23.4	7.1	13.5
6.	20.01.2020	56.9	20.7	8.3	12.6
7.	23.01.2020	61.3	25.7	7.3	15.1
8.	27.01.2020	60.8	28.3	7.1	16.4
9.	30.01.2020	62.7	27.1	7.9	16.1
10.	03.02.2020	53.1	32.9	9.3	13.8
11.	06.02.2020	55.6	25.0	10.5	17.9
12.	10.02.2020	56.0	24.7	8.6	13.5
13.	13.02.2020	60.5	21.4	9.4	14.0
14.	17.02.2020	57.8	27.6	9.4	14.3
15.	20.02.2020	60.0	27.1	10.9	13.8
16.	24.02.2020	39.7	18.3	5.7	10.9
17.	27.02.2020	56.8	29.2	7.5	15.1
18.	02.03.2020	54.2	34.6	10.1	14.4
19.	05.03.2020	58.5	28.7	15.6	17.3
20.	09.03.2020	58.8	27.2	9.0	13.2
21.	12.03.2020	51.4	25.5	10.6	14.8
22.	16.03.2020	60.4	28.9	10.3	15.2
23.	19.03.2020	51.3	27.5	14.9	16.4
24.	23.03.2020	NA	NA	NA	NA
25.	26.03.2020	NA	NA	NA	NA
26.	30.03.2020	NA	NA	NA	NA
27.	31.03.2020	NA	NA	NA	NA

RESULT INTERPRETATION				
No. of Observations	27	27	27	27
Min Concentration	62.7	34.6	15.6	17.9
Max Concentration	39.4	18.3	5.7	10.9
Average	55.7	25.8	9.1	14.3

Results & statistical calculations for Location- L2:

Name of Location (L2)		Near Mali Village			
Sr. No.	**Date of Sampling**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**NOx**
Unit		µg/m³	µg/m³	µg/m³	µg/m³
GSR 826 (E)		100	60	80	80
1.	02.01.2020	47.7	21.4	9.7	13.2
2.	06.01.2020	61.1	29.7	9.9	15.5
3.	09.01.2020	40.3	21.7	10.1	12.5
4.	13.01.2020	61.9	24.2	8.1	11.7
5.	16.01.2020	60.7	23.5	9.3	12.7
6.	20.01.2020	61.1	23.3	8.7	12.0
7.	23.01.2020	62.1	22.6	8.9	13.2
8.	27.01.2020	59.3	24.1	8.5	12.6
9.	30.01.2020	63.5	21.6	8.1	11.4
10.	03.02.2020	60.5	24.4	11.0	16.3
11.	06.02.2020	58.5	23.2	12.1	17.0
12.	10.02.2020	56.8	25.4	13.0	16.4
13.	13.02.2020	59.3	26.7	9.8	13.5
14.	17.02.2020	59.8	29.0	10.9	14.0
15.	20.02.2020	58.9	24.2	11.9	13.8
16.	24.02.2020	39.3	16.3	7.3	11.7
17.	27.02.2020	57.9	29.5	7.3	11.4
18.	02.03.2020	60.3	22.7	9.3	15.8
19.	05.03.2020	61.3	28.1	11.5	15.6
20.	09.03.2020	61.7	23.7	13.8	16.9
21.	12.03.2020	56.6	25.0	11.9	16.4
22.	16.03.2020	57.8	31.1	11.8	14.6
23.	19.03.2020	58.5	25.0	12.3	14.3
24.	23.03.2020	NA	NA	NA	NA
25.	26.03.2020	NA	NA	NA	NA
26.	30.03.2020	NA	NA	NA	NA
27.	31.03.2020	NA	NA	NA	NA

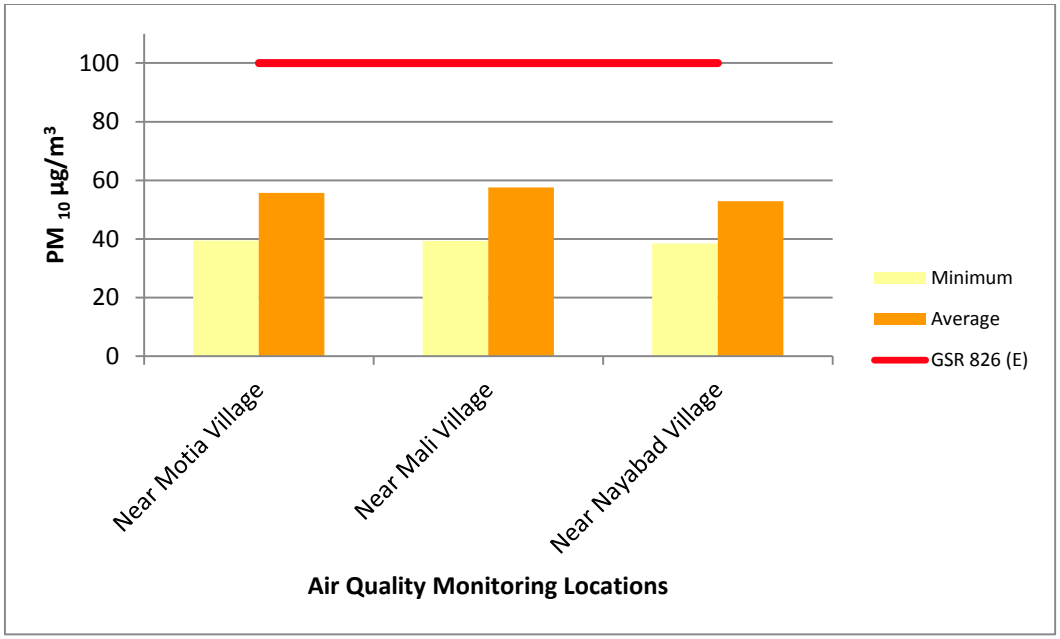
RESULT INTERPRETATION				
No. of Observations	27	27	27	27
Min Concentration	63.5	31.1	13.8	17.0
Max Concentration	39.3	16.3	7.3	11.4
Average	57.6	24.6	10.2	14.0

Results & statistical calculations for Location- L3:

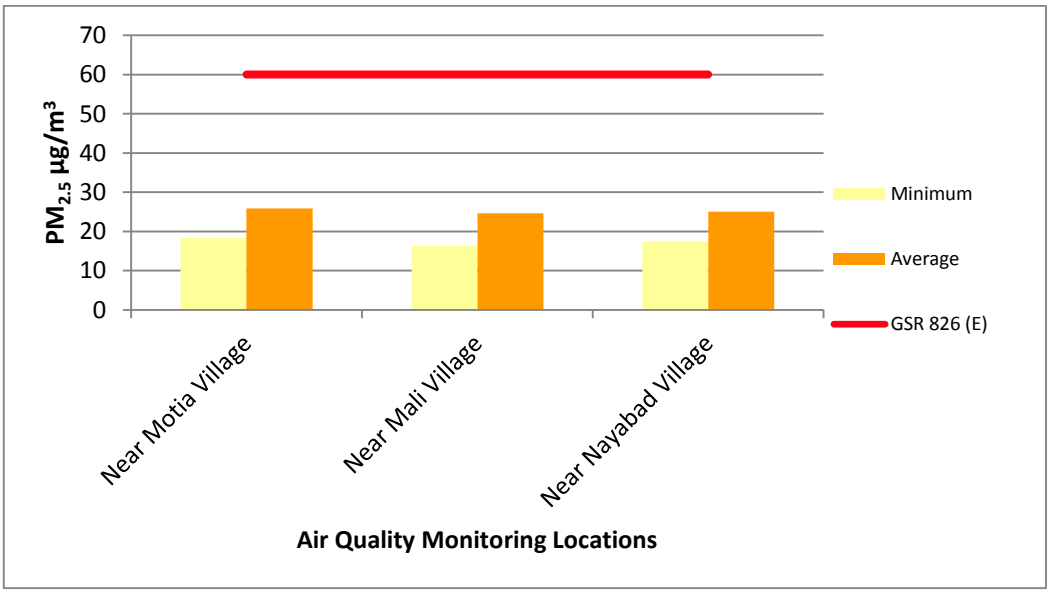
Name of Location (L3)		Near Nayabad Village			
Sr. No.	**Date of Sampling**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**NOx**
Unit		$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$
GSR 826 (E)		100	60	80	80
1.	02.01.2020	45.3	22.8	9.2	10.4
2.	06.01.2020	53.8	24.3	9.1	11.4
3.	09.01.2020	38.5	21.7	8.2	10.4
4.	13.01.2020	56.9	25.8	7.8	13.5
5.	16.01.2020	55.9	21.7	8.5	13.2
6.	20.01.2020	56.9	20.7	8.3	12.6
7.	23.01.2020	57.3	19.4	8.1	12.6
8.	27.01.2020	55.4	17.5	7.9	11.7
9.	30.01.2020	59.2	18.7	7.4	13.2
10.	03.02.2020	53.8	27.8	12.4	18.1
11.	06.02.2020	57.7	28.5	8.4	12.7
12.	10.02.2020	54.2	24.6	9.5	12.3
13.	13.02.2020	54.9	28.3	8.6	14.6
14.	17.02.2020	53.4	29.2	9.9	14.6
15.	20.02.2020	58.9	26.6	10.7	14.0
16.	24.02.2020	41.3	20.0	6.8	11.2
17.	27.02.2020	53.4	22.9	7.1	10.9
18.	02.03.2020	54.1	30.7	14.2	19.3
19.	05.03.2020	48.2	31.0	8.0	13.5
20.	09.03.2020	49.7	27.9	10.0	13.5
21.	12.03.2020	56.8	31.2	9.4	13.3
22.	16.03.2020	41.7	26.7	11.2	15.2
23.	19.03.2020	59.2	27.9	12.1	13.8
24.	23.03.2020	NA	NA	NA	NA
25.	26.03.2020	NA	NA	NA	NA
26.	30.03.2020	NA	NA	NA	NA
27.	31.03.2020	NA	NA	NA	NA

RESULT INTERPRETATION				
No. of Observations	27	27	27	27
Min Concentration	59.2	31.2	14.2	19.3
Max Concentration	38.5	17.5	6.8	10.4
Average	52.9	25.0	9.3	13.3

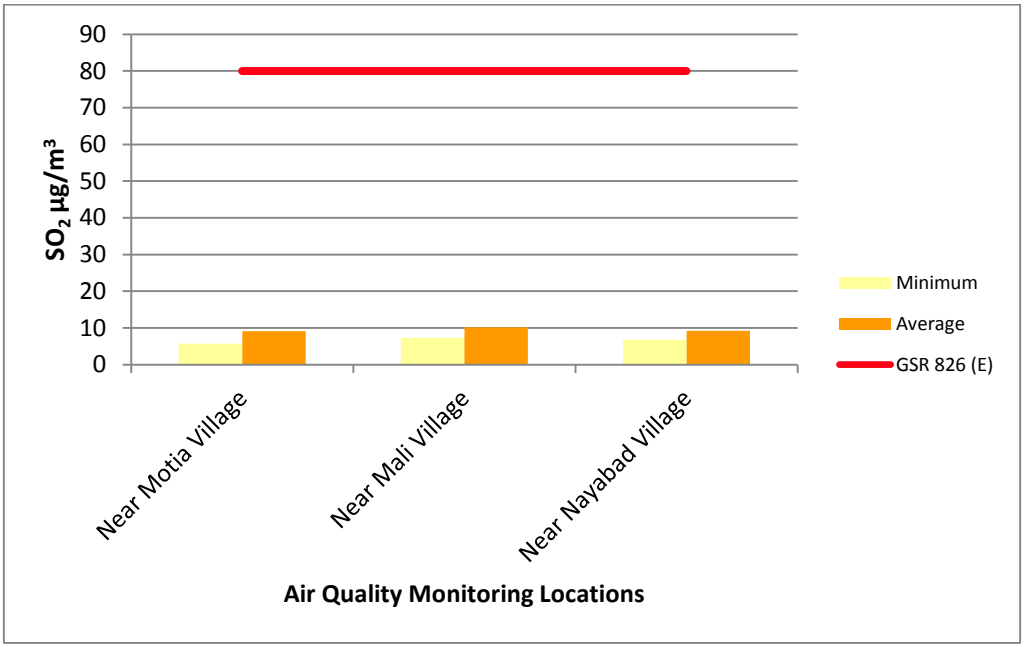
8.6 GRAPHICAL REPRESENTATION OF THE RESULTS



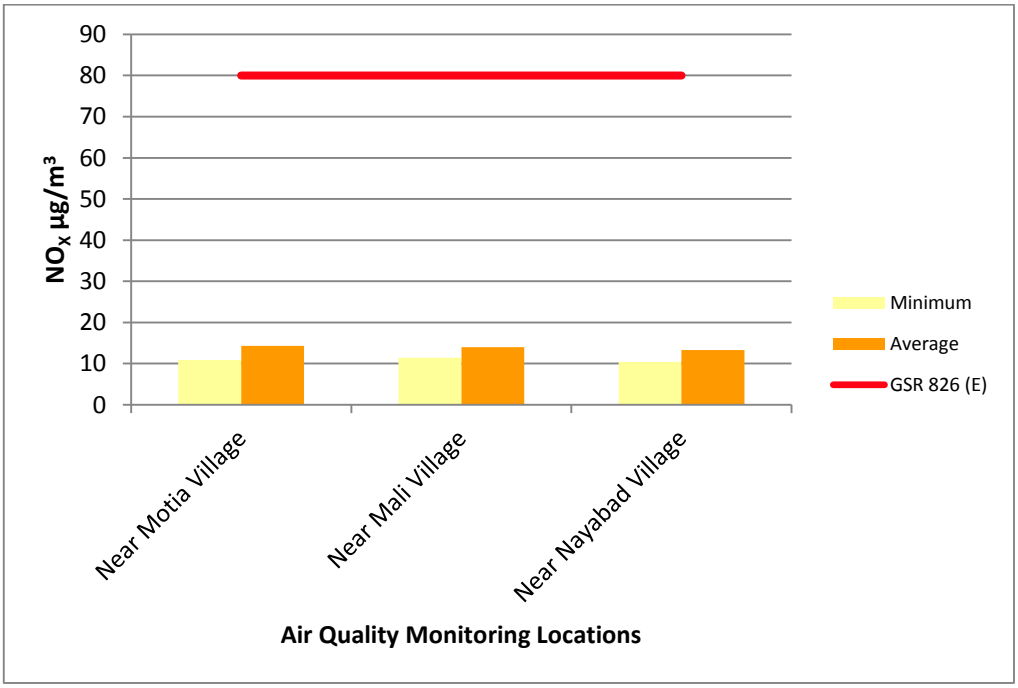
Particulate Matter (PM_{10})



Particulate Matter ($PM_{2.5}$)



Sulphur Dioxide (SO_2)



Oxides of Nitrogen (NO_x)

8.7 EXECUTIVE SUMMARY OF AAQM RESULTS

Particulate Matter (PM_{10})				
Site	**Minimum**	**Maximum**	**Average**	**GSR 826 (E)**
Near Motia Village	39.4	62.7	55.7	100
Near Mali Village	39.3	63.5	57.6	100
Near Nayabad Village	38.5	59.2	52.9	100

Particulate Matter ($PM_{2.5}$)				
Site	**Minimum**	**Maximum**	**Average**	**GSR 826 (E)**
Near Motia Village	18.3	34.6	25.8	60
Near Mali Village	16.3	31.1	24.6	60
Near Nayabad Village	17.5	31.2	25.0	60

Sulphur Dioxide (SO_2)				
Site	**Minimum**	**Maximum**	**Average**	**GSR 826 (E)**
Near Motia Village	5.7	15.6	9.1	80
Near Mali Village	7.3	13.8	10.2	80
Near Nayabad Village	6.8	14.2	9.3	80

Oxides of Nitrogen (NO_x)				
Site	**Minimum**	**Maximum**	**Average**	**GSR 826 (E)**
Near Motia Village	10.9	17.9	14.3	80
Near Mali Village	11.4	17.0	14.0	80
Near Nayabad Village	10.4	19.3	13.3	80

From all the above graphical representation it is clearly interpreted that all the values of PM_{10}, $PM_{2.5}$, SO_2 and NO_X were lower than the prescribed limits for all the stated locations.

8.8 ANALYTICAL RESULTS OF MERCURY

In this study, we also monitored some other critical pollutants like Mercury to assess the existing levels of air pollutants as well as the regional background concentration of the cluster area.
Beside these, some Heavy metal concentration in the ambient air were also monitored in and around the project area. The following tabulated pollutants were monitored once in a month.

Location	Sampling Month	Mercury (Hg)
Unit		µg/m^3
Limits as per GSR 826 Standard		NS
Near Motia Village	Jan'20	BQL(QL=0.02)
	Feb'20	BQL(QL=0.02)
	Mar'20	BQL(QL=0.02)
Near Mali Village	Jan'20	BQL(QL=0.02)
	Feb'20	BQL(QL=0.02)
	Mar'20	BQL(QL=0.02)
Near Nayabad Village	Jan'20	BQL(QL=0.02)
	Feb'20	BQL(QL=0.02)
	Mar'20	BQL(QL=0.02)

Note: NS= Not Specified

SECTION 9: WATER ANALYSIS REPORT

9.1 CONCEPT & SCOPE

Water quality of the project area plays an important role on the socio economy of the Project. The higher concentrations of the water pollutants have serious impacts on the environment. Hence, it becomes important to assess the water quality periodically in the project vicinity.

Thus to assess the water quality of the project area, 04 locations were selected for Ground water sampling.

The quality of Ground water samples were compared with respect to IS 3025/APHA specification, the concentration of the target analytes are within the prescribed limits.

Bacterial examination was also carried out to find out the E-Coli & Total Coliform contamination in water sources.

9.2 METHODOLOGY

PARAMETER	PRINCIPLE OF METHEDOLOGY
PH	Measurement of pH is one of the most important and frequently used test in water chemistry. Practically every phase of water supply and wastewater treatment, e.g., acid-base neutralization, Water softening, precipitation, coagulation, disinfection and corrosion control, is pH dependent. pH is used in alkalinity and carbon dioxide measurements and many other acid-base equilibria. At a given temperature the intensity of the acid or basic character of a solution is indicated by pH or hydrogen ion activity. Alkalinity and acidity are the acid and base neutralizing capacities of a water and usually expressed in mole per liter, needed to change the pH value of a 1-L sample by 1 unit. pH as defined by Sorenson is –log $[H^+]$; it is the "intensity" factor of acidity
Turbidity	The method is based on a comparison of the intensity of light scattered by a standard reference suspension under the same condition. Higher the intensity of scattered light, the higher the turbidity of particular sample. Formazin polymer is used as the primary standard reference suspension. The turbidity of a specify concentration of formalin suspension is defined as 4000 NTU.
Chloride	In a neutral or slightly alkaline solution, potassium chromate can indicate the endpoint of the silver nitrate titration of chloride. Silver chloride is precipitated quantitatively before red silver chromate is formed.
Fluoride	The SPANDS colorimetric method is based on the reaction between fluoride and a zirconium-dye lake. Fluoride reacts with the dye lake, dissociating a portion of it into a colorless complex anion (ZrF_6^{-2}) and the dye. As the amount of fluoride increase, the color produced becomes progressively lighter. The reaction rate between fluoride and zirconium ions is influenced greatly by the acidity of the reaction mixture. If the proportion of acid in the reagent is increased, the reaction can be made almost instantaneous. Under such condition, however, the effect of various ions differs from that in the conventional alizarin methods. The selection of dye for this rapid fluoride method is governed largely by the resulting tolerance to these ions.
Sulphate	Sulphate ion (SO_4^{2-}) is precipitated in an acetic acid medium with barium chloride ($BaCl_2$) so as to form barium sulphate ($BaSO_4$) crystals of uniform size. Light absorbance of the $BaSO_4$ suspension is measured by a photometer and the SO_4^{2-} concentration is determined by comparison of the reading with a standard curve SO_4^{2-}. The absorbance of the barium sulphate formed is measured by a spectrophotometer at 450 nm.
Cd, Cu, As, Pb, Hg, Zn, Mn	Atomic absorption spectroscopy is based on absorption by ground state atoms of an element present in the sample which is atomized in the flame or graphic furnace. Depending on absorption of selected wavelength of the element the concentration is estimated. The technique provides valuable information on concentration of required elements present in the sample. Concentration are in ppm or ppb levels depending on source of sample excitation.
Iron	Iron is brought into solution, reduced to the ferrous state by boiling with acid and hydroxylamine and treated with 1,10-phenanthroline at pH 3.2 to 3.3 Three molecules of phenanthroline chelate each atom of ferrous iron to form an orange-red complex. The colored solution obeys beer's law; its intensity is independent of pH from 3 to 9. A pH between 2.9 and 3.5 insures rapid color development in the presence of an excess of phenanthroline. Color standards are stable for at least 6 months.

Hexavalent Chromium (As Cr^{+6})	This procedure measures only hexavalent chromium, Cr^{+6}. For total chromium, Determination, acid-digest the sample and follow with a suitable instrumental analysis technique. The hexavalent chromium is determined calorimetrically by reaction with diphenylcarbazide in acid solution. A red-violet colored complex of unknown composition is produced which is measured at 540 nm.
Calcium (As Ca)	When EDTA is added to water containing both calcium and magnesium it combines first with the calcium. Calcium can be determined directly with EDTA, when the pH is made sufficiently high that the magnesium is largely precipitated as the hydroxide and an indicator is used that combines with calcium only. Several indicators give a Colour change when all of the calcium has been complexed by the EDTA at a pH of 12 to 13.
Total Hardness (As $CaCO_3$)	This method depends on ability of EDTA or its disodium salt to form stable complexes with calcium and magnesium ions. When the dye Eriochrome black T (EBT) is added to a solution containing calcium and magnesium ions at pH 10.0 a wine red complex is formed. This solution is titrated with standard solution of disodium salt of EDTA, which extracts calcium and magnesium from the dye complex and the dye is changed back to its original blue Colour. Eriochrome black T is used to indicate the end-point for the titration of calcium and magnesium together.
Residual Chloride	Chlorine will liberate free iodine from potassium iodide (KI) solution at pH 8 or less. The liberated iodine is titrated with a standard solution of sodium thiosulfate ($Na_2S_2O_3$) with starch as the indicator. Titrate at pH 3 to 4 because the reaction is not stoichiometric at neutral pH due to partial oxidation of thiosulfate to sulfate.
Boron (As B)	In the presence of boron, a solution of carmine or carminic acid in concentrated sulphuric acid changes from a bright red to a bluish red or blue, Depending on the concentration of boron present.
Total Dissolved Solids	A well-mixed sample is filtered through a standard filter and the filtrate is evaporated to dryness in a weighed dish and dried to constant weight at 180°C. The increase in dish weight represents the total dissolved solids.
Nitrate	Two moles of nitrate nitrogen react with one mole of chromotropic acid to form a yellow reaction product having maximum absorbance at 410 nm.
Alkalinity (As $CaCO_3$)	Hydroxyl ions present in a sample as a result of dissociation or hydrolysis of solutes react with addition of standard acid. Alkalinity thus depends on the end point pH used. For method of determining inflection points from titration curves and the rationale for titrating to fixed pH endpoints.

Figure 7: Water Sampling Near Motia Village

Figure 8: Water Sampling Near Mali Village

Figure 9: Water Sampling Near Nayabad Village

Figure 10: Water Sampling Near Patwa Village

9.3 ANALYTICAL RESULTS

Date of Sampling: 20.01.2020

Sr. No.	Parameter	Unit	Locations	As Per IS 10500:2012	
			Motia Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.45	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	26	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	428	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	182	200	600
9.	Alkalinity as $CaCo_3$	mg/L	93	200	600
10.	Calcium as Ca	mg/L	52.1	75	200
11.	Chloride	mg/L	22.5	250	1000
12.	Sulphate	mg/L	32.7	200	400
13.	Nitrate	mg/L	7.3	45	No Relaxation
14.	Iron	mg/L	0.23	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=0.1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	BQL(QL=0.1)	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	BQL(QL=0.2)	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	12.6	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 20.01.2020

Sr. No.	Parameter	Unit	Location	As Per IS 10500:2012	
			Mali Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.35	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	24	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	412	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	150	200	600
9.	Alkalinity as $CaCo_3$	mg/L	120	200	600
10.	Calcium as Ca	mg/L	40.1	75	200
11.	Chloride	mg/L	21.0	250	1000
12.	Sulphate	mg/L	33.3	200	400
13.	Nitrate	mg/L	7.3	45	No Relaxation
14.	Iron	mg/L	0.28	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=0.1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	BQL(QL=0.1)	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	BQL(QL=0.2)	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	12.2	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 20.01.2020

Sr. No.	Parameter	Unit	Locations	As Per IS 10500:2012	
			Nayabad Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.50	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	23	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	366	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	154	200	600
9.	Alkalinity as $CaCo_3$	mg/L	100	200	600
10.	Calcium as Ca	mg/L	37.7	75	200
11.	Chloride	mg/L	22	250	1000
12.	Sulphate	mg/L	30.2	200	400
13.	Nitrate	mg/L	7.4	45	No Relaxation
14.	Iron	mg/L	0.28	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=0.1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	BQL(QL=0.1)	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	BQL(QL=0.2)	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	14.6	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 20.01.2020

Sr. No.	Parameter	Unit	Location	As Per IS 10500:2012	
			Patwa Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.25	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	26	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	348	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	142	200	600
9.	Alkalinity as $CaCo_3$	mg/L	88	200	600
10.	Calcium as Ca	mg/L	43.3	75	200
11.	Chloride	mg/L	21.5	250	1000
12.	Sulphate	mg/L	30.9	200	400
13.	Nitrate	mg/L	6.3	45	No Relaxation
14.	Iron	mg/L	0.21	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=0.1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	BQL(QL=0.1)	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	BQL(QL=0.2)	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	8.3	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 22.02.2020

Sr. No.	Parameter	Unit	Locations	As Per IS 10500:2012	
			Motia Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.35	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	25	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	364	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	178	200	600
9.	Alkalinity as $CaCo_3$	mg/L	95	200	600
10.	Calcium as Ca	mg/L	50.5	75	200
11.	Chloride	mg/L	23.5	250	1000
12.	Sulphate	mg/L	33.6	200	400
13.	Nitrate	mg/L	7.8	45	No Relaxation
14.	Iron	mg/L	0.27	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=0.1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	BQL(QL=0.1)	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	BQL(QL=0.2)	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	12.6	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 22.02.2020

Sr. No.	Parameter	Unit	location	As Per IS 10500:2012	
			Mali Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.80	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	25	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	434	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	170	200	600
9.	Alkalinity as $CaCo_3$	mg/L	132	200	600
10.	Calcium as Ca	mg/L	48.9	75	200
11.	Chloride	mg/L	20	250	1000
12.	Sulphate	mg/L	34.6	200	400
13.	Nitrate	mg/L	7.9	45	No Relaxation
14.	Iron	mg/L	0.29	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=0.1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	BQL(QL=0.1)	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	BQL(QL=0.2)	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	11.7	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 22.02.2020

Sr. No.	Parameter	Unit	Locations	As Per IS 10500:2012	
			Nayabad Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.35	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	25	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	400	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	162	200	600
9.	Alkalinity as $CaCo_3$	mg/L	108	200	600
10.	Calcium as Ca	mg/L	51.3	75	200
11.	Chloride	mg/L	23.0	250	1000
12.	Sulphate	mg/L	32.2	200	400
13.	Nitrate	mg/L	7.9	45	No Relaxation
14.	Iron	mg/L	0.29	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=0.1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	BQL(QL=0.1)	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	BQL(QL=0.2)	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	8.3	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 22.02.2020

Sr. No.	Parameter	Unit	Location	As Per IS 10500:2012	
			Patwa Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.45	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	25	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	376	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	156	200	600
9.	Alkalinity as $CaCo_3$	mg/L	89	200	600
10.	Calcium as Ca	mg/L	47.3	75	200
11.	Chloride	mg/L	22.5	250	1000
12.	Sulphate	mg/L	32.8	200	400
13.	Nitrate	mg/L	8.6	45	No Relaxation
14.	Iron	mg/L	0.29	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=0.1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	BQL(QL=0.1)	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	BQL(QL=0.2)	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	9.2	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 19.03.2020

Sr. No.	Parameter	Unit	Locations	As Per IS 10500:2012	
			Motia Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.55	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	28	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	380	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	182	200	600
9.	Alkalinity as $CaCo_3$	mg/L	97	200	600
10.	Calcium as Ca	mg/L	53.7	75	200
11.	Chloride	mg/L	22.5	250	1000
12.	Sulphate	mg/L	34.5	200	400
13.	Nitrate	mg/L	8.6	45	No Relaxation
14.	Iron	mg/L	0.26	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=0.1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	BQL(QL=0.1)	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	BQL(QL=0.2)	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	11.7	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 19.03.2020

Sr. No.	Parameter	Unit	Location	As Per IS 10500:2012	
			Mali Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.45	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	29	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	376	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	174	200	600
9.	Alkalinity as $CaCo_3$	mg/L	115	200	600
10.	Calcium as Ca	mg/L	50.5	75	200
11.	Chloride	mg/L	22	250	1000
12.	Sulphate	mg/L	37.3	200	400
13.	Nitrate	mg/L	7.9	45	No Relaxation
14.	Iron	mg/L	0.26	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	BQL(QL=0.1)	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.01)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	BQL(QL=0.2)	5	15
30.	Detergent	mg/L	BQL(QL=0.05)	0.2	1
31.	Magnesium As Mg	mg/L	12	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 19.03.2020

Sr. No.	Parameter	Unit	Locations	As Per IS 10500:2012	
			Nayabad Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.70	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	27	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	406	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	178	200	600
9.	Alkalinity as $CaCo_3$	mg/L	111	200	600
10.	Calcium as Ca	mg/L	52.9	75	200
11.	Chloride	mg/L	23	250	1000
12.	Sulphate	mg/L	34.2	200	400
13.	Nitrate	mg/L	8.2	45	No Relaxation
14.	Iron	mg/L	0.27	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	BQL(QL=0.1)	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.01)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	BQL(QL=0.2)	5	15
30.	Detergent	mg/L	BQL(QL=0.001)	0.2	1
31.	Magnesium As Mg	mg/L	11.2	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

Date of Sampling: 19.03.2020

Sr. No.	Parameter	Unit	Location	As Per IS 10500:2012	
			Patwa Village	Acceptable Limit	Permissible Limit
1.	Colour	Hazen	BQL(QL=1)	5	15
2.	Odour	...	Agreeable	Agreeable	Agreeable
3.	pH @ 25 ^{o}C	...	7.60	6.5 to 8.5	No Relaxation
4.	Temperature °C	°C	27	-	-
5.	Taste	...	Agreeable	Agreeable	Agreeable
6.	Turbidity	NTU	BQL(QL=0.1)	1	5
7.	Total Dissolved Solids @ 180 ^{0}C	mg/L	368	500	2000
8.	Total Hardness as $CaCo_3$	mg/L	156	200	600
9.	Alkalinity as $CaCo_3$	mg/L	85	200	600
10.	Calcium as Ca	mg/L	49.7	75	200
11.	Chloride	mg/L	21.5	250	1000
12.	Sulphate	mg/L	33.9	200	400
13.	Nitrate	mg/L	8.8	45	No Relaxation
14.	Iron	mg/L	0.28	0.3	No Relaxation
15.	Fluoride	mg/L	BQL(QL=1)	1	1.5
16.	Hexavalent Chromium as Cr^{+6}	mg/L	BQL(QL=0.01)	-	-
17.	Phenolic Compounds	mg/L	BQL(QL=0.001)	0.001	0.002
18.	Residual Chlorine	mg/L	BQL(QL=0.05)	0.2	1
19.	Cyanide	mg/L	BQL(QL=0.01)	0.05	No Relaxation
20.	Aluminum (As Al)	mg/L	BQL(QL=0.001)	0.03	0.2
21.	Arsenic (As As)	mg/L	BQL(QL=0.01)	0.01	0.05
22.	Boron (As B)	mg/L	BQL(QL=0.1)	0.5	1
23.	Cadmium (As Cd)	mg/L	BQL(QL=0.001)	0.003	No Relaxation
24.	Copper (As Cu)	mg/L	BQL(QL=0.01)	0.05	1.5
25.	Lead (As Pb)	mg/L	BQL(QL=0.01)	0.01	No Relaxation
26.	Manganese (As Mg)	mg/L	BQL(QL=0.05)	0.1	0.3
27.	Mercury (As Hg)	mg/L	BQL(QL=0.001)	0.001	No Relaxation
28.	Selenium (As Se)	mg/L	BQL(QL=0.001)	0.01	No Relaxation
29.	Zinc (As Zn)	mg/L	BQL(QL=0.2)	5	15
30.	Detergent	mg/L	BQL(QL=0.001)	0.2	1
31.	Magnesium As Mg	mg/L	10.2	30	100
32.	E-Coli	MPN/100 mL	Absent	-	Absent
33.	Total Coliform	MPN/100 mL	Absent	Absent	Absent

The above tabulated results reveal that the concentration of the target analyte is found to be within the prescribed limits.

SECTION 10: NOISE LEVEL MONITORING

To know the background ambient noise level at the project and surrounding environment, noise level were measured at all the ambient air monitoring stations for baseline study.

The Day time & Night time average noise level data are given in tabular formats as well as in graphical form for easy interpretation.

Here, the day time means time from 06:00 am to 10:00 pm & night time means time from 10:00 pm to 06:00 am.

$$Leq = \frac{10\ \text{Log10}\ (\text{t1x10}^{\frac{L1}{10}} + \text{t2 x}\ 10^{\frac{L2}{10}} + \text{t3 x}\ 10^{\frac{L3}{10}} + ..)}{T}$$

Where Leq = Equivalent continuous noise level (dB)(A)
t1 = time at L1 (Hours)
t2 = time at L2 (Hours)
L1 = sound pressure level dB (A) at time 1
T = total time over which the Leq is required (Hours)

(L1) Near Motia Village

Sr. No.	Starting Date	Max Day Time	Min Day Time	Leq (Day)	Max Night Time	Min Night Time	Leq (Night)
	Unit	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
CPCB Standard for Industrial Area		75	75		70	70	
1	20.01.2020	53.2	43.5	50.7	47.9	38.2	40.7
2	20.02.2020	62.3	50.2	57.7	55.2	48.2	51.6
3	19.03.2020	63.1	51.5	57.7	54.1	49.5	52.1

(L2) Near Mali Village

Sr. No.	Starting Date	Max Day Time	Min Day Time	Leq (Day)	Max Night Time	Min Night Time	Leq (Night)
	Unit	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
CPCB Standard for Industrial Area		75	75		70	70	
1	20.01.2020	55.9	45.3	51.3	47.2	38.1	44.1
2	20.02.2020	61.7	51.2	57.7	55.1	49.2	51.8
3	19.03.2020	61.5	51.2	57.3	55.1	49.2	51.5

(L3) Near Nayabad Village

Sr. No.	Starting Date	Max Day Time	Min Day Time	Leq (Day)	Max Night Time	Min Night Time	Leq (Night)
	Unit	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
CPCB Standard for Industrial Area		75	75		70	70	
1	20.01.2020	52.4	41.9	50.4	46.2	35.3	39.7
2	20.02.2020	61.4	52.4	57.7	56.4	48.2	51.9
3	19.03.2020	61.4	52.4	57.7	55.3	48.2	51.5

(L4) Near Patwa Village							
Sr. No.	Starting Date	Max Day Time	Min Day Time	Leq (Day)	Max Night Time	Min Night Time	Leq (Night)
	Unit	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
	CPCB Standard for Industrial Area	75	75		70	70	
1	20.01.2020	55.2	41.6	54.0	45.3	39.4	40.4
2	20.02.2020	65.7	50.8	59.3	54.2	48.2	51.5
3	19.03.2020	62.3	51.7	58.5	55.8	48.2	51.7

(L5) Near HTG Residential Area							
Sr. No.	Starting Date	Max Day Time	Min Day Time	Leq (Day)	Max Night Time	Min Night Time	Leq (Night)
	Unit	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
	CPCB Standard for Industrial Area	75	75		70	70	
1	20.01.2020	61.5	51.2	55.9	44.3	37.5	46.2
2	20.02.2020	61.8	53.4	58.1	55.7	49.2	52.4
3	19.03.2020	61.8	53.4	57.9	55.7	50.3	52.7

(L6) Near Adani Office							
Sr. No.	Starting Date	Max Day Time	Min Day Time	Leq (Day)	Max Night Time	Min Night Time	Leq (Night)
	Unit	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
	CPCB Standard for Industrial Area	75	75		70	70	
1	20.01.2020	62.1	47.6	56.6	49.5	38.3	44.7
2	20.02.2020	60.9	54.2	57.5	54.1	48.6	51.5
3	19.03.2020	61.1	54.2	57.6	53.7	49.2	51.2

From above tabulated results it can be concluded that the noise level was within the prescribed limits throughout the monitoring period at the stated locations.

SECTION 11: SOIL ANALYSIS

11.1 CONCEPT & SCOPE

Soil is fundamental & ultimate natural resources that full fill a number of functions & provide various services like agriculture, industrial construction & ecological habitat development etc. Some of the most significant impacts on this resource occur as a result of activities associated with the use of chemical fertilizers, unscientific construction activities, unplanned city design, unscientific land use pattern and land filling by toxic materials.

Soil analysis can determine the fertility or the expected growth potential and the nutrient deficiency and potential toxicity which help in taking cost effective Marision for the better soil management.

Location Code	Name of Location
S-1	Near Mali Village
S-2	Near Nayabad Village
S-3	Near Patwa Village

11.2 SOIL ANALYTICAL RESULTS

Date of Sampling: 21.10.2020

Location: Near Mali Village

Date of Sampling: 17.02.2020

Sr. No.	Parameter	Unit	Result	Norms
1.	Magnesium	%	0.34	NS
2.	Calcium	%	1.16	NS
3.	Manganese	mg/kg	BQL(QL=0.1)	NS
4.	Boron	mg/kg	0.8	NS
5.	Copper	mg/kg	BQL(QL=0.1)	NS
6.	Sulphur	%	0.5	NS
7.	Chloride	%	0.09	NS
8.	Zinc	mg/kg	8.1	NS
9.	Nitrogen	%	1.31	NS
10.	Phosphorous	%	0.05	NS
11.	Potassium	%	0.049	NS
12.	Iron	%	0.067	NS
13.	Molybdnum	mg/kg	BQL(QL=0.1)	NS

Location: Near Nayabad Village

Date of Sampling: 17.02.2020

Sr. No.	Parameter	Unit	Result	Norms
1.	Magnesium	%	0.65	NS
2.	Calcium	%	1.12	NS
3.	Manganese	mg/kg	BQL(QL=0.1)	NS
4.	Boron	mg/kg	0.62	NS
5.	Copper	mg/kg	BQL(QL=0.1)	NS
6.	Sulphur	%	0.09	NS
7.	Chloride	%	0.04	NS
8.	Zinc	mg/kg	4.2	NS
9.	Nitrogen	%	0.87	NS
10.	Phosphorous	%	0.081	NS
11.	Potassium	%	0.056	NS
12.	Iron	%	0.047	NS
13.	Molybdnum	mg/kg	BQL(QL=0.1)	NS

Location: Near Patwa Village				
Date of Sampling: 17.02.2020				
Sr. No.	Parameter	Unit	Result	Norms
1.	Magnesium	%	0.82	NS
2.	Calcium	%	1.96	NS
3.	Manganese	mg/kg	BQL(QL=0.1)	NS
4.	Boron	mg/kg	0.8	NS
5.	Copper	mg/kg	BQL(QL=0.1)	NS
6.	Sulphur	%	0.085	NS
7.	Chloride	%	0.12	NS
8.	Zinc	mg/kg	3.1	NS
9.	Nitrogen	%	1.44	NS
10.	Phosphorous	%	0.08	NS
11.	Potassium	%	0.07	NS
12.	Iron	%	0.035	NS
13.	Molybdnum	mg/kg	BQL(QL=0.1)	NS

Note: NS= Not Specified

Annexure II

Corporate Social Responsibility

CSR PROGRESS REPORT

(OCT'19 –MAR'20)

Adani Power (Jharkhand) Limited

Motia, Patwa & adjacent Village,

Godda Taluka, Godda District

Jharkhand

HALF YEARLY REPORT 2019-20 (OCT'19 –MAR'20)

INTRODUCTION

The Adani Foundation, the CSR arm of Adani Group of Companies, executes Corporate Social Responsibility projects for Thermal Power Plant, Motia in four main core areas– Education, Community Health, Sustainable Livelihood Development and Community Infrastructure Development. With a people centric approach, the Foundation responds towards the emerging needs at the grass roots level aligning its activities with the Sustainable Development Goals (SDGs) with a vision to end poverty and protect and preserve planet and bring solidarity and peace among all individuals and society. Adani Foundation aims to walk with the communities, empower people to look ahead by making the right choices and securing a bright and beautiful future, together. This year at Godda site, the 2 ongoing Projects have nailed its reach by intensively benefitting immense number of beneficiary's viz. Gyanodaya which facilitate new learning pedagogy in govt. schools through e-learning classes. The exemplified performance of Gyanodaya in shaping bright future of children through digital learning's has navigated NITI Aayog to extend its reach to the unreached by replication of Gyanodaya in all 19 Aspirational Districts of Jharkhand. On the other hand, Phoolo Jhano Saksham Aajeevika Mandal (PJSASM), a Sustainable Model for Uplifting Livelihood for Women Groups have empowered women socially and economically who are independently surpassing all the rivals and achieving triumph in family and society through their stitching skills and allegiance. The unprecedented performance of Women Groups of Saksham Sewing trainees has received two assignments for Sweater Weaving Project and supply of uniforms for 1.51 lakh govt. school students for another 5 years from District Education department.

In this financial year Adani's CSR intervention extends to Godda and Sahebganj districts of Jharkhand state covering 192 villages of Core, Periphery, Railway Siding and Pipeline area. Apart from benefitting and engaging communities from our intervention areas, many of CSR activities were conducted in Godda town too for establishing Adani Foundation as a brand among the intellectuals of the society. Total population of Godda district is 13.13 lakhs, out of which population of our intervention villages is 60000 approximately. We have been able to benefit 4.53 lakhs people directly and 10.38 lakhs people indirectly across the stretch of 91 Kms ranged from Godda district to Sahebganj district passing through more than hundreds of project affected villages by organizing various community development activities in Education, Community Health, Sustainable Livelihood and Rural Infrastructure Development verticals.

The robust team of Adani Foundation at Jharkhand comprises of dedicated professionals including Unit CSR Head, Project Officers, and a deputy manager-CSR from Adani Power (Jharkhand) limited and a Medical team comprises of a doctor and four Para medicos.

The progress of CSR projects/interventions from **October, 2019** to **March, 2020** is described in detail as under:

HIGHLIGHTS OF CSR ACTIVITIES

A. Education & Rural Sports

Providing Quality Education in Society

Adani foundation strives to enhance the quality of education in its intervention villages through following initiatives directly benefitting over 60000 students and their families in the year 2019-20.

- **By Initiating Competitive Classes and Coaching for the Poor Students viz.**
  - **Apna School** initiative is providing coaching classes to 830 students in a 'Group of 30' till 5th standard in 8 location at Gangta, Nayabad I & Nayabad II, Kauribihar, Kaithartikar, Sondiha, Baliakitta & Amrakanoli villages.
  - **Adani Gyan Jyoti (Group -30) Yojana:** This year 492 students till 10th standard benefitted from foundation building coaching classes and capacity building sessions in core and pipeline areas.

- **Teacher Support** has been provided in 15 schools for subjects like Science and Mathematics and improving education level by benefitting over 2900 students.
- **Education Sponsorship program** to provide 100% education support for one ward each from 300 Project Affected Families of Jitpur mines to reduce dropout by focusing on quality education and thereby regular attendance of students.
- **Ekal Vidyalaya Initiative:** Adani supported, Shree Sankar Shewa Shamiti, Jharkhand run Ekal Vidyalaya have commenced classes in 120 schools in far reached tribal villages of Godda, Podaiyahat, Sunderpahari and Boarijor blocks benefitting over 3600 students with an objective to streamline dropout students to formal education system of tribal areas.

- **Distribution of Uniforms in Anganwadi Centres:** Adani Foundation had supported Anganwadi Centre through 1706 Anganwadi Uniform distribution in Pipeline village of Godda and Sahebganj district benefitting over 2000 children of 35 villages.
- **Distribution of Uniforms/Sweater/Shoes/Socks in Schools for Academic Session 19-20:** Adani Foundation supported Education department and School Management Committees through distribution of two pairs of School Uniforms, Sweaters, Shoes and Socks to students of Academic Session 2019-2020 across all 9 blocks of Godda district. During the year, 24386 children of class 1st and class 2nd standard were supported with school uniforms, along with this, Sweaters, Shoes and Socks were distributed to 1, 16,568, 93,936 and 93,936 children respectively benefitting more than **1 lakh** children.

- **Gyanodaya Project:** Adani Foundation in partnership with District Administration and Eckovation Solutions Pvt. Ltd. launched Gyanodaya project on August 2018 to promote e-learning through Smart Classes. Gyanodaya project is currently operational in 273 schools covering 846 classes in 9 blocks of Godda district with its spread across 201 remote and untapped villages facilitated by over 1000 skilled teachers and benefitting more than 53000 students directly.

  - **Signing of MOU with District Administration:** MoU has been signed with District Administration and Adani Foundation on October 2019 to continue the Gyanodaya Project for next five years with an objective to reach over 67000 children of 600 schools in Godda district.
  - **Launching of Gyanodaya Coffee Table Book:** Gyanodaya Coffee Table Book was launched on 14th November 2019 by VC in the presence of Honourable Dr. Priti G Adani, Chairperson, Adani Foundation. It highlights various element of Gyanodaya and showcases the impact stories in lives of students.
  - **Replication of Gyanodaya Model all over Jharkhand:** Gyanodaya model will be replicated in the year 2020-21 supported by Niti Aayog who will sanction funding of Rs 20 crore to the State Government to extend Gyanodaya program in all **19 Aspirational Districts** of Jharkhand which in turn will impact lakhs of students.

Capacity Building Programmes

- **Support to District Police Association:** Adani Team provided Support to District Police Association for Warm Welcome to Army Troop who summoned from different location for conducting Successful and Peaceful Assembly Election at Godda Region.

- **Sports Promotion Activity:** Two days school sports competition & Cultural Programme was organized like Race (100, 200 meter race), Long Jump, Shot-put organized in which both groups (Boys & Girls) of total 300 students from 8 different schools of project area had participated and showed their talent according to their ability
- **Children's Day Celebration:** Cultural activity was organized in premise of Middle School, Kauribaihar village of Railway line area in which approx. 25 students (boys and girls) from 5 different schools performed their act witnessed by 500 villagers and District Administration.
- **Extra-Curricular activity** has also been started for intellectual development of children such as Kabaddi, Quiz and Speech competition.
- **Health Hygiene and Sanitation:** Educating rural students about better health and Hygiene with participation of 400 rural students. Swachhata programme was also conducted in Kauribaihar, Motia, and Sondiha school of TPP area.
- **Swachhagrah project:** Visit to 92 Schools to conduct pre-test and interacted with Dal Members
- **Safety Awareness Training** was organised for School Teachers for self-protection for the purpose of self-awareness towards safety. Under this session, safety dept. provided one day training to all our teachers who work in different schools nearby our project area. They learnt from training session and assured to implement this knowledge in their schools and coaching and aware among the students.

Events to Support Education:

- **Financial assistance for 19th Book Fair at Deoghar** was extended in January 2020 where events such as cultural competitions, youth counseling, yoga and meditation and literary seminar were conducted with footfall of over 50000 people. There was proper branding of Adani in the event.
- **Organized 3 Days' Tilkha Manjhi Annual Fair at Siktia:** This year too Adani provided support in Annual fair organized by tribal community united by over 40 thousand people on 24th death anniversary of martyr Tilkha Manjhi which witnessed footfall of over 3000 people of tribal community from our plant area and nearby villages.
- **Support for Kavi Sammelan:** Kavi Sammelan was held at Mahila College and Townhall, Godda where combined audience size of 1500 people participated to learn related to literary field in the event with motto to instigate interest of new generation towards literature.

Supporting Sports Events

- **Sports Kit Distribution**: Sports kit comprising football kit, volley ball kit, cricket kit and other sports items such as rope and disc throw etc., were distributed to 50 youth groups and schools in intervention villages including pipeline, railway line and core villages.
- **Seven Cricket tournaments** were held in the year with participation of 3 teams in Pathargama block of pipeline area, 5 teams played in railway line area and 8 teams in core area who were supported with cricket kits.
- **Nine Football Tournaments** were held in core, railway line and pipeline villages in which 16 teams participated in each tournament with combined audience size of more than 21000 spectators.

B. Community Health

Mobile Health Care Unit (MHCU)

During **Oct'19** to **March'20**, five Mobile Health Care Units have together catered to primary health care needs of **37,575** patients this year from core, periphery, railway siding and pipe line area villages covering over 150 locations.

- **Mobile Health Care unit in core villages** The MHCU provides its services to 9 locations and 13 villages per week benefitting total **6264** patients including 2889 male, 2330 female & 1045 children have been served in this year.
- **AF supported Help age's Mobile Health Care Unit** covers 16 locations and 26 villages per week benefitting total **8797** patients including **2702** male, **3440** female and **2655** children.
- **Mobile Health Care Unit in Mines villages:** The MHCU conducts full quick para and also refers the patients to nearest hospital if required. Total **1041** patients including 308 males, 383 females, and 350 children were served in this year.
- **MHCU for Pipeline Villages in Godda:** Adani supported MHCU team to operate its operation for pipeline area villages of Godda district since October '18. Total **11060** patients including **3926** males, **4838** females and **2296** children were treated covering over 40 villages from 5 blocks.
- **MHCU for Pipeline Villages in Sahebganj**: Adani supported MHCU team to operate its operation for pipeline area villages of Godda district since 21st September '18. Total **10413** patients including **3466** males, **4640** females and **2307** children were treated this year covering over 35 villages from 4 blocks.
- **Labourers Health Check-ups for Gate Pass:** CSR Medical Team conducts health check-up of all labourers at TPP to be safe from health hazards. It includes height,

weight, colour blindness, BP, Blood Group, Sugar, Eye check-up. Total 3391 labourers were checked this year.

- **Health Awareness:** With collaboration of Medical Team of Adani Foundation and Helpage India, health awareness is raised among school children, teachers and community. Community health awareness programme during Medical camp in rural areas helps aware rural dwellers about their better health and safety from diseases.
- **Critical Health cases:** Diagnosis of critical cases of laborers working in TPP (site office) is done by CSR Medical Team regularly in an emergency manner.
- **Specialized Medical Health** Camps have been held at 4 locations covering more than 50 core, railway & pipeline villages benefitting 1968 patients.

- **Relief Program against Pandemic COVID 19:** Relief program has been initiated by Adani Foundation for safety and protection of every individual and community from Pandemic CORONA Virus through engagement in activities such as
  1. Production & Distribution of 1 Lakh Face Masks,
  2. Production & Distribution of 200 Apron/PPE,
  3. Production & Distribution of 30 Corpses Bags and
  4. Production & Distribution of Gowns for Doctors by PJSASM members all across districts,
  5. Sanitisation programme running in entire area of Godda and our concern villages through Application of Disinfectants in 12 intervention villages through Fogging/Spraying for 7 days.
  6. Distribution of 30000 Soap has been initiated in the community area,
  7. AF Supported Community Kitchen has been initiated at 3 places in the district to prepare meals and reduce hunger by feeding two times every day to more than 2000 Labourers, Contractors and Truckers in Town and Plant area,
  8. Input Support of Essential Commodities for 700 Poor Households such as Rice, Pulse, Oil, Vegetables, and Salt and other food grains for their subsistence**,**
  9. Production of 25 Hands-Free Sanitisation Machine/Units (G-HanSa) at Public Places and Plant Premises in Godda.
  10. E-Sewa App has been installed in coordination with District Administration, Godda which provides home delivery services for essential grocery items and commodities benefitting over 1000 consumers at door steps.
  11. Making Ambulance available for COVID 19 cases at Godda district.
  12. YouTube Channel for Students to access Gyanodaya classes in Godda district.

Suposhan Program

- **SuPoshan:** Malnutrition among children of 0 to 5 years has reduced by over 90% i.e. 271 children out of 299 became healthy while Anemia has reduced by more than 46 % i.e. over 813 out of 1758 adolescent girls of 10 to 19 years and women in reproductive age group have become healthy and rest falls under Moderately Anemic Range as per Universal HB screening survey. Suposhan program has been scaled up in 13 new villages of Railway (4) and Pipeline (8) and 1 new village of core area followed by baseline survey and conduction of Universal HB screening.

- **Hand wash Day:** Global Hand wash day was organized in TPP, Godda to raise awareness among school children, and community about practice of sanitation: Children shared this knowledge with their family members & sensitized the people around their household to practice hygiene & sanitation as a daily habit in order to protect themselves from infectious and contagious diseases.

Awareness Programmes

- **Swachhagrah Programme:** Swacchagrah program was launched in Godda on 11th August 2018 with 92 government schools of Godda and Poraiyahat blocks. It aims to engage children as change agents to bring about behavioral and attitudinal change in sanitation executed through Swachhagraha dals and Preraks in schools. It comprises of total 92 Swachhagarha School, 92 Swachhagraha Prerak, 92 Swachhagraha Dal, total 1840 Swachhagarahis and School visit in 92 schools was done to aware children on sanitation, its practices, solid and liquid waste management by conducting quizzes, competitions among students.

- **Awareness program:** Various awareness events like celebration of national nutrition week, global hand wash day, etc. were conducted during the period spreading the message to over 1500 people.

- **Voters Awareness Programme:** Voters Awareness Programme was organised in association with Godda District Administration under (SWEEP programme which runs under Govt. Initiative) to raise awareness on Voter Rights with participation of approx. 500 villagers.

- **Awareness Campaign on Beat Plastic Pollution:** This program was organized with an aim to curb plastic pollution wherein emphasis was laid on the importance of 3 R's 'Reuse, Reduce and Recycle' to attain Sustainable Development Goals.

Capacity Building Programmes

Seasonal Assistance/Community Involvement

- **Assistance to tribals in Sohraye festival:** Saree, Dhoti & T-shirt distributed on the occasion of Sohrai festival to 600 tribals in tribal villages of core, railway line and pipeline area
- **Assistance to tribal community in Sidhu Kanhu Mela:** Financial contribution to assist local community in organizing Sidhu Kanhu Fair where people across the Santhal Parganas region celebrates the triumph of rebellion leader Sidhu Kanhu Murmu over British Authority.
- **Material Support to Community:** During the year, Adani Foundation distributed various materials and reach out to more than 20000 beneficiaries directly and indirectly.
- **Assistance in Health, Marriage and Death:** Poor people are supported financially in events like marriage, death and illness as emergency support. During the period, total 205 beneficiaries have been supported to the tune of **Rs. 17, 65,700**.
- **Celebration of Republic Day:** On the eve of Republic Day on **26th January 2020** various cultural activities were organized involving AF team, District Administration, line departments and community in core, pipeline and Jitpur mining area.
- **Support to District Police Association:** Adani Team provided Support to District Police Association for Warm Welcome to Army Troop who summoned from different location for conducting Successful and Peaceful Assembly Election at Godda Region. Approx. 56 companies arrived here to provide security during Assembly election, in which Adani Team delivered their best services through warm welcome and provided feast to senior officials for Completion of Successful Assembly election 2019.

C. Sustainable Livelihood

- **Uniform Production Order:** Inauguration of Uniform Production Hub was done by Hon'ble CM on 4th March 2019. 17 Production cum Training centers is operating successfully.
- **Adani Skill Development Centre:** Adani Skill Development Centre- ASDC, Godda was inaugurated by Executive Director AF- Education and Skills on 27th September 2018. Total Eight trades viz. Welder, Fitter, Mason and Bar bender, General Duty assistant, Hospitality, Electrical, industrial Sewing Machine Operator, and Digital Literacy classes are operational in which over **1481** candidates are trained this year. Enrolment of candidates is going on in all eight trades at ASDC.
- **On Job Training & Placement of Saksham Trainees at ASDC:** This year 34 trainees were selected in 4 business trades imparted trainings in ASDC namely General

Duty Assistant (GDA) (4), Bar Bending (19), Hospitality (9) and 2 in Welder trade who were placed at reputed organizations with decent package and incentives.

- **Saksham Training cum Uniform Production Centers:** Total 17 Saksham training cum uniform production centres is operational including 4 core and 13 outreach centres in Godda district. During the year, 7 new Saksham training cum uniform production centres were inaugurated and trainees were enrolled in Thakurgangti, Gangta Govindpur, Padra, Bhartikitta, Sundarpahari, Ranidih, and Pathargama under the "Phoolo Jhano Saksham Aajeevika Sakhi Mandal (PJSASM) program**"** and more than 1200 women have been trained in Sewing Machine Operator/Self Employed Tailor vertical in this year.
- **Adani Supported Saksham Digital Learning Centres:** 2 Computer/Digital Learning Centers are operational in Motia, Rangania village of core area and newly commenced digital learning classes is functional in SBSSPSJ College, Pathargama of pipeline area and three schools of Sunderpahari benefitting total 1010 rural youths and children are developing their knowledge and personality through digital learning.
- **Accomplishment of Work order for Uniform Stitching to Phoolo Jhano Saksham Aajeevika Sakhi Mandal (PJSASM) and Extension of Work Order for 5 years:** District Administration had entrusted our Saksham Sewing trainees with the responsibility of stitching and delivering two pairs of uniform for 151,000 for govt. school students from standards I to VIII for Academic Session 2019-20 on 12th January 2019 which has been accomplished by women groups of PJSASM. Over 1500 women are engaged at 17 Uniform Production cum Training Centres led by Phoolo Jhano Saksham Aajeevika Sakhi Mandal (PJSASM). Another 5 years of work order for uniform production has been given to PJSASM by District Administration.
- **Total Earnings from Uniform Production:** Women Groups have collectively **earned over Rs 1.86 Crores** in the year 2018-2019 and 2019-20 respectively through this initiative of Adani Foundation by stitching over total **3, 05, 578** two pairs of School Uniforms.
- **Sweater Weaving Project:** District administration has entrusted faith on SHG for supply of Sweater for 1.50 lakhs school students. **Rs. 50 lakhs** was sanctioned for sweater making project from Canara bank to SHG led PJSASM group. It is functional in Sunderpahari Centre which is sustaining livelihood of more than 80 women belonging from remote areas.
- **Bharat Ki Laxmi Programme:** A one day Bharat Ki Laxmi program was organized on October 2019 to felicitate the lady trainers engaged in stitching works at various centers and to honor daughters who have made a mark with their achievement in various fields for public good.
- **JSLPS team and Phoolo Jhano SHG meeting:** For improvement of all the members of SHG Adani Foundation & JSLPS team regularly monitors the Lead SHG for their better performance and Positive results.

- **Organized Baijal Baba Cultural Program at Sunderpahari:** One Day event was organized on 1st March 2020 at Sunderpahari in participation with PJSASM members and tribal women in presence of honorable CM of Jharkhand Hemant Soren. Honorable Hemant Soren had appreciated the endeavor of PJSASM members in becoming self-sustained to generate livelihood through uniform production work with participation of more than 3000 audience.
- **Distribution of School Uniforms of Academic Session 2018-2019:** Adani Foundation supported Education department and School Management Committees through distribution of **3, 05, 578** two pairs of School Uniforms to **152,789** students in **1205** Primary and Middle Schools (1st to 8th class standard) across 9 blocks of Godda district namely Godda, Podaiyahat, Sunderpahari, Pathargama, Basantrai, Mahagama, Boarijor, Thakurgangti, and Mehrama block on cluster basis in respective BRCs and CRCs in the district with support of school teachers and principals.
- **Distribution of Learning Materials for Academic Session 2019-2020:** Adani Foundation supported Education department and School Management Committees through distribution of two pairs of School Uniforms, Sweaters, Shoes and Socks to primary and middle class students of Academic Session 2019-2020 across all 9 blocks of Godda district benefitting more than **1 lakh** children.
- **Production of 1 Lakh Safety Masks & 200 Apron in Saksham Training cum Production Center:** Women group of PJSASM are engaged during this juncture in producing around 1 lakhs masks and approx. 200 Apron to fight battle with epidemic COVID-19 outbreak.
- **Trainings on Organic Farming and Vermicomposting:** A one-day Village level training program was organized at Panchayat Bhawan in Motia village with participation of 50 farmers of nearby villages on promotion of organic farming and vermicomposting.
- **Material Support of Vermibed:** Adani Foundation supported farming communities by promoting production of organic manure by installation of Vermi-Compost Bag/Vermibed across the core and pipeline village. AF supported 69 small and marginal farmers by providing vermi-bags and educates them about the concept of manure making process at their doorsteps.
- **Financial Support for Volunteers and Project Affected Families:** This year Jitpur mines has continued to support 370 families project affected families at the rate Rs. 1440/- per month towards livelihood engagement. Also, Rs.1, 65,201 Monthly Honorarium payments for Volunteer was continues this year. These volunteers help the Adani team for field mobilization and also help to maintain positivity in the Project affected Villages.
- **Monitoring** of 150 Self Help Groups is going on under livelihood programme.

Awards and Honours

- **Certificate Distribution to Saksham Trainees:** ASDC Saksham trainees were awarded merit certificate after completion of trainings and their assessment of performance are per set standards in hospitality, welder, and Digital Literacy trade.
- **Distribution of Certified Saksham Certificates to SMO Trainees:** Merit certificates were distributed to Saksham trainees in Sewing Machine Operator (SMO) after successful completion of trainings of first batch of core centres namely ITI, ASDC, Pathargama, Jitpur and 2nd batch of outreach centres namely Motia, Rangania, Basantpur, Dumaria and other centres under National Skill Development Corporation (NSDC).
- **Celebration of International Women's Day:** International Women's Day was celebrated on 7th March 2020 at ITI Siktia with presence of dignitaries of District Administration, Adani Foundation and members of PJSASM Group. 115 women trainees of Saksham, 17 Suposhan Sanginis of core and railway line area and other associated programme women were awarded by Certificates, Gifts, Mango Saplings and Momentos as a token of appreciation and gratitude. Entire team of Phoolo Jhano Aajeevika Sakhi Mandals were awarded **SASAKT NARI SAMMAN** by Adani Foundation for their best contribution in Dress Production work.
- **Kayakalp Award:** Adani Foundation has received **Kayakalp Award** on 19th February 2020 at Sadar hospital, Godda by Deputy Commissioner for positive work and continuous endeavor in supporting District Health Department. The Sadar Hospital of Godda has been ranked with first rank position of Kayakalp Award in the year 2018-2019 in Jharkhand state. AF teams constantly works to provide better health care facilities and services to community for their better health by overall improvement of Medical facilities in Godda district.

D. Rural/Community Infrastructure Development

Water Conservation, Ground water recharge

1. Deepening work of **39** Ponds in 23 villages of TPP area has been carried out. Out of which 29 pond deepening work has been completed in 14 villages.

Drinking Water Facility

1. **Installation & Renovation of –Borewell, Community Well etc.:** 17 deep bore well were installed and renovated for drinking water facility at common places of the

area like educational institutes, common community structures etc. in core and pipeline areas.

2. **Installation & Renovation Work of 71 Hand pumps & Hand pump Platform** in 5 blocks including core, railway line and pipeline villages.

❖ Educational infrastructure Development

1. **Renovation of 3 School** is going on of Primary school at Amrakanoli village, Middle School at Baksara village and Gyanodaya Class Room in core and Pipe line areas.
2. **Construction of 06 Class room** is going on at High School, Motia to provide infrastructure for students to learn in a proper proximity.
3. **Construction of Main Gate of 3 College/School:** We have taken up the construction of main gate at 3 colleges /school at Godda College, Godda, Vidyapati Bhawan, Godda and SM College, Poriyahat.
4. **Renovation of Main Gate at SM College, Poriyahat:** We have renovated Main Gate and 20 seating place in campus of SM Intermediate College, Poriyahaat.
5. **Renovation of boundary wall at 2 schools** at Middle school, Basantpur and Middle school Sondiha.
6. **Renovation of 100 tile control room of Govt. Office:** To support Government officials for official purpose.
7. **Renovation of Govt. Guest House:** To provide better infrastructure for the government functionaries and delegates, we have renovated Govt. Guest House near Sarkanda Chowk, Godda.
8. **Renovation of 1 Anganwadi Center** at Gangta village of core area. It will help District Administration, ICDS functionaries for continuous and proper functioning of Anganwadi Centres to provide needful benefits.
9. **Painting work at Juvenile Home, Godda to** provide a proper environment for the improvement of children. It will also provide a homely environment for the children in Need of care and Protection and children in conflict with law.

❖ Other Village development structures

1. **Construction of 16 Model Bathroom & Soakpit near Handpump** in 6 villages of core, railway, pipeline and periphery area to provide better rural infrastructure in the villages and educational institutions.
2. **Construction of 52 Seating Place** in 31 villages including 10 villages of our TPP area and 21 villages of our pipeline and Intake Point area.
3. **Renovation of 7 Community Hall for Community Programs** in 7 villages of core, periphery and railway line area. This hall is also being used for Sewing training center as well as common community purpose.

4. **Construction of 2 PCC Road:** 2 PCC Road was constructed at Sondiha village to provide rural connectivity, linkages to market and access to basic services. This work has been benefitted to more than 5000 villagers from 4 vicinity villages.
5. **Renovation and construction of 25 community structures** like Temples/Puja Sthal/ Manjhisthan/ Satsang Bhawan/Sidhu Kanhu Shade etc. in core, railway line and pipeline villages.
6. **Construction of 5 Drain** in 4 villages Gangta, Nayabad, Sondiha and Motia. It will be beneficial to more than 900 households of the villages.
7. **Construction of Stairs at 7 Pond** in 5 villages of TPP core, railway line and pipeline areas that use this water for domestic and miscellaneous use.
8. **Construction of 01 barbed boundary** at Satichouki kuthari village, Sahibganj in our Intake Point area.
9. **Renovation of stitching center at ITI Sundarpahari.**
10. **Construction of Main Gate at ITI Siktia** for smooth functioning of Dress Stitching Center, in which all nearby tribal and rural women prepare dress for school children.

DETAILED DESCRIPTION OF CSR ACTIVITIES

EDUCATION & RURAL SPORTS

Providing Quality Education in Society

1. **'Apna School' initiative to provide coaching classes for students:** This initiative was initiated in tribal village viz. Nayabad, Gangta, and Baliakitta to provide coaching classes to the students till 5th standard. During the year another centres was started to provide access to formal education to the poor and enthusiastic children in Kauribihar, Kaithartikar, Sondiha, and Amrakanoli village.

   The total number of students getting benefitted is 830. The local teachers from the community have been engaged in the teaching. This initiative has led to improvement in learning and education of children. This coaching class is also useful to interact with the community.

   The initiative has mainly been taken in area with low literacy level i.e. below 50% literacy among Santhal and Yadav Community (Scheduled Tribes and Other Backward Classes).

Sl. No.	Location	Standard	No. of Student
1	Nayabad **I**	**I to V**	12
2	Nayabad **II**	**I to V**	16
3	Gangta **II**	**I to V**	14
4	Baliakita	**I to V**	42
5	Kauribihar	**I to V**	296
6	Kaithartikar	**I to V**	136
7	Sondiha	**I to V**	172
8	Amrakanoli	**I to V**	142
Total			**830**

2. **Adani Gyan Jyoti Yojna (Group 30):-** Education plays a vital role in development of society economically, socially and financially, it also helps to them strengthen, so Adani Gyan Jyoti Yojna was initiated in Motia Village in which 30 students each of 8^{th}, 9^{th} & 10^{th} standard studies at the centre for their concept building. This year the programme was extended in another village of pipeline area with an objective of improvement in results of poor & meritorious students in matriculation board exams. The program is serving over 492 students and capacitating them for their holistic development.

Sl. No	Adani Gyan Jyoti Kendra	Standard	No. of Student
Core Area			
1.	Motia	**8^{th}**	30
2.	Motia	**9^{th}**	30
3.	Motia	**10^{th}**	30
Total			**90**
Pipeline area			
1	Upper Middle School, Jiyajori	**8^{th} to 9^{th}**	65

2	Primary School, Ranidih	**1st to 5th**	48
3	Majdoor Bhawan, Karnu	**3rd to 5th**	39
4	Middle School, Baniyadih	**5th to 8th**	250
Total			**492**

Academic Performance: In tenure of FY 2018-19, total 95 numbers of students benefitted from Adani Gyan Jyoti Yojana and completed their exams successfully. This year Admission test was conducted for new session of class 8th and class 10th board students. Out of total 56 students of class 8th, 18 students were selected for next session while, all 30 students who appeared in 10th board exams got succeeded. Out of which 20 students got 1st division, 8 Students got 2nd division, & 2 students got 3rd division marks.

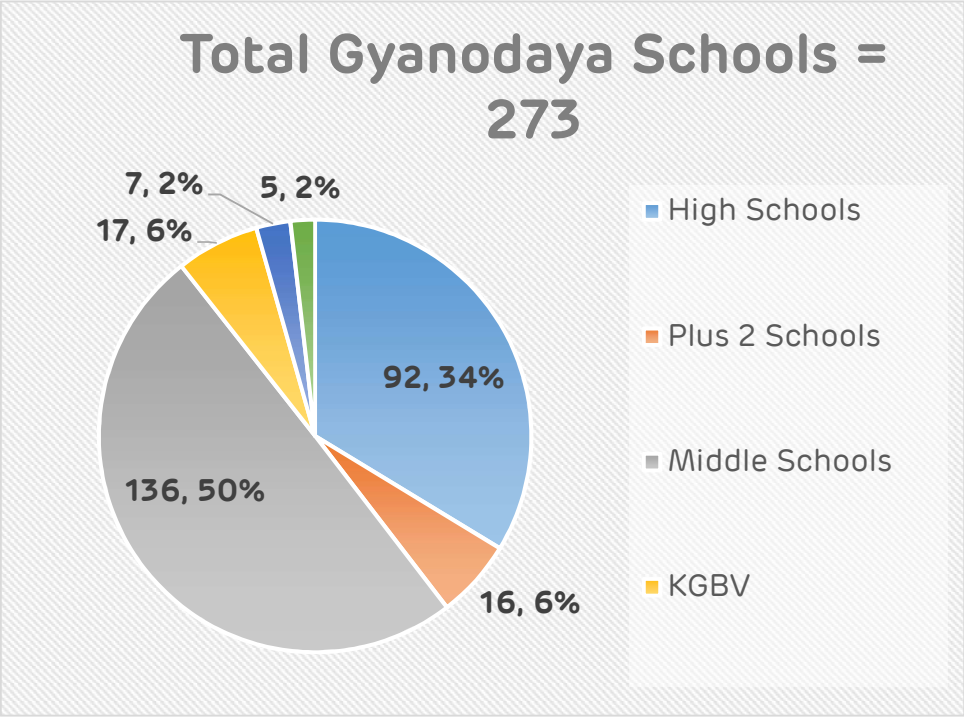
Class 8th (Student)					
Appeared	**Selected**	**%**			
56	18	32.14			
Class 10th (Student)		**Passing %**	**1st Div**	**2nd Div**	**3rd Div**
Appeared	**Passed**				
30	30	100	20	8	2

3. **Gyanodaya Project: GYANODAYA, 'Mera Mobile, Mera Vidyalaya'**, a step towards lightning in dark was launched by Adani Foundation in partnership with District Administration and Eckovation Solutions Pvt. Ltd. on August 2018 to promote e-learning through Smart Classes in Middle and Higher Secondary Government Schools for students of 6th-12th standard. Gyanodaya project has reached **273 Govt. Schools** covering 846 classes with its reach spread across 201 remote and untapped villages of Godda district in 9 blocks of Godda district.

   In the tenure of less than 1.8 years, the program has leveraged its services facilitated by over 1000 skilled teachers and benefitting more than 53000 students directly. Transformation in their lives has been observed through multiple benefits of digital learning such as - digital skills, decision making capabilities, visual learning, cultural awareness, improved academic performance and creativity. Gyanodaya model is filling the gap of teachers' shortage by enabling students to access the smart classes with a simple touch of TV remote.

   Outreach of Gyanodaya: Gyanodaya program covers **136** Middle Schools**, 92** High Schools, **16** Plus 2 Schools, **17** KGBVs, **7** Welfare Association Schools, and **5** JEE/NEET Centres, respectively.

Details of Block Wise Outreach of Gyanodaya							
Block	**Middle schools**	**High Schools**	**Plus2 Schools**	**KGBVs**	**Welfares**	**JEE/NEET Centres**	**Aggregate**
Godda	42	19	2	2	0	3	68
Sunderpahari	3	3	0	2	3	NA	11
Podaiyahat	27	17	5	2	0	NA	51
Pathargama	23	6	01	2	0	1	33
Basantrai	8	3	2	1	0	NA	14
Mahagama	15	15	2	2	0	1	35
Boarijor	3	7	1	2	4	NA	17
Mehrama	7	11	2	2	0	NA	22
Thakurgangti	8	11	1	2	0	NA	22
Total	**136**	**92**	**16**	**17**	**7**	**5**	**273**



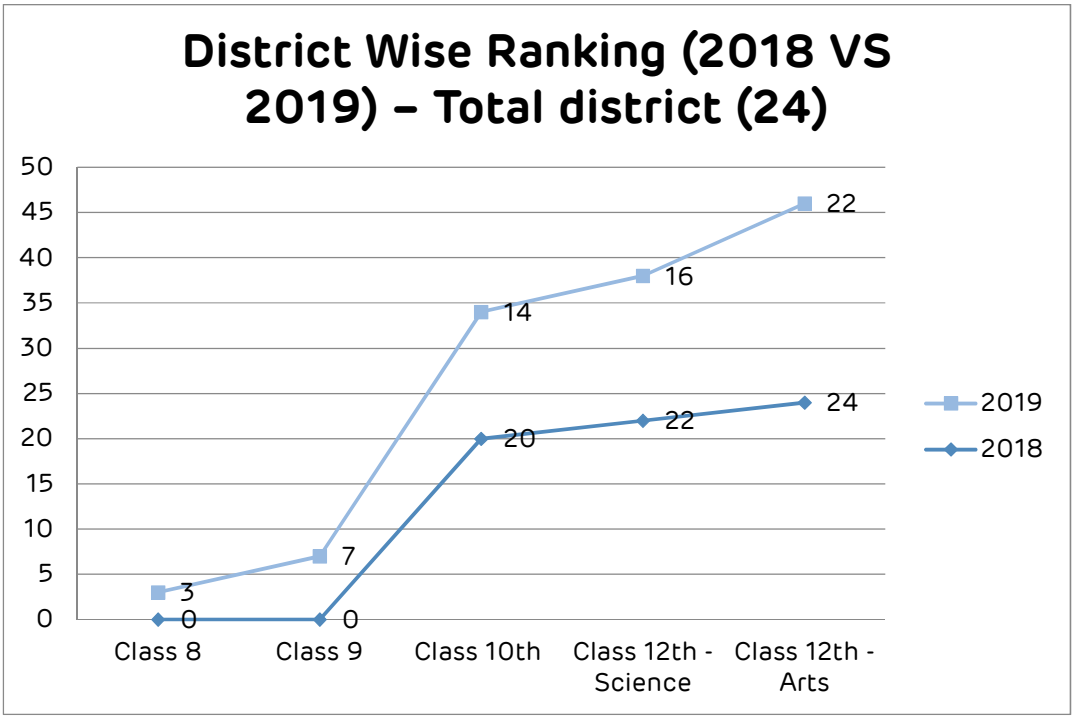
Programme Output

- **Capacity Building of 765 teachers:** Total 765 teachers have been trained to use digital technology to conduct smart classes in schools effectively and efficiently in the district.
- **Beautification Work of 176 schools:** Under the provision of 14th Finance Commission, 176 schools were beautified to enable school teachers and children for learning in ecosystem of education. This initiative also has seen the major involvement of Panchayati Raj Institutions in setting up crucial infrastructure in the schools using the provisions of the 14th Finance Commission.
- **100 % Electrification of 42 remote schools** has been done to provide energy access in schools and impart digital learning.
- About **25 schools** have been provided drinking water connection and hand-pumps to enable access to drinking water for children.

Programme Outcome

1. **Improvement in School Ranking at District Level:** The magnificent attempt of Gyanodaya has resulted into improvement in overall performance of education of Godda District after the year 2018. The School Ranking has enhanced in the year 2019 from
   a) 20th rank to **14th** rank in class 10th,
   b) 22nd rank to **16th** rank in class 12th (Science) and
   c) 24th rank to **22nd** rank in class 12th (Arts).

   In addition to this, class 8th stands at **3rd** rank and class 9th at **7th** rank position as compared to **21st position** in the last year.

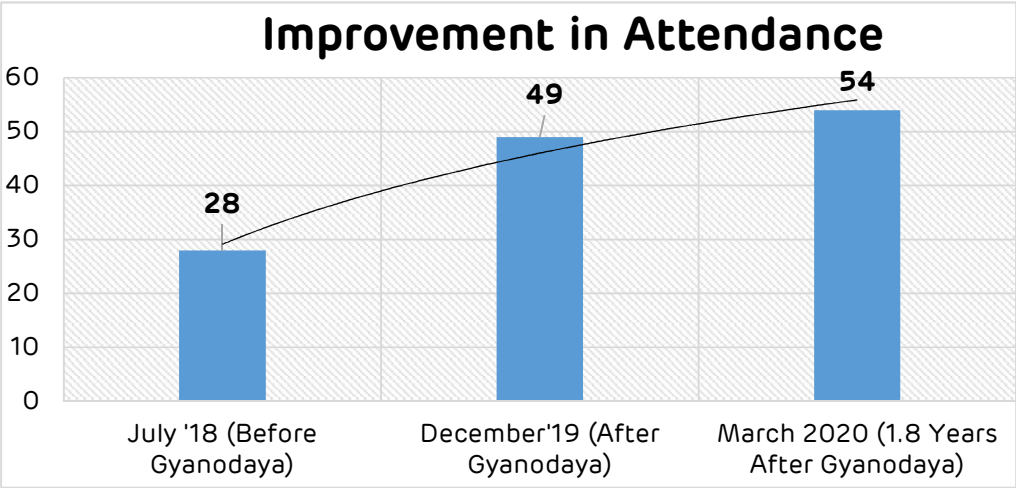


**No Examination held of Class 8th and Class 9th in 2018*

2. **Increase in Attendance Rate of Students:** The visually appealing, easy-to-grasp and retainable concepts covered in the study materials has led to 170% increase in the class-wise attendance comparing the figures of past years (July 18) from 20% attendance to **54%** (March 2020). A significant reduction in dependency on tuition classes has been observed all across the blocks which will thereby increase the faith of students and parents likewise on government schools. The growth in the class-wise attendance has been a result of making learning engaged and interactive using conceptualized and animated concept videos being taught under the Gyanodaya model.

Improvement in Attendance after implementation of Gyanodaya

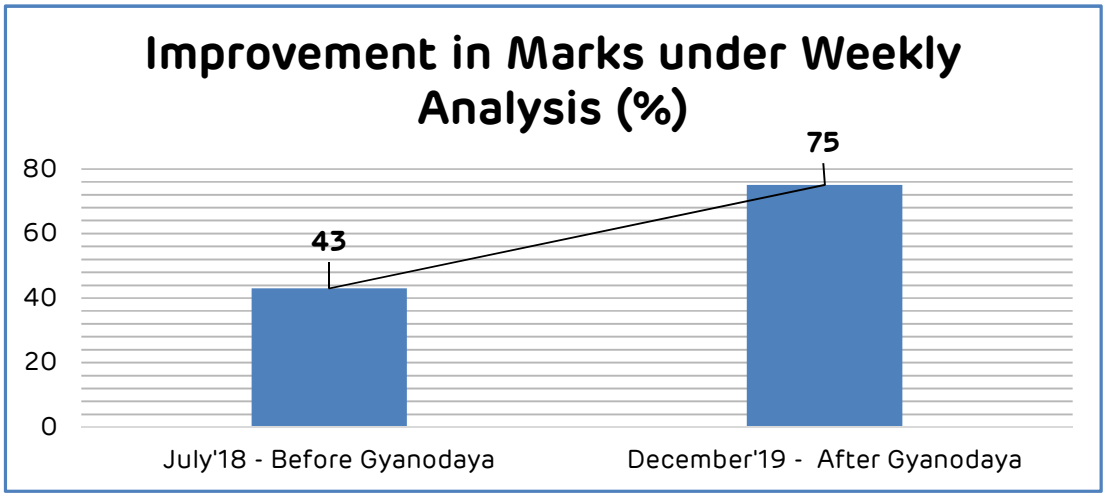
July-18 (Before Gyanodaya)	**March 2020 (1.8 Years After Gyanodaya)**
20-30%	54%



3. **Improvement in Marks of Students:** Prior to educational initiative of Gyanodaya, the students used to fall under 30-40% marks bracket which has now shifted to **70-75%** marks bracket on an average due to better understanding and retention of basic concepts and a daily quiz after every video.

Impact of Gyanodaya project on Results is as given below:

July-18 (Before Gyanodaya)	**December 2019 (1.6 Years After Gyanodaya)**
Improvement in Marks under Weekly Analysis	
30% - 40%	70-75 %

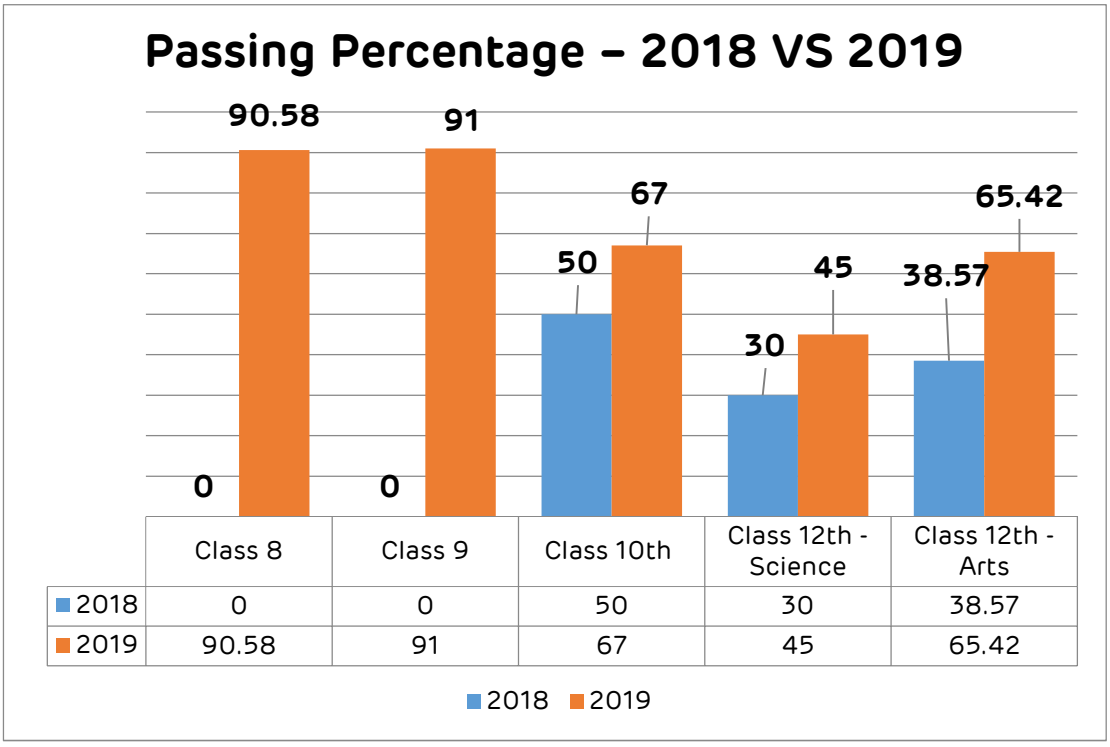


4. **Increase in Passing Percentages:** The passing percentage of students has increased in the year 2019 as compared to status of 2018 from 50% to 67% in class 10th; 30% to 45% in Intermediate (Science) and 38.57% to 65.42% in Intermediate (Arts). On the other hand, the passing percentages of class 8th students are 90.58% and class 9th students are 91% in the year 2019.

Class wise Increase in Passing Percentages of students in Godda district

	Class 8th	**Class 9th**	**Class 10th**	**Class 12th Science**	**Class 12th Arts**
Year 2018	0	0	50	30	38.57
Year 2019	90.58	91	67	45	65.42
% Increase	**90.58**	**91**	**34**	**50**	**69.61**

**Exams were not conducted of class 8th & 9th on 2018*



5. **Decline in Dropout Rate of Girls:** A significant increase in the presence of girl students in the schools is observed. This shows a promising change in the mind-set of the community towards girl child education.

6. **Social Inclusion of children of Marginalized and Below Poverty Line (BPL) families:** The most satisfying element of this initiative remains that the

beneficiaries of Gyanodaya comprise of children from families with limited economic opportunities, many being the sole bread-earners, and disadvantageous backgrounds.

- **Material Support for Gyanodaya:** Total 269 Equipment set (TV, Battery, and Invertor & Trolley) were distributed to running Schools for Gyanodaya Smart Class & IIT-JEE class running in 5 Schools and 23 new schools were provided Hardware set by Adani Foundation and Gyanodaya display board were installed in 155 Schools in Godda district.

Distribution of Equipment Set				
Particulars	**Godda**	**Dumka**	**Sahibganj**	**Total**
Equipment Set	250	17	2	269
Installation of Gyanodaya display board				
Particulars	**Godda district**			
Display Board	155			

4. Super 100 & Super 200 Program

- **Super 100 Programme**: The Super 100 Program of Adani Foundation in collaboration with District Administration provided Residential Coaching Classes for conducive learning environment to top 100 students of Godda district for the preparation of Jharkhand Board exam held on March 2019. It resulted in increase in performance of Super 100 Boys and Super 100 Girls. Out of 84 boys, 81.09 % got 1st division, and 10.71 % got 2nd division. Similarly, out of 93 girls, 90.32 % got 1st division and 8.6 % got 2nd division.

Academic Session 18-19

Performance (Passing Results in %)			
Super 100 Students	**Total Students**	**1st Division**	**2nd Division**
Super 100 Boys	84	81.09	10.71
Super 100 Girls	93	90.32	8.6

- **Super 200 Programme:** The outstanding performance of Super 100 students in Jharkhand Board Exam held on March 2019 and Appraisal by District Administration, led to origin of Super 200 Programme on 8th November 2019 with an objective to enable Super 200 students (Boys and Girls) to succeed in 10th Board exam with first division marks and secure bright career. It is operational in ITI Siktia, Women's College for Super 200 Boys and Kasturba Vidyalaya, Pathargama for Super 200 Girls in Godda district. Closing ceremony of Super 200 Program was held on February 2020 at ITI Siktia and Kasturba Vidyalaya to motivate and build confidence in students for the broad exam preparation. District Administration and Adani Foundation team put forth their speech to appreciate students on their hard work and blessings for future endeavor.

5. **Teacher Support in School:-** On community demand, Adani Foundation has provided 25 experienced and knowledgeable teachers in 15 schools including 14 govt. and 1 private school in core, railway line and pipeline areas to enable access to quality education by all the school going students. This initiative aims to improve the quality of education in schools by improving student-teacher ratio and concept building of students in subjects like Science and Mathematics benefitting over 2900 students who regularly attend classes.

Sl. No	Location	Standard	No. of Student
1.	High School, Motia	**9th & 10th**	235
2.	Middle school, Motia	**1st to 8th**	546
3.	High School, Baksara	**9th to 12th**	276
4.	Upgraded high school, Sondiha	**6th to 8th**	192
5.	Middle School, Kauribahiyar	**1st to 8th**	286
6.	Primary School, Kaithatikar	**1st to 5th**	142
7.	Veena Bharti, Poraiyahat	**6th to 10th**	276
8.	Middle School, Rangania/Baliakitta	**1st to 8th**	176
9.	Primary School, Amrakanoli	**1st to 5th**	136
10.	Middle School, Jiajori	**1st to 8th**	76
11.	Primary School, Ranidih	**1st to 5th**	50
12.	Primary School, Karnu	**1st to 5th**	100
13.	Manasparivartan Private School, Baksara	**1st to 8th**	126
14.	Upper Middle School, Baniadih	**8th to 9th**	176
15.	Primary School, Thakurgangti	**1st to 5th**	120
Total			**2913**

6. **Ekal Vidyalaya Initiative:** Adani supported Ekal Vidyalaya aims for integrated and holistic development of rural India and to take education to unreach of the rural & tribal children. Adani supported, Shree Sankar Shewa Shamiti, Jharkhand run Ekal Vidyalaya have commenced classes in 120 schools in far reached tribal villages of Sunderpahari and Podaiyahat blocks benefitting over 3600 students with an objective to streamline dropout students to formal education system of tribal areas. Training of Teachers (ToT) was organized for 90 teachers at TPP-Sunderpahari.

7. School Education Sponsorship Program

Context: Jitpur coal block is located in north-western part of Chuperbita Basin of Rajmahal coal field in Godda district of Jharkhand. Around, 70 % of population are PVTGs including Santhal and Paharia tribes who resides in outskirts area in rural Godda depending upon traditional culture and lifestyles for their survival. Rain fed farming, NTFPs collection, and wage labor in coal mines during drought period is their only, source of earning and substantial number of people falls under below poverty lines. Due to lack of income, illiteracy, agriculture debt; lack of awareness about their rights and basic provisions, alcoholism and superstitions enters them in vicious circle of poverty.

Also, the tribal children cannot access to basic education due to poor socio and economic condition of their families. They are rather engaged in agriculture, labor, livestock grazing, and monotonous work of households. In times of nurturing with education and constructive environment, their childhood are lost in solitude and despair with chain of hardships and labor**.** Also, due to no availability of adequate school and school teachers, there was 100% incidence of dropout in schools.

Intervention: To reduce the plight of families and overcome difficulties, and reduce dropout rate of tribal children, Adani Foundation team launched *School Education Sponsorship Program* in the year 2016 to provide 100% education support for one ward each from 300 Project Affected Families of Jitpur mines to reduce dropout by focusing on quality education and thereby regular attendance of students and ensure 100% literacy in new generation.

Services: Under this programme, 100% Educational support is provided which comprises of School Fees, Accommodation, Fooding and logistic facilities, Learning Materials such as Books, and Stationary items, and related needs are taken care of.

- **Community Mobilization:** The families were approached to inform, educate and sensitize on provisions and importance of Residential School Facility under this programme. The community were mobilized with support of Village Resource

Person, Community Leaders and active persons which helped disseminate knowledge regarding the services.

- **Enrolment:** In the year 2016-17, the parents of 155 wards were convinced in each family to enrol their children in educational institutions who were further, admitted in reputed private schools fulfilling all amenities. In the first year, it was challenging to retain the enrolled students and attend regular classes, AF team put dire efforts to stabilize and continue the regular course. Gradually, with quality learning pedagogy used by teachers and facilities provided to students helped hold children who attended classes with their own interest, effortlessly. It led to link more number of children in the succeeding years with enrolment of total 300 children from 300 families in current duration.

- **Achievements:** Dropout rate has reduced by over 60% and attendance rate of students has increased gradually by 70% in schools. Their parents are no longer forcing their wards to engage them in farming and other activities. They have become a social agent who passes the message for development of other children and debarring culture of alcoholism by people in the community for betterment of their society.

SN	Village	Enrolled (2019-20)
1	Dahubera	29
2	Pakeri	14
3	Dan agora	23
4	Dumarpalam	34
5	Jitpur	80
6	Kairajori	27
7	Paharpur	74
8	Sunder Pahari	9
9	Telvita	10
Total		**300**

8. **Distribution of Uniforms in Anganwadi Centres:** Adani Foundation had supported Anganwadi Centre through Uniform distribution in Pipeline village

of Godda and Sahebganj district. Total 1706 Anganwadi uniforms were provided to the children in 35 AWCs comprising of 3 blocks in Godda district falling under pipeline area namely Thakurgangti, Mahagama & Boarijor block and 2 blocks namely Borio & Taljhari in Sahebganj district benefitting children of 35 villages.

Distribution of Uniforms in Anganwadi Centres				
SN	**Area**	**Block**	**AWCs**	**Uniforms**
1	Pipeline-Godda district	3	28	1406
2	Pipeline-Sahebganj district	2	7	300
Total		**5**	**35**	**1706**

9. Distribution of Sweater/Shoes/Socks for Academic Session 2019-2020

Adani Foundation supported Education department and School Management Committees through distribution of two pairs of School Uniforms, Sweaters, Shoes and Socks to students of Academic Session 2019-2020 across all 9 blocks of Godda district. During the year, 24386 children of class 1st and class 2nd standard were supported with school uniforms, along with this, Sweaters, Shoes and Socks were distributed to 1, 16,568, 93,936 and 93,936 children respectively benefitting more than **1 lakh** children.

Details of Material Distribution Standard Wise in Godda district of Academic Session 2019-20							
Academic Session 2019-20	**Material**	**Class -1**	**Class-2**	**Class 3**	**Class4**	**Class - 5**	**Total**
	Sweater	24455	23940	21596	23101	23476	116568
	Shoes	19519	19256	17715	18706	18740	93936
	Socks	19519	19256	17715	18706	18740	93936
	Uniform	12304	12082	0	0	0	24386

Capacity Building Programmes

10. **Support to District Police Association:** Adani Team provided Support to District Police Association for Warm Welcome to Army Troop who summoned from different location for conducting Successful and Peaceful Assembly Election 2019 at Godda Region. Approx. 56 company arrived here to provide security during Assembly election in which Adani Team delivered their best services and provided feast to senior officials

Events to Support Education:

11. **Organized 3 Days' Tilkha Manjhi Annual Fair at Siktia:** This year too Adani provided support in Annual fair organized by tribal community united by over 40 thousand people on 24th death anniversary of martyr Tilkha Manjhi which witnessed footfall of over 3000 people of tribal community from our plant area and nearby villages.

12. **Support for Book Fair at Deoghar:** Financial assistance for 19th Book Fair at Deoghar was extended in January 2020 where events such as cultural competitions, youth counselling, yoga and meditation and literary seminar were conducted with footfall of over 50000 people. There was proper branding of Adani in the event.

13. **Support for Kavi Sammelan:** Kavi Sammelan was held at Mahila College and Town hall, Godda where combined audience size of 1500 people participated to learn related to literary field in the event with motto to instigate interest of new generation towards literature.

14. **Supported in Muslim Maha Sammelan:** Muslim Maha Sammelan was organized in Mahagama block of pipeline area in which Muslim community came from across the villages and gathered at a common place and celebrated the event. This program is being celebrated since last 7 year where every Muslim villager, young and old is eagerly waiting to be a part of this program.

Supporting Sports Events

1. **Sports Kit Distribution**: Sports kit comprising of football, volley ball, cricket and other sports items such as carom board, rope and disc throw etc., were distributed to more than 50 youth groups under rural youth engagement program to promote recreational activity and sports events in core, railway line and pipeline villages of Godda, Boarijor, Mahagama, Thakurgangti, and Pathargama block of Godda district and Borio block of intake area of Sahebganj district. It helped them in regular practice and a means of recreation. The distribution of kit help youth in more engaged in constructive activity.

SN	Sports Kit	Block	Quantity
1	**Cricket kits**	4	13
2	**Football Kit**	3	10
3	**Carom Kit**	2	5
4	**Badminton Kit**	**3**	15
5	**Volleyball Kit**	1	1

2. **Cricket Tournament** was held in the year at core, railway line and pipeline villages of Pathargama block where Adani sponsored prize for the winners. Participation of 3 teams in Pathargama block of pipeline area, 5 teams played in railway line area and 8 teams in core area who were supported with cricket kits. Approx. 2000 people were present in each tournament during these programme

3. **Football Tournament:** Nine football tournaments were held in total 39 villages of core, railway line and pipeline areas involving youths to instill with confidence, develop personality and motivate for shaping bright future. It was held at Pathargama, Mahagama and Boarijor, Thakur Gangti (Intermediate Reservoir) block of pipeline areas, Sunderpahari block in Jitpur Mines area, with participation of combined size of 4000 players from 39 villages and audience size of more than 21000 spectators from nearby villages.

Sports Events: Football Tournament				
SN	**Sport Name**	**No of Villages/ locations**	**No. of Participants**	**Average Audience Size**
1	Football Tournament	2	13 teams	2000
2	Football Tournament	10	11 teams	2000
3	Football Tournament	1	16 teams	5000
4	Football Tournament	22	64 teams	5000
5	Football Tournament	2	16 teams	2000
6	Football Tournament	2	16 teams	5000
Total		**39**	**136 teams**	**21000**

COMMUNITY HEALTH PROGRAMME

Mobile Health Care Unit (MHCU)

During OCT, 2019-MAR, 20, five Mobile Health Care Units have together catered to **37,575** patients so far from the Core, Periphery, Railway line and Pipeline villages. Adani Foundation runs MHCU in core and mines area villages to extend primary medical services in Periphery and Pipeline villages respectively. All of these five MMUs provide services in the villages as per schedule through a team of a Doctor, a Pharmacist, an ANM, and a Social Protection Officer. AF supported mobile medical facilities goes a long way to ensure access of poor people to quality primary health care services at their doorstep.

1. **Mobile Health Care Unit in Core villages:** Adani operated Mobile Health Care Unit in have conducted 418 halts in 2019-20 at 9 locations covering 13 villages per week. During the customer satisfaction survey it was found that villagers are satisfied with the MHCU and they recognize that the expenditure on primary health has reduced drastically. Total **6264** patients including 2889 male, 2330 female & 1045 children have been served in this year.

Patients treated by Adani Operated MHCU in OCT, 2019-MAR, 20					
SN	**Month**	**Males**	**Females**	**Children**	**Total**
1	October	800	464	173	**1437**
2	November	583	454	306	**1343**
3	December	459	319	163	**941**
4	January	429	424	157	**1010**
5	February	429	424	157	**1010**
6	March	189	245	89	**523**
Gross Total		**2889**	**2330**	**1045**	**6264**

2. **Mobile Health Care Unit in Jitpur Mines villages:** Mines MHCU delivered its services at five locations covering twelve villages where patients are diagnosed by doctor and provided free medicines to the patients. The MHCU conducts full quick para and also refers the patients to nearest hospital if required. Total **1041** patients including 308 males, 383 females, and 350 children were served in this year.

Patients treated by Mines MHCU in OCT, 2019-MAR, 20					
SN	**Month**	**Males**	**Females**	**Children**	**Total**
1	October	44	68	73	**185**
2	November	76	87	85	**248**
3	December	55	65	61	**181**
4	January	65	61	40	**166**
5	February	46	60	50	**156**
6	March	22	42	41	**105**
Gross Total		**308**	**383**	**350**	**1041**

3. **Helpage India operated MHCU for Periphery Villages:** Helpage India operated MHCU delivered medical services in 30 periphery villages coming under buffer zone 1 and railway siding villages of Adani Power Plant. Total 322 halts have been conducted covering 26 locations benefitting total **8797** patients including **2702** male, **3440** female and **2655** children.

Patients treated by Helpage India MHCU in OCT, 2019-MAR, 20					
SN	**Month**	**Males**	**Females**	**Children**	**Total**
1	October	453	549	542	**1544**
2	November	408	520	395	**1323**
3	December	430	505	377	**1312**
4	January	612	815	557	**1984**
5	February	612	815	557	**1984**
6	March	187	236	227	**650**
Gross Total		**2702**	**3440**	**2655**	**8797**

4. **MHCU for Pipeline Villages in Godda:** Adani supported MHCU team commenced its operation for pipeline area villages of Godda district since October '18. Total **11060** patients including **3926** males, **4838** females and **2296** children were treated covering over 40 villages from 5 blocks.

Patients treated by (Godda) MHCU in OCT, 2019-MAR, 20					
SN	**Month**	**Males**	**Females**	**Children**	**Total**
1	October	779	928	508	**2215**
2	November	667	850	389	**1906**
3	December	750	863	416	**2029**
4	January	753	964	417	**2134**
5	February	606	763	329	**1698**
6	March	371	470	237	**1078**
Gross Total		**3926**	**4838**	**2296**	**11060**

5. **MHCU for Pipeline Villages in Sahebganj:** Adani supported MHCU team commenced its operation for pipeline area villages of Godda district since 21st September '18. Total **10413** patients including **3466** males, **4640** females and **2307** children were treated this year covering over 35 villages from 4 blocks.

Patients treated by (Sahebganj) MHCU in OCT, 2019-MAR, 20					
SN	**Month**	**Males**	**Females**	**Children**	**Total**
1	October	678	770	389	**1837**
2	November	643	945	461	**2049**
3	December	550	820	376	**1746**
4	January	584	828	386	**1798**
5	February	583	699	425	**1707**
6	March	428	578	270	**1276**
Gross Total		**3466**	**4640**	**2307**	**10413**

5. **Specialized Medical Camps**: This year, total 4 Specialized Medical Camps including Mega Health Camps were organized at 4 locations covering more than 50 villages from core, railway line and pipeline area. Specialized Medical Camps were organized with the objective to provide critical and specialized health care services in villages to cater untreated illness/ medical issues concerning women/ girls and children, and eye patients for whom access to safe and standard health services remains a challenge. Total **1968** patients including males, females and children were diagnosed and treated for various ailments by doctors of respective specialization viz. Gynecology, ophthalmology and Pediatrics along with BP/ Sugar measurement and provision of medicines at free of cost at the camp site.

SN	**Date**	**Venue**	**Specialization**	**Patients treated**
1	29.12.2019	Motia	Special treatment camp for Malnourished Children	35
2	11.02 2020	Sadar Hospital, Godda	Special Camp for Burnt, Cleft lip and Filariasis patients	17
3	15.02 2020	Mahagama	Cancer Screening cum Detection Camp	116
4	20.02.2020	Mirjachauki Dharmashala, Sahebganj	Mega Health Camp-General	1800
Gross Total				**1968**

6. **Labourers Health Check-ups:** This year, total **3391 Labourers** were checked and treated by Adani Medical Teams at site office, TPP, Motia. CSR Medical Team

regularly does health check-up of all labourers at Project area who join newly in our Project. Before joining of employees, their health check-ups are done by our Medical team effectively and sincerely for better result and safe from coming hazards. Major check-up includes Body Mass Index (BMI) height & weight, colour blindness, BP, Blood Group, Sugar, Eye check-up and Epidemic COVID-19.

Health Check-Ups of Laborers		
SN	**Months**	**Total Laborers**
1	October	421
2	November	350
3	December	450
4	January	560
5	February	660
6	March	950
Gross Total		**3391**

7. **Relief Program against Pandemic COVID 19:** Relief program has been initiated by Adani Foundation for safety and protection of every individual and community from Pandemic CORONA Virus. Adani Foundation, District Administration & Nagar Nigam of Godda district is working jointly to fight battle against CORONA virus through engagement in activities such as:

    1. Donation of Rs. 1 Crore in **CM Relief Fund** of Jharkhand state by APJL, Godda.
    2. **Distribution of Personal Protective Equipment's (PPEs)** all across districts by production of **1 Lakh Face Masks, 200 Apron, 30 Corpses Bag** and **Gowns for Doctors** by PJSASM members in all respective sewing centres. It will be sterilized before distribution work.
    3. **Application of Disinfectants** in 12 intervention villages namely Motia, Basantpur, Sondiha and others Panchayats of TPP, Motia project and overall targeted areas in town through Fogging/Spraying for 7 days benefitting over 2089 HHs and 8356 people.
    4. **Sanitisation programme** running in entire area of Godda and 12 core villages. All employees and staffs of Adani Group are screened and tested for detecting COVID-19 virus through measurement of body temperature by Security team members, Along with this, **Distribution of 30000 Soap** has been initiated in the community area.
    5. **AF Supported Community Kitchen:** AF supported Community Kitchen in the district was initiated to prepare meals and reduce hunger by feeding two times every day to more than 2000 Labourers, Contractors and Truckers in Town and Plant area allocated at 3 places in the district.
    6. **Support of Essential Commodities for 700 Households:** In this adversities, team Adani Foundation and District Administration came along to reduce the plight and sufferings of most vulnerable groups of society such as women, BPL

families, poor children of more than 700 migrant workers, truckers and labourers of our Plant area by Supporting through distribution of packets of rations and essential grocery items such as Rice, Pulse, Oil, Vegetables, Salt etc. for their subsistence.

7. **Installation of 25 Hands-Free Sanitisation Machine/Units (G-HanSa) at Public Places and Plant Premises in Godda:** Adani Foundation team have initiated with knowledge and skills of 108 ASDC trainees proficient in Welder and Fitter trade who have setup an innovative Hands-Free Sanitisation Units which enables the commoners to access disinfectants via this simple and innovative tool. Currently, 25 units have been installed at several Public places and plant area for the citizens to prevent themselves from COVID-19 virus.
8. **E-Sewa App** has been installed in coordination with District Administration, Godda which provides home delivery services for essential grocery items and commodities benefitting over 1000 consumers at door steps.
9. **Medical Support** and **health checkup** services are carried out by Ambulance and Medical team of Adani Foundation, Godda providing immediate services in affected region of Godda district.
10. **YouTube Channel** for Students to access Gyanodaya classes in Godda district.

Suposhan Program

Support Program for Sustained Health and Nutrition (SuPoshan): SuPoshan programme, a flagship programme of Adani Foundation, was launched in Godda in January '17 with an objective to reduce the occurrence of malnutrition & anemia amongst children, adolescent girl, pregnant & lactating women within three years of implementation period, Suposhan project has reached out to over 8000 direct beneficiaries. Malnutrition among children of 0 to 5 years has reduced by over 90% i.e. 271 children out of 299 became healthy while Anemia has reduced by more than 46 % i.e. over 813 out of 1758 adolescent girls of 10 to 19 years and women in reproductive age group have become healthy as per Universal HB screening and rest falls under Moderately Anemic Range.

The program has been able to achieve set goals by administering program inputs with target groups such as regular focused group discussions, awareness events, family counseling on topics to bring about change in behavior pattern within the community and raise awareness on various related issues like feeding practices for newborn, introduction of complementary feeding, pregnancy care, health and hygiene, facts and myths related to menstruation cycle, diet and care during sickness, effective methods and habits of cooking, etc. Activities like Hb screening, promoting IFA tablet to anemic girls and women, check-up by pediatrician and MHCU doctor, immunization in VHND, vegetable seeds support too contributed to

bring about improvement in health status of malnourished children, girls and women.

Achievement in Malnutrition Identification and Reduction

SN	Village Name	Total No. of SAM identified	Improvement in SAM to MAM	Total No. of MAM identified	Improvement in SAM to MAM to Healthy	Current No. of MAM children	Current No. of SAM children
1	Motia	14	14	61	65	10	0
2	Patwa	2	2	6	8	0	0
3	Ranitikar	1	1	7	8	0	0
4	Nayabad	1	0	2	3	0	0
5	Gangta	0	0	0	0	1	0
6	Basantpur	30	29	46	68	7	1
7	Badi Buxara	7	7	19	25	1	0
8	Choti Buxara	5	5	11	13	3	0
9	Rangania	0	0	0	0	0	0
10	Baliakitta	10	10	7	16	1	0
11	Petbi	15	15	19	33	1	0
12	Sondiha	15	15	21	32	4	0
Total		**100**	**98**	**199**	**271**	**28**	**1**

Achievement in Anaemia Identification and Reduction

SN	Village Name	Total Adolescent Girls	Total Anaemic Adolescent Girls	Improvement in Adolescent Girls from Anaemia to No Anaemia	Total WRA	Total Anaemic WRA	Improvement in WRA from Anaemia to No Anaemia
1	Motia	159	99	60	131	55	76
2	Patwa	23	10	13	72	37	35
3	Ranitikar	0	0	0	0	0	0
4	Nayabad	5	2	3	31	20	11
5	Gangta	28	16	12	54	34	20
6	Basantpur	79	44	35	252	122	130
7	Badi Buxara	63	36	27	189	118	71
8	Choti Buxara	47	30	17	137	88	49

9	Rangania	16	9	7	17	8	9
10	Baliakitta	34	16	18	149	79	70
11	Petbi	36	15	21	118	52	66
12	Sondiha	75	39	36	43	16	27
Total		**565**	**316**	**249**	**1193**	**629**	**564**

**WRA: Women in Reproductive Age group (19-45 years)*
***Anaemic in Moderate Range*

❖ Expansion of Suposhan Program

SuPoshan Program is currently operational in TPP core area in 14 villages including two new villages namely Dumaria and Rampur Dumaria covering 16 Anganwadi centers at Godda site. This year, the Suposhan program was scaled up to 12 new intervention villages including Kanhadih (Ramnagar), Kauribaihar Ghat, Kauribaihar Mal, and Gumma village of Railway line area and 8 new villages of pipeline area namely Goradih, Jirli, Dhamni Simariya, Dhankunda, Dakaita, Telgama, Chitrakothi, and Ranidih village covering 13 AWCs to combat malnutrition and enhance nutritional level of target groups and community in the region.

More than 3000 HHs has been reached in new villages of railway line area, and pipeline area. The newly recruited Sanginis were trained on basic knowledge of Suposhan, implementation methods in villages with collaborative efforts working with ICDS and Community Health Workers. Suposhan program was started with conduction of baseline survey of households including target groups namely children (0-5), adolescent girls and Women in Reproductive Age Groups (WRA). In line with Baseline survey and Universal HB screening of core villages, the survey was carried out in railway and pipeline areas.

Details of Total Household and Target groups of Suposhan					
Railway Line					
SN	**Village**	**Total Household**	**Children (0-5)**	**Adolescent Girls**	**Women in Reproductive Age**
1	Kanhadih (Ramnagar)	234	87	106	236
2	Kauribaihar Ghat	225	124	83	217
3	Gumma	462	163	155	421
4	Kauribaihar Mal	302	150	180	298
	Total	**1223**	**524**	**524**	**1172**
New Core Villages					

5	Dumaria	422	152	146	348
	Total	**1645**	**676**	**670**	**1520**
Pipeline Area					
1	Goradih	319	76	176	293
2	Jirli	117	60	45	115
3	Dhamni Simariya	187	78	99	186
4	Dhankunda	145	39	49	147
5	Dakaita	205	72	92	229
6	Telgama	97	19	40	102
7	Chitrakothi	110	43	53	121
8	Ranidih	155	64	67	219
	Total	**1335**	**451**	**621**	**1412**
Total Families (RAIL+NEW-CORE+PIPE)		**2980**	**1127**	**1291**	**2932**

- **Input Support of Vegetable Seeds:** Adani Foundation provides input support to target families to meet the nutritional requirement of women and children as well as the entire family through inclusion of green nutritious vegetables in their daily meal. On October 2019, Adani Foundation, under SuPoshan programme has distributed seeds of leafy and nutrient-rich vegetables to families of adolescent girls, children below five years of age, pregnant and lactating women. Eleven varieties of leafy and climber vegetable rich in iron, minerals and vitamins such as spinach, beetroot, carrot, coriander, French bean, ladies finger, fenugreek, sponge gourd, bitter gourd, and bottle gourd has been promoted with 500 families of pipeline area villages including Jhirli, Ranidih, and Govindpur which have been administered by community members.

Awareness Programmes

8. **Swachhagrah Programme:** Swacchagrah program was launched in Godda on 11th August 2018 with 92 government schools of Godda and Poraiyahat blocks. The project has received considerable recognition and appreciation from various stakeholder viz. District Education department, School teachers, students, parents and state level bodies. In the short span of 10 months, Preraks have been prepared amongst teachers as well as students while 90 Swacchagraha dal comprising over 3000 Swacchagrahis are in action at these schools. Events like Hand Washing, Creation of Soap Bank, Map your school, Litter Graph, etc. have been conducted in schools to raise awareness among children and encourage them to be messengers and promoters of culture of cleanliness.

9. **Awareness Campaign on Beat Plastic Pollution:** This program was organized with an aim to curb plastic pollution wherein emphasis was laid on the importance of 3 R's 'Reuse, Reduce and Recycle' to attain Sustainable Development Goals. Around 3400 students, teachers and community were the participants of the event. The awareness drive comprised of informing and sensitizing the community on harmful impacts of plastic on climate and accountability of individuals, social activist, government and all stakeholders to protect and preserve the Mother Earth.

10. **Awareness Events:** Various awareness events like celebration of New Born Care Week, Celebration of World Aids Day, Celebration of Gender Day, etc. were conducted during the year spreading the message to over 1500 people. Street plays, various competitions were organized under SuPoshan which play an effective role in spreading the message for care of pregnant lady, signs of malnutrition, right food and care for malnourished child and importance of hygiene/ sanitation and timely vaccination for good health of child and family to masses as it easily draws attention of public and conveys messages through songs and acts in local language. Village meeting with participation of key stakeholders and activities to stimulate thinking among participants were also conducted in this year on topics such as significance of nutrition and its constituents in regular diet, vitality and method of hand washing, pregnancy care and its impact on newborn health, etc.

SN	Event Name	Date/Duration	Villages Covered	Audience Size
1	Celebration of New Born Care Week	15th to 21st November 2019	Motia, Patwa, Baksara, Nayabad, Gangta, Petwi, Rangania, Baliakitta, Basantpur, Jitpur mines villages	400
2	Celebration of World Toilet Day	19th November 2019	Bari Baksara, Choti Baksara, Motia, Jitpur mines villages	580
3	Anemia Management & Treatment	22nd November 2019	Motia,	40
4	Menstrual Hygiene Management Programme	26th November 2019	Patwa	50
5	Celebration of World Aids Day	2nd December 2019	Basantpur	30
6	Celebration of Gender Day	9th December 2019	Sondiha, Patwa	100
7	Celebration of Universal Health Coverage Day	12th December 2019	Motia, Patwa	200

8	Sexual and Reproductive Health Awareness Day	12th February 2020	Patwa	50
Total				**1450**

Capacity Building Programmes

Need based capacity buildings Programmes were organized by Suposhan team members to develop skills of Sanginis by educating them about ways to combat malnutrition through qualitative use of equipment's of measurement such as Infantometer, weighing machine, Stedometer, MOYO Chart, Mirror based HB screening for anemia detection to extract authentic and reliable information. Along with this, Household visit and Interaction with beneficiary of Anemia reduction, SAM children from migrated family with Sanginis was also done to capacitate parents and community as a whole.

SN	Date	Topics Covered	Sanginis
1	October 2019	Trainings on Seasonal Food Calendar Survey of Households and Community	Core Villages
2	8th January 2020	Training on Hb Screening and Baseline Survey	Core and Railway line
3	26th, 27th Feb 2020	Exposure Visit to NRC of Podaiyahat & Boarijor Block	Railway and Pipeline area

Medical Services

11. **Health Awareness:** with collaborative efforts of Adani Foundation & Helpage India in Peripheral & Railway Line village area to provide support for better community health. Health Awareness Program are organised in area to aware rural people about harmful diseases, maintenance of cleanliness, direction for balance diet which help them to fight from diseases. School children and community persons have become more vocal with active approach towards curbing diseases and sharing of such valuable information among community.
12. **Critical Health cases:** Diagnosis of critical cases of laborers working in TPP (site office) is done by CSR Medical Team regularly in an emergency manner.
13. **Collaboration with Chief Minister's Critical illness Scheme:** Ambulance support has been provided for the patients under this scheme, as a result of this support over half a century poor patients suffering from critical illness for

treatment got benefitted. The facility has been provided to patients' upto Deoghar, Ranchi and Patna.

14. **Ambulance Facility to Poor Patients**: Families from 13 core villages have been benefitted from this initiative of Adani whose families remain loyal and grateful to company for the support provided by us in times of distress. Ambulance service is given to poor people belonging to TPP area in times of medical emergency or for transfer of critical patients to higher centre like Bhagalpur, Deoghar, Ranchi, and Patna & Other nearby hospitals.

Seasonal Assistance

15. **Assistance to tribal in Sohraye festival:** Saree & Dhoti are traditional costume of tribal for festivities. AF distributed Saree for women and T-shirt & Dhoti for men on the occasion of Sohrai festival to over 600 tribals in tribal villages of core, railway and pipeline area.
16. **Material Support to Community:** The distribution of these materials has helped us to build positive image of Adani amongst people of Godda as well as strengthen our ties with key stakeholders. During the year, Adani Foundation distributed various materials and reach out to more than 20000 beneficiaries directly and indirectly.

Material Support to Community: Blankets during winter					
1	Core Area	2	1	200	800
2	Periphery	8	1	80	320
3	Pipeline Area	47	7	739	2956
4	Jitpur	11	1	165	660
Total		**68**	**9**	**1184**	**4736**

Welfare Support

17. **Assistance in Health, Marriage and Death:** Poor people are supported financially in events like marriage, death and illness as emergency support. During the period, total 205 beneficiaries have been supported to the tune of **Rs. 17, 65,700**. The persons to whom we have assisted were from the project affected villages.

SN	Support Cause	No. of beneficiaries	Supported Amount
1	Health Support	29	2,67,100
2	Marriage Support	36	1,54,000

3	Death Support	49	1,65,000
4	Education Support	1	5000
5	Social Occasion Support	90	1,174,600
Total		**205**	**17,65,700**

18. **Systematic Voter's Education and Electoral Participation (SVEEP)** was launched by Election Commission of India to inform, educate, motivate and facilitate voters and in turn make Indian democracy more participative and meaningful. The Adani Foundation also became a part of this glory and gave its best support in Community Mobilization. Numerous awareness programs were performed by the Cultural Program and Sports Activity.

SUSTAINABLE LIVELIHOODS

1. **Adani Skill Development Centre:** Adani Skill Development Centre- ASDC, Godda was inaugurated by Executive Director AF- Education and Skills on 27th September 2018. Total Eight trades viz. Welder, Fitter, Mason and Bar bender, General Duty assistant, Hospitality, Electrical, industrial Sewing Machine Operator, and Digital Literacy classes are operational in which over **1481** candidates are trained this year. Enrolment of candidates is going on in all eight trades at ASDC.

Sr. No	Trade	Year 19-20
		Total Trainees benefitted
1	Fitter (2 year)	91
2	Welder	35
3	Ass. Electrician (2 year)	50
4	Hospitality	65
5	Digital Literacy	985
6	G.D.A.	175
7	Bar Bending	80

Total	1481

❖ On Job Training & Placement of Saksham Trainees at ASDC

This year 34 trainees were selected in 4 business trades imparted trainings in ASDC namely General Duty Assistant (GDA) (4), Bar Bending (19), Hospitality (9) and 2 in Welder trade who were placed at reputed organizations and decent annual package. The (GDA) Trainees were selected by Nightingales- A Group Company of Mahindra & Mahindra for Bed Side Patient Attendant job at Bengaluru. Likewise, Hospitality trainees were selected by Sodexo for Steward Position currently placed at Nasik, Mumbai. Trainees from Bar Bending have been placed in Adani Power (Jharkhand) Ltd. under two contractors viz. N.G. Gadia and Simplex at annual package of 1, 44,000 and 1, 68,000 respectively and 2 Welder trainees were selected for Tata Motors in Ahmedabad. The continued hard work, dedication and perseverance of candidates, Adani Skill Development Centre (ASDC) and Adani Foundation have resulted into successful placement. These girls, youth and their families have expressed happiness and gratitude to Adani Foundation for an opportunity which has come as a life-changer in their lives.

Placement of Trainees at ASDC						
SN	**No. of Trainees placed**	**Trade**	**Company**	**Salary per Month**	**CTC (In lakhs)**	**Location**
1	**9**	Hospitality	Sodexo	**11631**	**1.4**	Nasik (Mumbai
2	**6**	Bar Bending	N. G Gadiya(Adani Power Plant, Godda)	**12000**	**1.44**	Godda
3	**13**	Bar Bending	Simplex(Adani Power Plant, Godda)	**14000**	**1.68**	Godda
4	**4**	GDA	Nightingales Home Health Care , Bengaluru	**11000**	**1.32**	Bengaluru
5	**2**	Welder	Tata Motors	**9000**	**1.08**	Ahmedabad
Total 34 Trainees						

- **Saksham Certificate Distribution at ASDC:** Saksham trainees were awarded merit certificate after completion of trainings and their assessment of performance are per set standards in hospitality, welder and Digital Literacy trade

2. **Saksham Training cum Uniform Production Centers:** Total 17 Saksham training cum uniform production centres is operational including 4 core and 13 outreach centres in Godda district. This year two batches (Batch VI and VII) have commenced training and two batches have completed training (Batch IV and V) at Saksham Training Centres.

   During the year, 7 new Saksham training cum uniform production centres were inaugurated and trainees were enrolled in Thakurgangti, Gangta Govindpur, Padra, Bhartikitta, Sundarpahari, Ranidih, and Pathargama under the "Phoolo Jhano Saksham Aajeevika Sakhi Mandal (PJSASM) program". So far, more than 1200 women have been trained in Sewing Machine Operator/Self Employed Tailor vertical who are engaged in producing school uniforms as well as are self-employed in stitching cloths of individual orders assisting them to uplift their socio-economic conditions.

S.N	Centre	Total Beneficiaries FY 2019-20
1	Rangania	46
2	Dumaria	30
3	Sondiha	35
4	Basantpur	57
5	Motia	31
6	Ranitikar	0
7	Patwa	10
8	Sarba	0

9	Bahuriya	18
10	Thakurgangti	33
11	Nayabad	0
12	Sundarpahari	147
13	Ranidih	14
14	Pathargama	77
15	ITI Siktia	368
16	Gangta Govindpur	57
17	ASDC Godda	152
18	Padra	23
19	Bhartikitta	29
Total		**1127**

*New Admission is going on in current batch of FY 19-20

3. **Adani Supported Digital Learning Centres:** 3 Computer/Digital Learning Centers are operational in Motia village of core area and newly commenced digital learning centres was inaugurated on August 2019 in SBSSPSJ College, Pathargama of pipeline area and three schools of Sunderpahari block was started on January 2020 namely 1. Kasturba Girls School, Sunderpahari, 2. Kasturba Girls School, Bankaghat and 3. +2 Schools, Rampur at Sunderpahari benefitting tribal and poorer school going children and college students of the region. While, Digital literacy trainings in Rangania centre has been completed.

   Under this program, over 1010 rural youths and children are developing their knowledge and personality through digital learning. It's a boon for marginalized and

poorer children and distressed rural youths who are now capacitating their abilities and igniting themselves with knowledge of digital education.

Sl. No	Name of Centers	Year 19-20
		Total Trainees benefitted
1	Rangania	25
2	Motia	98
3	Pathargama	375
4	Sunderpahari	512
Total		**1010**

** Village level Saksham Computer training Centre at Motia*
***Digital Learning Classes in College & Schools at Pathargama block and Sunderpahari block respectively*

4. Govt. Order for Uniform Stitching to Phoolo Jhano Saksham Aajeevika Sakhi Mandal (PJSASM) & Extension for 5 Years

District Administration had entrusted our Saksham Sewing trainees with the responsibility of stitching and delivering two pairs of uniform for 151,000 for govt. school students from standards I to VIII for Academic Session 2019-20 on 12th January 2019. It became an ultimate ladder for making over 2000 trained women socially and economically independent which brought a ray of hope in their lives. It was completed successfully with toil and dedication of women groups of PJSASM and accomplished first work order of uniform production.

Adani Foundation has set up a mass production Centre with total 274 Sewing Machines comprising of 107 domestic sewing machines, 154 electric operated machines and rest 13 are Kaj, Button and Interlocked machines in Core and Outreach centers to support these women to fulfill their commitment with District Education Development.

Over 1500 women are engaged at 17 Uniform Production cum Training Centres led by Phoolo Jhano Saksham Aajeevika Sakhi Mandal (PJSASM). The project has been extended by District Administration by signing MOU with Adani Foundation for producing school uniforms for next **five years**. More number of women will be linked to the centres to increase the socio-economic conditions of women through uniform production work.

- **Total Earnings from Uniform Production:** These 1500 skilled women have collectively **earned over Rs. 42, 62, 356.00** in the year 2019-20 respectively through this initiative of Adani Foundation by stitching over total **3, 05, 578** two pairs of

School Uniforms. Total **3, 05, 578** two pairs of School Uniforms has been distributed to **152,789** students in **1205** Primary and Middle School of 9 blocks of Godda district.

5. **Sweater Weaving Project:** Along with this, District administration has entrusted faith on SHG to whom another assignment has been given of Sweater weaving project to weave and produce sweaters from their talent for 1.50 lakhs school students. **Rs. 50 lakhs** was sanctioned for sweater making project from Canara bank to SHG led PJSASM group. This work is facilitated jointly by Adani Foundation, and valuable guidance and frequent monitoring by District Administration. It is functional in Sunderpahari Centre which is sustaining livelihood of more than 140 women residing in remote areas. It is planned to link more number of tribal and indigenous women from the region to improve their socio-economic conditions by providing livelihood opportunity in uniform production as well as sweater production.

6. **Bharat Ki Laxmi Programme:** A one day Bharat Ki Laxmi program was organized on October 2019 to felicitate the lady trainers engaged in stitching works at various centers and to honor daughters who have made a mark with their achievement in various fields for public good.

7. **JSLPS team and Phoolo Jhano SHG meeting:** For improvement of all the members of SHG Adani Foundation & JSLPS team regularly monitors the Lead SHG for their better performance and Positive results. Organized meeting with members and evaluated their working style and financial status for Audit purpose. Gave them valuable suggestion and taught them about working manners, So that they can keep their best performance.

8. **Organized Baijal Baba Cultural Program at Sunderpahari:** One Day event was organized on 1st March 2020 at Sunderpahari in participation with PJSASM members and tribal women in presence of honorable CM of Jharkhand Hemant Soren. Honorable Hemant Soren had appreciated the endeavor of PJSASM members in becoming self-sustained to generate livelihood through uniform production work. Chief Executive Members of PJSASM and Master Trainer of respective centres were summoned on the stage and honored by CM of Jharkhand. It was appealed to the tribal masses to join in uniform production initiative of PJSASM supported by Adani Foundation, Godda and District Administration. Local festivals and cultural activities were also organized during the event with participation of more than 3000 audience. Women Saksham trainees of SMO from core villages had also joined the event.

9. **Celebration of International Women's Day:** International Women's Day was celebrated on 7th March 2020 at ITI Siktia with presence of dignitaries of District Administration, Adani Foundation and members of PJSASM Group. It was organised to recognise consistent efforts and honour the women folks and employees who

contribute their valuable effort in development of organisation and society. 115 women trainees of Saksham, 17 Suposhan Sanginis of core and railway line area and other associated programme women were awarded by Certificates, Gifts, Mango Saplings and Momentos as a token of appreciation and gratitude. Nonetheless, entire team of Phoolo Jhano Aajeevika Sakhi Mandals were awarded **SASAKT NARI SAMMAN** by Adani Foundation for their best contribution in Dress Production work. The whole day was dedicated to encourage and sensitize the masses on prevailing social evils and exploitation by educating them through conduction of several cultural programs with participation of adolescent girls, SHGs members, teachers and Suposhan Sanginis such as Nukkad Natak, Welcome Song, Dance faced by women gender such as Child Marriage, Domestic Violence, Abolition of female feticide, and Dowry. It was intended to spread social message to reduce its occurrence and rejuvenate the broken society.

10. **Distribution of Certified Saksham Certificates to SMO Trainees:** Merit certificates were distributed to Saksham trainees in Sewing Machine Operator (SMO) after successful completion of trainings of first batch of core centres namely ITI, ASDC, Pathargama, Jitpur and 2nd batch of outreach centres namely Motia, Rangania, Basantpur, Dumaria and other centres under National Skill Development Corporation (NSDC). The trained and skilled women are getting self-employment opportunity in their local proximity and market place and shaping their fortune with their talent making the family and society proud!

12. **Distribution of School Uniforms of Academic Session 2018-2019:** Adani Foundation supported Education department and School Management Committees through distribution of School Uniforms to school children prepared by members of Phoolo Jhano Saksham Aajeevika Sakhi Mandal (PJSASM). The first work order of producing two pair of school uniforms for 1.50 Lakhs students' of government schools for Academic Session 2018-19 has been completed by women trainees. Total **3, 05, 578** two pairs of School Uniforms has been distributed to **152,789** students in **1205** Primary and Middle Schools (1st to 8th class standard) across 9 blocks of Godda district namely Godda, Podaiyahat, Sunderpahari, Pathargama, Basantrai, Mahagama, Boarijor, Thakurgangti, and Mehrama block on cluster basis in respective BRCs and CRCs in the district with support of school teachers and principals.

Details of Dress Distribution Standard Wise in Godda district of Academic Session 2018-19										
SL. NO.	**NAME OF BLOCK**	**CLASS -(I TO V)**					**CLASS (VI TO VIII)**			**Total Students**
		I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	
1	GODDA	3,443	3,320	3,997	4,270	3,849	2,570	2,410	2,823	**26,682**

2	PORAIYAHAT	3,575	2,971	3,146	3,028	3,119	2,425	2,065	1,748	**22,077**
3	SUNDERPAHARI	1,366	1,240	1,246	1,355	1,102	563	526	461	**7,859**
4	PATHARGAMA	1,895	1,745	2,016	2,176	1,942	1,499	1,469	1,259	**14,001**
5	BASANTRAI	1,987	1,956	2,223	2,226	1,858	1,413	1,276	1,250	**14,189**
6	MAHAGAMA	2,815	3,735	4,157	4,111	3,356	2,216	2,288	2,241	**24,919**
7	BOARIJORE	1,813	1,889	2,141	1,940	1,599	1,166	1,065	979	**12,592**
8	THAKURGANGTI	2,099	2,064	2,330	2,079	2,125	1,631	1,361	1,816	**15,505**
9	MEHARMA	1,877	1,873	2,158	2,179	1,855	1,821	1,798	1,404	**14,965**
Total		**20,870**	**20,793**	**23,414**	**23,364**	**20,805**	**15,304**	**14,258**	**13,981**	**152,789**

**Class wise total students including boys and girls of each block were distributed two pair of school uniforms*

13. **Production of Protective Face Masks & Apron in Saksham Training cum Production Center:** Women group of PJSASM are engaged during this juncture in producing around 1 lakhs masks and 200 Apron to fight battle with epidemic COVID-19 outbreak. In this testing period, all District officials, Ward members, Medical Teams and Adani Foundation are working collaboratively to cope up with an unprecedented circumstances caused by Corona Virus. Meanwhile, production of masks is operational in ITI Siktia, Pathargama, ASDC, Sunderpahari, Motia and other Saksham training centres adhering to safety protocols at workplace.

14. **Trainings on Organic Farming and Vermicomposting:** A one-day Village level training program was organized at Panchayat Bhawan in Motia village with participation of 50 farmers of nearby villages on promotion of organic farming and vermicomposting. It was emphasized to adopt bio based fertilizers prepared from available local resources. We also trained them about advantages of practicing organic farming which is more effective for health and hygiene of farmers' family and altogether preservation of Land & Soil from becoming infertile. The farmer trainees were awarded merit certificate on completion of trainings on vermicomposting.

15. **Material Support of Vermibed:** Adani Foundation supported farming communities by promoting production of organic manure by installation of Vermi-Compost Bag/Vermibed across the core and pipeline village. Adani Foundation supported 69 small and marginal farmers by providing vermi-bags and educates them about the concept of manure making process at their doorsteps. These

prepared vermicomposting will be helpful for their farm during Paddy cultivation in month of June – July.

Distribution of Vermibed		
SN	**Area**	**Farmers**
1	Core village	35
2	Pipeline village	34
Total		**69**

18. **Financial Support for Volunteers and Project Affected Families:** This year Jitpur mines has continued to support 370 families project affected families at the rate Rs. 1440/- per month towards livelihood engagement. Also, Rs.1, 65,201 Monthly Honorarium payments for Volunteer was continues this year. These volunteers help the Adani team for field mobilization and also help to maintain positivity in the Project affected Villages.

RURAL INFRASTRUCTURE DEVELOPMENT

Water Conservation, Ground water recharge

1. **Deepening work of 29 Ponds:** In this year 2019- 20, **39** Pond Deepening work was carried out in 23 villages of TPP area. Total **29** Ponds deepening work has been completed in 14 villages, while rest pond deepening works are ongoing and yet to start with an aim to increase in water storage capacity of ponds as well as increasing in ground water level. More than **1259** acres of agricultural land from 23 villages is depending on these ponds for irrigation purpose, benefitting **3261** farmers. These ponds are excavated for enhancing their water storage capacity by deepening the ponds.

   It is expected that the pond deepening work will enhance the crop intensity and irrigation area in more than 1259 acre of agricultural land with net increase in storage capacity by **242,542 cubic meters.** Apart from agriculture, other alternative livelihoods option have increased in our area such as livestock development, pisciculture etc. In addition to this the work will also boost in ground water level in the wells and bore wells in the area. As availability and increase in water storage, we could also introduce the scientific methods of agriculture like SRI methods in paddy and other crops.

Details of Pond Deepening Work:

Sr No	Name of Pond	Village	Net Increase in storage area (In Cubic Meter)	Potential Water Recharge (2.5 times of increase in storage)	Farmers benefitted	Land Benefitted in Acres
1	Andadih Pond	Sondiha	10,026	25064.35	NA	Ongoing
2	Badka pond	Gangta	12,320	30799.5	125	55
3	Sakhua pond	Sondiha	3,499	8747.5	75	35
4	Mandal pond	Basantpur-Kachuatikar	10,185	25462.93	105	60
5	Sarba pond	Sarba	8,499	21247.53	95	45
6	Gochar pond	Sondiha	7,790	19475.85	105	50
7	Khera pond	Rangania/ Baliakitta	2,540	6350.325	120	30
8	Basantpur Pond	Basantpur	4,497	11242.76	145	40
9	Tar Pond	Sondiha	3,478	8695.75	135	35
10	Khanda Pond	Ranganiya	4,491	11226.65	145	30
11	Chamru Manjhi Pond	Sondiha	4,814	12034.33	135	35
12	Gangati Pond	Rangania	5,285	13213.46	105	40
13	Patangiya Pond	Petbi Santhali	3,810	9525	145	35
14	Kapatchitra Pond	Pakadiya	4,579	11446.33	110	40
15	Baisari Pond	Baisari	5,852	14630	90	50
16	Dumaria Pond	Dumariya	11,142	27855	125	50
17	Pakadiya Pond Near Shiv Temple	Pakadiya	12,590	31475	140	55
18	Petbi Santhali Pond	Petbi Santhali	5,586	13964.05	170	40

19	Kauribahiyar Pond	Kauribahiyar	8,808	22020	110	45
20	Sukha Mathu Pond	Baliakitta	5,261	13152.28	114	40
21	Sondiha Pond-2	Sondiha	9,946	24863.75	118	60
22	Lobandha Pond	Lobandha	8,808	22020	90	45
23	Bhanga Pond	Rangania	9,676	24189.25	114	50
24	Ghogra Pond	Belbarna	9,995	24986.38	120	55
25	Bhasma Pond	Baliakitta/ Rangania	5,548	13870	85	40
26	Jajalpur Pond	Jajalpur	2,888	7220.6	90	23
27	Dhibri Pond	Rangania	5,883	14708.2	100	25
28	Gangta Pond	Nayabad	6,637	16592.33	125	31
29	Gadwa Pond	Jajalpur	20,137	50342.48	125	120
30	Rajkachahri Pond	Godda	15,126	37815	NA	Ongoing
31	Jora Pokhar	Godda	7,385	18461.25	NA	Ongoing
32	Godhi Pond	Godda	5,461	13652.5	NA	Completed/ NA
33	Shivpur Pond	Godda	NA	NA	NA	Completed/ NA
34	Lohiyanagar Pond	Godda	NA	NA	NA	Completed/ NA
35	Baghuniya Pond	Rampur	NA	NA	NA	Completed/ NA
36	Gudam Pond	Gaighat	NA	NA	NA	Completed/ NA
37	Sondiha Pond.	Sondiha	NA	NA	NA	Completed/ NA
38	Kanchan Pond	Petbi	NA	NA	NA	Completed/ NA
39	Santinagar Pond	GODDA	NA	NA	NA	Yet to Start
Gross Total			**242,542**	**606350.3**	**3261**	**1259**

Drinking Water Facility

1. **Drinking water facility in villages –Borewell, Community Well etc.:** Total 17 deep bore well and community well were installed and renovated for drinking water facility at common places of the area like educational institutes, common community structures etc. in core and pipeline areas. The work will facilitate the community during the summer season and all of the year.

2. **Installation & Renovation Work of Hand pumps & Hand pump Platform:** Hand pumps are primary source for drinking water and other domestic need in the TPP area. Adani Foundation has been taken up the hand pumps maintenance and repairing work of hand pumps, its installation and construction of hand pump platform in 5 blocks including core, railway line and pipeline villages. With this work, we are ensuring 100% functionality of the hand pumps in the area. This year we have renovated and repaired 71 hand pumps in the villages. Branding of hand pumps repaired by Adani Foundation are also been done for its recognitions and better monitoring.

Details of hand pump repairing work

SN	Village/Block	No. of Hand pump Repaired
1	Mahgama	9
2	Pathargama	6
3	Godda	33
4	Sunderpahari	13
5	Samda/Thakurgangti	6
6	Ratanpur/Thakurgangti	4
Total		**71**

Educational infrastructure Development

11. **Renovation of 3 School** including Primary school at Amrakanoli village, Middle School at Baksara village and renovated Gyanodaya Class Room in Kasturba Gandhi Balika Vidyalaya at Rangamati, Sahibganj of core and Pipe line areas for quality learning of students. It will provide better learning ambience for the rural children who cannot afford to avail education in private schools due to low household's income.

12. **Construction of 06 Class room** is going on at High School, Motia to provide infrastructure for students to learn in a proper proximity. Also it is helpful to create a better educational environment in the campus.
13. **Construction of Main Gate of 3 College/School:** We have taken up the construction of main gate at 3 colleges /school at Godda College, Godda, Vidyapati Bhawan, Godda and SM College, Poriyahat. There are more than 2500 students are studying Godda college, Godda is only college in Godda district for Higher Education and running on unpaid education policy, the provisions are beneficial in a large scale for the girls/boys studying in the college and school.
14. **Renovation of Main Gate at SM College, Poriyahat:** We have renovated Main Gate and 20 seating place in campus of SM Intermediate College, Poriyahaat to provide better ambience for college going students of Intermediate and also to college staffs and faculties.
15. **Renovation of boundary wall at 2 schools:** construction of boundary wall at 2 schools has been done at Middle school, Basantpur and Middle school Sondiha. After construction of the boundary wall it is beneficial for more than 500 students those who are studying in the school. Also it will helpful to create a better educational environment in the campus.

16. **Renovation of 100 tile control room of Govt. Office:** To support Government officials for official purpose, we have renovated 100 tile control room of DC Office to support and provide facilities to end users of government department. It will provide better environment for doing work with safe and secure environment.
17. **Renovation of Govt. Guest House:** To provide better infrastructure for the government functionaries and delegates, we have renovated Govt. Guest House near Sarkanda Chowk, Godda to provide better ambience for the guests and visitors of government departments.
18. **Renovation of 1 Anganwari Center:** 1 Anganwari Center was renovated at Gangta village of core area. Anganwadi is the source of several benefits for child and maternal health and well-being. It will help facilitate enhancement of nutrition level/Suposhan of community of our TPP area, particularly of children (0-5 years), adolescent girls, pregnant women and lactating mothers supported by Sanginis and Suposhan team members. In addition to this, it will help District Administration, ICDS functionaries for continuous and proper functioning of Anganwadi Centres to provide needful benefits.
19. **Painting work at Juvenile Home, Godda:** Painting work was done at Juvenile Home Godda. The beautification work will help provide a proper environment for the improvement of children. It will also provide a homely environment for the children in Need of care and Protection and children in conflict with law.

Other Village development structures

1. **Construction of 16 Model Bathroom & Soak pit near Handpump**: As we are working towards creating awareness for cleanliness and hygiene by our program named "SWACCHAGRIH" with aim to aware and engage people in creating cleanliness culture. Some time ago people had not toilets facility in their village and they were using open places for toilet which invites unhygienic condition and diseases among the people. To get rid of from this issue we have constructed 16 model bathrooms with soak pit near hand pump in 6 villages including core, railway, and pipeline to provide better rural infrastructure in the villages and educational institutions.

SN	Location	Area	Unit	Beneficiary
1	Niyamatchak village	Pipeline	7	370
2	Kauribihar village	Railway line	1	1476
3	Ratanpur Village	Core area	1	1431
4	Gangta Village	Core area	1	246
5	Samdah Village	Pipeline	1	1559
6	SRTJ, Batkhoriya College, Thakurgangti	Pipeline	5	1580
Total			**16**	**6662**

***Population Census 2011**

2. **Construction of 52 Seating Place (Chabutra) in TPP villages:** Construction of 52 Seating place (Chabutra) has been done in 31 villages including 10 villages of our TPP area and 21 villages of our pipeline and Intake Point area. Normally village not having common places in the village for seating purpose for elders and senior citizens. This is being used by the common people in the village for seating purpose.

3. **Renovation of 7 Community Hall for Community Programs** for Promotion of cultural activity and local events at village level for community. It helps share peace and harmony among community. As we committed to provide better community structures to the village, we have renovated 7 community halls in 7 villages of core, periphery and railway line area. This hall is also being used for Sewing training center as well as common community purpose.

4. **Construction of 2 PCC Road:** 2 PCC Road was constructed at Sondiha village (130 meter long and 2.5 meter wide & 173 meter long and 2.5 meter wide) to provide rural connectivity, linkages to market and gain access to basic services. This work has been benefitted to more than 5000 villagers from 4 vicinity villages.

5. **Renovation and construction of 25 community structures:** We have taken up the renovation of community structures like Temples/Puja Sthal/ Manjhisthan/ Satsang Bhawan/Sidhu Kanhu Shade etc. in core, railway line and pipeline villages. People of our area having big faith for these temples and other places. So many people are visiting daily for religious purpose at the temple.

6. **Construction of 5 Drain**: As we are working towards creating awareness for cleanliness and hygiene by our program named "SWACCHAGRIH" with aim to aware and engage people in creating cleanliness culture. In addition to this we have constructed 150m-200m drain in 4 villages Gangta, Nayabad, Sondiha and Motia. It will be beneficial to more than 900 households of the villages.

7. **Construction of Stairs at 7 Pond:** Pond is one of the important traditional water harvesting structures which enables survival to the water users and communities by providing water for domestic use, irrigation of farm land and life to biological creatures and microbial species. It also increases soil moisture through percolation of water and recharge ground water level. We made stairs for people in 7 ponds in 5 villages of TPP core, railway line and pipeline areas who use this water for domestic and miscellaneous use at Sondiha Pond, Sondiha, Tar Pond in Sondiha, Chamra Mansi pond in Sondiha village, Nayabad pond in Nayabad, Gumma pond in Gumma village, Satichouki kuthari village, Sahibganj, , Basantpur pond in Basantpur village.

8. **Construction of 01 barbed boundary:** To prevent the unwanted entrance and intrusion of animals and persons into the fenced area, and avoid mishappening, 1 barbed boundary was constructed at Satichouki kuthari village, Sahibganj in our Intake Point area.

9. **Renovation of stitching center at ITI Sundarpahari:** Renovation of Hall and outside area of ITI Sundarpahari for running Dress Stitching Center, in which all nearby tribal women prepare dress and sweaters for school children.

10. **Construction of Main Gate at ITI Siktia**: We have started construction work of Main Gate at ITI Siktia for smooth functioning of Dress Stitching Center, in which all nearby tribal and rural women prepare dress for school children.

Annexure III

Compliance Report of the letter from the Technical Officer of Forestry, Ranchi to Additional Principal Chief Conservator of Forest & Nodal Officer, Department of Forests, Environment & Climate Change, GoJ, Ranchi
Vide Letter no. FP/JH/Others/32773/2018/3253 dated 28.06.2019 & its subsequent amendment vide letter no. FP/JH/Others/32773/2018/3614 dated 25.11.2019

Sr. No.	Condition laid down by Central Government	Compliance status
1)	Legal status of the forest land shall remain unchanged.	Agreed. Adani Power (Jharkhand) Ltd. agreed to comply the condition that the legal status of the diverted forest will remain unchanged. Undertaking has been submitted
2) Compensatory afforestation		
a)	Compensatory afforestation shall be taken up by the Forest Department over 16.2 ha. non forest land (Site - Sasarkho-39, Khata No.127, Plot No.591) at the cost of the User Agency. As far as practicable a mixture of local indigenous species will be planted and monoculture of a species has to be avoided.	Adani Power (Jharkhand) Ltd. has proposed for new CA land Diversion of 14.025 ha. non-forest land (Site - Baridih and Gomot, Thana - Ghagra, Thana No. 100 and 99 in Gumla district under Gumla Forest Division) for Compensatory afforestation at the cost of project. The same land has been amended and approved in in-principle approval vide letter no. FP/JH/Others/32773/2018/3614 dated 25th November 2019. Accordingly DFO, Gumla vide his Letter No 3331, dated 30/12/2019 made a reference to DFO, Godda for CA scheme of the above land. Subsequently DFO, Godda has raised a Demand Note for the CA Scheme of the above land. Payment towards Compensatory Afforestation as detailed in **Annexure II**, has been done as per demand raised by Forest Department Vide RTGS UTR NO. **SBINR52020011500081339** JHARKHAND CAMPA. Payment receipt enclosed as **Annexure I**
b)	The non-forest land to be identified for compensatory afforestation shall be transferred and mutated in favour of the State Forest Department for raising compensatory afforestation before issue of the Stage-II approval.	Agreed. Non Forest land measuring 14.025 Ha in Baradih village, Thana No-100 in Ghaghra Block of Gumla district has been identified/approved for Compensatory Afforestation. This land has been transferred & mutated in favour of the State Forest Department for raising compensatory afforestation thereon.
c)	The non-forest land which is transferred and mutated in favour of the State Forest Department for the purpose of Compensatory Afforestation shall be declared as Reserved	Agreed Payment made as per demand raised by Forest Department (**Annexure I**).

Sr. No.	Condition laid down by Central Government	Compliance status
	Forest under Section-4 or Protected Forest under Section-29 of the Indian Forest Act, 1927 or under the relevant section (s) of the local Forest Act. The Nodal Officer must report compliance within a period of 6 months from the date of grant of final approval and send a copy of the original notification declaring the non-forest land as R.F. under Section-4 or P.F. under Section-29 of the Indian Forest Act, 1927 or under the relevant section of the local Forest Act as the case may be, to this Ministry for information and record.	RTGS UTR NO. **SBINR52020011500081339** JHARKHAND CAMPA. Nodal Officer shall be pursued for reporting compliance regarding declaring the Non Forest land as Reserved Forest u/s 4 or Protected Forest u/s 29 of the Indian Forest Act, 1927
d)	The cost of compensatory afforestation at the prevailing wage rates as per compensatory afforestation scheme and the cost of survey, demarcation and erection of permanent pillars if required on the CA land shall be deposited in advance with the Forest Department by the project authority. The CA will be maintained for 10 years. The scheme may include appropriate provision for anticipated cost increase for works scheduled for subsequent years.	The payment of Rs. 68,08,337/- towards maintaining the Compensatory Afforestation (CA) has been transferred through RTGS UTR NO. **SBINR52020011500081339** JHARKHAND CAMPA Payment reference and details enclosed as **Annexure I**
3) NPV:		
a)	The State Government shall charge the Net Present Value (NPV) for the 13.3293 ha forest area to be diverted under this proposal from the User Agency as per the order of the Hon'ble Supreme Court of India dated 30/10/2002, 01/08/2003, 28/03/2008, 24/04/2008 and 09/05/2008 in IA No. 566 in WP (C) No. 202/1995 and as per the guidelines issued by the Ministry vide letters No. 5-1I1998-FC (Pt.II) dated 18/09/2003, as well as letter No. 5-2/2006-FC dated 03/10/2006 and 5-3/2007-FC dated 05102/2009 in this regard.	Agreed. Demand for NPV raised by Forest Department vide **Annexure VI**. The payment towards Net Present Value for Rs. **83,44,142**/- has been transferred through RTGS UTR NO. **SBINR52020011500081339** JHARKHAND CAMPA Payment reference and details enclosed as **Annexure I**
b)	Additional amount of the NPV of the diverted forest land, if any, becoming due after finalization of the same by the Hon'ble Supreme Court of India on receipt of the report from the Expert Committee, shall also be charged by the State Government from the User Agency. The User Agency shall- furnish an undertaking to this effect.	Agreed. Undertaking has been submitted

Annexure III

Sr. No.	Condition laid down by Central Government	Compliance status
4)	All the funds received from the user agency under the project shall be transferred / deposited to CAMPA fund only through **e-portal** (https://parivesh.nic.in/-)	Agreed. The payment has been made to CAMPA fund through e- portal. Payment details are enclosed as **Annexure I**
5)	The complete compliance of the FRA, 2006 shall be ensured by way of prescribed certificate from the concerned District Collector.	Agreed. Copy of FRA has been submitted
6)	The boundary of the diverted forest land shall be suitably demarcated on ground at the project cost, as per the directions of the concerned Divisional Forest Officers.	Agreed Boundary of the diverted forest land will demarcated on the ground at the project cost as per the directions of DFO. Undertaking has been submitted
7)	User Agency shall restrict the felling of trees to minimum number in the diverted forest land and the trees shall be felled under the strict supervision of the State Forest Department and the cost of felling of trees shall be deposited by the User Agency with the State Forest Department.	Agreed Undertaking has been submitted
8)	The pipeline shall be laid down 1.5 m below the ground surface and proper leveling will be done after installation of the pipeline.	Agreed Undertaking has been submitted
9)	User Agency shall obtain Environment Clearance as per the provisions of the Environmental (Protection) Act, 1986, if applicable.	The proposed project of Construction of underground Water Pipeline does not fall under EIA Notification 2006. Hence EIA is not required and EC not obtained.
10)	The alignment and layout plan of the proposed water pipeline through diverted forest land shall not be changed without prior approval of Central Government.	Agreed Undertaking has been submitted
11)	During construction/installation of the pipeline or operation and maintenance activities thereafter, the following restriction/provision shall be complied: (a) No housing/camp structure or labour camp shall be established on the forest land. (b) Sufficient firewood, preferably the alternate fuel, shall be provided by the User Agency to the labourers engaged for this purpose after purchasing the same from the State Forest Department or the Forest Development Corporation or any other legal source of alternate fuel.	Agreed Undertakings has been submitted

Sr. No.	Condition laid down by Central Government	Compliance status
12)	No additional or new path will be constructed inside the forest area for transportation of construction materials for execution of the project work.	Agreed. Undertaking has been submitted
13)	The period of diversion under this approval shall be co-terminus with the period of the project life.	Agreed. Undertaking has been submitted
14)	(a) The forest land shall not be used for any purpose other than that specified in the project proposal. (b) The forest land proposed to be diverted shall under no circumstances be transferred to any other agencies, department, or person without prior approval of Govt. of India	Agreed. Undertaking has been submitted Agreed. Undertaking has been submitted
15)	Violation of any of these conditions will amount to violation of Forest (Conservation) Act, 1980 and action would be taken as per the MoEF&CC Guideline F. No. *11-42/2017-FC* dt *29/0112018.*	Agreed. Undertaking has been submitted
16)	Any other condition that the Ministry of Environment, Forest & Climate Change may stipulate from time to time in the interest of conservation, protection and development of forest & wildlife.	Agreed. Undertaking has been submitted
17)	The compliance report shall be uploaded on e-portal (https://parivesh.nic.in/-)	Agreed.
3.	After receipt of the compliance report on fulfillment of the conditions as stipulated above, from the State Government, formal approval will be issued in this regard under Section 2 of Forest (Conservation) Act, 1980. Transfer of forest land to user agency should not be effected by the State Government till formal order approving diversion of forest land is issued by the Central Government	Noted.
4.	The Regional Empowered Committee has also suggested that as a significant component towards fulfilment of Corporate Environment Responsibility, the project proponent should specifically contribute for the rejuvenation of the Ganga river in the segment along districts of Sahebganj and Bhagalpur specially in respect of conservation of Dolphin and other aquatic biodiversity. However, the financial commitment on this account shall not be the part of compensatory levies under this FC Act approval.	Noted & Agreed. Adani Power (Jharkhand) Limited has developed Conservation Action Plan on Dolphins & other Aquatic Biodiversity in River Ganga at Sahibganj through expert Professor & Biodiversity Consultant of M/s T. M. Bhagalpur University, Bihar. Report enclosed as **Annexure IV** As per the Action Plan, APJL will expend approx. **Rs. 18.16 lakhs** for conservation of Biodiversity

Annexure III

Sr. No.	Condition laid down by Central Government	Compliance status
*	*"Compensatory afforestation shall be taken up by the Forest Department over 14.02 ha. non-forest land (Site - Baridih and Gomot, Thana - Ghagra, Thana No. 100 and* 99 *in Gumla district under Gumla Forest Division)' at the cost of the User Agency. The compensatory afforestation should consist of plantation of suitable mixture of only local native species avoiding mono culture. The CA land (embedded in tenancy lands and situated remotely from forest lands) should be safeguarded against encroachment with permanent demarcation structures and fencing as appropriate at the cost of User Agency."*	Adani Power (Jharkhand) Ltd. has proposed for new CA land Diversion of 14.025 ha. non-forest land (Site - Baridih and Gomot, Thana - Ghagra, Thana No. 100 and 99 in Gumla district under Gumla Forest Division) for Compensatory afforestation at the cost of project. The same land has been amended and approved in in-principle approval vide letter no. FP/JH/Others/32773/2018/3614 dated 25th November 2019.

AGENCY COPY

NEFT / RTGS CHALLAN for Ad-HOC CAMPA

Date : 08-01-2020

Agency Name.	ADANI POWER JHARKHAND LIMITED
Application No.	19932773405
MoEF/SG File No.	FP/JH/OTHERS/32773/2018
Location.	JHARKHAND
Address.	Sambhav House, Judges Bungalow Road, Bodakdev, AhmAhmedabad
Amount(in Rs)	15152479/-

Amount in Words :One Crore Fifty-One Lakh Fifty-Two Thousand Four Hundred and Seventy-Nine Rupees Only

NEFT/RTGS to be made as per following details;

Beneficiary Name:	JHARKHAND CAMPA
IFSC Code:	CORP0000371
Pay to Account No.	1507219932773405 Valid only for this challan amount.
Bank Name & Address:	Corporation Bank Lodhi Complex Branch, Block 11,CGO Complex, Phase I, Lodhi Road, New Delhi -110003

- This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only
- This challan is valid only for seven days.

BANK COPY

NEFT / RTGS CHALLAN for Ad-HOC CAMPA

Date : 08-01-2020

Agency Name.	ADANI POWER JHARKHAND LIMITED
Application No.	19932773405
MoEF/SG File No.	FP/JH/OTHERS/32773/2018
Location.	JHARKHAND
Address:	Sambhav House, Judges Bungalow Road, Bodakdev, Ahm Ahmedabad
Amount(in Rs)	15152479/-

Amount in Words :One Crore Fifty-One Lakh Fifty-Two Thousand Four Hundred and Seventy-Nine Rupees Only

NEFT/RTGS to be made as per following details;

Beneficiary Name:	JHARKHAND CAMPA
IFSC Code:	CORP0000371
Pay to Account No.	1507219932773405 Valid only for this challan amount.
Bank Name & Address:	Corporation Bank Lodhi Complex Branch, Block 11,CGO Complex, Phase I, Lodhi Road, New Delhi -110003

- This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only
- This challan is valid only for seven days.

After making successful payment, User Agencies may send a line of confirmation through Email: helpdeskcampa@corpbank.co.in

04152

04152

SBINR52020011500091339

Adani Power (Jharkhand) Limited

Payment Details for NPV & CA Scheme

Proposal No.: FP/JH/Others/32773/2018/3253 dated 28.06.2019

Demand Note from Forest Department				
SN	Division	CA Scheme Charges	NPV Charges	Wildlife Conservation Plan Charges
		(Rs.)	(Rs.)	(Rs.)
1	**Godda**	68,08,336.65	45,78,126.00	NIL
2	**Sahibganj**	NIL	37,66,016 .00	NIL
	Total	68,08,336.65	83,44,142.00	NIL
Grand Total Amount = Rs. 1,51,52,479/-				

CONSERVATION ACTION PLAN

on

Dolphins & other Aquatic Biodiversity in River Ganga at Sahibganj

for

2x800 MW Godda Thermal Power Plant, Jharkhand

Submitted by:

Adani Power (Jharkhand) Limited

Prepared by:

Prof. Sunil K. Choudhary, Biodiversity Consultant,

T. M. Bhagalpur University, Bhagalpur, Bihar

October 2019

Conservation Action Plan for

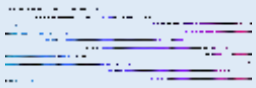
Dolphins & other Aquatic Biodiversity in River Ganga at Sahibganj

Ref. Stage – I FC vide Letter No. FP/others/32773/2018/3253 – condition no. 4 dated 28th June 2019

For

2x800 MW Godda Thermal Power Plant, Jharkhand

Submitted by:



Adani Power (Jharkhand) Limited

Prepared by

Prof. Sunil K. Choudhary, Biodiversity Consultant,
T. M. Bhagalpur University, Bhagalpur, Bihar for Adani Power (Jharkhand) Ltd.

October 2019

Table of Contents

List of Tables

List of Figures

Conservation Action Plan for Dolphins & other Aquatic Biodiversity in River Ganga at Sahibganj (Ref. Stage – I FC vide Letter No. FP/others/32773/2018/3253 – condition no. 4 dated 28th June 2019) Godda Thermal Power Plant

1. Background

Project	:	Construction of water intake structure for withdrawal of water from River Ganga at Sahibganj for 2x800 MW Ultra Super Critical Thermal Power Plant at Godda, Jharkhand
Geo-coordinates of proposed intake well near the south bank of River Ganga at Sahibganj		Latitude 25° 14' 36.52" North & Longitude 87° 41' 18.02" East
Client	:	Adani Power (Jharkhand) Ltd.
Source sustainability study for withdrawal of water from River Ganga for proposed Godda Thermal Power Plant	:	Executed by Academy of Water Technology & Environ Management (AWTEM), Kolkata in Technical collaboration with Indian Institute of Social Welfare & Business Management (Constituent Institute of University of Calcutta) & CSIR Central Glass & Ceramic Research Institute, Kolkata. Final Report: July, 2018
Statutory permission accorded to the proposed project	:	i) Concurrence given for drawing 36 MCM/Annum water from River Ganga by Water Resources Department, Govt. of Jharkhand vide Letter No. 2/PMC/388/2015-41 Dated 15/01/2018 ii) Permission for withdrawal of water from River Ganga for the proposed project given with some conditions by National Mission for Clean Ganga (NMCG), Ministry of Water resources, River Development & Ganga Rejuvenation, Govt. of India vide F. No. T-02/2016-17/450/NMCG/Misc./513 Dated 08/08/2018 iii) Permission for diversion of 13.3293 ha of forest land for lying

		underground water pipe line granted with certain conditions in favour of M/s Adani Power (Jharkhand) Ltd. in Sahibganj & Godda districts of Jharkhand by Regional Office (Ranchi), Ministry of Environment, Forest & Climate Change, Govt. of India vide letter No. FP/JH/Others/32773/2018 Dated 28/06/2019 addressed to The Additional Chief Secretary, Department of Forests, Environment & Climate Change, Govt. of Jharkhand

Adani Power (Jharkhand) Limited – AP(J)L is a subsidiary company of Adani Power Limited which has been formed to develop 2x800 MW Thermal Power Plant for exporting power to Bangladesh at Motia, Gangta, Gaighat and adjacent villages of Godda District in Jharkhand State.

AP(J)L has proposed to construct the water intake and pipeline infrastructure on River Ganga at Sahibganj to meet its water requirement of 36 MCM annually for the proposed Godda Thermal Power Plant. The water from River Ganga will be pumped from Intake location to Godda Thermal Power Plant through underground Water Pipeline. The proposed project is to ensure the availability of water with 100% reliability which is important and vital for functioning of the project. As per conditions of the Ministry of Environment, Forest and Climate Change, Govt. of India for Environmental Clearance of the proposed project, it is mandatory to make impact assessment study on hydrology and ecology (including river biodiversity) of the river at and around project location site due to proposed withdrawal of water from the river.

Accordingly, Adani Power (Jharkhand) Limited commissioned M/s Academy of Water Technology & Environ Management (AWTEM), Kolkata in Technical collaboration with Indian Institute of Social Welfare & Business Management (Constituent Institute of University of Calcutta) & CSIR Central Glass & Ceramic Research Institute, Kolkata to undertake '*Source sustainability study for withdrawal of water from River Ganga for proposed Godda Thermal Power Plant (2x800 MW) in Jharkhand*'.

1.1 Findings of Ecological Impact Assessment Study as part of 'Source sustainability study for withdrawal of water from River Ganga for proposed Godda Thermal Power Plant (2X800 MW) in Jharkhand' conducted by Academy of Water Technology & Environ Management (AWTEM), Kolkata in

Technical collaboration with Indian Institute of Social Welfare & Business Management , Calcutta & CSIR Central Glass & Ceramic Research Institute, Kolkata

The Ecological Impact Assessment study as part of the '*Source sustainability study for withdrawal of water from River Ganga for proposed Godda Thermal Power Plant (2x800 MW) in Jharkhand*' was undertaken by M/s Academy of Water Technology & Environ Management (AWTEM), Kolkata in Technical collaboration with Indian Institute of Social Welfare & Business Management (Constituent Institute of University of Calcutta) & CSIR Central Glass & Ceramic Research Institute, Kolkata in May, 2018 for assessment of likely impact of 36 MCM water withdrawal from River Ganga at Sahibganj in Jharkhand State on the ecology and aquatic biodiversity of the river.

M/s AWTEM and its' technical collaborators have documented the aquatic biodiversity of the river including phytoplankton (mainly represented by algal taxa), zooplankton, periphytons, zoobenthos (Polychaetes, Oligochaetes, Crustacea, Insects, Gastropods and Bivalves), fish species, bird species, higher vertebrate fauna (including Gangetic dolphin) and riparian vegetation near the proposed intake well and water infrastructure site on south bank of the River Ganga at Sahibganj. The documentation of aquatic biodiversity of the river was done on the basis of primary and secondary information. The survey for listing aquatic biodiversity was conducted in the mid-channel of the river 10 km upstream and 15 km downstream of proposed water intake point in May, 2018 (pre-monsoon period). Shanon Weiner's Species Diversity Index and Pielou's Index of Equitability for phytoplankton and zooplankton were computed and the values indicated about the condition of the river with respect to pollution status at 5-sampling sites (site-1: water intake point, sites-2, 3 & 4: downstream of water intake point and site-5: upstream of water intake point). 8-Gangetic dolphins *Platanista gangetica gangetica,* an Endangered species (IUCN, 1996), were sighted in the survey of 30 km of river stretch.

The findings of the Ecological Impact Assessment study as part of the '*Source sustainability study for withdrawal of water from River Ganga for proposed Godda Thermal Power Plant (2x800 MW) in Jharkhand*' refer that the water abstraction of 36 MCM/year from River Ganga at Satichouki mouza near Sahibganj for proposed Godda Thermal Power Plant (2x800 MW) is not likely to have any significant ecological impact on the river. However, it may have some ecological impact in form of habitat shrinkage

and alteration. To mitigate this impact i.e. habitat shrinkage due to formation of sand bars in the river, dredging of river bed at periodic interval has been recommended.

1.2 Purpose of engaging Biodiversity Consultant

The Statutory permissions have been accorded by different concerned agencies to the proposed project for construction of the water intake and pipeline infrastructure on River Ganga at Sahibganj to meet its water requirement of 36 MCM annually. The Statutory permissions accorded to the proposed project include:

i) Concurrence given for drawing 36 MCM/Annum water from River Ganga by Water Resources Department, Govt. of Jharkhand vide Letter No. 2/PMC/388/2015-41 Dated 15/01/2018,

ii) Permission for withdrawal of water from River Ganga for the proposed project given with some conditions by National Mission for Clean Ganga (NMCG), Ministry of Water resources, River Development & Ganga Rejuvenation, Govt. of India vide F. No. T-02/2016-17/450/NMCG/Misc./513 Dated 08/08/2018, and

iii) Permission for diversion of 13.3293 ha of forest land for lying underground water pipe line granted with certain conditions in favour of M/s Adani Power (Jharkhand) Ltd. in Sahibganj & Godda districts of Jharkhand by Regional Office (Ranchi), Ministry of Environment, Forest & Climate Change, Govt. of India vide letter No. FP/JH/Others/32773/2018 Dated 28/06/2019 addressed to The Additional Chief Secretary, Department of Forests, Environment & Climate Change, Govt. of Jharkhand.

Refer to the following condition listed at serial no. 4 in the said approval letter of Regional Office (Ranchi), Ministry of Environment, Forest and Climate Change, Govt. of India:
"The Regional Empowered Committee has also suggested that as a significant component towards fulfillment of Corporate Environment Responsibility, the project proponent should specifically contribute for the rejuvenation of the Ganga River in the segment along districts of Sahibganj and Bhagalpur in respect of Conservation of Dolphin and other aquatic biodiversity."

Though, no Wildlife Sanctuary or National Park and no major wildlife migrant route are located within 10 km radius of the proposed water intake site, but schedule-I animal, Dolphins are reported to be present in the Sahibganj stretch of Ganga.

Sahibganj stretch of River Ganga has been designated as one of the 8- Biodiversity Hotspots for conserving river biodiversity including Gangetic dolphins under the aegis of Namami Gange Programme of National Mission for Clean Ganga (NMCG) project. Hence Ganges river dolphin is the focal component of EIA of the proposed project.

Gangetic dolphin *Platanista gangetica gangetica* is an endangered species and has been given legal protection under Indian Wildlife (Protection) Act 1972. It has been categorized as Endangered on the International Union for Conservation of Nature (IUCN) Red List, included in Appendix I of the Convention on International Trade in Endangered Species of Flora and Fauna (CITES); and in Appendix II of the Convention on Migratory Species (CMS). This is why any water development project in a river inhabiting Gangetic dolphin needs proper Conservation Action Plan on dolphins and its habitat. This is also in accordance with the Environmental Safeguard Policies of leading World Funding Agencies such as World Bank, Asian Development Bank, JICA, AIIB etc.

Keeping above facts into consideration, it was decided by Adani Power (Jharkhand) Limited that a River Biodiversity/Dolphin expert should be engaged to prepare the Conservation Action Plan for dolphins and other aquatic biodiversity in the stretch of River Ganga along the districts of Bihar and Jharkhand.

2

Applicability of National, State and Local Environmental Norms and Environmental Clearance issues, and Relevance of International Treaties to the Project

The proposed project is the construction of the water intake and pipeline infrastructure on River Ganga at Sahibganj to meet its water requirement of 36 MCM annually for the proposed Godda Thermal Power Plant.

2.1 Applicability of National, State and Local Environmental Norms and Environmental Clearance issues

The following laws and regulations are applicable to the environment and social aspects of the proposed *project i.e. construction of the water intake and pipeline infrastructure on River Ganga at Sahibganj to meet its water requirement of 36 MCM annually for the proposed Godda Thermal Power Plant*

- Policy and regulatory framework of Govt. of India
- Environmental Policy of the Jharkhand State Government
- Legislations applicable to the construction activities

2.2 Constitutional Provisions: The Constitution of India, in Article 48, of Directive Principles of the State, states that "the state shall endeavour to protect and improve the environment and to safeguard forests and wildlife of the country". Further Article 51-A (g), of fundamental duties, emphasizes that, "It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures". These two provisions of the constitution are the guiding principles for the environmental legislation in India.

2.3 Statutory requirements for the proposed project

The statutory requirements for the proposed project and the key environmental laws and related regulations applicable to the project are presented in Table 1.

Table 1: Environmental Regulations and Legislations

S. No.	Act/Rules	Purpose	Applicability Yes/No	Reasons for Applicability	Authority
1.	Wildlife Protection Act, 1972 and amendment in 2002. The Wildlife (Protection) Rules, 1995.	The Wildlife Protection Act, 1972 has been formulated in order to protect the wild life in PAs i.e. sanctuaries and National Parks.	No	No Sanctuary or National Park & no major wildlife migrant route are located within 10 km radius of the proposed project site. However, schedule-I animal, Dolphins are reported to be present in the Sahibganj stretch of Ganga for which suitable monitoring and mitigation measures are required.	MoEF&CC
2.	EIA Notification issued by MoEF&CC 2006, GoI and subsequent amendments thereof till date	The MoEF&CC uses EIA Notification 2006 as a major tool for minimizing the adverse impacts of project activities.	No	No relevance to the project	MoEF&CC/ EAC
3.	MoWR, RD & GR Notification New Delhi, 07 October, 2016 under Section 42(b)	To restore the biodiversity value of the Ganga River with the ultimate goal to achieve NMCG long term vision for Ganga River conservation so that viable populations of all endemic & endangered species occupy their full historical range.	Yes	The proposed project is of Low Impact Category (NMCG). NOC required from NMCG.	Ministry of Water Resources, River Development & Ganga Rejuvenation, GoI.
4.	The Environment (Protection) Act, 1986 and further notifications issued under this Act.	To provide the protection and improvement of environment and for matters connected therewith.	Yes	This Act is a paramount piece of legislation for controlling and preventing environmental pollution and degradation.	MoEF&CC, GOI
5.	Water (Prevention and	An Act to provide for the prevention	No	The generation of waste is expected during	SPCB

	Control of Pollution) Act, 1974 and amendments in 1978 & 1988.	and control of water pollution and maintaining or restoring of wholesomeness of water.		construction of water intake & infrastructure from civil engineering activities which will be prevented from getting mixed into River Ganga	
6.	Air (Prevention and Control of Pollution) Act, 1981	Air quality during construction and operation phases will be guided by this specific act.	No		SPCB
7.	Forest (Conservation) Act, 1980 (amended in 1988)	This Act restricts the diversion of forests for use of non-forest purposes.	Yes	The proposed project includes diversion of 13.3293 ha of forest land for lying of underground water pipe line in Sahibganj & Godda districts of Jharkhand Requires Clearance from Jharkhand State Forest Department.	Jharkhand State Forest Department
8.	Noise Pollution (Regulation and Control) Rules, 2000	Necessary to regulate and control noise producing and generating sources with the objective of maintaining the ambient air quality standards in respect of noise.	No	Operation of machineries and drilling & excavation during construction activities are expected to generate noise / vibrations. However, mitigation measure will be taken.	MoEF&CC/ SPCB
9.	Ancient Monuments and Archaeological Sites and Remains Act, 1958	This Act provides for the preservation of ancient and historical monuments and archaeological sites and remains of national importance.	No	No historical monuments protected by Archaeological Survey of India (ASI) are located within 10 km radius of the proposed project site.	Archaeological Survey of India (ASI)

National Mission for Clean Ganga: The **National Mission for Clean Ganga** (NMCG) is the implementation wing of National Ganga Council which was set up in October 2016 under the River Ganga (Rejuvenation, Protection and Management) Authorities order 2016. The order dissolved National Ganga River Basin Authority. The aim is to clean the Ganga and its tributaries in a comprehensive manner. The vision and objectives of NMCG have guided the formulation of eight important areas where the focussed corrective actions are being carried out in mission mode, viz.: "*Aviral dhara*" (uninterrupted flow), "*Nirmal dhara*", "*Ecological restoration*", "Sustainable agriculture", "*Geological safeguarding*", "*Basin protection against disasters*", "*River hazards management*" and "*Environmental knowledge-building and sensitisation*".

The Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR, RD & GR), Govt. of India in consultation with Wildlife Institute of India and other scientific institutions/ organizations has identified 16 terrestrial and 7 aquatic species including Gangetic dolphin with the objective of saving critically endangered species/ecosystems that to ensure their protection outside Protected Areas, across the wider landscape/riverscape/seascape.under NMCG scheme.

National Mission for Clean Ganga (NMCG) in its efforts of biodiversity conservation in Ganga River basin has been working further on the Ganges River Dolphin Conservation Action Plan and has taken up steps to coordinate with various institutions to

- build capacity for Ganga River Dolphin Conservation and Management,
- minimize fisheries interface and incidental capture of Ganges river dolphins,
- restore river dolphin habitats by minimizing and mitigating the impacts of developmental projects,
- involve communities and stakeholders for sustainable efforts in Ganges river,
- educate and create awareness, and
- set off targeted research.

Table 2: International Treaties and its Relevance to the Project

S. No.	Convention	Features	Year of Ratification/Support	Relevance to the project	Requirement
1.	Convention concerning the Protection of the World Cultural and Natural Heritage3 (World Heritage Convention)	The most significant feature of the 1972 World Heritage Convention is that it links together in a single document the concepts of nature conservation and the preservation of cultural properties. The Convention recognizes the way in which people interact with nature, and the fundamental need to preserve the balance between the two.	1972	No relevance to the project	No requirement of any action during project implementation
2.	Convention on Biological Diversity	The objectives of this Convention are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.	1992	River Ganga at Sahibganj near Water intake & infrastructure construction site has reported breeding population of Gangetic dolphins.	The project takes care of conservation of aquatic biodiversity including dolphins through mitigation measures detailed in Conservation Action Plan during construction and operation phases. Hence objectives of this Convention have been taken care of.
3.	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	The CITES aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Through its three appendices, the Convention accords	1975	No relevance to the project	No requirement of any action during project implementation

		varying degrees of protection to more than 30,000 plant and animal species.			
4.	Bonn Convention on Conservation of Migratory Species of wild animals (CMS).	The Convention aims to conserve terrestrial, aquatic and avian migratory species throughout their range. It is an inter governmental treaty, concluded under the aegis of the United Nations Environment Programme, concerned with the conservation of wildlife and habitats on a global scale. Since the Convention's entry into force, its membership has grown steadily to include 119 (as of 1 April 2013) Parties from Africa, Central and South America, Asia, Europe and Oceania.	1979	No relevance to the project	No requirement of any action during project implementation

3

Existing Information on Aquatic (River) Biodiversity in and around the Water Intake Site (Water intake & Infrastructure point on south bank of River Ganga at Sahibganj)

The objective of reviewing the secondary data on aquatic biodiversity is to provide a brief overview of Key Biodiversity Issues in the River Ganga near the project site (Water intake & Infrastructure point on south bank of River Ganga at Sahibganj) including the 'Area of Influence' spanning 5km upstream and 10km downstream of the river from the water intake and infrastructure point, focusing on aquatic species including dolphin and its habitats.

3.1 River Ganga in Sahibganj Area

Sahibganj area is in the Lower Ganga plain. Out of 28 districts in Jharkhand, Sahibganj is the only district connected to Ganga. The surface land is plain and the river flows from west to east. In recent years, the main course of River Ganga has a trend of moving from south to north in Sahibganj area. Sahibganj is flood prone area. The flood situation aggravates when the river itself is in high spate in monsoon. As both longitudinal as well as lateral slopes in Sahibganj plains are too mild, the inundations spread over extensive areas. Active braided channels, meanders, and oxbow lakes, which result from dynamic hydrological processes occurring within a low gradient alluvial plain, characterize the geomorphology of the River Ganga in this area. Water levels rise as much as 10m and the main channel widens to 2-4km during the monsoon season. The river channels are not deeply incised in this area, and exposed bank sediments are those of the modern aggrading flood plain systems. Detached flood plains with sand/mud deposits developed over years are being extensively used for agricultural and animal husbandry purposes by local people. Farmers are using synthetic fertilizers, pesticides and insecticides extensively in agriculture. Toxic substances of fertilizers, pesticides and insecticides are drained from flood plain crop fields on both the banks through run-off directly into the river, and cause chemical pollution of the river. In addition, garbage, excreta and muck are being dumped into the river at numerous

points at Sahibganj. There are three major points of discharge of domestic sewage of the Sahibganj town directly into the river. To this is added the burden of other human activities like bathing, washing of clothes, excessive navigation, brick making, immersion of dead bodies etc. These cause considerable contamination of the river water and upset the ecological balance of the river and may also impact the biodiversity of the river including Gangetic dolphins.

3.2 Biodiversity Profile of the Project Area (stretch of River Ganga near water intake and infrastructure construction site at Sahibganj)

The biological spectrum of River Ganga is multidimensional and it is much richer than other lotic ecosystems in the country. Aquatic biodiversity of the River Ganga in Sahibganj stretch has not been adequately investigated; however few reports are available on the biodiversity profile of the Lower Ganga which includes water intake site also (Bilgrami, 1991; Choudhary *et al*., 2006; Choudhary, 2007; Kelkar *et al*., 2010; Sinha *et al*., 2010a & 2010b; Montana *et al*., 2011; Choudhary *et al*., 2013a & 2013b; Dey *et al*., 2014 & 2018; WII-GACMC, 2017; Kelkar *et al*., 2018 and Kumar & Choudhary, 2018). The forms in Lower Ganga include a wide variety of both micro- and mega- flora and fauna, and those include phytoplankton (mainly represented by algae), zooplankton, other invertebrates, fishes, reptiles, birds and mammals. The aquatic biodiversity of the river near the proposed water intake and infrastructure construction site has been studied using secondary data to understand the present river environment scenario near the water intake site. The proposed site at Sahibganj supports rich diversity of aquatic wildlife, many of which are threatened with extinction including Ganges river dolphin *Platanista gangetica gangetica*, Indian smooth-coated otter *Lutrogale perspicillata*, several species of hard- and soft-shell turtles, several species of fish including prey base of dolphins and variety of resident and migratory birds. Sahibganj stretch of River Ganga has been designated as one of the 8- Biodiversity hotspots for conserving river biodiversity including Gangetic dolphins under the aegis of Namami Gange Programme of National Mission for Clean Ganga (NMCG) project.

3.2.1 Ganges river dolphin: One of the most rare, endemic, endangered and charismatic mammals of the Ganga basin is the Gangetic dolphin. It can only live in

freshwater and is essentially blind. It is found in the Ganges-Brahmaputra-Meghna and Karnaphuli-Sangu river systems of India and Bangladesh (Mohan *et al*., 1997; Sinha *et al*., 2000; Smith *et al*., 2001; Choudhary *et al*., 2006).However in recent years, its range has been reduced and abundance has declined in many areas (Reeves & Leatherwood, 1995). It is listed in the Schedule-I of The wildlife (Protection) Act 1972 of India', categorized as Endangered on the International Union for the Conservation (IUCN, 1996) Red list, included in Appendix I of the Convention on International Trade in Endangered Species (CITES) and in Appendix II of the Convention on Migratory Species (CMS). There is no meaningful estimate of range-wide abundance, but at least 2500 – 3000 Ganges dolphins are assumed to survive across their entire range (Sinha *et al*., 2010). Ganges river dolphin has been declared as 'National Aquatic Animal of India'.

In a survey conducted by the joint teams of Wildlife Institute of India, Dehradun and T. M. Bhagalpur University in March 2018, 29 dolphins have been recorded in the river stretch between Manihari and Sakrigali, 14 km downstream to Sahibganj (includes project site) (Unpublished Data, pers. comm. October 2018, Rashid Raza, Scientist, WII, Dehradun under CAMPA Dolphin Project). AWTEM in collaboration with IISWBM and CSIR-CGCRI, consultants commissioned by APJL for undertaking 'Source sustainability study for drawl of water from River Ganga for proposed Godda Thermal Power Plant' recorded 8 – dolphins in 30km stretch of the river near Sahibganj in the survey conducted in May, 2018.

Threats to Ganges river dolphin

The Gangetic river dolphins face many threats and those include competition with humans for food and water resources, physical alteration, degradation and loss of habitats, deliberate killing for dolphin products such as meat and oil, and collision with powered vessels. These dolphins are also threatened by the enormous pollutant load of the river affecting the immune and reproductive system adversely and by destructive fishing activities, which results in high mortality from by-catch (accidental entanglement in fishing gears) and reduced availability of prey. These animals are perhaps more vulnerable to these threats because their habitat requirements often place them in areas where human activities are most intense.

Why should the Gangetic Dolphin in India be conserved?

- Recent declaration by Govt. of India for Gangetic river dolphin as 'National Aquatic Animal',
- Baiji (Chinese river dolphin) extinction in China,
- Precarious status in Nepal and Bangladesh,
- India is last stronghold with extant populations in Ganges – Brahmaputra River Systems,
- An excellent indicator of riverine ecosystem health,
- Unique riverine species with echolocation abilities,
- Friend of fish and fishermen, and
- International Convention obligations

Ganges river dolphin is the flagship species and indicator of the health of the river. It is an extremely valuable species for monitoring the river environment. Being at the top of the food chain its presence in adequate numbers signifies a rich biodiversity within the river system. It is the flagship species and indicator of the health of the river. It is an extremely valuable species for monitoring the river environment.

3.2.2 Smooth-coated otter *Lutrogale perspicillata*

Otters are semi-aquatic fish eating mammals. They are adapted to semi-aquatic life (Hussain, 1999). They accomplish most of their activities under water; whereas the reproduction and resting happen outside the water like the other terrestrial mammals. They are also recognized as one of the top predators of freshwater ecosystem (Ottino & Giller, 2004) and key species in the floodplain river environment. They are suitable indicators of the health of a river ecosystem as they are sensitive to degradation along the food chain.

The status of otters from the Ganga river system is poorly documented. In Lower Ganga basin (Vikramshila Gangetic Dolphin Sanctuary), high density of breeding population of smooth-coated otters has been reported in Bihar (Choudhary *et al.*, 2006; Sinha *et al.*, 2010). Fishermen & flood plain farmers confirm the sightings of otters towards the northern bank of the river in Manihari – Sahibganj stretch.

Smooth-coated otter is protected in India under the Indian Wildlife (Protection) Act, 1972, Schedule II, listed as Endangered as per IUCN criteria and listed on CITES Appendix II.

3.2.3 Fish species

Fish is an important component of biodiversity of the Ganga River. The Ganga has been the abode of rich Ichthyofauna diversity and source of livelihood for millions of people who inhabit the river bank. The Ganga River supports about 375 fish species, of which 34 including Indian Major Carps (IMC) (*Labeo rohita, Catla catla, Cirrhinus mrigala*, and *Labeo calbasu*), large catfishes (*Aorichthys aor, A. seenghala, Wallago attu, Bagarius bagarius*), featherbacks (*Notopterus notopterus, N. chittala*) and murrels (*Channa marulius, C. punctatus*) are of commercial value (Sinha *et al*., 2010). Bilgrami and Datta Munshi (1985) recorded **69 fish species** at Rajmahal (downstream to the project site at Sahibganj) in a survey carried out in lower middle stretch of the river Ganga between Patna and Rajmahal during December 2007 to May 2009. Some of the fish species reported from Lower Ganga have been identified as prey species of the Gangetic dolphins, and those include *Mystus cavasius, Mystus tengra*, *Sperata seenghala*, *Osteobrama cotio*, *Parambassis ranga* (*chanda*) and *Eutropiichthys vacha.* Thus fish population of the Middle/Lower Ganga basin in eastern India make major contributions to the nutrition needs of millions of people and are also critical for the conservation of the endangered Gangetic dolphin. Most of the fish species reported from Middle/Lower Ganga stretch are either not included in the IUCN-Red list or under "Least Concern" category. *Wallago attu* is the only recorded species that is under Near Threatened (NT) category as per the IUCN Red List of Threatened Species (2010), all other fish species are listed under IUCN Least Concern (LC) category.

3.2.4 Turtles and Crocodilians

The Ganges system supports 18 species of turtle fauna (Choudhary & Bhupathy, 1993). Both Hard-shell turtles *Kachuga tecta* and Soft shell turtles like *Nilssonia gangetica* (Syn. *Aspideratus gangeticus*), *Nilssonia hurum, Lissemys punctata* (Indian flap-shell turtle) are commonly sighted in Middle/Lower stretch of river Ganga. Fishermen confirm presence of both hard-shell turtles and soft- shell turtles in the stretch of river Ganga from Manihari to Rajmahal (includes project site at Sahibganj). The Indian soft-shell turtle *Nilssonia gangetica* and Indian flap-shell

turtle *Lissemys punctata* act as scavenger in the river as they feed on carcasses and cadavers. Indian Roofed turtle, *Kachuga tecta*, Ganges soft-shell turtle, *Nilssonia gangetica* and Indian Peacock soft-shell turtle, *Nilssonia hurum* are listed under Schedule I of the Indian Wildlife (Protection) Act 1972 and in Appendix I of CITES.

Croccdile species – Mugger *Crocodylus palustris* and Gharial *Gavialis gangeticus* (critically endangered, exclusively riverine and fish eating crocodile) are reported to occur sporadically in Middle/lower stretch of river Ganga. Gharial, *Gavialis gangeticus,* an endemic species of the Ganga river system, once commonly sighted in Ganga, is now rare. Among other reptiles and amphibians, a few widespread species of frogs, water snakes *Xenochrophis piscator* and monitor lizards have been also recorded in the Lower Ganga stretch.

3.2.5 Birds

The Ganga River system supports a high richness and diversity of aquatic avifauna and is an important staging point for winter migrants. The geo-morphological features in the basin of river Ganga provides varieties of habitats in the form of mid-channel island, channel between islands, sand bars, flood plains and a large number of floodplain wetlands which attract thousands of resident and migratory birds. The Gangetic basin supports 177 species of birds (WII-NMCG, 2018). Nests of Bank Myna, *Acridotheres ginginianus* and barn Swallow, *Hirundo rustica* are also observed along river banks. Some of the species reported from the river Ganga are iconic and globally threatened such as Greater adjutant *Leptoptilos dubius* (IUCN: Endangered; IWPA: Sch IV), Lesser adjutant *Leptoptilos javanicus* (IUCN: Vulnerable; IWPA: Sch IV) and Indian skimmer *Rynchops albicolis* (IUCN: Vulnerable; IWPA: Not listed). Seven are near threatened (IUCN: NT; IWPA: Sch IV) species – Black Necked Stork *Ephippiorhynchus asiaticus*, Black-headed Ibis *Threskiornis melanocephalus*, Ferruginous Pochard *Aythya nyroca*, River Lapwing *Vanellus duvaucelli*, Black-tailed Godwit *Limosa limosa*, Eurasian Curlew *Numenius arquata* and Painted Stork Mycteria leucocephala. Some common species of birds sighted in Ganga include Cormorants, Egrets, Herons, Drongos, Common Cranes, Ducks, Spoonbills, Pelicans and Sandpipers.

3.2.6 Other Wildlife In Ganga Flood Plains

Numerous floodplain carnivores (e.g. Jackal *Canis aureus*, Indian Fox and Jungle Cat), and ungulates (e.g. Nilgai *Boselaphus tragocamelus*, Spotted Deer, Wild Pig) have also been recorded from the flood plains of the lower Ganga reaches, and also reported in Sahibganj stretch of the river by AWTEM in its Final Report on Source sustainability study for drawl of water from River Ganga (Final Report, July 2018).

3.2.7 Lower Taxa: Invertebrates, Plankton Diversity, Aquatic and Riparian Flora

Comprehensive assessments are not available for taxa like molluscs, crustaceans, aquatic insects, other macro-invertebrates, aquatic and riparian macrophytes, algae, phytoplankton and zooplankton for Sahibganj Ganga stretch; however few reports are available for these taxa in Middle/Lower Ganga reaches.

Macrozoobenthos

Aquatic Macrozoobenthos are extremely diverse group of animals dwelling in the Ganga river system. They are commonly used to evaluate the ecological integrity of rivers and as indicators of water quality assessment. Many species of May-Fly Nymphs, Caddis-Fly larvae and Stone-Fly larvae can survive only in well-oxygenated water. Choudhary *et al*. (2016) found Gastropods as dominant macrozoobenthos taxa followed by Bivalves and Insecta in the river Ganga at Bhagalpur, upstream of the proposed water intake and infrastructure construction site at Sahibganj (Lower Ganga). Gastropods included six species i.e. *Viviparus bengalensis, Thiara lineate, Melanoides tuberculatus, Lymnaea acuminate Gyraulus convexiusculus, and Pila globosa, whereas* Pelecypoda were represented by seven species i. e. *Lamellidens corrianus, Corbicula striatella, Radiatula lima, Novaculina gangetica, Hydroporus sp., Gyrinus sp. and Renatra fusca.*

Zooplankton

Zooplanktons are the integral part of the lotic community and contribute significantly in the biological productivity of the Ganga river ecosystem. Zooplankton are useful as bioindicators to help us detect pollution load. Zooplanktons in Lower Ganga are represented by members of Rotifera, Copepoda, Cladocera and some larval forms (naupli) and Decapods. The most common genera of rotifers reported from middle Ganga include 7-species of *Brachionus,* 3-species of *Keratella* and 3 species of

Filinia. The crustacean zooplanktons include species of *Cyclops, Diaptomus* and *Daphnia*. AWTEM has listed 9-species of zooplankton from 5-sampling stations in 30km stretch of River Ganga near Sahibganj in a survey conducted in May, 2018 (Source sustainability study for drawl of water from River Ganga for Godda TPP: Final Report, July 2018).

Phytoplankton

Phytoplanktons, mainly represented by the algal taxa, are the main primary producers and constitute the base of food chain in river ecosystem.

Bilgrami and Datta Munshi (1979) recorded 140 algal species in middle/lower segments of river Ganga (Patna – Farakka). Kumar and Choudhary (2018) recorded 158 species of phytoplankton in 180km stretch of middle/lower Ganga from Munger (Kasthaharni Ghat) to Manihari (Singhal Tola Ghat) belonging to Bacillariophyceae (69 species), Chlorophyceae (58 species), Cyanophyceae (28 species) and Euglenophyceae (3 species). *Scenedesmus quadricauda, Scenedesmus obliquas, Scenedesmus dimorphus, Chlorella vulgaris, Pediastrum duplex, Actinastrum hantzschii, Coelastrum microporum, Synedra ulna, Synedra acus, Melosira granulata, Nitzschia acicularis, Cyclotella meneghiniana* and *Oscillatoria princeps* reported from this stretch of the river Ganga are the most pollution tolerant species of algae (Palmer, 1969). AWTEM has listed 17-species of phytoplankton from 5-sampling stations in 30km stretch of River Ganga near Sahibganj in a survey conducted in May, 2018 (Source sustainability study for drawl of water from River Ganga for Godda TPP: Final Report, July 2018).

Riparian vegetation

River bank vegetation is ecologically termed as riparian flora, and is highly dynamic. It links terrestrial and aquatic habitat. Riparian vegetation consists of macrophytes, native grasses, sedges, climbers, shrubs and trees (Dutta *et al.*, 2011). Riparian zones are significant in ecology and environmental management, because of their role in soil conservation, their habitat biodiversity, and the influence they have on fauna and river ecosystem. Some of floodplain plants are ecologically very important as they provide shelter to the aquatic animals for breeding and spawning (Bilgrami, 1991).

There is no systematic account available for plant diversity along the entire stretch of Ganga. The common riparian vegetation in middle/lower Ganga stretch include

Polygonum plebegum, Rumex dentatus, Rungia pectinata, Calotropis gigantea, Eclipta prostrata, Tridax procumbens, Vernonia cinerea, Ipomoea aquatica, Cyperus rotundus, Fimbristylis dichotoma, Kyllinga brevifolia, Scirpus maritimus, Acalypha indica, Croton bonplandianum, Phyllanthus simplex, Euphorbia hirta, E. parviflora, Chrozophora rottleri, Leucas aspera, Boerhaavia diffusa, Argemone mexicana, Desmodium gangeticum, Cynodon dactylon, Dichanthium annulatum, Panicum repens, Saccharum spontaneum, Setaria verticillata, Ranunculus sceleratus, Scoparia dulcis, Tamarix dioica and Lippia nodiflora. Some of the riparian macrophytes are good soil binders such as *Saccharum spontaneum, S. arundaceum, Ipomoea carnea, Imperata cylindrica, Cynodon dactylon, Cyperus rotundus, Tamarix* dioica and *Dichanthium annulatum*. Many of the macrophytes are used as fuel, fodder and for making thatches and mats. Besides they provide shelter to breeding fish, insects and other animals.

3.3 General Remarks about the aquatic biodiversity profile of River Ganga near water intake site at Sahibganj

There is no systematic account/data available for the aquatic (river) biodiversity for the proposed project site, however some secondary data are available on the aquatic biodiversity of Lower Ganga stretch which includes project site also. From the review of numerous published research papers, articles, reports and notes on biodiversity of river Ganga and from personal communications with researchers of Bhagalpur University, Wildlife Institute of India, Dehradun and Ashoka Trust for Research in Ecology and Environment, Bangalore, we get sufficient evidence of presence of various forms of biodiversity in Sahibganj Ganga stretch (includes the project site). The most important biodiversity component is the reported presence of endangered Gangetic dolphin and its prey base (fish species). In addition to dolphins other aquatic wildlife are also supposed to be present in the project site including smooth-coated otter, turtles, macrozoobenthos, phytoplankton, zooplankton and diverse aquatic/semi-aquatic plants in riparian zone.

4

Conservation Action Plan for Dolphins & other Aquatic Biodiversity in River Ganga at Sahibganj

There is confirmed report of presence of breeding population of Ganges river dolphin in the Sahibganj segment of River Ganga. In addition to dolphins other aquatic wildlife are also reported to be present in the river near the project site including smooth-coated otter, turtles, macrozoobenthos, phytoplankton, zooplankton and diverse aquatic/semi-aquatic plants in riparian zone.

The project proponent (Adani Power Jharkhand Limited) has proposed to construct the water intake and pipeline infrastructure on south bank of River Ganga for abstraction of 36 MCM water annually from the river for Godda Thermal Power Plant. As per ToR provided by WRD, Govt. of Jharkhand, Consultants M/s AWTEM and Associates (IISWBM & CSIR-CGCRI) was commissioned by the project proponent for 'Source sustainability study for withdrawal of water from River Ganga' for the proposed project. The abstraction of water (36 MCM/Annum) from River Ganga for Godda Thermal Power Plant might have negligible impacts on ecology and biodiversity of the river including dolphins. Hence, Ganges river dolphin is the focal component of Conservation Action Plan of Godda Thermal Power Plant project.

4.1 Anticipated Impacts of water intake and associated infrastructure construction activities on Aquatic (River) Biodiversity including dolphins

The construction of water intake point and associated infrastructure at project location site on the edge of the south bank of the river at Sahibganj may include several activities such as embankment, engineering works and some dredging near river bank leading to increased turbidity and chemical pollution of the river, increased river traffic (movement of boats), anthropogenic noise as well as noise and vibrations produced by operation of machineries (including dredgers). These activities are likely to impact aquatic biodiversity of the river including dolphins and habitat of dolphins. The main anticipated impacts are detailed below in Table-3.

Table 3: Potential Impacts of Proposed water intake & associated infrastructure construction activities on River Biodiversity

Activity/Aspect	Scope	Type of Impact	Degree of Impact	Potential significance prior to mitigation
Construction Phase				
Dredging/Excavation of River bed for fixing piles				
Sediment plume	Short-term/Temporary	Negative effect	Low	Release of organic nutrients from the sediment plume enhances diversity and abundance of benthic fauna near dredged/excavated site; potential to increase the amount of food available temporarily to river dolphins
Dredged/excavated material from riverbed	Long-term Significant	Negative effect	High	Dredged/excavated material – valuable resource for future use & applications
Substrate removal	Short-term/Temporary	Negative effect	Low	Alteration of bottom topography & hydrography resulting into loss of habitats & the risk of physical & mechanical stress to benthic communities
Turbidity Increased turbidity in Area of Influence near water intake infrastructure construction site	Local effect Short-lived Not significant	Negative effect	Moderate	Interference with the photosynthesis and feeding of zooplankton due to turbidity and general effects in the plankton, nekton and benthos

Fish	Long-term	Negative effect	Moderate	Possible regime shift in fish species, alteration in fish-foraging ability and spawning due to increased turbidity
Gangetic dolphins				
Collision /Interaction between dolphin and dredger or Boat head	Temporary/Short-term	Negative effect	Very low	Dolphins likely to temporarily move away from active water intake infrastructure construction area
Hearing damage due to underwater noise associated with dredging, operation of machines & river traffic	Negligible	Negative effect	Very low	Hearing damage predicted to occur only within a few meters from the dredger or operational machines or due to vibrations caused due to movement of motor-boats whereas sustained avoidance behaviour is predicted to occur up to 60m from the source of noise
Masking of communication, and behavioural responses due to dredger/machines noise or noise produced by river engineering works	Significant	Negative effect	Moderate	Not a significant issue in **Active construction area** as Gangetic dolphin has dominant energy around 65 kHz well above the dominant frequency range of most man-made noise including dredger and other noise. However in **Indirect Impact Zone** (500 m circumference area from the water intake infrastructure alignment), potential impact in biologically important behaviours of dolphins such as foraging, breeding and resting due to masking of echolocation signals

Decline in prey base of dolphin due to dredging/excavation or disturbance due to movement of motor-boats	Short-term	Negative effect	Low	Dolphins likely to compensate for small-scale changes in prey abundance by switching prey species and moving to alternative foraging grounds
Other aquatic biodiversity **Birds/Otters/Muggers**	Insignificant/Short-term	Negative effect	Low	Disturbance due to construction activities; Other aquatic biodiversity including birds, otters and muggers are likely to move away from the active construction site
Riparian vegetation	Insignificant/Short-term	Negative effect	Low	impact due to storage of dredged/excavated material on or adjacent to river bank- a threat to breeding and spawning area for many fish species; PIU is supposed to identify a dedicated place for disposal of debris far away from river catchment area near the project site

* Impact Qualification Criteria **Low**: Hardly perceptible effect; **Moderate** - Perceptible effect without much importance; **High** – Perceptible significant effect

4.2 Mitigation and Environmental Management Plan

The objective of the Environmental Management Plan (EMP) is to ensure effective implementation of the recommended mitigation measures. The mitigation measures are designed either to avoid impacts, or mitigate those which cannot be avoided, to reduce adverse impacts to an acceptable level. The Environmental Management Plan (EMP) consists of a set of mitigation, monitoring and institutional measures to be taken up during the design, construction and operation stages of the project. The plan also includes the actions needed for implementation of these measures.

4.2.1 Environmental Management Plan for mitigation of impacts on River Biodiversity including Dolphins due to Construction of water intake and associated infrastructure on the edge of south bank of River Ganga at Sahibganj during Construction, Operation & Maintenance Phase

A strategy has been developed (2010) by the then Ministry of Environment and Forest, Govt. of India for reducing the effects of water development on rivers in the Ganga basin, particularly on the habitation of the Ganges Dolphin. The Ganges river dolphins need to be considered in the assessment of impacts of water development projects. The preferred option from conservation perspective is to refrain from interfering with the natural flow regime and to avoid constructing barriers to animals. However, socio-political conditions make it impractical to completely halt water developmental activities especially in the Ganga basin, so the immediate goal must be to manage such activities in ways that will minimise the harm to dolphins and other aquatic species.

The potential impact of river engineering works, increased river traffic and noise associated with these activities due to construction of water intake structure are mainly on two taxa of river biodiversity, fish and dolphins. Suitable Environmental Management and Monitoring Programs should be developed for these taxa.

Gangetic dolphin is endangered species and National Aquatic Animal of India and several fish species are dolphin prey species. Gangetic dolphin is listed in the Schedule-I of The wildlife (Protection) Act 1972 of India, categorized as

Endangered on the International Union for the Conservation (IUCN, 1996) Red list, included in Appendix I of the Convention on International Trade in Endangered Species (CITES) and in Appendix II of the Convention on Migratory Species (CMS). It is the flagship species and indicator of the health of the river. It is an extremely valuable species for monitoring the river environment. Bihar and Jharkhand hold a large fraction of the global population of the species and hence is of global importance for the conservation of this threatened species. According to current Conservation Action Plan for the World's Cetaceans, the main focus of the IUCN/Cetacean Specialist Group has been on freshwater cetaceans. Moreover, the recent reported extinction of the Chinese river dolphin or Baiji *Lipotes vexillifer* has underlined the urgent need for the conservation of river dolphins, particularly *Platanista* dolphins across the world. The Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR, RD & GR), Govt. of India under National Mission for Clean Ganga (NMCG), in its efforts of biodiversity conservation in Ganga River basin, has been working on the Ganges River Dolphin Conservation Action Plan and has taken up various steps to coordinate with various institutions for conservation of Gangetic dolphin and its habitats.

There is confirmed report of presence of breeding population of Ganges river dolphin in the Sahibganj segment of River Ganga (includes water intake site). Hence Ganges river dolphin is the focal component of EMP of water intake and pipeline infrastructure construction on River Ganga at Sahibganj.

Keeping this in mind, necessary protection and monitoring measures should be planned and taken up.

4.3 Recommended EMP & Monitoring Measures

4.3.1 Gangetic Dolphins

- Maintain speed of motor-boats at 4-5 km/h in upstream and at 9-10 km/h in downstream movement and speed of dredger while moving at 1-3 knots to minimize the risk of collision.

- Stop movement of motor-boats or dredger if dolphins are sighted within 30 m of motor-boat/Dredger head.

- Hearing sensitivity for Gangetic dolphins not assessed thoroughly yet, hence to predict impacts of machine/dredger noise or noise associated with other river engineering works on dolphin population and behaviour conclusively not possible. Noise monitoring during construction phase recommended.

- Construction activity schedule for the project is to be prepared in such a way that there is minimum disturbance on foraging activity of dolphins. Movement of motor-boats and operation of machineries or dredger near construction site to be conducted only after the dolphin's morning peak feeding hours and before its evening peak feeding hours.

- All sightings during river engineering works in the 'Area of Influence' should be reported.

- Execute dolphin monitoring program as prescribed in the Environmental Management Plan, both in construction and operation and maintenance phase.

- Pre– and Post– monsoon study on dolphin population abundance and dolphin behaviour such as foraging, diving, resting and breeding during construction activities should be undertaken every year as per Conservation Action Plan.

- The mitigation measures for protection of dolphins should be monitored by Project Authorities. This will help in objective evaluation of mitigation measures being implemented & will carry out objective assessment of mitigations measures. The Project Authority will also comply with the MoWR, RD & GR approval conditions and will interact with local Wildlife authority (DFO, Sahibganj Forest Division).

- Studies and monitoring of dolphin population abundance and dolphin behaviour such as foraging, diving, resting and breeding to be undertaken by River Dolphin Expert.

4.3.2 Fishes

- Installation of fish exclusion curtain / environmental windows to reduce suction of fish eggs & yolk sac fry from Dredger.

- Take appropriate measures to reduce turbidity levels. Effects of suspended sediments and sedimentation are species-specific, but invertebrates, eggs, and larvae are most vulnerable. During water intake and pipeline infrastructure construction associated activities, concentration of suspended solids should not be more than 200 mg/L. Monthly monitoring of turbidity levels during construction phase is recommended.

4.3.3 Disposal of construction debris

- Discharge of residual liquid into the river not allowed as it results into river water contamination.
- Petroleum and oily wastes to be taken in drums for final disposal.
- Debris/Discarded construction material/excess earth/waste to be disposed at Designated Confined Disposal facility.

4.3.4 General Recommendations for Mitigation of Impacts

- Construction activities to be conducted only in day hours, not in night hours as it will disturb the river fauna including dolphins in rest.
- Regular maintenance of dredge vessel and assisting motor boats to be conducted to the manufacturer's specifications.
- All motor-boats would operate in accordance with appropriate equipment noise and vibration standards.

- Ensure all personnel performing activities related to environmental management of river engineering works for construction of the water intake and pipeline infrastructure are trained, qualified and competent.

- Ensure all personnel performing activities are aware of their responsibilities under the EMP. All personnel associated with water intake and pipeline infrastructure construction activities to be sensitized

not to go for fishing and not to harm dolphin or other flora and fauna in surroundings of the construction site.

- Regular Education, Awareness and Training programs for all the stakeholders. The awareness and training programs to be oriented towards the protection of dolphins and compliance with MoWR, RD & GR approval conditions.

- For implementation of EMP and Mitigation of identified threats, particularly for dolphins, support from State/Local Wildlife Authority to be ensured.

- The PIU will provide all assistance to local Wildlife authority (DFO, Sahibganj Forest Division) in surveillance of the river in Sahibganj segment for any activity detrimental to aquatic wildlife including dolphins and their habitat and for monitoring unsustainable fishing during construction and operation and maintenance phase..

With the implementation of recommended mitigation measures and EMP, direct or residual impacts on river biodiversity including dolphins due to water intake and pipeline infrastructure construction activities under the proposed project will be negligible.

Table 4: Environmental Management Plan for River Biodiversity Conservation during Construction & Operation phase of Water intake facilities at Sahibganj for Godda Thermal Power Plant

Activity/ Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision	Monitoring of Mitigation
Construction Phase					
Pin Pointing Locations of embankment at south bank of the river & civil structure construction at the site	Increase in Turbidity around location and disturbance to aquatic life	Suitable fence around embankment location & construction site surroundings (up to appropriate distance in all directions to avoid impact on aquatic life and carry out work during day time i.e. only after the dolphin's morning peak feeding hours and before its evening peak feeding hours. The concentration of suspended solids (Turbidity) should not be more than 200 mg/L.	Contractor	PIU Safeguard Officer	PMU Environmental Coordinator
Construction Debris and Waste due to water intake & pipeline infrastructure construction	Contamination of River water	All construction wastes and debris should be collected reused to the extent possible and disposed off at approved and identified site. No waste should be disposed off in Ganga River	Contractor	PIU Safeguard Officer	PMU Environmental Coordinator
Avoidance of Dolphin entry in water intake well foundation area	Entry of Dolphins and other aquatic life in water intake well foundation	Suitable screens shall be maintained properly to restrict entry of dolphins and aquatic life.	PIU	PIU Safeguard Officer and Environmental Expert of Contractor	PMU Environmental Coordinator

Activity/ Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision	Monitoring of Mitigation
Noise Generation from Construction equipment, machinery and movement of vessels/motor-boats at construction site	Excessive noise generation may impact underwater aquatic life specially dolphins	All machinery and equipment to be used should limit noise generation <120 dB (A) at 10 m distance to minimise impacts. Contractor should provide necessary certificate from equipment manufacturer for this	Contractor	PIU Safeguard Officer	PMU Environmental Coordinator
Monitoring of impacts of construction activities on Dolphin & other aquatic biodiversity	The construction activities is not proposed inside the river and there will not be impact to dolphin population	1. No construction activities is proposed inside the river however will carry out Dolphin Sighting Survey in upstream and downstream (10 km distance) during pre and post monsoon season through River dolphin expert 2. Monitor availability of prey base of Dolphin (Fish) through collection of fish catch at landing sites	1. River Biodiversity/ Dolphin Expert 2. Fish catch data may be collected from fish landing point	River Dolphin Expert / PIU Safeguard Officer	PMU Environmental Coordinator
Training Program for Sensitization of construction workers for protection of Dolphins and other aquatic life	Construction workers may go for unauthorised fishing and other activities in river disturbing habitat of dolphins & other aquatic biodiversity	A training program should be conducted by the environmental expert of PIU Safeguard Officer under guidance from Environmental Coordinator of PMU to sensitize construction workers/crew about importance of protection of dolphin & other aquatic biodiversity	Training and awareness consultant team and PIU Safeguard Officer	PMU Environmental Coordinator	PMU NHAI
Environmental Education & Awareness Program	Environmental Education & Awareness program among local stakeholders will help in checking all such activities injurious to aquatic biodiversity	A variety of environmental education & awareness programs for need & importance of conserving river biodiversity including dolphins should be organized among fishers, farmers,	PMU & Environmental Coordinator / Training and awareness consultant team	PMU Social Coordinator	PMU

Activity/ Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision	Monitoring of Mitigation
	including dolphins & their habitats	school & college students & people.			
Management of Dolphin Habitat and Assistance to local Forest Department	Biodiversity Conservation Action Plan implementation will help in protection of Dolphin & its habitat	Biodiversity Conservation Action Plan includes monitoring, protection and sustenance of Dolphin & its habitat	PIU & Jharkhand State Forest Department (Sahibganj Forest Division)	DFO Sahibganj Forest Division	PMU & Chief Wildlife Warden Jharkhand
Operation Phase					
Monitoring of Impacts during operation & maintenance of water intake facilities on dolphins & other aquatic biodiversity	Regular monitoring of impacts in operation & maintenance phase on Dolphins & other aquatic biodiversity. Operation & maintenance activities may result in disturbance to resident dolphin population & its habitats	Pre- and post- monsoon monitoring to be carried out every year for Dolphin population, dolphin behaviour such as, foraging, diving and migration and prey base of dolphins	Biodiversity/River Dolphin Expert & Local Forest Department	PMU/DFO Sahibganj Forest Division	PMU Environmental Coordinator
Monitoring of fishing pressure & threats to fishery & dolphins involving local fishing community	Use of destructive fishing nets & gears may result into by-catch mortality of dolphins due to entanglement into fishing net	Monitoring of destructive fishing nets, gears and practices, Monitoring for dolphin mortality & dolphin entanglement in fishing nets	PIU/Contractor	State Forest Dept. (Sahibganj Forest Division), Local NGOs & Local community	PMU Environmental Coordinator
Environmental Education & Awareness	Environmental Education & Awareness program will help in developing positive attitude among local stakeholders towards aquatic biodiversity conservation including dolphin & its habitat	Education & Awareness outreach activities: Village meetings, distribution of handbills, pamphlets. Preparation of video documentary & its demonstration among local stakeholders	PIU /Contractor / Training and awareness consultant team	State Forest Department, Local NGOs, Local University	PMU Environmental Coordinator

Table 5: Environmental Monitoring Program for Construction & Operation Phase

Environmental Component	Location	Responsible for implementation	Parameters	Responsible for Supervision	Indicators/ Standards	Frequency	Cost (INR)
Construction Phase							
Dolphin abundance estimation/Dolphin count survey (Upstream/Downstream by Single Observer Survey method recommended)	Dolphin abundance estimation in 5 km upstream & 10 km downstream of the river from the proposed construction site	PIU/Contractor through Biodiversity/ River Dolphin Expert	Dolphin numbers (Low, Best & High), Age class (Adult, Sub-adult & Calf) & no. of each size class	PIU Safeguard Officer	Encounter rate: dolphins/ hour & dolphins/ km	02 in a year Dry peak season (April-May) & Post-monsoon season (Last week Oct.-Nov.)	Included in Biodiversity monitoring plan cost
Fish & Fishery survey & assessment of depletion of prey base	5 km upstream & 5 km downstream of the river from the proposed construction site	PIU/Contractor through Biodiversity Expert or Local University	Fish catch composition at landing sites adjacent to construction site, fish catch per unit effort	PIU Safeguard Officer	Changes in fish composition, yield, fish size & trend in decline of prey base	02 in a year Pre-monsoon season & Post-monsoon season =Total 2 surveys per year	Included in Biodiversity monitoring plan cost
Measurement of ambient noise level	Measurement of ambient noise level across a range of habitats and ecological conditions within the 'Area of Influence' of construction site in the river	PIU/Contractor	Measurement of effects of external noise level on dolphin movement, space use, diving behavior and stress-related behaviours	PIU Environmental Coordinator	Ambient Noise Standards. Equivalent day and night noise levels in dB(A)	Measurement of ambient noise level: 02 (in pre - & post-monsoon period) every year.	Included in Biodiversity monitoring plan cost
Environmental Education & Awareness	Education & Awareness outreach activities in fisher's hamlets, farmer's villages,	PIU /Contractor/ Training and awareness	Village meetings, preparation &	Biodiversity/River Dolphin Expert, DFO	Increased awareness for protection of river	04 – On quarterly basis	Included in Biodiversity monitoring plan cost

Environmental Component	Location	Responsible for implementation	Parameters	Responsible for Supervision	Indicators/ Standards	Frequency	Cost (INR)
	and among local people	consultant team	distribution of handbills, pamphlets	Sahibganj Forest Division	biodiversity including dolphins, Education about Wildlife & Fishery Regulatory Rules		
Operation & Maintenance Phase							
Dolphin abundance estimation/Dolphin count survey (Use of Downstream/Upstream Single Observer Survey method recommended)	5 km upstream & 10 km downstream of the river from the proposed construction site	PIU/Contractor through Biodiversity/ River Dolphin Expert	Dolphin numbers (Low, Best & High), Age class (Adult, Sub-adult & Calf) & no. of each size class	PIU Safeguard Officer	Encounter rate. dolphins/ hour & dolphins/ km	02 in a year Dry peak season (April-May) & Post-monsoon season (Last week Oct.-Nov.)	Included in Biodiversity monitoring plan cost
Environmental Education & Awareness	Education & Awareness outreach activities in fisher's hamlets, farmer's villages, local schools & colleges and among local people	PIU /Contractor/ Training and awareness consultant team	Village meetings, workshop, poster exhibition, preparation & distribution of handbills, pamphlets & other education material	Biodiversity/River Dolphin Expert, DFO Sahibganj Forest Division	Increased awareness for protection of river biodiversity including dolphins/ Education about Wildlife & Fishery Regulatory Rules	06 – Every two months in a year	Included in Biodiversity monitoring plan cost

- The cost of EMP of Construction & Operation & Maintenance phases included in the Biodiversity Conservation Action/Monitoring Plan (Table 6).

4.4 Biodiversity Conservation Action/Monitoring Plan and Cost

The Biodiversity Conservation Action Plan (BAP) refers here to management of water intake and pipeline infrastructure construction site and activities associated with construction for protection/conservation of river biodiversity including dolphins and their habitats through developing appropriate management/monitoring plan.

The project construction site is known to serve as habitat for the endangered and nationally protected Gangetic dolphin and several other aquatic animal species such as turtles, birds including migratory birds and several fish species including dolphin prey species. Fishing activities take place on an ad-hoc basis along the river in the project 'Area of Influence'. Measures must be undertaken to ensure unimpeded migration of the Gangetic dolphin and fish; and construction activities and infrastructures do not lead to the reduction in their population. During construction and de-commissioning phases, temporary and permanent structures along the river banks, river, and flood plain area could affect fish habitat, migratory birds, turtles, and other animals through disruption of normal activities, deterioration and loss of habitat.

In the proposed Project, the objective of the Biodiversity Conservation Action Plan (BCAP) should be to protect/conserve and to enhance the status of local (river) biodiversity focussing on protection/conservation of the endangered Gangetic dolphins and dolphin prey species (fish) within and in and around project 'Area of Influence'. Activities under the BCAP should include baseline data collection, monitoring and implementation of specific recommendations for protection/conservation activities. The following activities should be implemented under the BCAP:

a) **Establishment of baseline biodiversity:** Collection of baseline data on flora and fauna (primary data through Rapid Biodiversity Survey for aquatic wildlife including dolphins) within the 15km project influence area (5km upstream and 10km downstream to the construction site in the river) to set the pre-project baseline.

b) **Monitoring during construction and operation of water intake facility:** Monitor flora and fauna, particularly Gangetic dolphin and dolphin prey species

(fish), during project construction stage (2 years) and during project operation stage (3 years) to observe changes in comparison to baseline conditions. The purpose of this exercise aims to ensure that biodiversity levels are maintained at baseline conditions/levels or improved.

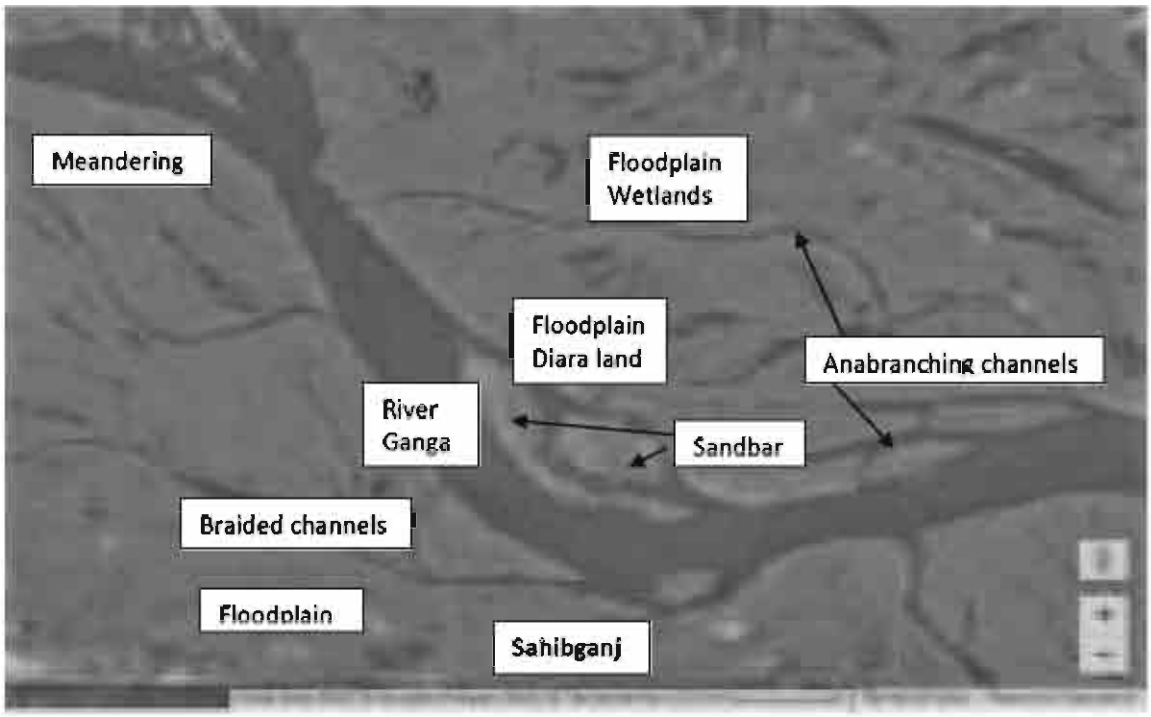


Figure 1: Diverse riverine and floodplain habitats at & around Sahibganj

c) <u>Capacity building of local stakeholders:</u> Capacity building of local stakeholders including construction workers/crew, field researchers, local forest department staff, local NGOs/CSOs and others who will not involve in activities injurious to aquatic biodiversity and their habitats and will disseminate this message to other sections of the society.

d) <u>Environmental Education and Awareness</u> : Environmental education and awareness outreach activities among flood plain farmers, fishers, school and college students and local people about the need and importance of conserving river biodiversity including Gangetic dolphins. The fishermen, in particular, should be educated about the harmful impacts on river biodiversity because of

unsustainable fishing practices (use of harmful fishing nets and gears) and they should be trained in fishing methods that do not impact dolphins. Environmental education and awareness outreach activities may include village meetings, workshop, training, poster exhibition, distribution of handbills, pamphlets and other education material. The details of such activities should be decided by the External Monitor.

e) **Support to Local Forest Department**: All assistance to local Wildlife authority (DFO, Sahibganj Forest Division) should be provided by PIU in surveillance of the river in Sahibganj segment for any activity detrimental to aquatic wildlife including to dolphins and their habitat and for monitoring unsustainable fishing during construction and operation and maintenance phase.

Table 6: Biodiversity Conservation Action/Monitoring Plan and Cost

Activity	Frequency	Rate	Cost (INR) Per Year
Pre-construction Phase			
Rapid River Biodiversity Survey for collection of baseline data (Dolphin population estimation, Survey for dolphin prey species i.e. fish, other wildlife, plankton community & Riparian vegetation)	Post-monsoonal - 01	Lump sum	1,00,000
Total cost during Pre-construction Phase			**1,00,000**
Construction Phase			
1. Dolphin count survey	Seasonal-02 Dry peak season (April-May) & Post-monsoon season (Last week Oct.-Nov.)	@INR 50,000 per survey X 2 surveys per year	1,00,000
2. Survey for Fishery & prey base of Dolphins	Pre-monsoon season & Post-monsoon season Total = 2 surveys in a year	@INR 40,000 per survey X 2 surveys in a year	80,000
3. Survey for other aquatic wildlife & plankton community	Seasonal:02 Pre-monsoon & Winter	@INR 50,000 for each survey X 2 surveys in a year	1,00,000
4. Riparian vegetation survey	Annual (01): end of the monsoon season	@ INR 50,000 per survey	50,000
5. Measurement of external noise level at project site	Measurement of ambient noise level: 02 (in pre – & post-monsoon period) every year at 2-locations.	INR 1,000 per measurement X 4-measurements	4,000
7. Environmental Education (EE) & Awareness	04 on quarterly basis	INR 10,000/per EE & Awareness outreach activity	40,000
		Total	**INR 3,74,000/-**
		EE literature printing	INR 50,000/-

Activity	Frequency	Rate	Cost (INR) Per Year
		Total Cost for 2 years of Construction Phase (INR 4,24,000 X 2 years)	**INR 8,48,000/-**
		Total Cost for Biodiversity Monitoring during Construction Phase	**INR 8,48,000/-**
Operation Phase			
1. Dolphin count survey	Seasonal-02 Dry peak season (April-May) & Post-monsoon season (Last week Oct.-Nov.)	@INR 50,000/ survey X 2 surveys/year	100, 000
2. Measurement of external noise level	Measurement of ambient noise level: 02 (in pre – & post-monsoon period) every year at 2-locations.	INR 1000 per measurement X 4-measurements	4,000
4. Survey for other aquatic wildlife & plankton community	Seasonal:02 Pre-monsoon & Winter	@INR 50,000 for each survey X 2 surveys a year	1,00, 000
5. Riparian vegetation survey	Annual (01): end of the monsoon season	@ INR 50,000/survey	50,000
7. Environmental Education (EE) & Awareness	04 on quarterly basis	INR 10,000 per EE & Awareness outreach activity	40, 000
		Total	**INR 2,94,000/-**
		Total Cost for 3 years for operation & Maintenance phase (INR 294000 x 3 years)	**INR 8,82,000/-**
		Total Cost for Construction, Operation & Maintenance phase	**INR 17,30,000/-**
		Contingency @5 %	**INR 86,500/-**
		Total Cost of Biodiversity Monitoring	**INR 18,16,500/-**

BIBLIOGRAPHY

Bashir, T., Behera, S. K., Khan, A. and Gautam, P. (2012): An inventory of mammals, birds and reptiles along a section of the river and banks of upper Ganges, India. *Journal of Threatened Taxa* 4(9), pp: 2900 – 2910.

Behera, S. K., Singh, H., Sagar, V. and De, R. (2014): Current status of Ganges river dolphin (*Platanista gangetica gangetica)* in the rivers of Uttar Pradesh, India. In: Rivers for Life - Proceedings of the International Symposium on River Biodiversity: Ganges – Brahmaputra – Meghna River System, Ecosystems for Life, Sinha, R. K. & Ahmed, Benazir (eds.), A Bangladesh – India Initiative, IUCN, pp: 139 – 149.

Bilgrami, K. S. and Dutta Munshi, J. S. (1985): Ecology of river Ganges- Impact of human activities and conservation of aquatic biota (Patna to Farakka) DOEn final technical report, Bhagalpur, 103pp.

Bilgrami, K. S. (1991a): Biomonitoring of water quality of the Ganga, In: The Ganga, a scientific study, Eds. C. R. Krishnamurthy, K. S. Bilgrami, T. M. Das and R. P. Mathur. Ganga Project Directorate, MoEF New Delhi, Northern Book Center, New Delhi. 223pp.

Bilgrami, K.S. (1991b): Impact of flood on productivity of Diara land an vegetation. In: The Ganga: A Scientific Study, Ganga Project Directorate Report, New Delhi, India (Eds. C.R. Krishnamurty, K. S. Bilgrami, T. M. Das and R. P. Mathur). pp. 99-100.

Choudhary, S.K., B.D. Smith, S. Dey, S. Dey & S. Prakash (2006): Conservation and biomonitoring in the Vikramshila Gangetic Dolphin Sanctuary, Bihar, India. *Oryx*, 40(2): 189-197.

Choudhary, S. K., Dey, S. and Kumar, B. N. (2018): Study on bioproductivity of the Gangetic dolphins near NTPC Ltd., Kahalgaon. NTPC Dolphin Project Report, University Dept. of Botany, T. M. Bhagalpur University, Bhagalpur, Bihar.

Dey, Sushant, Dey, Subhasis, Choudhary Sunil K., & Kelkar, Nachiket (2014): Avifauna of the Vikramshila Gangetic Dolphin Sanctuary, Bihar, India. *Forktail*, 30, pp: 34 – 40.

The Wildlife (Protection) Act (Schedule I). Government of India, No. 53 of 1972, New Delhi, India.

IIT Consortium (2012): Floral and Faunal diversity in Lower Ganga: Varanasi to Farakka. GRB EMP: Ganga River Basin Environment Management Plan; Report Code: 026_GBP_IIT_ENB_DAT_03_Ver1, 31 pp.

Islam, M. Z. and Rahmani, A. R. (2004): *Important Bird Areas (IBAs) in India: Priority sites for Conservation.* Mumbai: IBCN: Bombay Natural History Society, and Cambridge (UK): Birdlife International.

IUCN (1996): 1996 IUCN Red List of threatened animals. IUCN, Gland, Switzerland and Cambridge, UK. 448 pp.

Kelkar N., J. Krishnaswamy, S. Choudhary & D. Sutaria (2010): Coexistence of fisheries with river dolphin conservation. Conservation Biology 24: 1130–1140.

Kelkar, N., Dey, S., Deshpande, K., Choudhary, S.K., Dey, S., and Morisaka, T. (2018): Foraging and feeding ecology of *Platanista*: an integrative review. Mammal Review, 48 (3): 194-208.

Kumar, B. N. and Choudhary, Sunil K. (2018): Phytoplankton as index of Water Quality with reference to pollution of The Ganga River from Munger to Manihari, Bihar (India). JETIR, Volume 5, Issue 7, pp: 236-244.

Kumar, S. (2001): Plant Diversity along River Ganga. Dehradun; Sai Publishers.

Montana, C., Choudhary, S. K, Dey, S. and Winemiller, K. 2011. Compositional trends of fisheries in the River Ganges, India. *Fisheries Management & Ecology*, Blackwell Publishing Ltd. 18 (4): 282-296.

Nawab, A. (2009): Aspects of the ecology of Smooth–coated Otter Lutrogale perspicillata Geoffroy St. Hilaire, 1826: A Review. Journal of Bombay Natural History Society, 106(1): 5–10.

Payne, A. I., Sinha, R., Singh, H. R. and Huq, S. 2003. A review of the Ganges Basin: its fish and fisheries. In: R. L. Welcomme & T. Petr (Eds.) Proceedings of the Second International Symposium of Management of Large Rivers for Fisheries, Vol. 1. Bangkok, Thailand: RAP Publication, FAO Regional Office for Asia and the Pacific, pp. 229–252.

R. K. Sinha, *The Ganges River Dolphin – A Tool for Baseline Assessment of Biological Diversity in River Ganges,* India, *op.cit.,* 34.

Sinha, R. K. (2013): The Gangetic dolphin and action plan for its conservation in Bihar. Department of Environment and Forests, Govt. of Bihar, India. 52 pp.

Sinha, R. K., Behera, S. and Choudhary, B. C. (2010a): Conservation Action Plan for the Gangetic Dolphin 2010 – 2020. Ministry of Environment and Forests, Govt. of India. 44 pp.

Sinha, R. K., Sinha, R. K. and Kedia, D. K. (2014): Spatial and Temporal variation in Ichthyofaunal diversity in the Middle – Lower stretch of the river Ganges. In: Rivers for Life - Proceedings of the International Symposium on River Biodiversity: Ganges – Brahmaputra – Meghna River System, Ecosystems for Life, Sinha, R. K. & Ahmed, Benazir (eds.), A Bangladesh – India Initiative, IUCN, pp: 241 – 255.

Sinha, R. K., Smith, B.D., Sharma, G., Prasad, N.K., Choudhary, B.C., Sapkota, K., Sharma, R.K., Behera, S. K. 2000. *Status and distribution of the Ganges Susu Platanista gangetica in the Ganges River system of India and Nepal*. In: Reeves, R.R., Smith, B.D., Kasuya, T. eds. Biology and conservation of freshwater cetaceans in Asia. Occasional paper of the IUCN Species Survival Commission 23. International Union for Conservation of Nature, Gland, Switzerland, and Cambridge, United Kingdom. pp 54-61.

Sinha, R. K., Verma, S. K. and Singh, Lalji (2010b): Population status and conservation of the Ganges river dolphin (*Platanista gangetica gangetica*) in the Indian subcontinent. In: *Biology, evolution and Conservation of River dolphins within South America and Asia*, (eds.) Ruiz-Garcia, M. and Shostell, J. M. New York, USA: Nova Science Publishers, Inc.

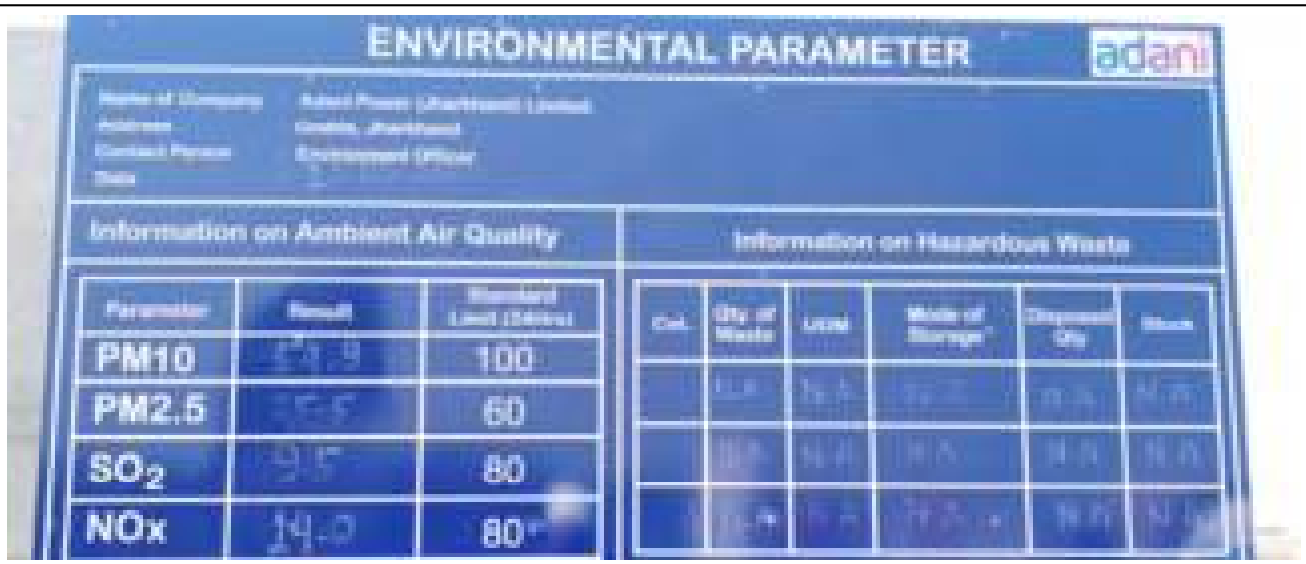
WII-GACMC (2017). Aquatic Fauna of Ganga River: Status and Conservation. Ganga Aqualife Conservation Monitoring Centre, Wildlife Institute of India, Dehradun.

Zoological Survey of India (ZSI) (1991): *Faunal Resources of Ganga,* Part I (Calcutta: Zoological Survey of India, 1991), 145 pp.

Annexure IV

Green Belt Development

Seasonal Flower Bed



Environment Parameter Board on Main Gate


Construction of RCC Roads to easy movement and reduce fugitive dust emission

Water Sprinkling at Site

Wet internal road after water sprinkling