GMR Kamalanga Energy Limited

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05-01/25

Ref: GKEL/MOEF&CC/2024-25/8532
Date: 08.01.2025

To
The Director
Eastern Regional Office
Ministry of Environment, Forests & Climate Change, Govt. of India
A/3, Chandrasekharpur, Bhubaneswar, Odisha - 751023

Sub: Submission of 26th revised Half Yearly EC Compliance Status Report Expansion by additional of 1x350 MW, TPP (Phase-II) at Village Kamalanga, Dhenkanal District, Odisha.

Ref:
1. Env. Clearance vides your letter No. J_13012/73/2011-IA. II(T) dated 5th Dec 2011
2. Env. Clearance vides your letter No. J_13012/73/2011-IA. II(T) dated 11th Jan 2019
3. Env. Clearance vides your letter No. J_13012/73/2011-IA. II(T) dated 11th Apr 2019
4. Env. Clearance vides your letter No. J_13012/73/2011-IA. II(T) dated 24th Feb 2023

Dear Sir,

With reference to the subject referred above, we are pleased to submit the 26th revised Half Yearly EC Compliance Status Report of our 1 x 350 MW Thermal Power Plant (Phase-II) at village Kamalanga, Dhenkanal District, Odisha, for your kind perusal please.

Kindly acknowledge receipt of the same.

Thanking You,

Yours Sincerely,
for GMR Kamalanga Energy Limited

Manoj Mishra
Plant Head

Encl. – As above

Copy for kind information to:
1) Director, MoEF&CC, GOI, New Delhi
2) Regional Director, CPCB Zonal Office, Kolkata
3) Member Secretary, SPCB - Odisha, Bhubaneswar
4) Regional Officer, SPCB - Odisha, Hakimpada, Angul

EC Compliance Report

Name of the project : GMR Kamalanga Energy Limited, Dhenkanal, Odisha

Clearance Letter No. & Date : J 13012/73/2011-IA. II(T) dtd. 05.12. 2011, 11.01.2019, 11.04.2020 & 24.02.2023 *(Phase-II: 1x350MW)*

Period of Compliance Report : April 2024 to September 2024

A. SPECIFIC CONDITIONS :

Sl.	Conditions	Compliance Status
1	Vision document specifying prospective plan for the site shall be formulated and submitted to the Regional Office of the "Ministry within six months.	Vision of the company has evolved continuously. Copy of the present vision and mission is enclosed as Annexure- I which is also available on company web site. https://www.gmrgroup.in/vision-values-beliefs/
2	Scheme for implementation for harnessing solar power within the premises of the plant particularly at available roof tops shall be formulated and status of implementation shall be submitted to the Regional Office of the Ministry from time to time	Already implemented at GET hostel, guest house, EDC office of our township area and solar fencing around the boundary wall, Traffic Solar blinker lights also installed.
3	In case source of fuel supply is to be changed at a later stage (now proposed to use imported coal from Indonesia) the project proponent shall intimate the Ministry well in advance along with necessary requisite documents for its concurrence for allowing the change. In such a case the necessity for re-conducting public hearing may be decided by the Ministry in consultation with the Expert Appraisal Committee.	GMR Kamalanga Energy Ltd undertake to comply with this condition. In case source of fuel supply is to be changed at any stage, that will be duly informed to MoEFCC and due course of process shall be competed.
4	Provision for installation of FGD shall be provided for future use.	Space for the installation of FGD is provided in the plant layout. The map is enclosed as per Annexure- II.
5	Coal transportation to plant site shall be undertaken by rail and no road transportation shall be permitted.	Rail transportation facility is developed.
6	A detailed study on chemical composition particularly heavy metal and radioactive contents shall be carried out through a reputed institute and the report shall be submitted to Regional Office of the Ministry. Only after ascertaining its radioactive level shall fly ash be utilized for brick manufacturing or supplied to brick manufacturers.	TCLP test of the fly-ash is being done on half yearly basis covering heavy metal and radioactive content. Report enclosed as per Annexure- III.
7	The project proponent shall carry out a long term R&D on Boiler efficiency vis-a-vis large variation on ash content of coal and submit its findings to the Ministry at a later stage.	We are being carried out a long term R&D on Boiler efficiency vis-a-vis large variation on ash content of coal.
8	A stack of 275m height with flue gas velocity not less than 22 m/s shall be installed and provided with continuous online monitoring equipment for SOx, NOx and PM2.5 & PM10. Mercury emissions from stack may also monitored on periodic basis.	The stack height is 275 meters (a copy of the aviation clearance mentioning the stack height is attached in Annexure IV). A Continuous Emission Monitoring System is installed, and a copy of the RT-DAS server screenshot is enclosed in Annexure V.
9	High Efficiency Electrostatic Precipitators (ESPs) shall be installed to ensure that particulate emission does not exceed 50 mg/Nm^3	A high-efficiency ESP has been installed for the existing plant and same will be included in the further expansion.

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10	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.	A Dust Extraction (DE) system and a Dry Fog Dust Suppression (DFDS) system have been installed for the existing plant and same will be included in the further expansion. Photos of the pollution control system are enclosed as per Annexure VI.
11	Utilisation of 100% Fly Ash generated shall be made from 4th year of operation. Status of implementation shall be reported to the Regional Office of the Ministry from time to time. Fly ash in the mine void should be used only after carrying the study regarding the impact on ground water and after permission of the DGMS. It should not be used for agriculture purpose.	Fly ash utilization of existing plant is 100% from last 05 years. By now, GKEL has not utilized Fly for mine void filling. Flyash utilization status is submitted to MoEFCC on half yearly basis through half-yearly EC compliance report. Flyash utilization status is also audited by external agency nominated by CPCP on yearly basis. FY 2023-24 fly ash audit report attached as per Annexure- VII.
12	Fly ash shall be collected in dry form and storage facility (silos) shall be provided. Unutilized fly ash shall be disposed off in the ash pond in the form of slurry form. Mercury and other heavy metals (As, Hg, Cr, Pb etc.) will be monitored in the bottom ash, as also in the effluents emanating from the existing ash pond. No ash shall be disposed off in low lying area.	Dry fly ash collection facilities and HCSD system are in place for 3x350 MW operating plant. Ash generation & utilization status for the year 2024-25 (H-1) are as follow: - ➢ Total Ash generated = 13,61,452 MT ➢ Total Ash utilisation = 13,61,452 MT ➢ % of utilisation = 100 FY 2023-24 fly ash audit report attached as per Annexure- VII. Same will be incorporated in the upcoming 1x350 MW unit.
13	Ash pond shall be lined with HDP/LDPE lining or any other suitable impermeable media such that no leachate takes place at any point of time. Adequate safety measures shall also be implemented to protect the ash dyke from getting breached. Ash pond water shall be re circulated and utilized.	To prevent leaching, the ash pond has been lined with an HDPE lining, as per CPCB standards. Condition assessments of the ash pond are conducted on an annual basis to detect any abnormalities that might result in a breach. The FY 2023-24 ash pond condition assessment report is attached as Annexure VIII.
14	Sulphur and ash contents in the coal to be used in the project shall not exceed 0.5 % and 34 % respectively at any given time. In case of variation of coal quality at any point of time fresh reference shall be made to the Ministry for suitable amendments to environmental clearance condition wherever necessary.	Sulphur content in the coal is being maintained below 0.5%. Copy of coal test report enclosed as per Annexure- IX. GKEL Thermal Power Plant is a Pit-Head TPP and all parameters are being achieved as per notification S.O. 1561(E) 21st May, 2020.
15	Hydrogeology of the area shall be reviewed annually from an institute/ organization of repute to assess impact of surface water and ground regime (especially around ash dyke). In case any deterioration is observed specific mitigation measures shall be undertaken and reports/ data of water quality monitored regularly and maintained shall be submitted to the Regional Office of the Ministry.	Hydrogeology study conducted after receipt of the EC for 1x350 MW units in 2011. Study of hydrology based on ground water table and quality monitoring is being conducted on annual basis. Total eight sampling locations in the 10KM radius area is fixed for ground water sampling that covers around the ash dyke also. Report is enclosed as per Annexure- X.

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16	No ground water shall be extracted for use in operation of the power plant even in lean season.	No ground water extracted.
17	No water bodies (including natural drainage system) in the area shall be disturbed due to activities associated with the setting up of operation of the power plant.	No any water bodies in the area are disturbed.
18	Minimum required environmental flow suggested by the Competent Authority of the State Govt. shall be maintained in the Channel/ Rivers (as applicable) even in lean season.	Water form river Brahamani is withdrawn for operating power plant after due clearances from the State Water Resources department that was granted after due geo-hydrology studies and ensuring the minimum water flow in the stream by the water resources authorities in the state.
19	Land and Water requirement shall be restricted as per latest CEA norms issued.	We adhere to the latest CEA norms. Reports to CEA is being submitted on quarterly basis. CEA norm for water consumption is 3.5m3/MWH whereas GKEL is consuming < 2.5 m3/MWH.
20	COC of 5.0 shall be adopted.	The avg. COC of last six months is 7.00 and Specific water consumption is <2.5 m3/MW. Quarterly (Q-2) report file to CPCB for water consumption is enclosed as per Annexure- XI.
21	Regular monitoring of ground water level shall be carried out by establishing a network of existing wells and constructing new piezometers. Monitoring around the ash pond area shall be carried out particularly for heavy metals (Hg, Cr, As, Pb) and records maintained and submitted to the Regional Office of this Ministry. The data so obtained should be compared with the baseline data so as to ensure that the ground water quality 'is not adversely affected due to the project.	For regular monitoring of groundwater, a total of four piezometric wells have been developed around the ash dyke. Monitoring of these piezometric wells is conducted on a monthly basis. Groundwater quality, particularly for heavy metals (Hg, Cr, As, Pb), is monitored at eight locations, including the piezometric wells on a half yearly basis. The data from the groundwater test reports have been compared with baseline data, indicating that groundwater quality is not adversely affected by the project. The report is enclosed as Annexure XII.
22	Monitoring surface water quality in the area shall also be regularly conducted and records maintained. The monitored data shall be submitted to the Ministry regularly. Further, monitoring points shall be located between the plant and drainage in the direction of flow of ground water and records maintained. Monitoring for heavy metals in ground water shall be undertaken.	Monitoring of surface water and ground water for heavy metals is conducted on quarterly basis, and submitted to MoEFCC and CPCB and SPCB. A copy of the Surface Water and ground water Quality Report is enclosed as Annexure XIII.
23	Waste water generated from the plant shall be treated before discharge to comply limits prescribed by the SPCB.	Zero Liquid Discharge (ZLD) is maintained. Effluent generated from the plant is treated in the Effluent Treatment Plant (ETP), and sewage is treated in the Sewage Treatment Plant (STP).
24	The project proponent shall undertake rain water harvesting measures and shall develop water storage for use in operation of	Rainwater harvesting infrastructure measures have been detailed and executed

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	the plant. Rain water harvesting system shall be put in place which shall comprise of rain water collection from the built up and open area in the plant premises. Action plan for implementation shall be submitted to the Regional Office of the Ministry within six months.	in both the built-up and open areas of the plant, including the township. The action plan for implementation and the study report on rainwater harvesting are enclosed as per Annexure X.
25	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.	The site is already developed, and additional soil for leveling is not required for the 4th unit of 1x350 MW. No instances of digging of soil outside the plant boundary has been recorded.
26	At least three nearest village shall be adopted and basic amenities like development of roads, drinking water supply, primary health Centre, primary school etc. shall be developed in co-ordination with the district administration.	Beyond the EC obligation of adopting 03 villages, a total of 9 villages (Manpur, Mangalpur, Kamalanga, Maniabeda, Achalkote, Durgapur, Bhagamunda, Barasahi and Kaliataila) have been adopted. Development of roads, drinking water supply, primary health centers, schools, and Anganwadi centers has been completed. Detail CSR activity report and Annual report are enclosed as Annexure- XIV.
27	The project proponent shall also adequately contribute in the development of the neighbouring villages. Special package with implementation schedule for providing potable drinking water supply in the nearby villages and schools shall be undertaken in a time bound manner.	Development of neighboring villages, provision of potable drinking water, and improvement of schools infrastructure are being carried out. Detail CSR activity report and Annual report are enclosed as Annexure- XIV.
28	CSR scheme shall be undertaken based on need based assessment in and around the villages within 5.0 km of the site and in constant consultation with the village Panchayat and the District Administration. As part of CSR employment of local youth after imparting relevant training as may be necessary shall be undertaken as committed.	A comprehensive CSR scheme has been developed based on the needs assessment of the communities. A total of nine villages within a 5.0 km radius of the site have been developed. Adequate employment opportunities have been provided on both the company payroll and vendor payroll, according to the requisite skills required for the jobs. Detail CSR activity report and Annual report are enclosed as Annexure- XIV.
29	A special scheme for upliftment of SC & ST population in the study area shall be formulated and implemented in a time bound manner. The project proponent shall also identify the rights of Tribal under existing Laws and ensure its protection and implementation thereof.	As part of the comprehensive development agenda of GMR, a total of 1,500 families, including 529 SC & ST families in the adopted villages have been uplifted through various CSR measures. A committee has been formed to identify appropriate livelihoods suited for the project-affected families, including SC and ST families. The activities undertaken include farming, mushroom cultivation, goat rearing, sheep rearing, poultry, dairy, and micro-enterprise development. A total of 1,500 project-affected families, including 50 elderly

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		persons, receive food rations every month under the Livelihood Support program. After the completion of the Livelihood Restoration Program in March 2022, support was provided for fish farming in 90 ponds and paddy cultivation of Kuber and sugar-free varieties to 25 farmers. In addition to these activities, vocational training was provided to youth and women belonging to the SC and ST communities. One ST girl undertook a short-term BPO course with our support and is now employed at a call center in Kolkata. Livelihood supports are also provided for the promotion of special varieties of paddy like sugar-free and Kuber, the promotion of bio-fertilizers, fish farming, honey bee keeping, mushroom farming, and poultry farming. In the year 2023-24, the following livelihood supports were provided to the community: Three tailoring units were supported in two villages, benefiting about 72 girls/women for stitching and selling garments, bags, etc. 110 project-affected families received support for paddy cultivation, and 15 received support for potato cultivation. Nano Urea and Nano DAP were provided to all paddy farmers. ➢ 15 farmers received sprayers. ➢ 70 people received support for fish farming. ➢ 15 persons, including 10 women, received support for mushroom farming. ➢ 15 persons, including 10 women, received layer poultry birds. ➢ 3 persons received honey bee boxes, bringing the total number of boxes to 10.
30	An amount of Rs 5.0 Crores shall be earmarked as one-time capital cost for CSR programme as committed by the project proponent. Subsequently a recurring expenditure of Rs 1.0 Crores per annum till the life of the plant shall be earmarked as recurring expenditure for CSR activities. Details of the activities to be undertaken shall be submitted within six month along with road map for implementation.	Beyond the stipulated initial CSR fund of ₹5.0 crores and subsequent expenditure of ₹1 crore per annum, the company, sensing the developmental scope in the surrounding villages, has incurred an expenditure of ₹51.3 crores to till date. ➢ GMRVF DAV Public School established. ➢ Hospital facility provided. ➢ Pipe water supply ongoing in 5 villages in collaboration with the RWSS department of the Government of Odisha.

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		➢ Two community centers constructed in the villages of Manpur and Kamalanga. ➢ Compound wall constructed at Government High School, Kamalanga. ➢ Renovation of school building in Maniabeda. ➢ Two new classrooms constructed at Kamalanga High School and Saraswati Shishu Mandir in Mangalpur. ➢ Boundary wall elevation work done at Panchayat High School, Manpur. ➢ Construction of CC roads in Achalkote Village, connecting RD road to Mangalpur Harijan Sahi, Kshatriya Sahi to Gopal Sahi in Manpur Village, Harijan Sahi to Barik Sahi in Manpur, and renovation of Laxmi Temple at Brameswar Temple campus in Manpur. ➢ Community center and cart parking shed at Bhagamunda. ➢ Bore well digging in Kamalanga. ➢ Pond desilting in Mangalpur. ➢ Furniture and solar lights supplied to 4 villages. ➢ Developing prayer ground at Kamalanga. ➢ Construction of Mahima Prayer Hall in Durgapur. ➢ Renovation and improvement of Durga Mandir in Kamalanga. ➢ Construction of Yang Mandap in Durgapur. ➢ Construction of Gopal Sahi Pala Mandap in Mangalpur. ➢ Common prayer hall near Sani Temple Mandap in Kantabania. ➢ Construction of meeting cum rest room for senior citizens. ➢ Construction of Kshatriya Sahi Ladies Community Centre. ➢ Implementation of 5S at Meramundli-B 400KV substation. ➢ Installation of LED street lights in Kamalanga Village.
31	It shall be ensured that an in-built monitoring mechanism for the CSR schemes identified is in place and annual social audit shall be got done from the nearest government institute of repute in the region. The project proponent shall also submit the status of implementation of the scheme from time to time. The achievements should be put on company's website.	An in-built monitoring mechanism under the purview of the Head of CSR has been constituted for the timely monitoring of the CSR initiatives. Annual social audit has been done by KIIT School of Rural Management, a nationally-recognized institution of repute. Community consultations are held on a quarterly basis, during which multiple

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		stakeholders are apprised of the cumulative progress of the initiatives. The feedback and suggestions from the community are incorporated into the planning and implementation process. The status of the implementation of the CSR initiatives is disclosed through the company's annual report, the company website, and the GMR Foundation.
32	Green Belt consisting of 3 tiers of plantations of native species around plant and 100m width shall be raised. The density of trees shall not be less than 2500 per ha with survival rate not less than 80 %.	➢ A 3 tiers of plantations of native species around plant and 100m width has been done with density of trees shall not be less than 2500 per ha. ➢ A green belt with indigenous species has already been developed. We have planted near 4 Lakh saplings as of September 2024 (including 1,435 saplings in 2024-25) around the plant and township premises, along the railway line, and the approach road, covering a land area of 382.32 acres. ➢ Survival rate is around 90%. ➢ Under social voluntary project- Sabujima (A Green Initiative), 160 Nos. of fruit bearing trees were planted along with organic farming in the campus of Kamalanga Nodal High School, at Kamalanga Village. ➢ In addition to this, we have also developed avenue plantation and green belt in Dhenkanal area as required by District Administration. ➢ Yearly plantation details and photographs enclosed as per annexure-XV.
33	An Environmental Cell shall be created at the project site itself and shall be headed by an officer of appropriate seniority and qualification. It shall be ensured that the head of the cell shall directly report to the Head of the Organization.	An environment monitoring cell with suitably qualified staff has been in place since 2013. The letter submitted to OSPCB on 31.07.2013 is enclosed as Annexure XVI. The environmental monitoring cell at GKEL is headed by the General Manager of EHS and includes a Manager of Environment and three other team members with backgrounds in environmental science and chemistry. Regular environmental monitoring of AAQ locations and stacks is conducted through an NABL accredited laboratory. The entire monitoring operation and schedule are coordinated by the environmental monitoring cell at GKEL.

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B. GENERAL CONDITIONS

Sl.	Conditions	Compliance status
1	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.	Zero Liquid Discharge (ZLD) is maintained. Effluent generated from the plant is treated in the Effluent Treatment Plant (ETP) and recirculated for reuse. To ensure that effluents and storm water are not mixed, separate drainage systems for the collection and subsequent treatment of effluents and storm water have been established.
2	Sewage treatment plant shall be provided (as applicable) and the treated sewage shall be used for raising greenbelt/ plantation.	Zero Liquid Discharge (ZLD) is maintained. Sewage is treated in the Sewage Treatment Plant (STP) and use for raising greenbelt/ plantation.
3	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 of plant layout shall be submitted to the Ministry as well as to the Regional Office of the Ministry.	To keep coal yard fire in check, various arrangements have been put in place. In the 04 nos. coal pile/stock yard inside plant boundary, we have installed adequate fire-fighting equipment i. e. 03 fire monitor points, 10 nos. fire landing valve with 50 mtr hose pipe, 10 nos. rain guns/water sprinklers to each coal pile/stock yard. Copy of these measures with full details along with location in marked in plant layout enclosed as per Annexure- XVII.
4	Storage facilities for auxiliary liquid fuel such as LDO /HFO/LSHS shall be made in the plant area in consultation with Dept. of Explosives, Nagpur. Sulphur content in the liquid fuel shall not exceed 0.5%. Disaster Management Plan shall be prepared to meet any eventuality in case of an accident taking place due to storage of oil.	LDO storage facility has been developed alonwith consultation with Dept. of Explosive. Sulphur content in the liquid fuel is being maintained within 0.5%. A copy of license and test report enclosed as per annexure- XVIII.
5	First Aid and sanitation arrangements shall be made for the drivers and other contract workers during construction phase.	First aid and sanitation arrangements have been made for drivers and contractor workers.
6	Noise levels emanating from turbines 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 be periodically examined to maintain audiometric record and for treatment for any hearing loss including shifting to non-noisy /less noisy areas.	Noise level is being maintained under permissible levels. Poster /wall paintings are also displayed for creating awareness on impact of high noise levels. For people working in the high noise area, requisite personal protective equipment like earplugs/ear muffs etc. has been provided. Workers engaged in noisy areas such as turbine area, air compressors etc. is being periodically examined for any hearing loss. The average max. and min. noise levels at boundary are as follows: - ➢ Day time noise levels- 67.3 dB(A) max. and 46.1 dB(A) min. ➢ Night time noise levels- 64.5 dB(A) max. and 43.7 dB(A) min.

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7	Regular monitoring of ambient air ground level concentration of S02, NOx, PM2.5 & PM10 and Hg shall be carried out in the impact zone and records maintained. If at any stage these levels are found to exceed the prescribed limits, necessary control measures shall be provided immediately. The location of the monitoring stations and frequency of monitoring shall be decided in consultation with SPCB. Periodic reports shall be submitted to the Regional Office of this Ministry. The data shall also be put on the website of the company.	Ambient Air Quality (AAQ) is being monitored at 07 locations regularly by a MoEF&CC accredited laboratory, and records are maintained. Reports are submitted quarterly to MoEF&CC and OSPCB on a monthly basis. The FY 2024-25 Q2 report is enclosed as per Annexure XIX.
8	Provision shall be made for the housing of construction labour (as applicable) within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical, health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	During construction phase, necessary infrastructure and adequate facilities were made for the housing of construction labour. Presently, no labour camp is available at site.
9	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.	Duly complied. Grant of EC advertisement in 02 newspaper enclosed as per annexure-XX.
10	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.	Copies of the clearance letter was duly sent to the local administration and local bodies and their suggestions were considered. The EC copy has been uploaded in the following Company URL: https://www.gmrgroup.in/kamalanga/
11	The proponent shall upload the status of compliance of the stipulated environmental clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MOEF, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; SPM, RSPM ($PM_{2.5}$ & PM_{10}), SO_2, 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.	The status of compliance with the stipulated environmental clearance conditions is being uploaded on the company's website. Please see the compliance status on the company's URL:https://www.gmrgroup.in/kamalanga/ Online monitoring data is being displayed at Gate No – 2 & 3
12	The environment statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental clearance conditions and shall also be sent to the respective Regional Offices of the Ministry by e-mail.	Copy of Environment Statement report of FY 2023-24 is enclosed as per annexure- XXI.
13	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	The status of compliance with the stipulated environmental clearance conditions is being uploaded on the company's website.

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	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.	Please see the compliance status on the company's URL:https://www.gmrgroup.in/kamalanga/
14	Regional Office of the Ministry of Environment & Forests will monitor the implementation of the stipulated conditions. A complete set of documents including Environmental Impact Assessment Report and Environment Management Plan along with the additional information submitted from time to time shall be forwarded to the Regional Office for their use during monitoring. Project proponent will up-load the compliance status in their website and up-date the same from time to time at least six monthly basis. Criteria pollutants levels including NOx (from stack & ambient air) shall be displayed at the main gate of the power plant.	Duly omplied. Six-monthly compliance is being uploaded on portal. Pollutants levels including NOx (from stack & ambient air) are displayed at the main gate and additionaly at another gate of the plant.
15	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.	Capital investment made towards environmental protection measures until September 2024 is ₹40,186.48 lakhs, and operating expenditure for environmental protection measures in FY 2024-25 (H1) is ₹4,076.91 lakhs. An item-wise breakup is enclosed as per Annexure XXII.
16	The project authorities shall inform the Regional Office as well as the Ministry regarding the date of financial closure and final approval of the project by the concerned authorities and the dates of start of land development work and commissioning of plant.	As 63% of the project has been completed, financial closure is yet to be made.
17	Full cooperation shall be extended to the Scientists/Officers from the Ministry, Regional Office of the Ministry, CPCB/ SPCB who would be monitoring the compliance of environmental status.	Being complied as advised.

Sl.	***Additional Conditions as per the MoEF&CC letter dated 11.01.2019***	**Compliance Status**
i	No forest land is involve in the incremental area of 120.07 Acres.	No forest land is involved.
ii	Avenue Plantation shall be developed along the Railway line and Approach roads.	Avenue plantation is being developed along the mandated area.
iii	Revised emission standard and water consumption as per the Ministry's notification dated 07.12.2015 and subsequent amendments notified from time to time.	We adhere to the ministry's notification and subsequent amendments.
iv	Treated water from the STP located within 50km distance from the project.	STP not available within 50 Kms radius of the plant.
V	An environmental Officer be declared to look after the matter related to the implementation of various environmental control measures. In case any non- implementation of such environmental control measures, the environmental Officer shall be held responsible.	Environmental Officer declared and communicated to the Eastern Regional Office of ministry vide letter no. 6630 dated 12.04.2019 attached as Annexure- XXII.
Vi	A copy of forest diversion permission under FC Act, 1980 shall be submitted for which an application has been submitted with State Forest Department.	The forest diversion proposal has already been submitted to State Forest Department and is in-process.
Vii	CER Activity will be carried out as per Ministry's OM No.22-65/2017-IA.II dated 01.05.2018 for implementation of Various CER/CSR activities delineated in the Ministry's OM dated 01.05.2018 within the project affected and surrounding areas.	CER/CSR activities report has been submitted to the Eastern Regional Office ministry vide letter no. 6630 dated 12.04.2019 attached as Annexure- XXII.

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Viii	The left out area of 31.19 acres shall be used for green belt development, as proposed, the periphery development area of 7.33 acres shall be used for creating infrastructure and other CSR activities for the benefit of communities surrounding the project.	Green belt development work and peripheral development work completed.
Sl.	***Additional Conditions as per the MoEF & CC letter dated 11.04.2019***	**Compliance Status**
i	Progress of construction activities and expenditure incurred shall be submitted along with six monthly compliance report	Progress of construction activities and expenditure incurred towards the activities are enclosed as per annexure- XXIII.
ii	While commissioning the proposed unit, the compliance of revised emission norms issued vide Notification dated 07.12.2015 for the parameter PM: 30mg/Nm^3, SO_2: 100mg/Nm^3, NO_x: 100mg/Nm^3, and Hg: 0.03mg/Nm^3 shall be adhered along with specific water consumption as per the notification dated 28.06.2018. The Flue Gas Desulphurisation System, NOx control measures such as SCR/SCNR/De-NOx burners shall be installed to achieve the revised emission norms.	We are adhering to new notifications and norms as prescribed from MoEF&CC time to time.
iii	As per the Revised Tariff Policy notified by Ministry 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 bodies/similar organisation located within 50 km radius of the proposed power project to minimize the water drawl from surface water bodies. The detail of sewage treatment plants located within the 50km radius along with the capacities shall be submitted.	Agreed to comply. STP is not available within 50 km-radius of the plant.

GMR KAMALANGA ENERGY LTD.

Annexure-I

GMR
POWER &
URBAN INFRA

VISION

GMR Group will be an institution in perpetuity that will build entrepreneurial organizations making a difference to society through creation of value.

VALUES & BELIEFS

Mahatma Gandhi

Humility

We value intellectual modesty and dislike false pride and arrogance

JRD Tata

Entrepreneurship

We seek opportunities they are everywhere

Tenzing & Hillary

Teamwork & Respect for Individual

Nurturing a relationship of trust, collaboration and mutual respect.

Sardar Vallabhbhai Patel

Deliver the Promise

We value a deep sense of responsibility and self-discipline, to meet and surpass on commitments made

Swami Vivekananda

Learning & Inner Excellence

We cherish the lifelong commitment to deepen our self awareness, explore, experiment and improve our potential

Mother Teresa

Social Responsibility

Anticipating and meeting relevant and emerging needs of society

Warren Buffet

Financial Prudence - Frugality

We spend wisely and judiciously

GMR Group

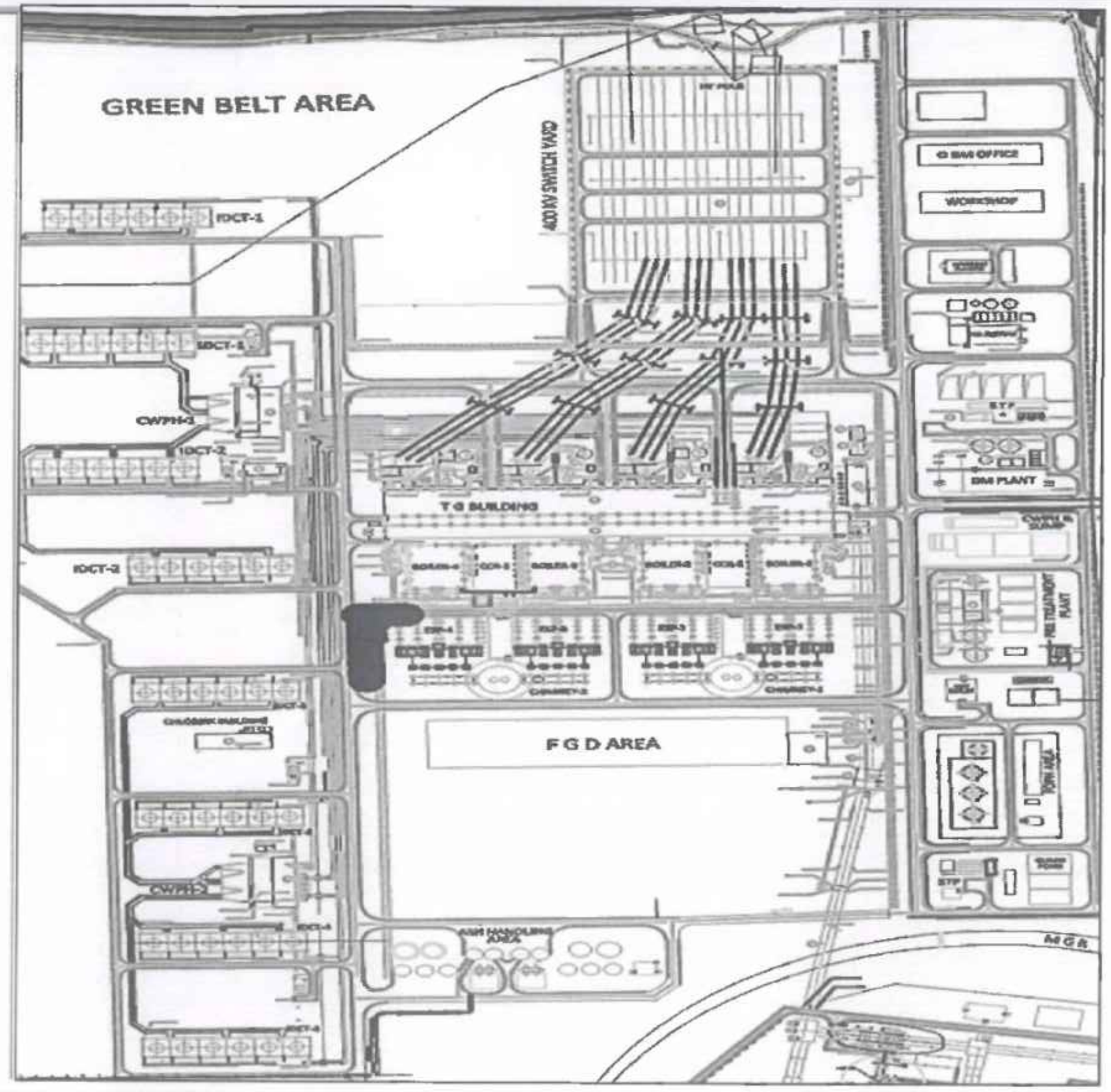
Airports | Energy | Transportation | Urban Infra | Services | Sports | Foundation

www.gmrgroup.in

GMR KAMALANGA ENERGY LTD.

PROJECT LAYOUT

GMR



GMR KAMALANGA ENERGY LTD.

Annexure-II

Annexure-III

Visiontek Consultancy Services Pvt. Ltd.

(Committed For Better Environment)

Certified for : ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

Accredited by : NABET-A Grade, MOEF & CC/CPCB & SPCB-A Grade

- Infrastructure Engineering
- Water Resource Management
- Environmental & Social Study
- Surface & Sub-Surface Investigation
- Quality Control & Project Management
- Renewable Energy
- Agricultural Development
- Information Technology
- Public Health Engineering
- Mine Planning & Design
- Mineral/Sub-Soil Exploration
- Waste Management Services

Laboratory Services
Environment Lab
Food Lab
Material Lab
Soil Lab
Mineral Lab
&
Microbiology Lab

Annexure-3

Ref: Envlab/23-24/TR-08785 *Date: 30.04.2024*

TCLP SAMPLE ANALYSIS REPORT

1. Name of the Industry : **M/s GMR Kamalanga Energy Ltd, Dhenkanal**
2. Sampling Location : **A-1: Ash Sample from Ash Pond-1 & 2 Mix**
   : **A-2: Fly Ash Sample from Silo (Silo-1, 2, 3 & 4 Mix)**
   :**A-3: Bottom Ash Sample from Hydrobin**
3. Date of Sampling :20.04.2024
4. Date of Analysis : 20.04.2024 to 29.04.2024
5. Sample Collected By : VCSPL Representative in presence of Client's Representative

Sl. No.	Parameters	Unit	Desirable Limit in (mg/l)	Analysis Results		
				A-1	A-2	A-3
1	Arsenic (as As)	mg/l	5.0	0.065	0.075	0.083
2	Mercury (as Hg)	mg/l	0.2	BDL	BDL	BDL
3	Lead (as Pb)	mg/l	5.0	0.48	BDL	BDL
4	Chromium (VI)	mg/l	5.0	0.25	0.28	0.26
5	Total Chromium (as Cr)	mg/l	5.0	0.48	0.95	1.27
6	Nickel (as Ni)	mg/l	20.0	0.08	0.25	0.58
7	Zinc (as Zn)	mg/l	250.0	1.82	2.85	2.05
8	Selenium (as Se)	mg/l	1.0	BDL	BDL	BDL
9	Manganese (as Mn)	mg/l	10.0	2.35	2.88	1.76
10	Beryllium (as Be)	mg/l	0.75	BDL	BDL	BDL
11	Cobalt (as Co)	mg/l	80.0	0.64	1.65	2.18
12	Copper (as Cu)	mg/l	25.0	0.25	2.55	1.83
13	Molybdenum (as Mo)	mg/l	350.0	0.14	0.15	0.18
14	Antimony (as Sb)	mg/l	15.0	BDL	BDL	BDL
15	Vanadium (as V)	mg/l	24.0	0.065	0.25	0.062
16	Fluoride (as F)	mg/l	180.0	3.62	2.48	2.52
17	Silver (as Ag)	mg/l	5.0	BDL	BDL	BDL
18	Barium (as Ba)	mg/l	100.0	0.22	0.34	0.22
19	Cadmium (as Cd)	mg/l	1.0	0.10	0.12	0.73
20	Thallium (as Tl)	mg/l	7.0	BDL	BDL	BDL
21	Cyanide (as Cn)	mg/l	20.0	BDL	BDL	BDL
22	Corrosive (pH)	--	2.0-12.5	5.3	5.4	5.3

Reviewed by

VISIONTEK CONSULTANCY SERVICES PVT. LTD. BBSR

Approved by

VISIONTEK CONSULTANCY SERVICES PVT. LTD. BBSR

GMR KAMALANGA ENERGY LTD.

Annexure-IV

(13)

SPEED POST

भारतीय विमानपत्तन प्राधिकरण
AIRPORTS AUTHORITY OF INDIA

File No. AAI/ER/NOC(257/10)/ 057-060.

Date: 10.01.2011

NOC FOR HEIGHT CLEARENCE ONLY

To
N.D.Rathi
M/s GMR Kamalanga Energy Ltd.
HIG – 28, Gangadhar Meher Marg
Bhubaneswar – 751013 (Odisha)

Sub: Issue of NOC

1. Please refer to your application No.**GKEL/BBSR/AAI/10-11/508** dated **06.10.2010** on the subject mentioned above.

2. This office has no objection to the construction of the proposed **Two Chimney** by **M/s GMR Kamalanga Energy Ltd.** here in after referred to as the applicant(s) at location, **Vill – Kamalanga, Block – Odapada, Tahsil – Dhenkanal Sadar, Dist – Dhenkanal, Odisha (Chimney No.1 Lat 20° 52′ 07″ Long 85° 16′ 06″, Chimney No.2 Lat 20° 52′ 07″ Long 85° 16′ 11″)** to height [**Chimney No.1, 277.39M** (in figures) **Two Hundred and Seventy Seven decimal Three Nine Meters**(in words) Above Ground Level, **Chimney No.2, 279.39** (in figures) **Two Hundred and Seventy Nine decimal Three Nine Meters** (in words) Above Ground Level]. So that the top of the proposed structure when erected shall not exceed **347.39M (Three Hundred and Forty Seven decimal Three Nine Meters)** Above Mean Sea Level **for both the proposed chimneys**.

3. This No Objection Certificate is being issued on the express understanding that site elevation reduced level (height of Above Mean Sea Level) of **70M for Chimney No.1 and 68M for Chimney No.2** of the relative location of the proposed building/structure & its distances and bearings from the ARP/Runway ends as tendered by the applicant(s) are correct. If however, at any stage it is established that the said data as tendered by the said applicant is actually different from the actual data which could adversely affect aircraft operations, the structure or part(s) there of in respect of which this NOC is being issued will have to be demolished at his own cost or as may be directed by the Airports Authority Of India. The applicant(s) is/are therefore advised in his/their own interest to verify the elevation and other data furnished for the site, before embarking on the proposed construction.

4. The issue of this NOC is further subject to the provisions of section 9-A of the Indian Aircraft Act 1934 and those of any notifications issued there under from time to time and under which the applicant may be called upon by the Airports Authority Of India to demolish in whole or in part the structure now being authorized vide this NOC.

5. No Radio /TV Antenna lighting arresters, staircase, Mumtee Overhead water tank and attachments or fixtures of any kind shall project above the height indicated in para 2.

6. The use of oil fired or electric fired furnace is obligatory within 08Km from the Airport.

7. This certificate is valid for a period of **seven years** from the date of issue. If the building/structure/chimneys not constructed & completed within the above mentioned period of **seven years** the applicant(s) required to obtain a fresh No Objection Certificate from the Chairman, Airports Authority Of India and/or the General manager (Aerodrome)E.R. The date of completion of building/structure/chimney should be intimated to the Chairman/or the General Manager (Aerodrome)Eastern Region.

8. No light or a combination of lights which by reason of its intensity, configuration or colour may cause confusion with the aeronautical ground lights of the near by Airport shall be installed at the site at any time during or after the construction of the **Chimney**.

***** Day Marking & Night lighting with secondary power supply should be provided as per ICAO standard.**

GMR KAMALANGA ENERGY LTD.
GMR

*** Day Marking & Night lighting with secondary power supply should be provided as per ICAO standard.
*** This NOC is subject to clearance from Airport Operator, if any Defence Airfield (or one for which AAI is not the aerodrome operator) is nearby.

for AIRPORTS AUTHORITY OF INDIA

(K.K.Gupta) 12/1/11
General Manager(Aero)ER

Copy to:-

1) The General Manager (NOC), Airports Authority Of India, Safdarjung Airport, Rajiv Gandhi Bhawan, New Delhi-110003 for information.
2) The General Manager(Carto), Airports Authority Of India, Safdarjung Airport, Rajiv Gandhi Bhawan, New Delhi-110003.
3) The Airport Director
Airports Authority of India,
Biju Patnaik Airport, Bhubaneswar
4) Guard File

(K.K.Gupta)
General Manager(Aero)ER

महा प्रबंधक (एयरो)पूक्षे
General Manager (Aero)ER
ने.सु.चं.बो हवाई अड्डा, कोलकाता – 700052
N.S.C.B.I Airport, Kolkata – 700052
दूरभाष – 25119600
Phone – 25119600
टेली फैक्स – 25119223
Tele Fax – 25119223

OSPCB

https://ospcb-rtdas.com/#/landing/industryReports/realTimeReport

Dashboard | Live Status | Regulator Reports | Industry Reports | Star Rating | Calibration | Work Flow | GMR_Kamalanga

Real Time Report / Trends

Reports

M/s. GMR Kamalanga Energy Ltd.(Including Township over 45 Ac.)

Meramandali , Odisha POWER PLANT Refresh

Data Last Received On	Configuration Updated On	Calibration at	CEMS	EQMS	AAQMS	Total Stations
05, January, 2025	25, July, 2019	01, January, 2018	3	1	4	8

Live Readings

Help

Emission | Effluent | Ambient

Stack_2_Boiler2

Stack_2_Boiler2

0.0164 mg/Nm3
Stack_2_Boiler2 - Hg
15 MinsAvg: 0.02 mg/Nm3
Limit: 0 - 0.03 mg/Nm3 Range: 0 - 50

347.0693 mg/Nm3
Stack_2_Boiler2 - NOx
15 MinsAvg: 324.27 mg/Nm3
Limit: 0 - 450.0 mg/Nm3 Range: 0 - 1000

43.375 mg/Nm3
Stack_2_Boiler2 - PM
15 MinsAvg: 42.83 mg/Nm3
Limit: 0 - 50.0 mg/Nm3 Range: 0 - 1000

1172.8978 mg/Nm3
Stack_2_Boiler2 - SO2
15 MinsAvg: 1158.90 mg/Nm3
Limit: 0 - 600.0 mg/Nm3 Range: 0 - 1000

Type here to search What will be ITC Hote... ENG 14:52 05-01-2025

GMR KAMALANGA ENERGY LTD.

Annexure-IV

Annexure-VI

ANNEXURE-I

Report on Environment improvement
initiatives undertaken for mitigation of fugitive emission

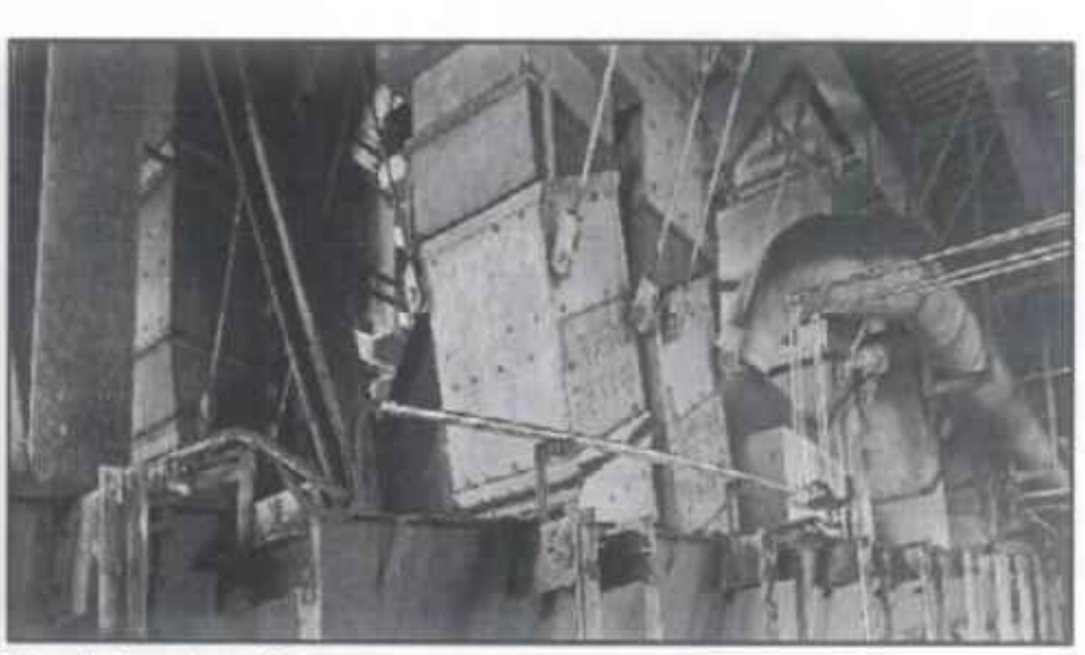
- *Installation of Dry Fog Dust Suppression System (DFDS) In CHP*
- *Fog Cannon deployment in Coal Yard*
- *Mechanize Wheel Washing System*

1. INSTALLATION OF DRY FOG DUST SUPPRESSION SYSTEM (DFDS) IN CHP:

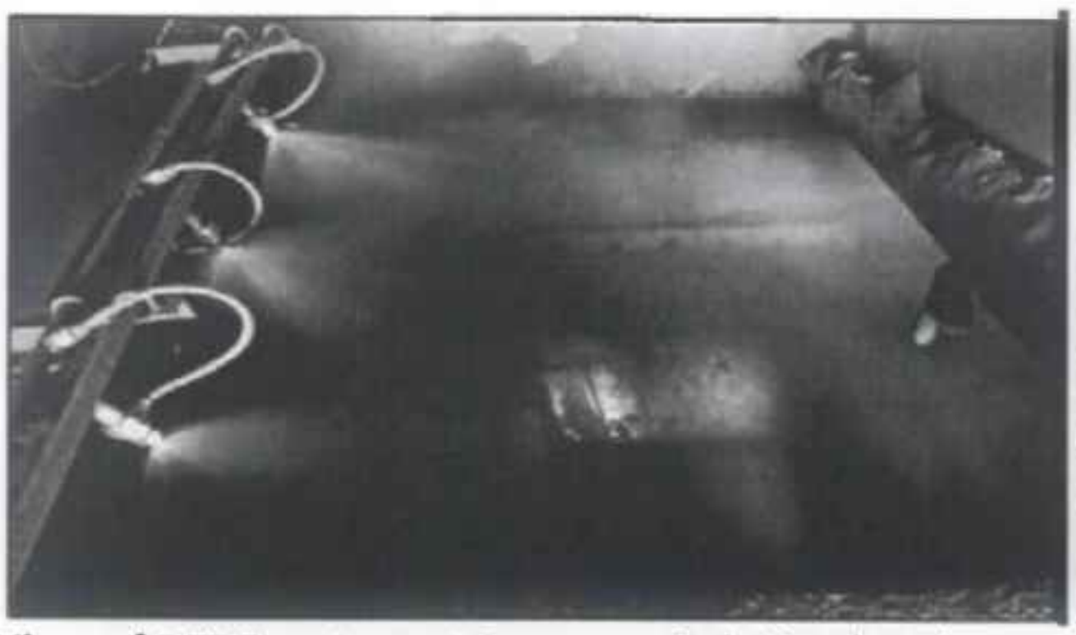
DFDS system uses a special air-atomizing nozzle that produces a very dry fog to agglomerate and remove airborne dust particles from the material (coal) handling and processing operations. The DFDS system utilizes compressed air and plain water to produce these 1 - 10 micron droplets (true fog). These ultra-fine water droplets attach (agglomerate) to like size airborne dust particles, sometimes referred to as PM-10 (particulate matter 10 microns or smaller). Subsequently, the slightly wetted dust particles become heavy enough to be removed from the air and fall back into the process. It is important to note that it is only wet the dust, not the material. This results in very low water and power consumption, requiring no expensive chemicals or significant wetting of the product (always less than 1/2 % by weight, typically no more than 0.1% moisture addition). DFDS system installed at crusher house, TT-6 &TT-7(Bunker area), Track Hopper(210 meters), Wagon Tripler(Pre-mist & DFDS) & Truck Tripler.

Benefit:

- Improving in Work zone and ambient air quality by effective controlling of fugitive dust emission from coal handling & processing.
- Safe and health working atmosphere for the workmen.
- Increasing of equipment efficiency.

View of DFDS system at Conveyor Belt head end - 3A/3B of Crusher House



View of DFDS system at Conveyor Belt Head end

DFDS system at Track Hopper

2. FOG CANNON DEPLOYMENT IN COAL YARD

02 nos. of Fog Cannon have been deployed for control of coal yard fugitive Dust. Fog Cannon has been designed to tackle the problem of airborne dust particles generated by Coal material handling activities. Fog

GMR KAMALANGA ENERGY LTD.

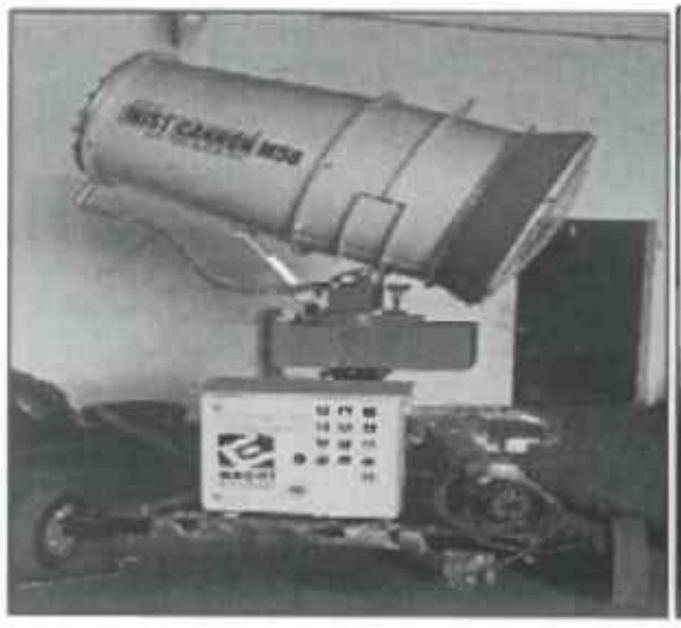
Cannon has been shown to suppress up to 95% of airborne dust particles. This fog cannon provided additional control measures apart from the high velocity jet sprinkler which is in place & working.

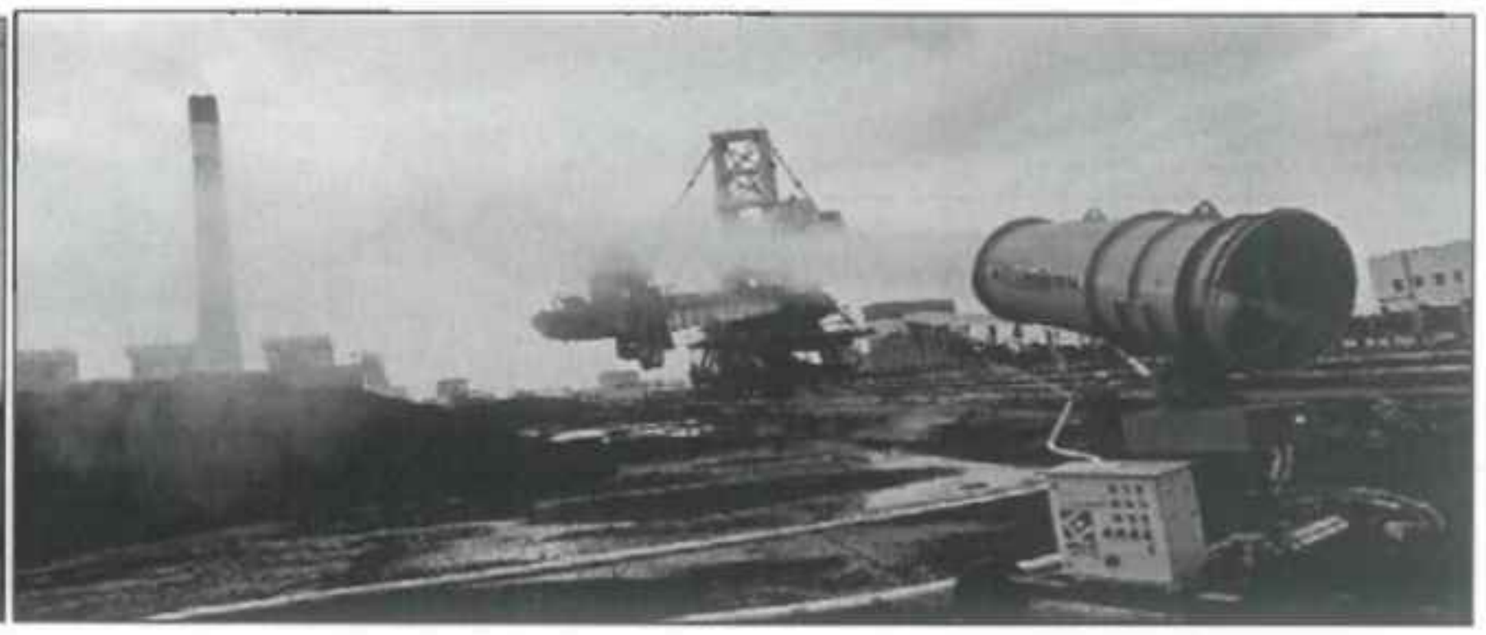
Project Detail:

1. Fog (mist) cannon model: Mist Cannon M50
2. Mist throwing range – up to 50 meter in ideal condition.
3. Cost of Rs. 9.89 Lakhs

Benefit:

- They help to Improve the workzone and ambient air quality by effective controlling of fugitive dust emission from coal handling activities like coal truck unloading, stacking, reclamation in the yard etc.
- reduce the health risk.





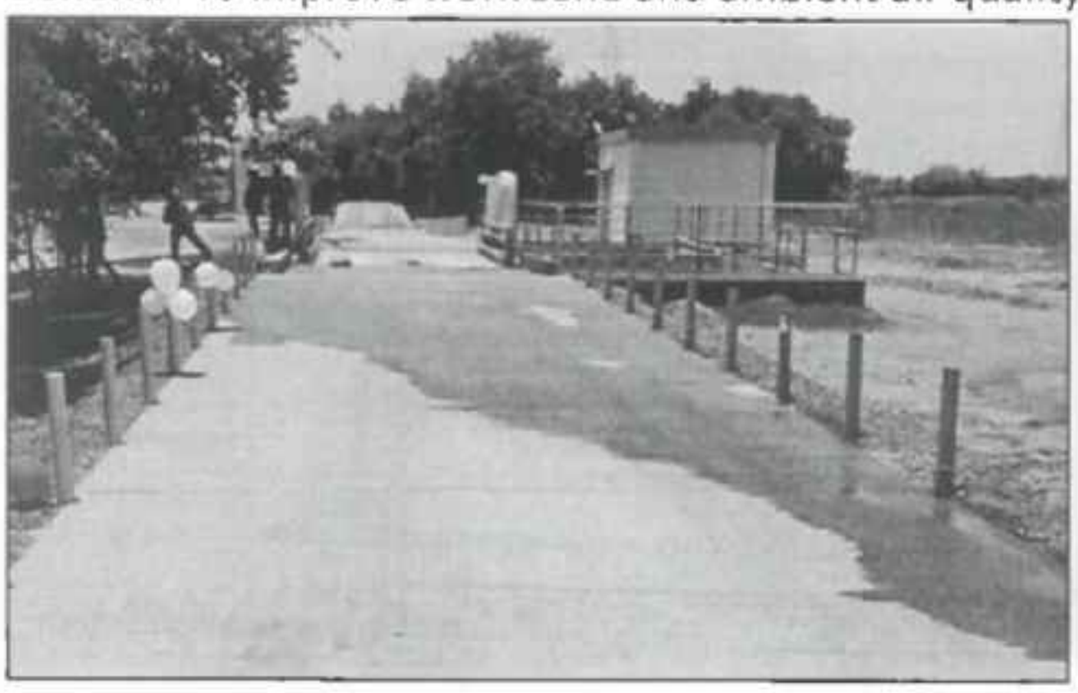
3. MECHANIZE WHEEL WASHING SYSTEM

In order to control the road fugitive dust, GMR Kamalanga Energy Limited has installed the Mechanised Wheel Washing System for cleaning wheels/tires and lower body parts of trucks / bulkers which are engaged in transportation of coal and fly ash. The wheel washing system is positioned just before the road weigh bridge, so that the vehicles will go to wheel washing system, then to weigh bridge and then exit from the plant area through Raw material gate.

Project Details:

1. Project cost: 42 Lakhs Appx.
2. Capacity: 35-40 Trucks/hour.
3. Clear water tank capacity: 45 m^3
4. Waste water recycle tank capacity: 60 m^3
   (With intermediate baffle wall to facilitate sedimentation process)
5. Water makeup – 10 KLD from plant recycled water.

Benefit: -To improve work zone and ambient air quality by control the road fugitive dust.



GMR KAMALANGA ENERGY LTD.

Annexure-VII

राष्ट्रीय प्रौद्योगिकी संस्थान
NATIONAL INSTITUTE OF TECHNOLOGY
राउरकेला ROURKELA- 769008, ओडिशा ODISHA

RIGHT TO INFORMATION

FTS/3265AB
Date: 22/06/2024

No. NITR/CE/2024/L/1243

To

The Member Secretary
The Ministry of Environment, Forest and Climate Change

Sub: Submission of Annual Ash Compliance Report (for the period of 1st April 2023-31st March 2024) of GMR Kamalanga Energy Limited, Dhenkanal, ODISHA

Respected Sir,

With reference to the subjected cited above, I am submitting herewith the softcopy of Annual Ash Compliance Report along with month wise generation and utilization data of GMR Kamalanga Energy Limited for the period of 1st April 2023-31st March 2024. The attachments also include the shapefiles of thermal power plant.

Kindly acknowledge the receipt of the same.

With warm regards,

Yours sincerely.

Spsingh 22/06/2024

Prof. Suresh Prasad Singh,
Department of Civil Engineering.
National Institute of Technology-Rourkela
Rourkela, Odisha

HEAD, DEPT. OF CIVIL ENGG.
National Institute of Technology
Rourkela - 769 008 (ODISHA)

Cc: 1) The Member Secretary, State Pollution Control Board, ODISHA
(Email: paribesh1@ospcboard.org)

2) "power cpcb" <power.cpcb@gov.in>;

GMR KAMALANGA ENERGY LTD.

	(xiv) Others (please specify)	-	
	(c) Quantity of bottom ash utilised (MTPA):	**622535.57**	
	(i) Fly ash based products (bricks or blocks or tiles or fibre cement sheets or pipes or boards or panels):	-	
	(ii) Cement manufacturing:	-	
	(iii) Ready mix concrete:	-	
	(iv) Ash and Geo-polymer based construction material.	-	
	(v) Manufacturing of sintered or cold bonded ash aggregate:	-	
	(vi) Construction of roads, road and flyover embankment:	622535.57	
	(vii) Construction of dams:	-	
	(viii) Filling up of low lying area:	-	
	(ix) Filling of mine voids:	-	
	(x) Use in overburden dumps:	-	
	(xi) Agriculture:	-	
	(xii) Construction of shoreline protection structures in coastal districts:	-	
	(xiii) Export of ash to other countries:	-	
	(xiv) Others (please specify):	-	
	Total quantity of current ash unutilised (MTPA) during reporting period:	**NIL**	
16.	Percentage utilisation of current ash generated during reporting period (per cent):	**100%**	
	Details of disposal of ash in ash ponds: (a) Total quantity of ash disposed in ash pond(s) (Metric Tons) as on 31st March (excluding reporting period):	1074753.8 MT	
	(b) Quantity of ash disposed in ash pond(s) during reporting period (Metric Tons):	NIL	
17.	(c) Total quantity of water consumption for slurry discharge into ash ponds during reporting period (m^3)	NIL	
	(d) Total number of ash ponds: (i) Active: (ii) Exhausted (yet to be reclaimed): (iii) Reclaimed:	Both Lagoon-1 & 2 NIL	
	(e) Total area under ash ponds (ha):	74.90 ha	
	Individual ash pond details: *Ash pond-1, 2, etc. (please provide below mentioned details separately, if number of ash ponds is more than one)*	Lagoon-1	Lagoon-2
	(a) Status: Under construction or Active or Exhausted or Reclaimed	Active	Active
	(b) Date of start of ash disposal in ash pond (DD*MM/YYYY or MMYYYY):	12.11.2013	30.03.2014
18.	(c) Date of stoppage of ash disposal in ash pond after completing its capacity (DD/MM/YYYY or MM/YYYY): (Not applicable for active ash ponds)	Not Applicable	Not Applicable
	(d) Area (hectares):	38.46 ha	36.44 ha
	(e) Dyke height (m):	6.0 m	11.0 m
	(f) Volume (m^3):	9,58,333.33 m^3	15,63,166.67 m^3
	(g) Quantity of ash disposed as on 31st March (Metric Tons)	NIL	NIL
	(h) Available volume in percentage (per cent) and quantity of ash can be further disposed (Metric Tons): (Unit weight 1.2 g/cc)	100% 11,82,400.00	100% 19.28,648.63 MT
	(i) Expected life of ash pond (number of years and months):	2.5 Years with present arrangement	

GMR KAMALANGA ENERGY LTD.

BPSingh
22/06/2024

GMR KAMALANGA ENERGY LIMITED, Dhenkanal, Odisha										
Ash Generation and Utilization Month-wise Report (April 2023-March 2024)										
Month	Ash Generated (MT)	Ash Utilization (MT)								
		Supply to cement plant	Brick making	Land filling	Mine filling	Road and flyover embankments	Others (Specify)	Total utilization	Utilization (%)	Remarks
April-23	202269	64158	52110	-	-	86001	-	202269	100.00	-
May-23	207652	73574	61016	-	-	73062	-	207652	100.00	-
June-23	198436	61936	62334	-	-	74166	-	198436	91.76	-
July-23	223300	52175	64762	-	-	106362	-	223300	106.45	-
Aug-23	204285	44500	52466	-	-	107319	-	204285	102.15	-
Sept-23	172679	45200	69641	-	-	057838	-	172679	100.00	-
Oct-23	213561	49508	82919	-	-	81134	-	213561	100.00	-
Nov-23	219733	63675	77158	-	-	78901	-	219733	100.00	-
Dec-23	188597	64080	60453	-	-	64064	-	188597	100.00	-
Jan-24	159300	46857	64686	-	-	47757	-	159300	100.00	-
Feb-24	234783	65621	87997	-	-	81165	-	234783	100.00	-
Mar-24	265542	90769	85428	-	-	89318	-	265542	100.00	-
Total	**2490137**	**722080**	**820970**	-	-	**947087**	-	**2490137**	**100.00**	-

Note: The term ash indicates both fly ash and bottom ash

GMR KAMALANGA ENERGY LTD.

Spsingh
22/06/2024

Prof. Suresh Prasad Singh

HEAD, DEPT. OF CIVIL ENGG.
National Institute of Technology
Rourkela - 769 008 (ODISHA)

GMR KAMALANGA ENERGY LIMITED

CONDITION ASSESSMENT OF ASH POND

FINANCIAL YEAR 2023-24

19-03-2024

V ENGINEERING CONSULTANTS, PUNE

INDEX

CHAPTER-1, INTRODUCTION

M/s GMR Kamalanga Energy Limited (hereinafter referred to as GKEL) is operating a coal based Thermal Power Project of installed capacity 3x350 MW, at Village -Kamalanga in District – Dhenkanal of Odisha.

As in all coal based thermal power stations, ash is produced as a by-product during combustion of coal for boiling water to produce steam required to rotate the turbines for power generation.

AS per the MOEF Gazette Notification dated 31 December 2021, the entire ash produced in all thermal power stations shall be utilized within the same financial year itself. Power plants, which fail to satisfy this requirement within the permissible grace period, shall have to pay hefty fines. In addition to the utilization of ash produced in the financial year, ash stored in ash ponds in the previous years (designated as Legacy ash) also shall be evacuated within stipulated periods. However the amendment dated 31st December 2022 to the above Notification has exempted ash stored in the operating ash ponds during previous years from the stipulations for legacy ash.

As per MOEF Notification, all thermal power plants can operate ash ponds limited to 0.1 hectare/MW, for temporary storage. Under this provision, GKEL can operate a temporary ash pond extending up to 120 hectares. GKEL is proposing to continue the existing ash pond extending to about 80 hectares as the temporary ash pond.

The Gazette Notification from MoEF & CC also stipulates that the safety of the ash dykes shall be assessed by a competent Geotechnical design Expert on annual basis and a Safety certificate shall be uploaded in the web site of thermal power stations before 30th April of every year.

To satisfy this stipulation for the year 2023-24, GKEL has assigned V Engineering Consultants (hereinafter referred to as VEC) to assess the safety of the GKEL ash dyke and to provide a Safety Certificate. As a part of this work, Mr. Vasudevan Cheloor (the ash dyke expert of VEC) visited the GKEL Project site on 22nd February 2024 and inspected the prevailing condition of the ash dyke. Based on the physical assessment at site and subsequent desk studies at VEC office, the following Report elaborating the Safety conditions of the existing ash dyke is prepared to facilitate the confirmation of safety of the existing dyke section.

CHAPTER 2, REFERENCE DOCUMENTS

The major documents referred in this study are listed below.

a) Guidelines on design, construction, O&M and annual certification of coal ash ponds-issued jointly by Central Pollution Control Board (CPCB) & Central Electricity Authority (CEA)- dated June 2023.
b) Extraordinary Gazette Notification dated 31st December 2021, issued by Ministry of Environment and Climate control (MOEF &CC).
c) Amendment to above EGN dated 31st December 2022, issued by MOEF&CC.
d) IS 8826: Guidelines for design of large Earth & Rock filled dams.
e) IS 7894: Code of Practice for stability analysis of earth dams.
f) IS 1904: Code of practice for design and construction of foundations in soil-General Requirements.
g) IITK-GSDMA Guidelines for seismic design of earth dams and embankments.
h) Stability Coefficients for Earth slopes , by A.W. Bishop and Norbert Morgenstern , published by Institution of Civil Engineers, London.

CHAPTER-3, SALIENT FEATURES OF EXISTING ASH POND

The existing ash pond is extending to about 80 hectares, with two storage lagoons and one common water collection pond. The ground level varies from EL 64 M to 71 m and 2 m high starter earthen dyke was constructed over the sloping ground. The top level of bund varied from EL 69 M to 71 M. Inside the lagoons, rock was present at shallow levels and the entire overburden earth was excavated for use in construction of the starter bund. The starter dyke has a 6 m top width and slopes of 2.5H:1 V, on the sides. The bottom of the lagoons have been lined with 750 micron HDPE liner, underlain by 150 mm sand cushion and covered with 150 mm earth cover. After filling the mother dyke, Lagoon-2 has been raised with top level of raised dyke at EL 72.5 M. The raised dyke inner slope has been lined with concrete, which is also impervious (permeability about 10 power (-10) which is much lower than clay blanketing having permeability of about 10 power (-6) cm/sec. The construction of dyke raising was completed in August 2018.

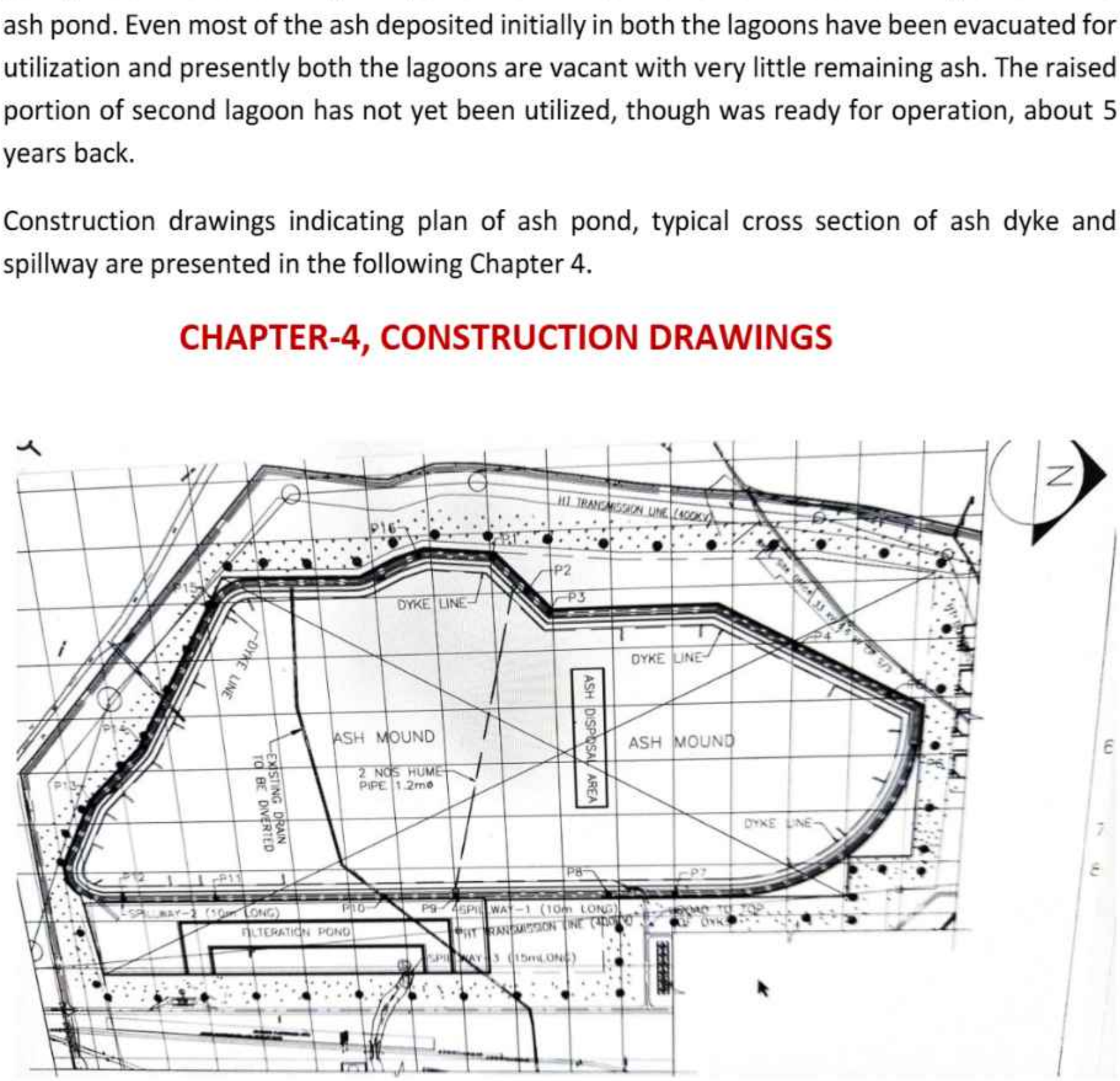
3 numbers of box culvert Spillways have been provided for water discharge from both lagoons to overflow pond and from overflow pond to the outside discharge channel. In order to control water accumulation depths in the storage lagoons, pipes have been embedded in the spillways.

To ensure the TSS of effluent overflowing the spillway in the water collection pond, to be within the allowable limits, the effluent collected in the water collection pond will pass through a filter bund with geo-textile membrane on upstream side, before discharging over the spillway to the outside discharge channel.

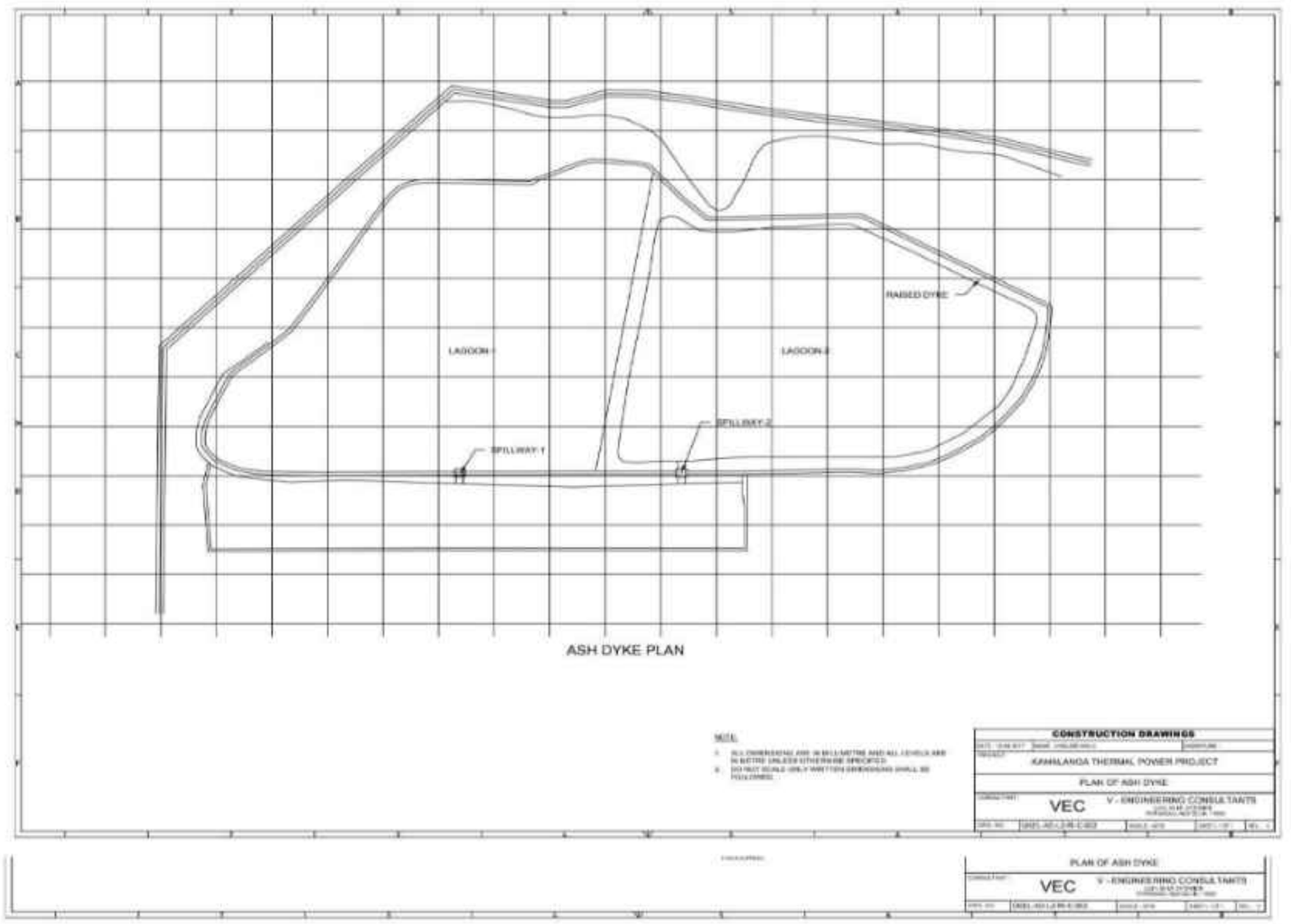
This plant was designed for ash disposal with HCSD system for both bottom ash and fly ash. Bottom ash mixed with fly ash before feeding to the HCSD system. However, for the past 5to6 years, the entire ash is being transported from the plant itself and no ash is being stored in the ash pond. Even most of the ash deposited initially in both the lagoons have been evacuated for utilization and presently both the lagoons are vacant with very little remaining ash. The raised portion of second lagoon has not yet been utilized, though was ready for operation, about 5 years back.

Construction drawings indicating plan of ash pond, typical cross section of ash dyke and spillway are presented in the following Chapter 4.

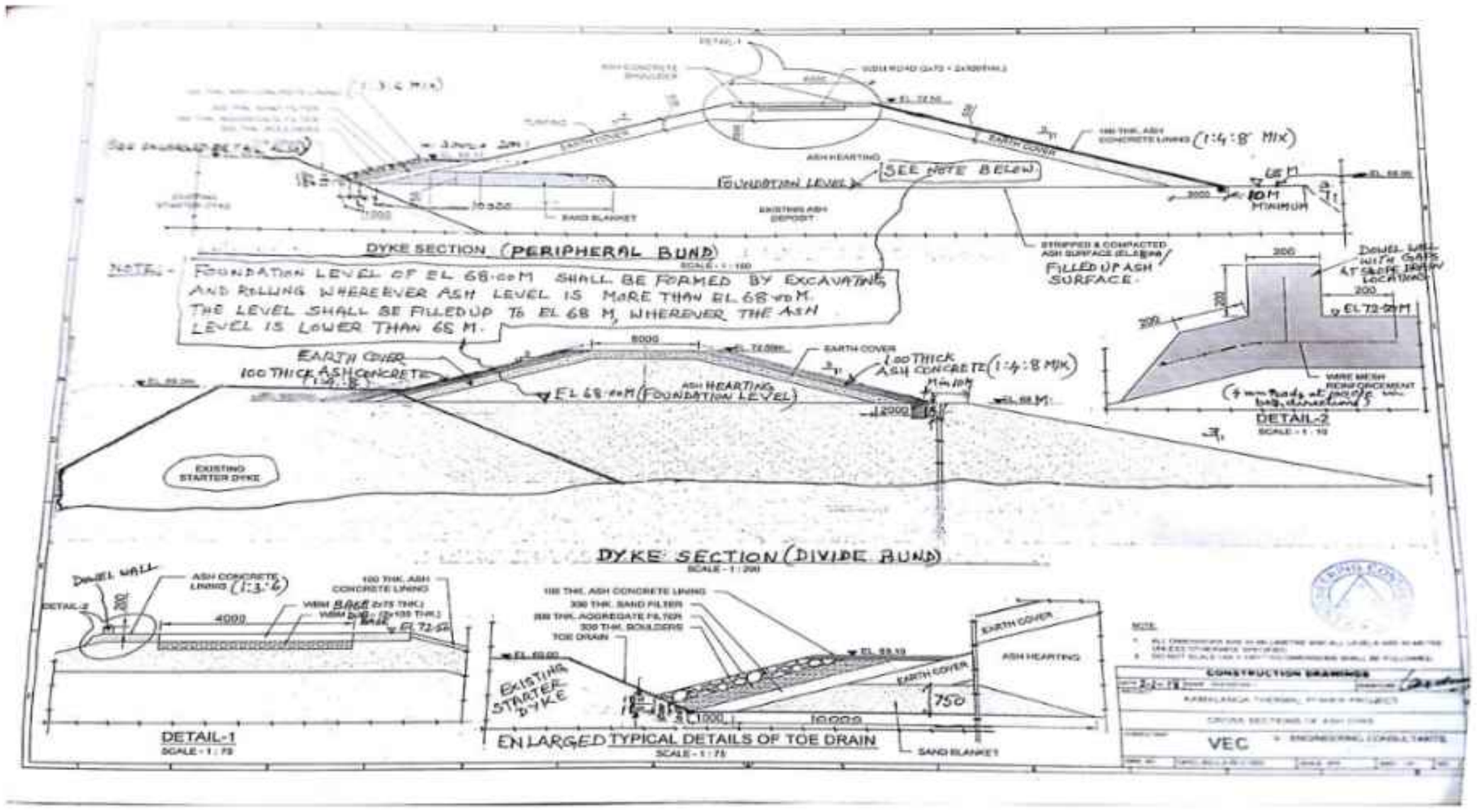
CHAPTER-4, CONSTRUCTION DRAWINGS



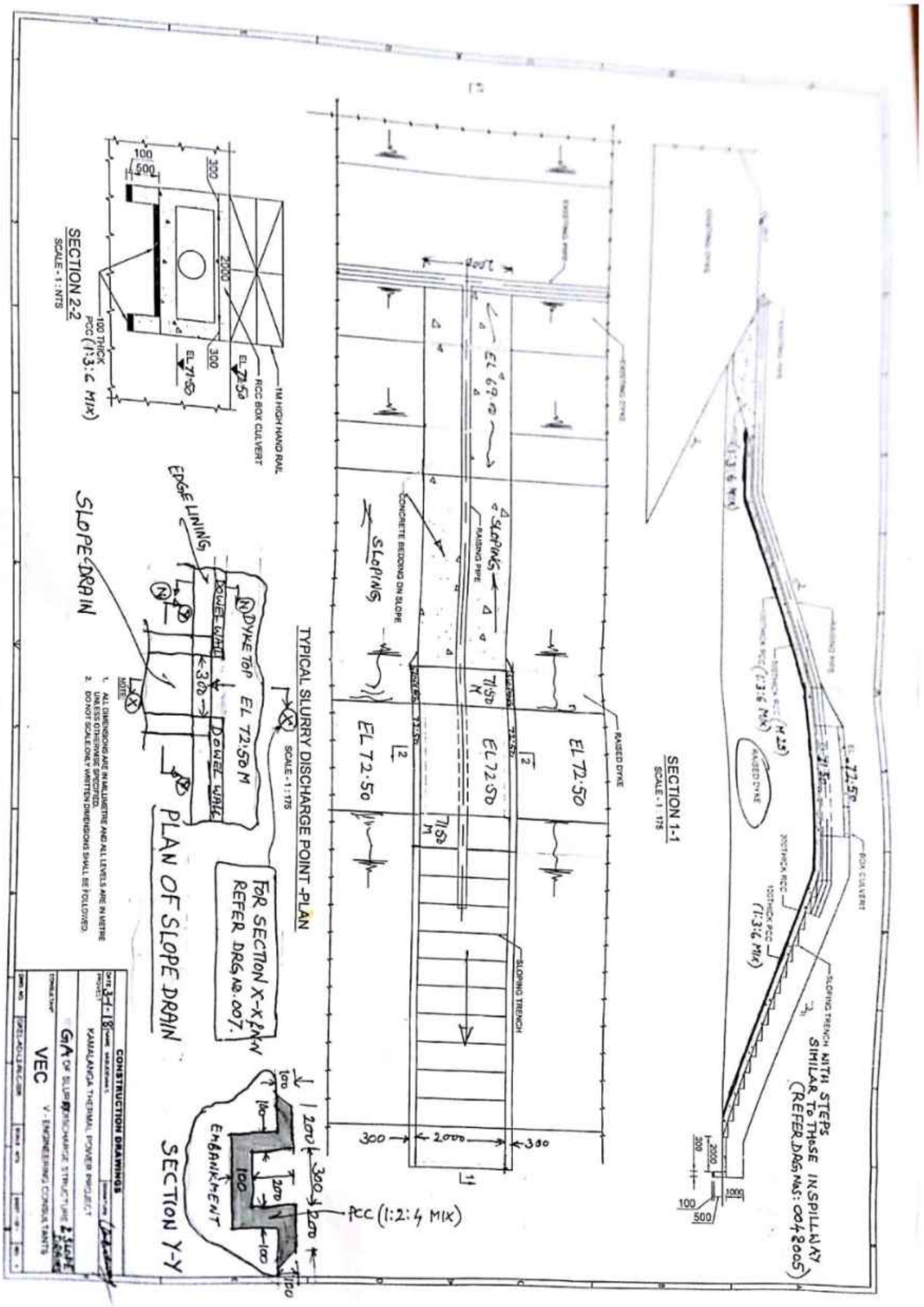
PLAN OF KAMALANGA ASH POND



PLAN OF LAGOON 2 RAISING



CROSS SECTION OF DYKE RAISING



SPILLWAY DETAILS

CHAPTER-5, PHOTOGRAPHS OF EXISTING DYKE

PHOTOGRAPH-1, EMPTY LAGOON WITH GREEN BELT ALROUND

PHOTOGRAPH-2, ROAD OVER DYKE TOP WITH GREENBELT OUTSIDE

PHOTOGRAPH-3, ROAD OVER DYKE & UPSTREAM SLOPE LINING

PHOTOGRAPH-4, SPILLWAY DOWNSTREAM VIEW

PHOTOGRAPH-5, RECOVERY PUMPHOUSE

PHOTOGRAPH-6, ADDITIONAL SPILLOVER POND

CHAPTER-6

MAIN OBSERVATIONS DURING INSPECTION OF ASH POND

In the GKEL plant, the fly ash is collected and stored in dry form in silos. The bottom ash is initially collected in wet form and then dewatered in the hydro bins and subsequently stored in silos. Direct loading facilities of conditioned ash to the trucks are available in all silos.

In view of the 100% ash utilization from the plant itself, the ash pond has not been utilized for the past 5 to 6 years. Only rain water falling directly within the ash dyke area is being collected in the ash pond lagoons. Presently both the lagoons are dry. The pipes embedded in the spillway will limit the depth of impoundment. Even in the case of continuous unprecedented rain fall when the lagoons may be filled with rain water, the spillways with spill level at 1 m below dyke top will ensure adequate evacuation of rain water, to avoid any over topping.

As the dyke is lined with impervious liner on the inner slopes and on the reservoir bottom, no seepage is likely to enter the dyke body, except through any gaps or holes etc, which will be negligible.

Due to the dyke area being unutilized for so many years, grass has been grown in both the lagoons. On the dyke top and on slopes no major vegetation is existing.

No appreciable settlement of dyke, which was originally constructed many years back (starter dyke about 11 years back and raising about 5 years back) is observed.

Around the dyke, a green belt of average 40 metre width has been provided. The average density of trees is 900 per acre.

CHAPTER-7, CONCLUSIONS ON HEALTH STATUS OF EXISTING DYKE

a) The design section of existing dyke with top width of 6 metre and side slopes of 2.5 to 3H:1V, having maximum height of about 7 metre above surrounding ground level has been verified to be adequate from stability point of view. The dyke section has been verified to be safe against sliding failure also.

b) The fact that no appreciable settlement has occurred even after many years from completion of construction, indicates that the quality of construction was in line with the specifications provided by the designer.

c) The presence of impervious liner on the inner dyke slope and reservoir bottom will ensure that there will not be any damage due to seepage of water into the dyke body.

d) An excellent vegetation cover present on the downstream slope will ensure that there will not be any rain cuts on the downstream dyke slope.

e) The bottom ash and fly ash are collected and stored in silos in dry form at the plant, and practically the entire ash produced in the plant is being transported out by various user agencies. In emergency conditions, the unutilized ash is being stored in the ash pond, which is also being evacuated within a short period for utilization. In GKEL, the ash transportation to the dyke has been designed with HCSD system and hence the quantum of water accumulation will be much less compared to lean slurry system.

f) The main possible danger is from rainwater accumulation during rainy season. The rain water collected in the lagoon, along with decanted water from ash slurry, is being discharged out into the water collection pond through pipes embedded in the spillways at lower levels initially and through spillways when full water/ash accumulation in the lagoons upto design FRL (1 metre below the dyke top level) . This will ensure maximum rain water accumulation to within the design free board of 1 metre, even in the unlikely event of unprecedented rain fall for long durations.

Overall the existing GKEL ash dyke is assessed to be in good health and safe during the intended operation.

CHAPTER-8, COMPLIANCE TO CEA GUIDELINES

MOEF&CC Gazette Notification 31.12.2021 mandates power plants to ensure Annual Certification of ash pond and dykes on safety of ash ponds and dykes, Capacity utilization/availability of ash ponds, water use/recycling and Wastewater disposal, and environmental pollution and green belt etc, according to the specification and procedures laid down by CPCB in Consultation with CEA, and submit annual implementation report about the Compliance of provisions in the notification by the 30th day of April, every year to Central Pollution Control Board (CPCB) and concerned State Pollution Control Board (SPCB) or Pollution Control Committee (PCC), Central Electricity Authority (CEA), and concerned Integrated Regional Office of Ministry of Environment, Forest and Climate Change by the coal or lignite based thermal power plants.

Annual certification of ash ponds and dykes shall be carried out by a qualified professional engineer for structural stability and safety assessment and to ensure that the design, construction, operation, and maintenance of the ash pond and ash dykes is consistent with recognized and generally accepted good engineering standards.

1. Annual certification shall be carried out once in every year and annual Implementation report about the compliance of provisions in the notification shall be submitted by the 30th day of April, every year.
2. Annual certification shall be by a qualified professional geotechnical engineer.
3. TPP shall make available any kind of record/Data etc. required at the time of certification.
4. Certifying Expert shall examine the Compulsory Periodic Maintenance Inspection Checklist for the Ash Pond provided by TPP.
5. Certifying Expert shall submit the report which shall cover the following: -

a) Structural stability of the active Ash Pond as per IS 7894

b) Slope Protection as per relevant IS code

c) Adequate Spillway Capacity

d) Dykes compaction

e) Downstream erosion protection

f) Check list for Annual Safety Audit and Check list for Fly Ash Generation and utilization

g) Interpretations from the compulsory maintenance inspections Check lists on the overall safety of the Ash Pond

h) Details of the actions taken on the deficiencies noted during the Maintenance inspections and annual certification inspection

6. Report of the annual certification shall inter alia include observations on points mentioned in Para A (6) of the notification as well as details of the actions taken on the deficiencies noted during the safety audit.

Check List for Annual Certification of Ash Ponds and Dykes for the period 1-4-2023 to 31-3-2024.		
Sr .No.	**Component**	**Observations/Remarks**
1	Name of Power Plant	GMR Kamalanga Energy Limited
2	Name of the company	GMR Kamalanga Energy Limited.
3	District	Dhenkanal

4	State	Odisha
5	Postal address for communication	GMR Kamalanga Energy Limited, Village Kamalanga, P.S. Katabania, Via Meramundali, Dhenkanal ,Odisha - 759121
6	E-mail:	Sushil.Choudhury@gmrgroup.in
7	Power Plant installed capacity (MW)	1050 MW(3x350)
8	No. of units generated(MWh)	3
9	Total area under power plant (ha) :(including area under ash ponds)	Total area under plant including ash pond- 463 hectares Area of ash pond alone-80 hectares.
10	Method of slurry discharge.	Designed for HCSD discharge with 75% ash concentration, but being operated with 50 to 60 percent ash concentration.
11	TSS of decant Water (Going outside/ for recirculation)	For the past so many years, there was no ash storage in the existing lagoons and hence no water overflow, except the rainwater during rainy season.
12	Maintenance of Dyke.	The dyke is maintained well.
	1)Top Width	6 M
	2) Top level of dyke	Lagoon-1, Starter dyke top varying from EL Lagoon-2, First raising top EL 72.5 M
	3) Free board	Design free board 1 m
	4) Earth covering and turfing	Starter dykes in both lagoons were made with complete earth. Turfing has been provided on the outer slopes. The raising in Lagoon-2 was carried out with ash hearting covered with earth on top and on sides .Outer slope has been protected with turfing.

	5) U/S slope protection	750 micron thick HDPE liner, covered with 50 mm thick precast concrete slab, on inner slope.
	6) WBM Road	WBM road has been provided on starter dyke top and on the top of first raising.
	7) Rock Toe, toe drain, berm, rock pitching	As no area falls under flood plains, no stone pitching is required and not provided. Rock toe, berms and toe drain provided are in good condition.
13	Instrumentation	
	a) Piezometer,	Piezometer wells are provided at all four sides to monitor water level fluctuation
	b) surface settlement	No instrumentation has been provided
14	Wet Patches/softening on downstream slope	No wet patches observed.
15	Gully Formation	No gully formation observed.
16	Rat holes/ animal burrows	No holes observed.
17	Growth of plants	No growth of plants was observed on the dyke top and on slopes.
18	Toe drain and surface drain	Toe drain and slope drains are in good condition
19	Facilities for inspection and maintenance of the dyke.	The dyke is only maximum 7 metre height and the road on top of dyke will provide adequate access for inspection.
20	Flood lighting	No flood lighting is provided over the dyke The ash pond area is located within plant area and plant area lighting is sufficient to facilitate emergency inspections if required in the night. Also the head lights of vehicles will be adequate for ensuring adequate visibility during nights.

21	Seepage or leakage	Due to non-operation for last 5 to 6 years, there is no water ponding . No seepage or leakage was observed.
22	Monolith joints	No joints were observed.
23	Foundation condition-Any damage or undermining of the downstream toe	The foundation condition was seen as safe and no undermining at the outer toe was observed.
24	Slope stability of dyke	Computations for Slope stability analysis carried out are presented under Annexure-B Computations of Check for sliding failure is presented under Annexure-C.
	1. Dyke Slope stability, as per IS 7894 to be examined and write the results and submit the report.	Minimum factor of safety under steady seepage condition is 1.71, against acceptable value of 1.5 recommended in the IS Code. Maximum displacement under seismic condition is less than 1 meter as recommended in the IIT, Kanpur Guidelines. Factor of safety against sliding failure-2.04, which is more than permissible value of 1.75, stipulated in IS 1904.
	2. Dyke slopes should be examined for irregularities in alignment and variances from smooth uniform slopes, unusual changes from original crest alignment and elevation, evidence of movement at or beyond the toe, and surface cracks which indicate movement.	Dyke slopes were examined to be as per design and no irregularities like movements and cracks were observed.
25	Condition of Drainage Systems	The spillway is in good condition. As there is no ash disposal, no water is flowing out.
26	Condition of Slope Protection	No damage observed to the slope protection works on both slopes..

27	Environmental Pollution	No environmental pollution was observed during inspection.
28	Greenbelt	Green belt of average width 40 metre has been provided alround the dyke. Average density of trees is about 900 trees per acre.
29	Any other information	The existing ash pond is not under operation for the last 5 to 6 years. Under the present condition of 100 % ash transportation from the plant itself, no ash disposal is planned in the near future also. Hence, there is no danger from slurry filling. The rainwater accumulated will be drained out through pipes embedded in the spillway at lower levels and through the spillways when reservoir is full. Hence, there is no danger to the dyke from rain water also. There exists a system of periodical inspection of the dyke area and identification of defects for prompt rectification. A sample inspection report is attached in the Assessment Report for ready reference, under Annexure-D.
30	Signature of Authorized Signatory	 (Vasudevan Cheloor) Ash dyke design expert
31	Qualification and experience details of Inspecting expert	A. Name -Vasudevan Cheloor B. Educational qualification- i) BSc(Engg) Degree in Civil Engineering from NIT, Kozhikode, Kerala in 1969. ii) M.Tech Degree in Civil Engineering (Marine Structures- a combined course covering hydraulics, geotechnical engineering and Structural Engineering) from NIT, Suratkal, Karnataka in 1972.

		C. Professional Membership- Life member of Indian Geotechnical Society-Delhi Chapter. D. Professional Experience- Over 50 years of experience In the design of hydropower projects, ash dykes, ash mounds, reservoir embankments etc. E. Organizations worked Karnataka Power Corporation Ltd, Bangalore -11 years NTPC Limited, New Delhi -24 years GMR Consultancy services, New Delhi-5 years AF Consultants, NOIDA (Now renamed as AFRI)-4 years F. Consultancy services provided to thermal power projects operated by IPPs in the design of ash dykes and ash mounds (Reliance Power-Sasan & Rosa, GMR-Kamalanga & Warora, Moser Baer-Anuppur, DB Power-Raigarh, Jindal Power-Raigarh and Talcher Kaniha)

ANNEXURE-A, GENERAL CAUSES OF FAILURES OF ASH DYKES

Ash dykes are embankments made of earth and ash, constructed in multi-phase. Usually, the starter dykes are made of earth and the raisings are made of ash hearting with earth cover.

Earthen embankments are vulnerable to nature's actions like rainfall; earthquakes etc. in addition to the forces transferred by ash /slurry fill. Though precautions are provided in the design to withstand maximum possible events, due to the heterogeneous character of earth, uniform strength cannot be developed throughout and some weak spots may be present within the dyke body. Such weak spots will indicate weakness signs first, such as cracks, seepages, boils, sinkholes, settlements, heaving signs, springs, wet spots, rain cuts, slippages, rat holes etc. Earthen dykes will never fail suddenly without expressing first such weakness signs (except during overtopping, where the failure will be sudden).

If we regularly monitor and identify the weakness signs, as soon as they develop, and take appropriate remedial measures as early as possible, the weakened spots/areas in the embankments can be strengthened against the developed weaknesses, thereby avoiding propagation of the weakness to larger areas, which in turn will avoid any failure of the embankment.

It is comparable to identifying diseases and treating to cure in human beings. Periodic inspection of dykes is equivalent to Routine Health Check Ups for human beings and Maintenance activities are equivalent to Treatment for diseases in men. Thus by adopting periodic inspection and maintenance procedures, the health of ash dykes cancan be ensured.

Statistics indicate that majority of the embankment failures have occurred due to overtopping with water. Overtopping with water will cause instant failure of embankments, as the water falling with high velocity on the downstream slope will cut the slope instantaneously.

Other types of possible failures are as listed below.

1) **Formation of cracks in the dyke body due to differential settlements within dyke body or in the foundation.**
   If unattended, the size of cracks will progressively increase in width and length, eventually leading to failure of embankments. Differential settlements will generally occur due to under compaction of foundation or dyke body.
2) **Formation of voids in the shape of pipes within the dyke body or in foundation due to erosion of materials due to water seepage.**
   If unattended, these voids will increase in diameter and length progressively eventually leading to failure of dykes. This type of failure is generally called piping failure. The pipes are generally formed because of under compaction at certain locations or due to inadequate internal drainage arrangement leading to excess exit gradient starting the erosion of materials at the dyke toe. Piping failure will also occur due to seepages emerging on the outer slope above rock toe, which are generally caused due to shrink, inadequate compaction.
3) The roots of Vegetation growing on the dyke body may dry out and shrink, creating voids leading to solution channels and may lead to piping failure if many such voids are interconnected.
4) Rat holes formed in the dyke body can also cause failure if many such holes got interconnected, leading to a continuous seepage path.
5) Rain cuts on the dyke slopes and on top of dyke.
6) Erosion of upstream slope due to wave action.

No embankment will fail instantly, if overtopping is prevented. All other types of failures will provide advance warnings in the form of cracks, seepage, sink holes, settlements etc. in a small scale initially. Only if these failure symptoms are ignored and not repaired, they will aggravate progressively and lead to failures over a long time.

Overtopping can be avoided by providing sufficient free board and elaborate water escape arrangements.

Other types of failures can be prevented by promptly attending to all warning signs, by carrying out appropriate remedial actions on priority basis. An efficient inspection and maintenance system will prevent all such damages and ensure the safety of ash dykes.

Ash dykes will be healthy only if they are

- Well- designed
- Well- constructed
- Well- maintained
- Well- operated

The designer will include all safety requirements in the design.

The construction shall be carried out as per the specifications provided by the designer, including quality assurance procedures.

Periodic inspection and prompt repairs before every monsoon are essential to ensure safety of the dyke. All water evacuation paths provided and planned shall be maintained without any blockage such as silt deposition, vegetation growth etc.

During operation stage, the ash slurry discharge and water management shall be carried out as envisaged in the design especially the maximum ash and water levels, ensuring design free board and water evacuation arrangements as planned in the design.

ANNEXURE-B, STABILITY ANALYSIS OF ASH DYKE

For stability analysis, the dyke section with maximum height is considered, with following features.

Starter dyke-made up of earth, 2 M height , top width of 6 M, side slope 2. 5H:1V.

Rocky strata are available at about 2 M below ground level.

Raised dyke- made up of ash hearting and earth cover on slopes and on top.
Top width-6 m, side slope 3H:1V, maximum height-4.5 m

Total height of combined dyke above GL=5.5 M.

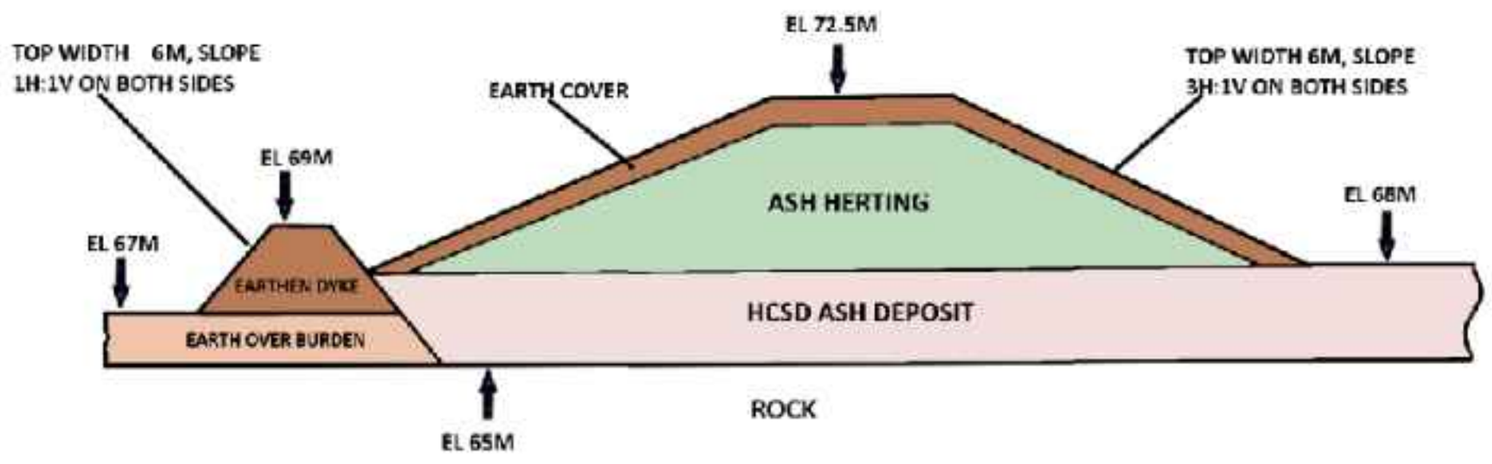
Though the overburden has been excavated from the reservoir bottom, for stability under steady seepage condition, the outer slope height above GL only will be effective.

Materials used for dyke construction have the following properties.

Earth- Bulk density-18 kN/cum, Cohesion- 21 kN/sqm, Friction angle-20 degrees

HCSD Ash- Bulk density 13 kN/cum, Cohesion-0, Friction angle 30 degrees.

The section considered for stability analysis is indicated below.



DYKE SECTION FOR STABILITY ANALYSIS

6.1 Stability under static conditions

In general, the factor of safety of an earthen embankment will depend mainly on seven Variables-Height of slope (h), Depth factor (D) indicating position of rock level, Slope angle (Beta), Pore pressure (u), cohesion intercept (c′), friction angle (phi) and Bulk density (Gamma).

However, an accurate and general solution can be made possible by 3 factors.

For a given value of the dimensionless number (c′ / (gamma x h)), the factor of safety (F) against slip failure depends only on the geometry of the section, expressed by the values of cot (beta) and D, pore pressure r_{un} and angle of shearing resistance (phi).

In the paper titled "Stability coefficients for earth slopes "prepared by A.W. Bishop and Norbert Morgenstern and published by the Institution of Civil Engineers, London, the authors have presented two stability coefficients m and n, for different values of pore pressure variation (r_{un}= c'/ (gamma x h)), embankment slopes and angle of internal friction.

The Factor of Safety can be expressed as $F=m-n*r_{un}$.

As per IS: 7894, Code of Practice for Stability Analysis of Earth dams, the stability analysis shall be carried out mainly under four conditions:

a) **End of Construction condition:**

This condition will be critical only where the rate of embankment raising is at the rate of more than 15 metre per year. However, in the case of GKEL, the dyke was constructed many years ago and the maximum dyke height was only 7 metre. Hence, this condition is considered as not critical and hence not proposed to be examined.

b) **Sudden draw down condition:**

As the ash pond is designed to fill gradually and the outflow will be only at the design spilling levels, there is no chance of water level coming down suddenly, sudden draw down condition will never occur and hence this case is not proposed to be examined.

c) **Steady seepage condition:**

This condition is applicable to ash dyke also and minimum factor of safety against slope slip failure shall be 1.5 as per IS 7894. The analysis is proposed to be carried out with the 7 m high dyke, resting on ground, with water up to the design FRL (full height of dyke). The gradual ash filling on the upstream side also will stabilize the peripheral dyke progressively and hence the actual factor of safety against slope failure will be much more than what is estimated in the stability analysis considering full height water accumulation.

Further, as the upstream slope of ash dyke is lined with HDPE liner, water is not likely to seep into the dyke section and hence the actual dyke section will not behave like a hydraulic structure. Due to this also, the effective stability of the dyke will further increase only.

6.2 Seismic condition.

This case is applicable to ash dykes also and is examined as explained below.

The Kamalanga area falls under Seismic Zone III, which is only moderately dangerous. In addition, the maximum height of dyke above ground level is only 5.5 metre, which falls under the category of low dams. Hence, the risk is very less.

Recent studies have suggested that the seismic stability of earth and waste slopes evaluated with seismically induced permanent deformation procedures based on the landmark works of Newmark and Makdisi &Seed is a more appropriate solution. The calculated seismic displacement from these procedures is viewed approximately as an index of embankment performance under seismic loading. Seismic displacement procedures will always be approximate in nature due to complexities of the dynamic response of the earth/ materials

involved and the variability of the earthquake ground motion. However, when viewed as an index of potential seismic performance, the calculated seismic displacement can and has been used effectively in practice to evaluate earth structure designs.

Earthen slopes experience considerable deformation in strength and stiffness during seismic activities.

It is clearly observed that permanent displacement increases with increase in slope angle. The pattern of increase in permanent displacement is almost linear.

IIT Kanpur has recommended that the materials of all new dams and embankments should be compacted to a density that will cause them to dilate rather than liquefy during earthquake shaking. It is recommended that the compacted density of material should exceed 95% of Standard Proctor Maximum Dry Density (SPMDD) for rail or road embankments. For GKEL ash dyke also this compaction density has been achieved.

From the experience and literature studies, it is considered that a maximum permanent displacement up to 1 metre during earthquake will not make earth dams and embankments functionally unsuitable.

IS 8826-Guidelines for design of Large earth & rock fill dams recommend that the materials used for homogeneous dams shall fall within the categories-GC, CL, CI, SP, SM or CH.

The earth and ash materials used for Kamalanga ash dyke falls under the permissible groups. It can be safely concluded that the acceptable materials compacted to an in-situ dry density not less than 95% of Standard Proctor MDD, is not likely to liquefy and permanent displacement of embankment under seismic conditions will be within the acceptable value of 1 metre.

6.3 RESULTS OF STABILITY ANALYSIS

6.3.1 Static condition:

From the studies carried out by Bishop and Morgenstern on the stability of earthen embankments, it is found that the Factor of Safety against slip failure will be increasing continuously in a more or less straight-line manner with increase in the values of non-dimensional factor ((c/(gamma*h) (hereinafter referred to as stability factor).

In the case of GKEL, the starter dyke, founded on earth was constructed with c-phy soil.

The raised dyke has been constructed with ash hearting (c==0) covered with earth (c-phy soil) on the top and slopes. The raised dyke is founded on ash fill.

In the dyke section considered for stability analysis, out of total 141 sqm, 38 sqm consists of earth and 103 sqm consists of ash. Various possible slip circles will pass through partly in earth and partly in ash. Hence the shearing resistance offered by the dyke section against slip failure, will be the combined resistance offered by both materials together.

As the proportion of ash and earth will be different for different slip circles, it is proposed to carry out the stability analysis separately with the following three ash-earth combinations and the minimum value of factor of safety obtained will be considered as the conservative factor of safety for Kamalanga ash dyke.

Case-1, Total dyke section made up of earth

Case-2, Total dyke section made up of ash

Case-3, The total dyke section is made up of material having weighted average properties.

Dyke Section	H M	Gamma kN/cum	C kN/Sqm	Phy Degrees	Average Slope	St.Number c/(h*gamma)	FS
Total Earth	5.5	18	21	20	4.27H:1V	0.2121	1.71
Total Ash	5.5	13	0	30	4.27H:1V	0	1.744
Weighted Avg material	5.5	14.31	5.66	27.30	4.27H:1V	0.0719	2.608

Minimum Factor of Safety=1.71

Computation of FS

Case-1, Earth section

For SN=0.025, m=1.961, n=1.775, FS=1.961-.23*1.775=1.552
For SN=0.05, m=2.23, n=1.799, FS=2.23-0.23*1.799=1.816
For SN=0.2121, FS=1.816+(1.816-1.552) (0.2121-0.05)/ (0.05-0.025) =1.71

Case-2, Ash section

For SN=0, m=2.309, n=2.454, FS=2.309-.23*2.454=1.744

Case-3, weighted average material

For SN=0.025, m=2.689, n=2.531, FS=2.689-0.23*2.531=2.10
For SN=0.025, m=2.957, n=2.546, FS=2.957-0.23*2.546=2.371
FOR SN=0.079, FS= 2.371+(2.371-2.1) (0.0719-0.05)/ (0.05-0.025) =

The minimum factor of safety computed against slope slip failure of 1.71 is greater than the minimum factor of safety of 1.5 stipulated by IS Codes.

However, it may be further noted that the above analysis has been carried out on very conservative manner, considering water storage within the reservoir for the full height of dyke and consequent pore pressure distributed uniformly below the phreatic line for the entire height of dyke section. But in the actual case, as pipes are embedded in the spillway, the water depth will always be limited to maximum of about 2 metre, above the deposited ash. Because of this, the actual factors of safety against slip failure will be much higher.

Further in view of providing impervious liners on the upstream slope of the dyke, the entry of water in to the dyke section through seepage is minimized and hence the lined dyke section is practically not a hydraulic structure. Even if there are some gaps and holes in the liners, the net seepage area will be only a negligible fraction of the total area and hence the quantum of resulting seepage will not be sufficient to saturate the dyke body to develop the design phreatic line considered in the conservative stability analysis. Because of this also the actual factor of safety will be much higher than the estimated value under the conservative analysis.

In view of the estimated factor of safety being more than acceptable value, even under very conservative conditions, the existing dyke section is certified as safe under the intended operating conditions.

6.3.2 Seismic condition

As the dyke section is made of acceptable categories of soil and ash and also compacted to an in-situ dry density not less than 95% of Standard Proctor MDD, the soil and ash hearting are not likely to liquefy and permanent displacement of embankment under seismic conditions is expected to be within the acceptable value of 1 metre.

ANNEXURE-C, CHECK FOR SLIDING OF DYKE BODY

In the case of unlined earthen embankments, the water pressure from the water accumulation in the lagoon will be dissipated due to seepage through the dyke body and hence no horizontal force will be acting on the dyke body. But in a lined dyke, there will not be any seepage through the dyke body and hence the complete hydro static pressure will act on the dyke body as a horizontal pressure. This may cause sliding of the dyke bottom unless there is adequate frictional resistance between the dyke body and foundation.

Maximum hydrostatic head considering water fill up to dyke top=5.5 m

Horizontal force per metre length=5.5*5.5/2=15.125 t.

Base width of starter dyke=10 m.

Weight of starter dyke per metre length=16x1.8=28.8 tonnes

Frictional force between starter dyke and base soil=2.1x10x1+28.8*tan 20 degrees

=21+28.8X0.364=31.48 tonnes

Factor of safety against sliding=31.48/15.125=2.08, more than allowable value of 1.75, stipulated in IS: 1904, Code of practice for design and construction of foundations in soil.

ANNEXURE-D, SAMPLE INSPECTION REPORT

GMR Kamalanga Energy Limited Kamalanga, Dhenkanal, Odisha	GMR	
EHS DEPARTMENT	Doc No: GKEL/27/EHS/008/005 (W.E.F-15.03.2020)	
INSPECTION CHECKLIST OF ASH POND	Rev No. – 00	Insp. Date: 16/02/24
SCOPE OF WORK: INSPECTION OF ASH POND & ASH WATER RECOVERY SYSTEM		

S No.	Item Description	Status	Remarks
A	**Inlet System**		
1	Ash dumping if any and points in Lagoon 1 & 2	NO	
2	Inlet distribution Pipe Condition & leakage if any	OK	NO leakage
B	**Ash Pond & Embankment (Lagoon 1 & 2)**		
3	Ash filled level	L1 - 1%	L2 - 5%
4	Water accumulation	NO	
5	Free board (min 01 mtr)	OK	
6	Fugitive emission	No	
7	Road condition on embankment	OK	
8	Upstream HDPE Lining condition	OK	
9	Upstream concrete lining condition	OK	
10	Spill way condition & over flow if any	OK	NoOverflow
11	Any leakage from embankment	No	
12	Any leakage in ash slurry line	NO	
13	Abnormality in embankment condition	NO	
14	Grass turfing condition	OK	
15	Vegetation growth	OK	
16	Toe drain condition	OK	
17	Access to garland pipeline for regular inspection.	yes	
C	**Filtration Pond & Rock Dyke**		
18	Rock dyke condition	OK	
19	Membrane condition on the upstream side of rock dyke.	OK	
20	Ash water Leakage from base of the rock dyke	NO	
21	Vegetation growth in filtration ponds & rock dyke	yes	Removal in Progress
D	**Ash water recovery system (Decantation Pond & Sump)**		
22	Accumulation of Ash in the decantation pond	NO	
23	Availability of pumps	02	
24	Operation status of pumps	02	
25	Sump status	OK	
26	Outlet - from Decanted pond	OK	
E	**Others**		
27	Approach road	Ok	
28	Illumination	–	Day light yes.

Checked by: Name Niranjan Behera Designation: AM Sign: Date: 16/02/24

Name Manoj Rout Designation: A.M Sign: Date: 16/02/24

Reviewed by: Name SUSLI KUMAR CHANDRA Designation: Deputy Mgr Sign: Date: 16/02/24

GKEL ASH DYKE SAFETY CERTIFICATE

It is hereby confirmed that I (Vasudevan Cheloor- ash dyke expert of V Engineering Consultants) have inspected the existing ash dyke in the GMR Kamalanga Energy Limited, on 22nd February, 2024 , for assessing the health of ash dyke. Based on my observations at site and desk studies carried out at my office, I hereby certify that the existing GKEL ash dyke having a maximum height of about 5.5 M above ground is found to be safe from design, construction and operation point of view. This ash dyke has been constructed with the top level at EL 72.5 M, top width of 6 metre and side slopes of (2.5 to 3) H:1 V on both upstream and downstream.

This ash dyke has been designed for wet slurry disposal by HCSD method, thereby limiting the quantum of water accumulation in the lagoons. For the last 5 to 6 years, 100 percent ash is utilized from the plant itself and hence no ash is being deposited in the ash pond. Even almost all the ash deposited earlier has been evacuated and utilized and hence the ash pond is practically empty. Moreover, since the upstream slope and reservoir bottom has been lined with impervious lining, negligible water seepage can occur into the dyke body. However, to be on conservative side, I carried out Slope Stability Analysis, ignoring the presence of impervious lining, and confirmed that this dyke will have a minimum Factor of safety of 1.71, against slip failure during steady seepage conditions, which is more than 1.5 (the minimum value stipulated in IS 7894). Also, it is estimated that during seismic conditions, the maximum deflection at top will not be more than 1m, the permissible limit recommended in IIT Kanpur Guidelines. The dyke was checked for safety against sliding failure also and the factor of safety against shear failure has been estimated to be 2.04 against the required minimum value of 1.75 as per IS 1904.

Based on my assessment and desk studies, I hereby declare and certify that the existing ash dyke with top level at EL 72.5 M, at GMR Kamalanga Energy Limited is safe under all intended operating conditions.

I would also like to emphasize that a well-designed, well-constructed, well maintained and well operated dyke will never fail instantaneously without advance warning signs of weakness, unless water flows over the dyke top. Hence, by promptly repairing the weak areas, and by ensuring that the design free board is maintained without any overfilling of ash, the safety of the dyke can be ensured during the entire operation stage.

I also certify that I am competent to assess the safety of ash dykes, by virtue of my educational qualification (M.Tech degree in Civil Engineering) and professional experience extending to more than 50 years in the design of ash dykes, earthen embankments, reservoir embankments, earth dams etc.

Dated –19th March ,2024.

V ENGINEERING CONSULTANTS VEC

(VASUDEVAN CHELOOR),
M.Tech (Civil Engineering),
Ash dyke specialist and Proprietor,
V Engineering Consultants.

Annexure-IX

QUALITEK LABS LIMITED

D2/18, Mancheswar Industrial Estate, Bhubaneswar – 751010, Odisha, India
Website: www.qualiteklab.com
E-mail id: customerservices.bbsr@qualiteklab.com; Phone: 0674-2952347

Qualitek Labs
Delivering Business Confidence

TEST REPORT

ULR No. : NA	**Format No.: QLB/MSP/QA/012/F001/00**
Test Report No: QLB/TR/MN/2024/0702/009 P2	**Report issue date: 10/07/2024**
Sample Submitted/Drawn: Submitted	

Customer Detail:

Name: GMR Kamalanga Energy Limited

Address: KamalangaKantabania, Dhenkanal, Odisha, India-759121

Sample Details:

Sample Name/type #:	Coal	**Item code#:**	NA
Sample qty. received:	200 gm	**Sample registration no.:**	QLB/MN/2024/0702/009
Batch no/lot no#:	Feeder Coal U#2	**Sample conditions:**	Good
Mfg. license no.#:	NA	**Packing description:**	Intact
Mfg. date/Exp. date#:	NA	**Sample receipt date:**	02/07/2024
Ref (WO no.)#:	NA	**Sample registration date:**	02/07/2024

Sampling Details:

Sampling done by:	NA	**Sampling plan/method:**	NA
Date & time of sampling:	NA	**Sample item:**	NA
Location of sampling:	NA	**Quantity sampled:**	NA
Environmental conditions during sampling:	NA	**Any deviation occurred during sampling:**	NA

Analysis Details:

Analysis start date: 02/07/2024 **Analysis end date:** 06/07/2024

Sr. No	Test Parameters	Unit of measurement (UOM)	Test Method	Specification	Test Result
	Discipline: Chemical				
	Group : Solid Fuels				
1	Mercury	ppm	QLB/STP/MN/020	NA	16
2	Ultimate Analysis Sulphur	%	ASTM D 5373	NA	0.42
3	Ultimate Analysis Oxygen	%	ASTM D 5373	NA	14.15
4	Ultimate Analysis Hydrogen	%	ASTM D 5373	NA	2.73
5	Ultimate Analysis Carbon	%	ASTM D 5373	NA	35.07
6	Ultimate Analysis Nitrogen	%	ASTM D 5373	NA	1.17

Symbol/s:# Information provided by customer for which the laboratory has no control,**Test subcontracted.

Remarks : 1. NA: Not applicable 2.The results apply to the sample as received

----------End of Test Report----------

Reviewed by
Name : Mrs. Smruti Rekha Parida
Designation : Jr. Executive-QA

Authorized by
Name : Mr. Pabitra Kumar Panda
Designation : Asst Manager-Minerals
Discipline : Chemical

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Annexure-X

Annexure 7.1

CONTENTS

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1.02 Objectives

Rainwater harvesting is the collection and storage of rain water runoff that goes as wastage from catchment areas like roofs, paved areas, roads and bare grounds as well as green belts. Rainwater is the purest form of water available on the earth at all places though the quantity of availability varies from place to place. Collection of rainwater may be in the form of surface storage in RCC tanks, underground sumps or small syntax tanks to meet the domestic requirements immediately within a short period. The second option available is to collect the rainwater to utilize the same for recharging the ground water aquifer system (depleted aquifers) through appropriate recharge structures constructed as per the site hydrological and hydrogeological parameters. Rainwater harvesting is a simple, economical and eco-friendly technique of preserving every drop of water falling on the earth. The problems of large variations in water availability associated with growing demand leads to the need for rainwater harvesting. Catchment areas for collection of rainwater include rooftops, compounds, roads, parks, bare grounds or any other natural or artificial surface.

1.03 Scope of work

(i) Ground water resource estimation & relevant data collection

Micro level hydrogeological investigation for rainwater harvesting & other hydro geological investigation required for rain water harvesting structure.

(a) Ground water resource estimation in project area to calculate the balance after withdrawal.

(b) Estimation of subsurface storage space for rain water harvesting.

(c) Estimation of surplus monsoon runoff.

(d) Estimation of requirement of water for recharge.

(e) Site selection & estimate the storage capacity of artificial recharge structure.

Data collection required for rainwater harvesting system.

(a) Collection of information of projected/anticipated water usage from ground water in and around proposed area.

(b) Collection of hydrological and hydrometeorological data from State Ground Water and Central Ground Water Board. The number of bore wells/ tube wells under

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(vi) Compliance of Environmental Clearance from Ministry of Environment and Forest , Govt. of India, New Delhi. *(The copy attached)*

(vii) Preparation and submission of report incorporating above scope.

The field work was completed during the 9-15 August 2011. The purpose of site visit is to generate data on the topographic conditions, contour, land use pattern, morph-meteorological condition and other project specific feature.

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(B) Ground Water Resources In Plant area :

1. Total Area = 440 Acres (400 Acre Plant area + 40Acre Colony Area)
2. Net Annual Ground Water Availability = 22.38 Ham
3. Existing Gross Ground water draft for all uses = 6.04 ham
4. Balance Gross Ground water available = 16.34 ham
5. Stage of Ground Water Development = 27.0 %

The Net annual ground water available is 22.38 **MCM** and draft from all uses is 6.04 **MCM**. Net ground water available for future irrigation use is **16.34 MCM.**. The ground water resources development has reached up to 27 % and categorizing as **safe.**

7.03 Ground Water Resources Potential of Investigated Area

Groundwater resources of the investigated area have been worked out by water level fluctuation method. The rise in water level in the area is due to rainwater infiltration and applied irrigation water. The decline in water level is mainly due to withdrawal for different purposes. The statistical calculation for estimation of total annual groundwater resources is given below.

Monsoon Recharge

The monsoon recharge in the zone water fluctuation in the area suitable for recharge is worked out based on water level fluctuation and specific yield. The specific yield of water bearing formation is considered as 0.02.

Area suitable for groundwater recharge	4.4 sq Km
Water table fluctuation (rise) (Based on well invented reported data)	3.00 m
Specific yield in the zone of water table fluctuation	0.02
Monsoon recharge of area x water level fluctuation x sp. Yield	4.4 x 3.0 x 0.02 =0.264 MCM/annum

Gross annual GW draft

Number of groundwater structures (in use) = 10

Average GW draft per unit structure (unit draft) = 0.001 MCM/annum

GW draft per year = 0.01 MCM/annum

Groundwater Balance

Annual utilizable groundwater resources - Net annual Groundwater Draft 0.4522 MCM – 0.01 MCM= 0.4422MCM/annum

Level of groundwater Development

The level of ground water development is presently 27 % and it is very much within **Safe Category.**

- Quantification of surface water requirement and surplus annual run off availability as source water for artificial recharge in watershed.
- Working out design of suitable recharge structures, their numbers, type, storage capacity and efficiency considering the estimated storage space and available source water for recharge.
- Cost estimates of artificial recharge structures required to be constructed in identified areas.

8.03 Assessment of Factor for Harvesting Surplus Monsoon Runoff

Source water availability

The average annual rainfall is 1287 mm. The total Plant area is about 4.4 Sq. km. The surface water potential for the entire project area is estimated by using Inglis formula, which arrives to **2.87 MCM/annum.**

Sub-Surface Storage Potential

The better understanding of lateral extent, thickness and replenishment capacity of the rock is needed to evaluate sub-surface storage potential. To estimate the available storage space for sub-surface storage potential in plant area, a post monsoon depth to water level map is prepared on the basis of reported data. The post monsoon depth to water level represents a situation of minimum thickness of vadose zone available for recharge. The upper 3 meter of unsaturated vadose zone is not considered for recharge to avoid water logging, soil salinity etc.

8.04 Rainwater harvesting in the plant area

Rooftop Rainwater Harvesting

Total Rooftop area = 0.22 Km^2

Normal annual rainfall = 1287 mm (1.287 m))

Catchment factor for road and Paved = 0.85 (as per C.G.W.A. norms)

Total volume of water to be generated = 0.22 x 1.287 x 0.85 = 0.240 MCM/Annum

Road and Paved Area Rainwater Harvesting

Total road and Paved runoff area = 0.13 Km^2

Normal annual rainfall = 1287 mm (1.287 m)

CHAPTER – IX

9.0 CONCLUSIONS

Based on the hydrogeological, geophysical ,hydrometrological studies and field investigation in the project area following conclusions were drawn.

- The normal annual rainfall for the last 30 Years is 1287 mm. It is noticed from the annual rainfall data that the pattern of rainfall is erratic.
- The total Thermal Power Project area is 4.4 Sq. Km.
- The Annual Precipitation in the entire project area (Area x rainfall) =4.4 x1000 m x 1000 m x 1.287 m =5662800 m^3/ annual = 5.67 MCM/annum
- Total surface run off in the entire Project area = Area x Rainfall x Runoff Coefficient =5.67 x 0.85 =4.82 MCM/annum.
- Total ground water recharge potential before the project is 0.476 MCM/annum.
- Ground water recharge potential after the completion of project and implementation of artificial recharge schemes would be 1.021 MCM/annum.
- Net enhance in ground water potential due the implementation of the artificial recharge schemes would be 0.555 MCM/annum.
- Surplus runoff (0.10 MCM/annum) leaving the project area will be diverted to raw water tank and will be utilized by the plant. Hence entire rainwater will be utilized either through ground water recharge or storage in raw water tank.
- The total water requirement of Thermal Power Plant will meet through the Brahmani River through the proposed pipe line.
- The Thermal Power Project will not utilize ground water.
- A major part of the area is occupied by weathered sand stones and shales with boulders.
- At some places the massive rocks are exposed on the ground surface.
- Direct ground water recharge will be most feasible due to sand stones and shales with boulders exposed on ground surface.
- Being massive rocks exposed on ground surface runoff in the entire project area will be more.

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CHAPTER – X

10.0 RECOMMENDATION FOR RAINWATER HARVESTING

Keeping in view of the hydrogeological situation, topography and the lay out plan of present plant following structures are recommended for rain water recharge to ground water.

1. Percolation tanks
2. Trenches
3. Recharge pits and recharge shafts

10.01 Storm water drainage with recharge well.

To collect the storm water 7 numbers of recharge pit with the dimension of 3.5 m x 3.5 m x 3 m filled with filter material and having a borewell up to depth of 30 m bgl is recommended. The diameter of the borewell will be of 8". The rainwater collected in form of storm water will be collected in the pit and it will recharge first aquifer system.It is designed at the two-junction point of the drainage. The designs of the storm water recharges structure are given in figure 10.5.

10.02 Rooftop Rainwater Harvesting

Rainwater collected from the Rooftop area will be recharge through a tube well having depth of 80 m bgl. Through this recharge tube well the aquifer system lying below 10 m bgl will recharged. The major part of the proposed roof area is identified for recharging. The design of the rooftop rainwater recharge structure is given in figure 10.6 and 10.7.

Recharge pits and recharge shafts: Keeping in view of industrial activities it is recommended to construct three to four recharge ponds or pits of large dimensions. Slope of the recharge pits should be 2:1 to reduce clogging and sedimentation on the walls of the pits. Pits should be back filled with gravel sand filter material over a layer of cobbles/boulder at the bottom. These pits should also be used as pond. The bottom of pond should be facilitated with a layer of sand at the bottom to prevent the silt from clogging permeable strata. The source water should be made as silt-freed as possible

10.04 Storage of surplus run off

The surplus rainwater leaving out side of the project area may be diverted to raw water tank. This will reduce the quantiy of imported water from Brahmani River especially during the rainy season. This will also reduce the pumping cost of the water from the Brahmani River.

10.05 Construction of Piezometers

Two number of shallow piezometer and two number of deep piezometer in power plant area may be constructed to monitoring ground water level and ground water quality as per norms laid by CGWA. The locations of proposed piezometer are shown in the figure 10.1 The designs of deep and shallow piezometer are given in figure 10.2 and 10.3 respectivly. Monthly ground water level data and water quality data may be collected and submitted to CGWA on regular basis.

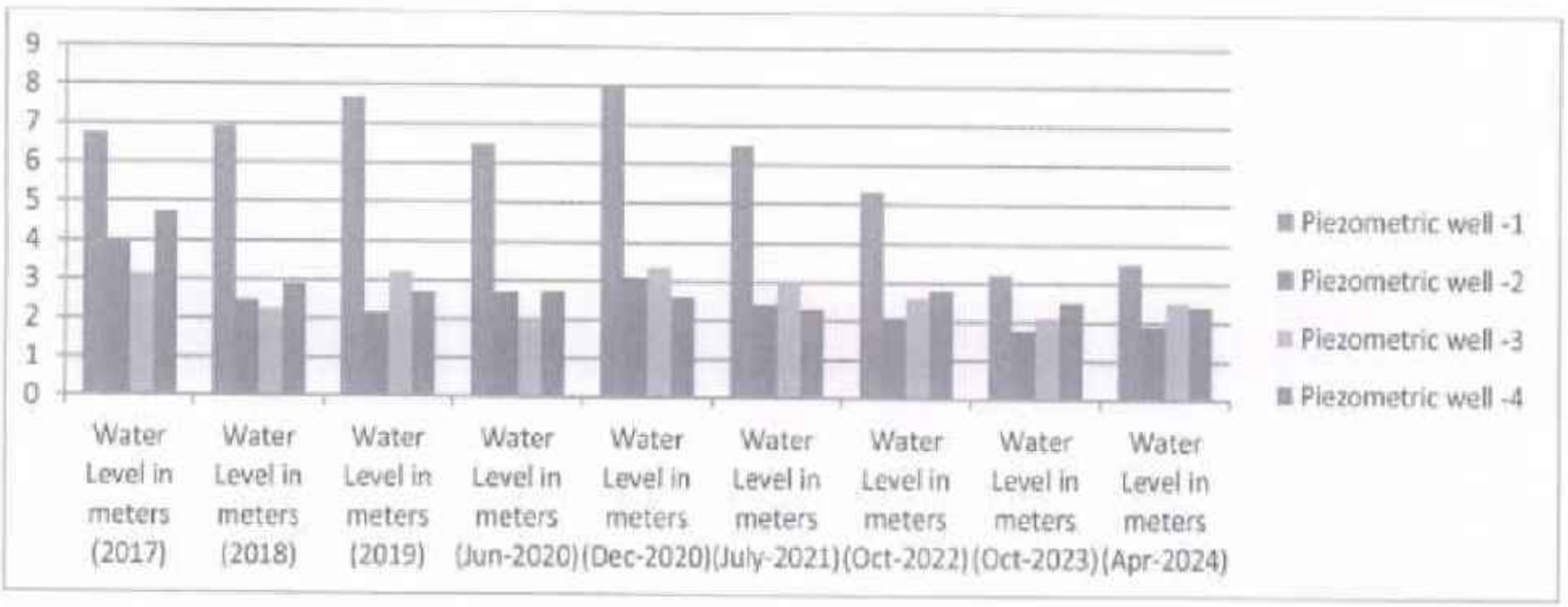
4.0 RESULTS & TREND ANALYSIS

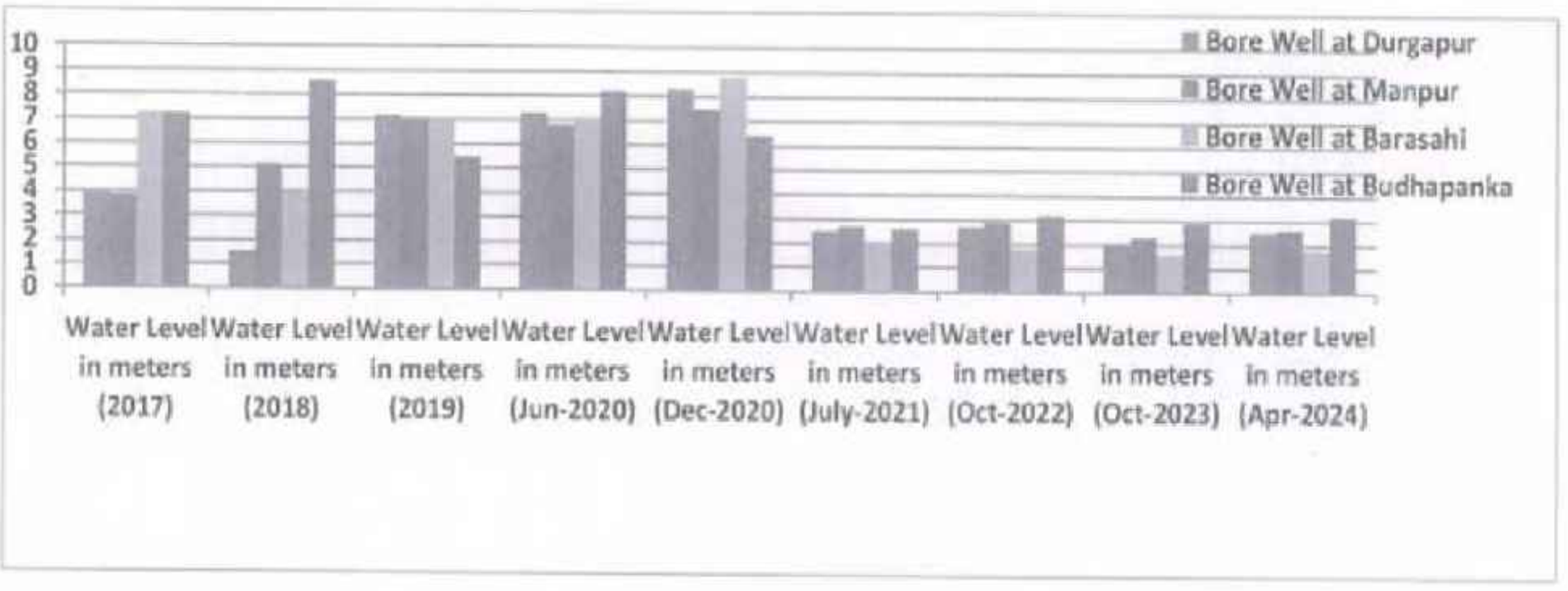
4.1 Trend in Ground Water Level

The ground water level monitoring report is attached as **Annexure-3.**

TREND IN GROUND WATER LEVEL

Sl. No.	Location Name	Water Level in Meters -2017	Water Levelin meters - 2018	Water Level in meters - 2019	Water Level in meters June-2020	Water Levelin meters- Dec-2020	Water Level in meters - July-2021	Water Levelin meters - OCT-2022	Water Level in meters - OCT-2023	Water Level in meters- Apr-2024
Plant Premises-Core zone										
1	Piezometric well -1	6.75	6.92	7.68	6.5	7.97	6.5	5.3	3,2	3.5
2	Piezometric well -2	3.95	2.46	2.16	2.7	3.1	2.4	2.1	1.8	1.9
3	Piezometric well -3	3.15	2.22	3.22	2.0	3.35	3.0	2.6	2.1	2.5
4	Piezometric well -4	4.75	2.90	2.71	2.75	2.6	2.3	2.8	2.5	2.4
Outside Plant Premises-Buffer zone										
1	Bore Well at Durgapur	3.9	1.5	7.17	7.3	8.3	2.5	2.7	2.1	2.5
2	Bore Well at Manpur	3.85	5.13	7.04	6.8	7.5	2.7	2.9	2.3	2.6
3	Bore Well at Barasahi	7.25	3.95	6.93	7.1	8.8	2.0	1.8	1.6	1.8
4	Bore Well at Budhapanka	7.25	8.57	5.45	8.2	6.4	2.6	3.2	2.9	3.2





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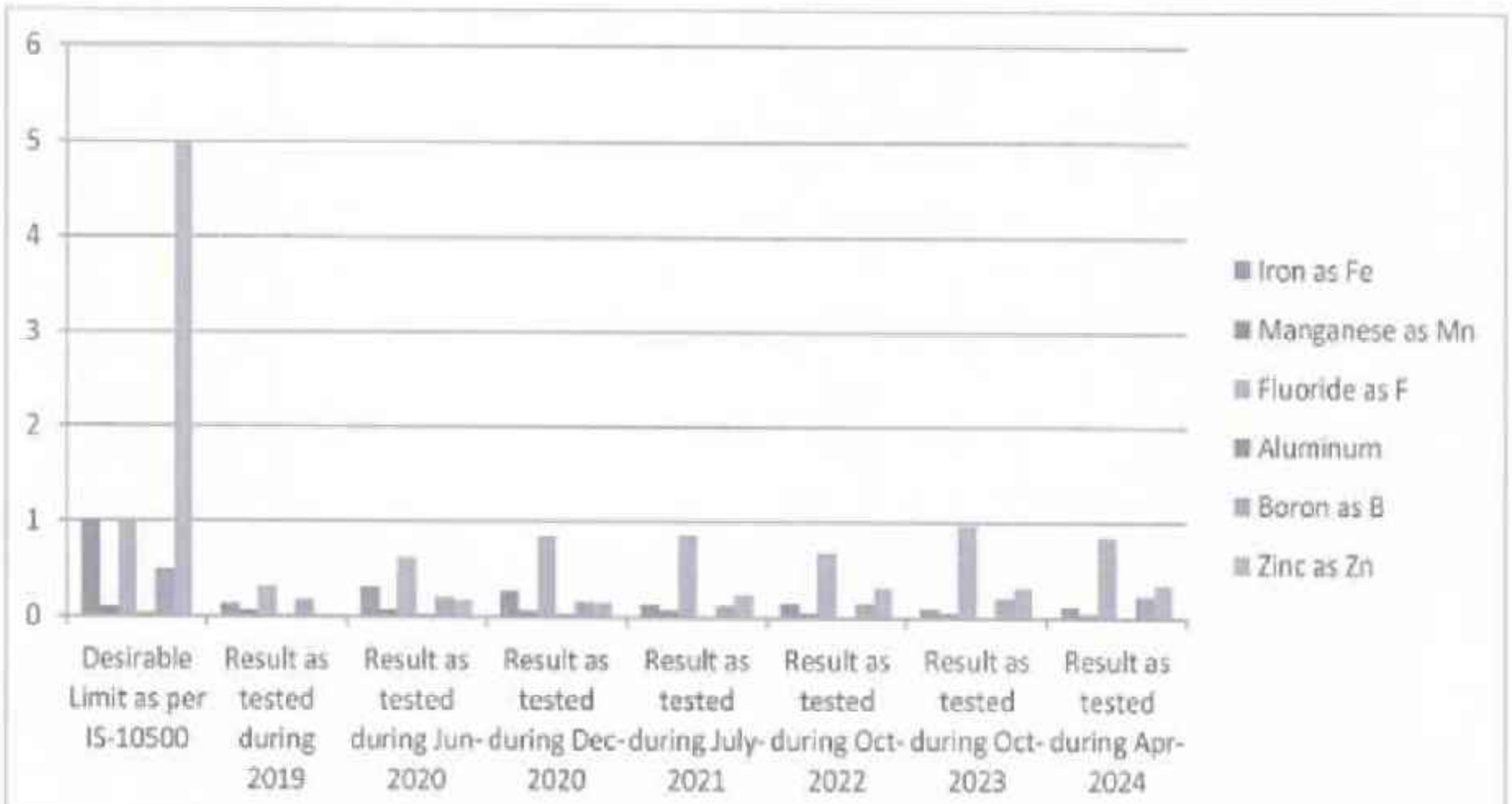
4.2 Trend in Ground Water Quality

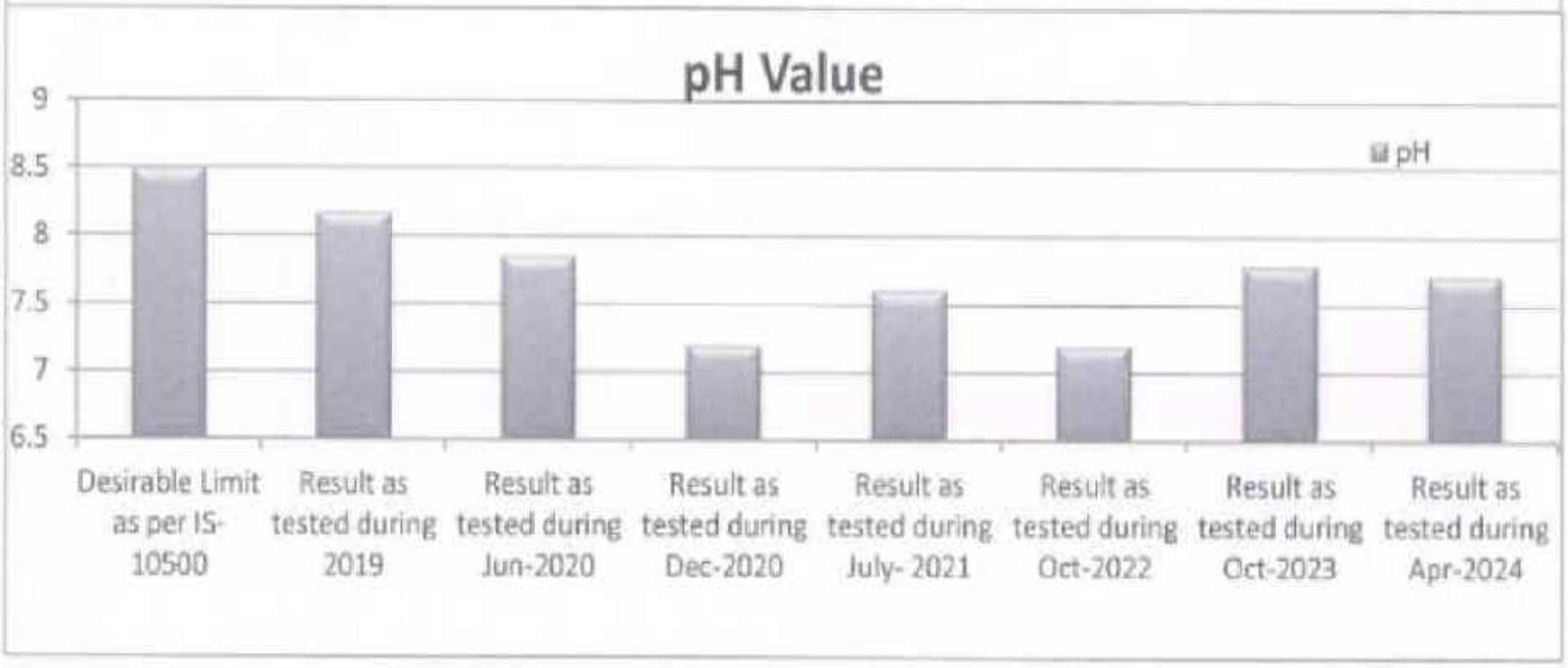
4.2.1 Core Zone; Piezometric Well

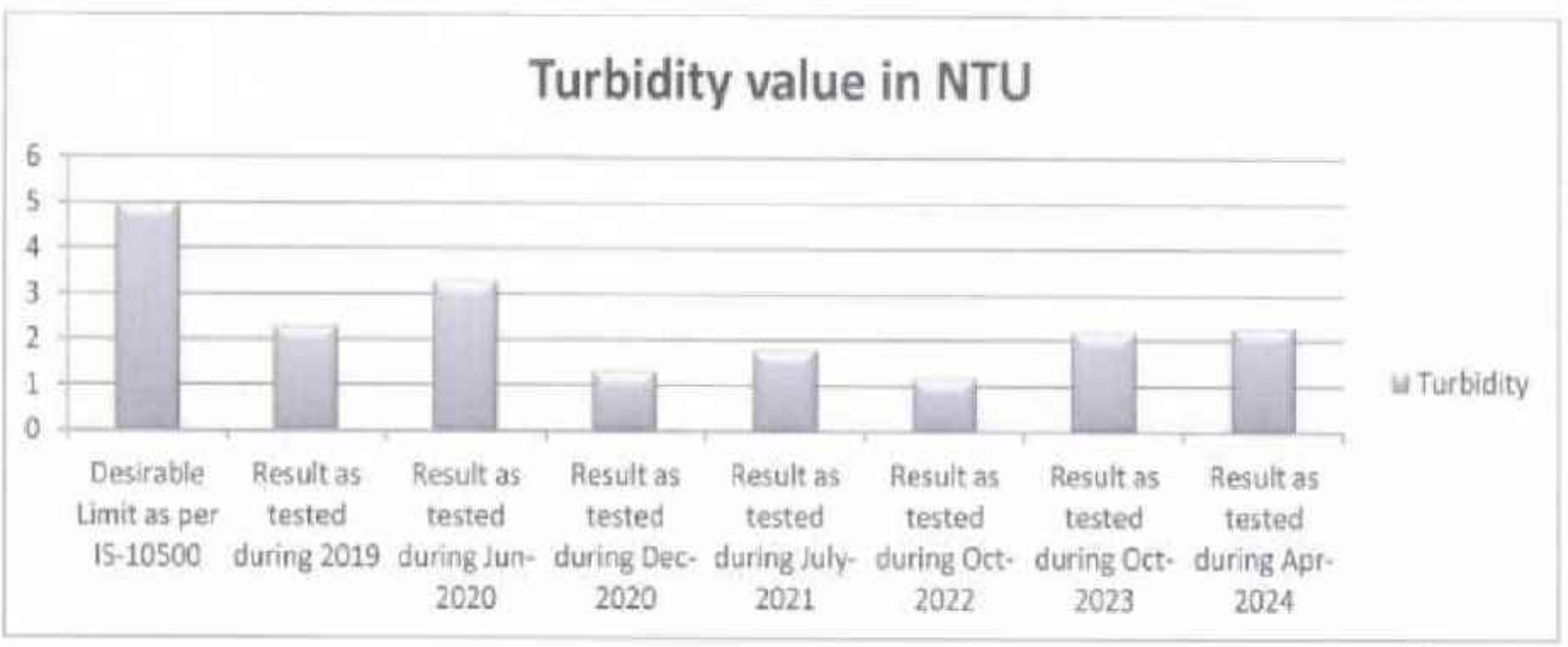
Trend in Ground Water Quality at Location-1; Piezometric Well – 1

Sl. No.	Parameters	Unit	Desirable Limit as per IS-10500	Result as tested during 2019	Result as tested during Jun-2020	Result as tested during Dec-2020	Result as tested during July- 2021	Result as tested during Oct-2022	Result as tested during Oct-2023	Result as tested during Apr-2024
01	Colour	Hazen	5.0	CL	CL	<5	<5	<5	<5	<5
02	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
03	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
04	Turbidity	NTU	5	2.3	3.3	1.3	1.8	1.2	2.2	2.3
05	pH	-	6.5-8.5	8.17	7.86	7.2	7.6	7.2	7.79	7.72
06	Total Hardness	mg/l, Max	200	88	118	128.0	107.0	95	90.72	97.6
07	Iron as Fe	mg/l, Max	1.0	0.135	0.31	0.28	0.13	0.15	0.10	0.12
08	Chloride as Cl	mg/l, Max	250.0	147	158	140.0	159.0	141	135.0	128
09	Residual free Chlorine	mg/l, Max	0.2	ND	ND	ND	ND	ND	ND	ND
10	Total Dissolved Solids	mg/l, Max	500.0	346	413	491.0	420.0	430	470.4	468.5
11	Calcium as Ca	mg/l, Max	75.0	28.0	41.2	35.0	35.0	25	29.43	30.5
12	Copper as Cu	mg/l, Max	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13	Manganese as Mn	mg/l, Max	0.1	0.066	0.072	0.065	0.072	0.045	0.045	0.042
14	Sulphate as SO_4^{-}	mg/l, Max	200.0	23.7	34.2	43.7	35.5	37.2	43.2	42.8
15	Nitrate as NO_3^{-}	mg/l, Max	45.0	2.3	3.3	2.4	0.7	1.09	0.67	0.65
16	Fluoride as F	mg/l, Max	1.0	0.32	0.62	0.84	0.86	0.68	0.96	0.85
17	Phenolic Compound	mg/l, Max	0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Mercury as Hg	mg/l, Max	0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Cadmium as Cd	mg/l, Max	0.003	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Selenium as Se	mg/l, Max	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Arsenic as As	mg/l, Max	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cyanide as CN	mg/l, Max	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Lead as Pb	mg/l, Max	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Zinc as Zn	mg/l, Max	5.0	0.024	0.17	0.15	0.24	0.31	0.35	0.34
25	Anionic Detergent	mg/l, Max	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Hexa Chromium as Cr^{+6}	mg/l, Max	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mineral oil	mg/l, Max	0.5	ND	ND	ND	ND	ND	ND	ND
28	Alkalinity	mg/l, Max	200.0	156	172	124.0	173.0	162	147.0	144.0
29	Aluminum	mg/l, Max	0.03	0.028	0.034	0.029	BDL	BDL	BDL	BDL
30	Boron as B	mg/l, Max	0.5	0.18	0.21	0.16	0.12	0.15	0.21	0.22
31	Magnesium as Mg	mg/l, Max	30	5.2	3.7	9.8	4.7	7.9	4.20	4.6
32	Total Coliform	MPN/100ml	--	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8

Note: CL: Colourless, Al: Agreeable, ND: Not Detected.
BDL (Below Detectable Limits) Values: Cu: 0.02 mg/l, Mn: 0.05 mg/l, C6H5OH: 0.05 mg/l, Hg: 0.002 mg/l, Cd: 0.01 mg/l, Sc: 0.001 mg/l, As: 0.001 mg/l, Pb: 0.01 mg/l, Zn: 0.05 mg/l, Cr+6: 0.02 mg/l, Al: 0.1 mg/l, B: 0.1 mg/L, E.C(MPN/100ml): 1.8.







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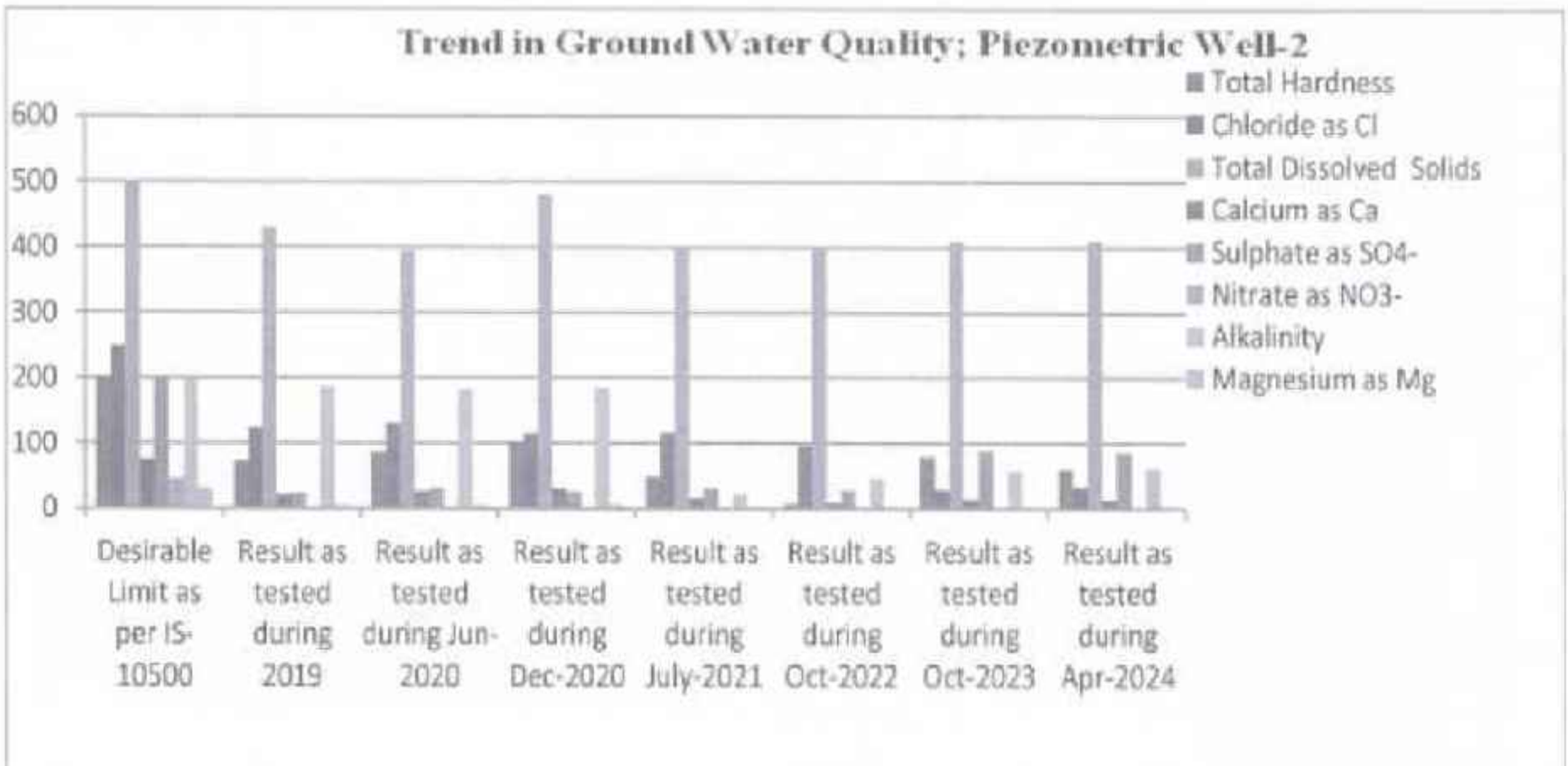
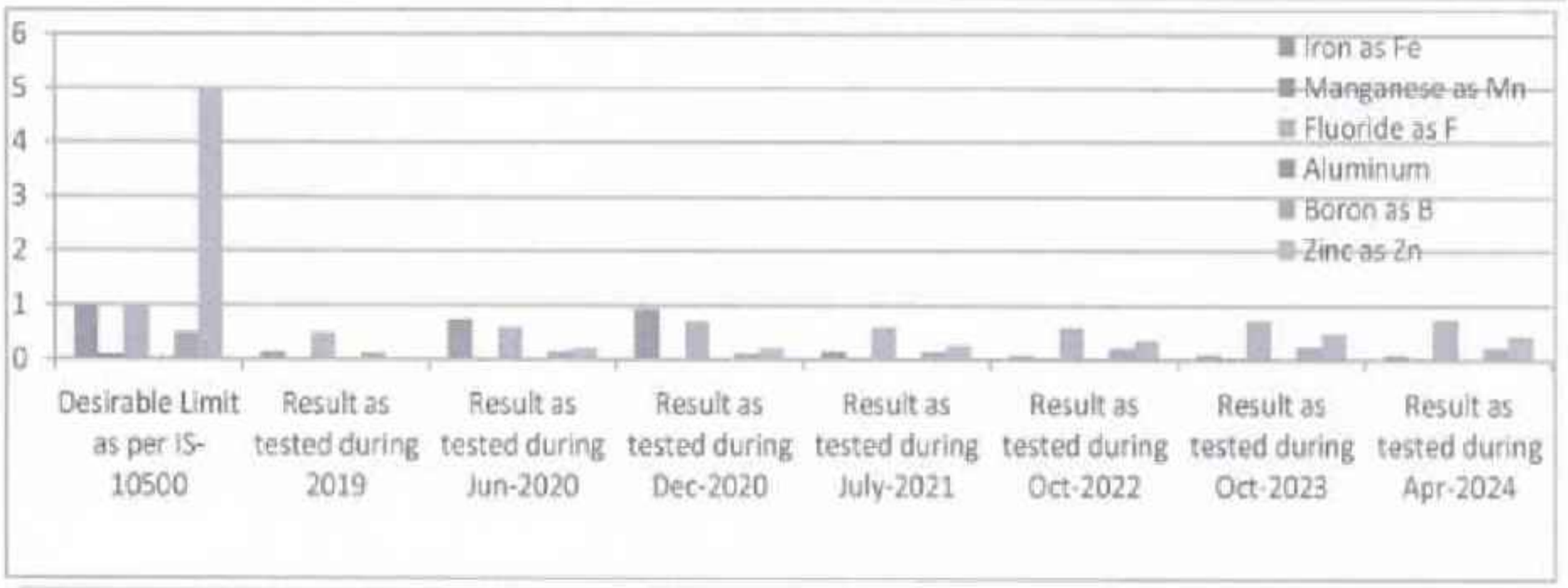
Trend in Ground Water Quality at Location-2; Piezometric Well – 2

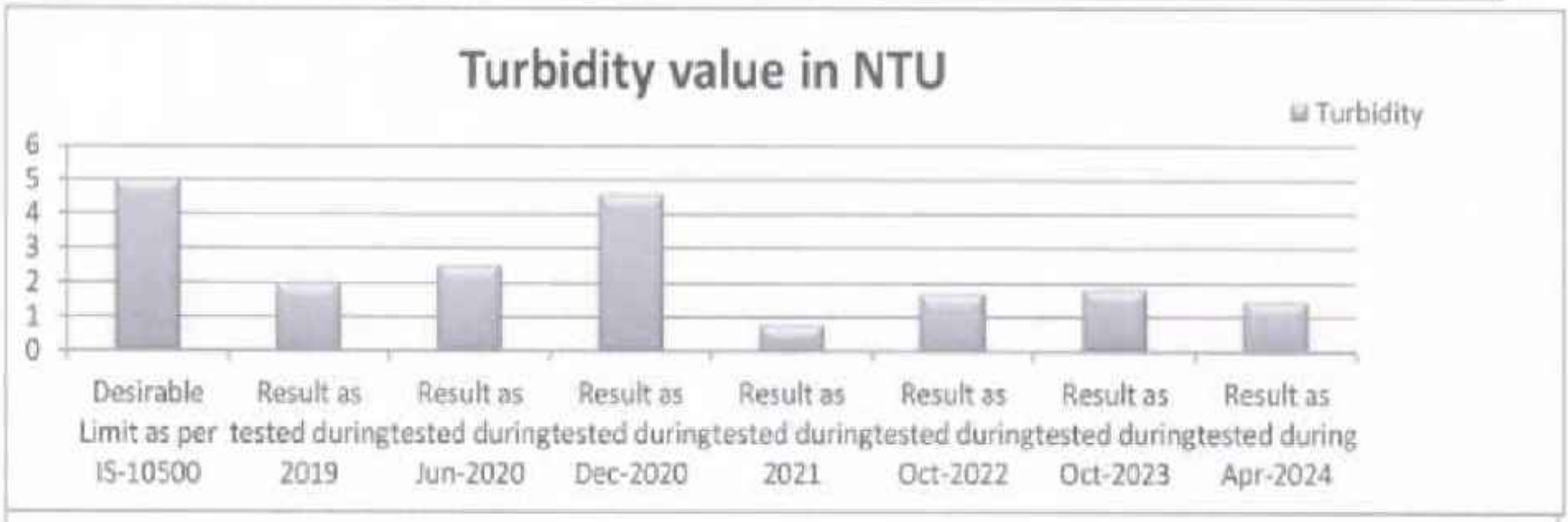
Sl. No.	Parameters	Unit	Desirable Limit as per IS-10500	Result as tested during 2019	Result as tested during Jun-2020	Result as tested during Dec-2020	Result as tested during July-2021	Result as tested during Oct-2022	Result as tested during Oct-2023	Result as tested during Apr-2024
01	Colour	Hazen	5.0	CL	CL	<5	<5	<5	<5	<5
02	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
03	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
04	Turbidity	NTU	5	2.0	2.5	4.6	0.8	1.7	1.8	1.5
05	pH	-	6.5-8.5	8.22	7.63	7.48	8.3	7.9	7.2	7.3
06	Total Hardness	mg/l, Max	200	72	86	102.0	48.0	63	78.08	59.6
07	Iron as Fe	mg/l, Max	1.0	0.142	0.74	0.93	0.16	0.08	0.09	0.10
08	Chloride as Cl	mg/l, Max	250.0	123	130	116.0	117.0	96	29.0	32
09	Residual free Chlorine	mg/l, Max	0.2	ND	ND	ND	ND	ND	ND	ND
10	Total Dissolved Solids	mg/l, Max	500.0	431	395	482.0	403.0	398	410.0	411.2
11	Calcium as Ca	mg/l, Max	75.0	22.0	26.6	30.4	15.0	9	14.43	14.4
12	Copper as Cu	mg/l, Max	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13	Manganese as Mn	mg/l, Max	0.1	0.022	0.026	0.025	0.031	O.031	0.035	0.036
14	Sulphate as SO_4^-	mg/l, Max	200.0	22.3	29.8	25.6	30.4	27	87.9	85.6
15	Nitrate as NO_3^-	mg/l, Max	45.0	1.5	1.7	2.1	0.5	0.67	1.10	1.16
16	Fluoride as F	mg/l, Max	1.0	0.50	0.60	0.71	0.6	0.58	0.72	0.75
17	Phenolic Compound	mg/l, Max	0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Mercury as Hg	mg/l, Max	0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Cadmium as Cd	mg/l, Max	0.003	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Selenium as Se	mg/l, Max	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Arsenic as As	mg/l, Max	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cyanide as CN	mg/l, Max	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Lead as Pb	mg/l, Max	0.01	BDL	0.011	0.018	BDL	BDL	BDL	BDL
24	Zinc as Zn	mg/l, Max	5.0	0.028	0.21	0.22	0.27	0.37	0.48	0.46
25	Anionic Detergent	mg/l, Max	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Hexa Chromium as Cr^{+6}	mg/l, Max	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mineral oil	mg/l, Max	0.5	ND	ND	ND	ND	ND	ND	ND
28	Alkalinity	mg/l, Max	200.0	186	182	185.0	23.0	45	57.4	62.5
29	Aluminum	mg/l, Max	0.03	0.019	0.022	0.025	BDL	BDL	BDL	BDL
30	Boron as B	mg/l, Max	0.5	0.12	0.15	0.11	0.15	0.22	0.26	0.24
31	Magnesium as Mg	mg/l, Max	30	5.6	4.7	6.3	2.6	3	3.2	3.8
32	Total Coliform	MPN/100ml	--	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8

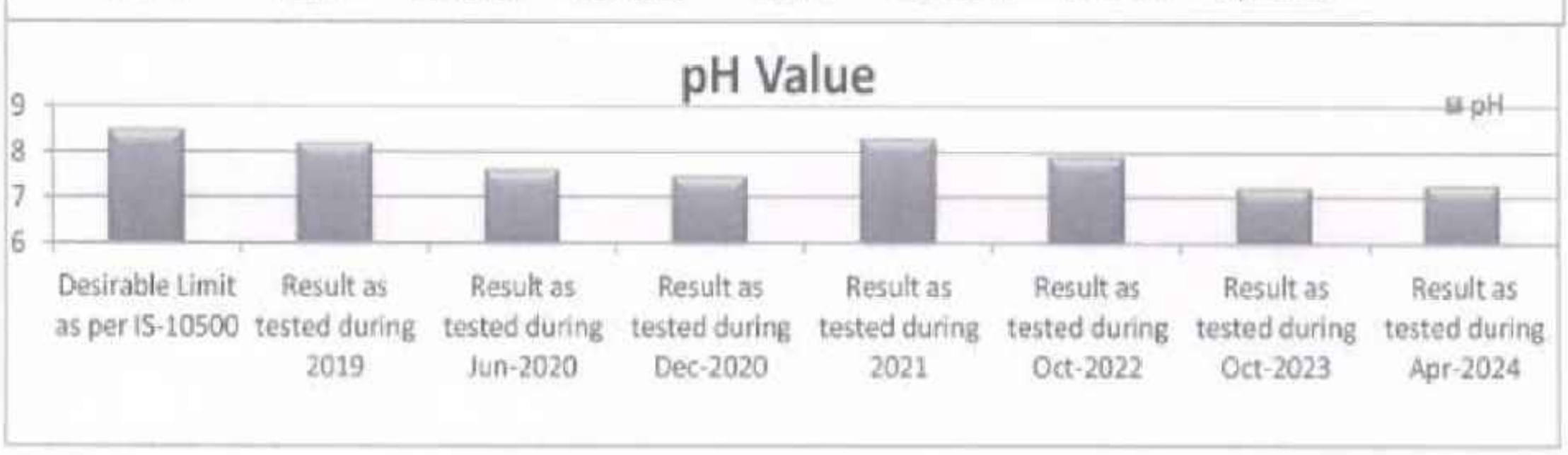
Note: CL: Colourless, AJ: Agreeable, NDS: Not Detected

BDL (Below Detectable Limits) Values: Cu: 0.02 mg/l, Mn: 0.05 mg/l, C_6H_5OH: 0.05 mg/l, Hg: 0.002 mg/l, Cd: 0.01 mg/l, Se: 0.001 mg/l, As: 0.004 mg/l, Pb: 0.01mg/l, Zn: 0.05 mg/l, Cr+6: 0.02 mg/l, Al: 0.1 mg/l, B: 0.1 mg/l, TC(MPN/100ml): 1.8.









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Trend in Ground Water Quality at Location-3; Piezometric Well – 3

Sl. No.	Parameters	Unit	Desirable Limit as per IS-10500	Result as tested during 2019	Result as tested during Jun-2020	Result as tested during Dec-2020	Result as tested during July- 2021	Result as tested during Oct-2022	Result as tested during Oct-2023	Result as tested during Apr-2024
01	Colour	Hazen	5.0	CL	CL	<5	<5	<5	<5	<5
02	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
03	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
04	Turbidity	NTU	5	2.8	2.7	3.7	3.3	5.8	4.7	4.6
05	pH	-	6.5-8.5	7.39	7.14	6.97	7.2	7.04	6.9	6.8
06	Total Hardness	mg/l, Max	200	214	212	218.0	226.0	151	132.0	108.2
07	Iron as Fe	mg/l, Max	1.0	0.172	0.6	5.1	0.47	0.51	0.53	0.48
08	Chloride as Cl	mg/l, Max	250.0	25.5	134	29.0	31.0	28	24.0	26.0
09	Residual free Chlorine	mg/l, Max	0.2	ND	ND	ND	ND	ND	ND	ND
10	Total Dissolved Solids	mg/l, Max	500.0	404	334	434.0	368.0	390	387.3	368.5
11	Calcium as Ca	mg/l, Max	75.0	63.6	60.2	65.0	65.0	51	12.12	12.8
12	Copper as Cu	mg/l, Max	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13	Manganese as Mn	mg/l, Max	0.1	0.02	0.024	0.028	0.042	0.072	0.075	0.076
14	Sulphate as SO_4^-	mg/l, Max	200.0	15.7	17.2	29.6	9.3	13	11.3	11.8
15	Nitrate as NO_3^-	mg/l, Max	45.0	0.8	1.2	1.8	0.9	2.4	1.44	1.38
16	Fluoride as F	mg/l, Max	1.0	0.45	0.55	0.75	0.3	0.35	0.42	0.45
17	Phenolic Compound	mg/l, Max	0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Mercury as Hg	mg/l, Max	0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Cadmium as Cd	mg/l, Max	0.003	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Selenium as Se	mg/l, Max	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Arsenic as As	mg/l, Max	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cyanide as CN	mg/l, Max	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Lead as Pb	mg/l, Max	0.01	0.013	0.012	0.019	BDL	BDL	BDL	BDL
24	Zinc as Zn	mg/l, Max	5.0	0.017	0.12	0.14	0.21	0.59	0.62	0.65
25	Anionic Detergent	mg/l, Max	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Hexa Chromium as Cr^{+6}	mg/l, Max	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mineral oil	mg/l, Max	0.5	ND	ND	ND	ND	ND	ND	ND
28	Alkalinity	mg/l, Max	200.0	188	178	190.0	186.5	170	130.0	109.5
29	Aluminum	mg/l, Max	0.03	0.012	0.019	0.023	BDL	BDL	BDL	BDL
30	Boron as B	mg/l, Max	0.5	BDL	BDL	BDL	0.11	0.19	0.16	0.15
31	Magnesium as Mg	mg/l, Max	30	19.9	19.8	17.2	15.5	5.8	6.5	6.4
32	Total Coliform	MPN/100ml	--	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8

Note: CL: Colourless, Al: Agreeable, ND: Not Detected
BDL (Below Detectable Limits) Values: Cu- 0.02 mg/l, Mn- 0.05 mg/l, C6H5OH- 0.05 mg/l,Hg- 0.002 mg/l, Cd- 0.01 mg/l, Se- 0.001 mg/l, As- 0.004 mg/l, Pb- 0.01mg/l,Zn- 0.05 mg/l, Cr+6- 0.02 mg/l, Al- 0.1 mg/l, B- 0.1 mg/l, TCMPN 0-0-0/<1.8.

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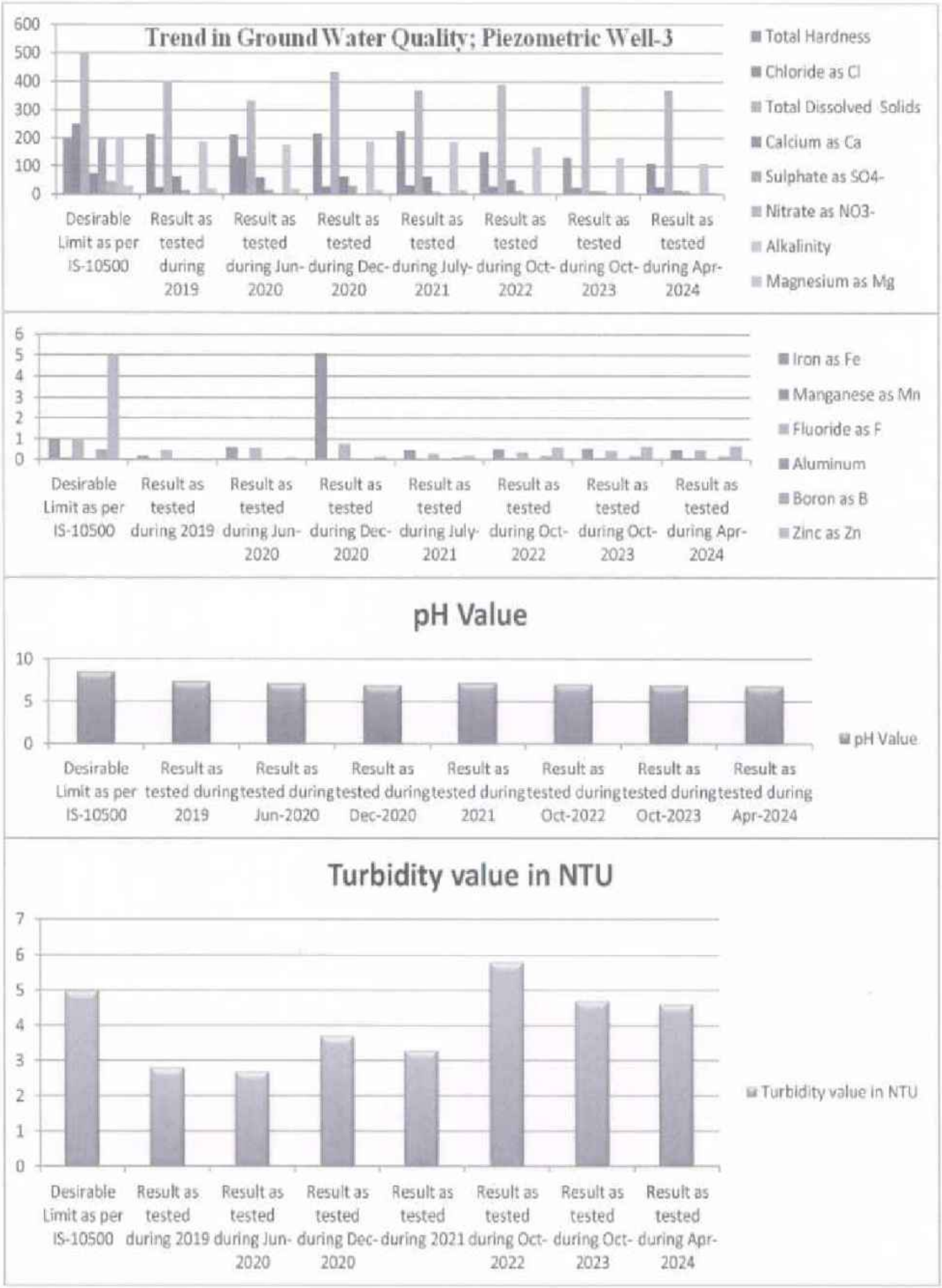
Trend in Ground Water Quality; Piezometric Well-3
600
500
400
300
200
100
0
Desirable Limit as per IS-10500
Result as tested during 2019
Result as tested during Jun-2020
Result as tested during Dec-2020
Result as tested during July-2021
Result as tested during Oct-2022
Result as tested during Oct-2023
Result as tested during Apr-2024
Total Hardness
Chloride as Cl
Total Dissolved Solids
Calcium as Ca
Sulphate as SO4-
Nitrate as NO3-
Alkalinity
Magnesium as Mg
6
5
4
3
2
1
0
Iron as Fe
Manganese as Mn
Fluoride as F
Aluminum
Boron as B
Zinc as Zn
pH Value
10
5
0
pH Value
Turbidity value in NTU
7
6
5
4
3
2
1
0
Turbidity value in NTU

Trend in Ground Water Quality at Location-4; Piezometric Well – 4

Sl. No.	Parameters	Unit	Desirable Limit as per IS-10500	Result as tested during 2019	Result as tested during Jun-2020	Result as tested during Dec-2020	Result as tested during July- 2021	Result as tested during Oct-2022	Result as tested during Oct-2023	Result as tested during Apr-2024
01	Colour	Hazen	5.0	CL	CL	<5	<5	<5	<5	<5
02	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
03	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
04	Turbidity	NTU	5	3.5	4.2	4.8	1.2	0.8	1.7	1.5
05	pH	-	6.5-8.5	8.07	7.67	8.1	7.4	7.5	7.3	7.4
06	Total Hardness	mg/l, Max	200	68	92	76.0	70.0	57	43.2	51.8
07	Iron as Fe	mg/l, Max	1.0	0.152	0.51	0.46	0.34	0.27	0.95	0.62
08	Chloride as Cl	mg/l, Max	250.0	232	221	154.0	243.0	230	245.0	238
09	Residual free Chlorine	mg/l, Max	0.2	ND	ND	ND	ND	ND	ND	ND
10	Total Dissolved Solids	mg/l, Max	500.0	412	411	480.0	418.0	472.0	437.0	428.5
11	Calcium as Ca	mg/l, Max	75.0	39.8	31.6	24.6	26.0	12.0	12.0	12.0
12	Copper as Cu	mg/l, Max	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13	Manganese as Mn	mg/l, Max	0.1	0.079	0.081	0.073	0.084	0.08	0.05	0.04
14	Sulphate as SO_4	mg/l, Max	200.0	31.5	41.6	32.3	62.1	51.7	16.3	15.2
15	Nitrate as NO_3	mg/l, Max	45.0	2.8	2.6	2.1	0.5	2.67	1.41	1.52
16	Fluoride as F	mg/l, Max	1.0	0.65	0.68	0.85	0.76	0.87	0.78	0.67
17	Phenolic Compound	mg/l, Max	0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Mercury as Hg	mg/l, Max	0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Cadmium as Cd	mg/l, Max	0.003	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Selenium as Se	mg/l, Max	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Arsenic as As	mg/l, Max	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cyanide as CN	mg/l, Max	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Lead as Pb	mg/l, Max	0.01	BDL	0.014	0.018	BDL	BDL	BDL	BDL
24	Zinc as Zn	mg/l, Max	5.0	0.12	0.43	0.32	0.46	1.35	2.2	2.6
25	Anionic Detergent	mg/l, Max	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Hexa Chromium as Cr^{+6}	mg/l, Max	–	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mineral oil	mg/l, Max	0.5	ND	ND	ND	ND	ND	ND	ND
28	Alkalinity	mg/l, Max	200.0	72	92	74.0	36.0	42	46.0	43.3
29	Aluminum	mg/l, Max	0.03	0.036	0.037	0.031	BDL	BDL	BDL	BDL
30	Boron as B	mg/l, Max	0.5	0.15	0.18	0.15	0.18	0.23	0.27	0.28
31	Magnesium as Mg	mg/l, Max	30	6.2	3.2	3.5	1.2	6.5	2.10	2.4
32	Total Coliform	MPN/100ml	–	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8

Note: CL: Colourless, Al: Agreeable, ND: Not Detected.
BDL (Below Detectable Limits) Values: Cu<0.02 mg/l, Mn<0.05 mg/l, C_6H_5OH<0.05 mg/l, Hg<0.002 mg/l, Cd<0.01 mg/l, Se<0.001 mg/l, As<0.004 mg/l, Pb<0.01mg/l, Zn<0.05 mg/l, Cr+6<0.02 mg/l, mg/l, B<0.1 mg/l, TCMPN/100ml<1.8.

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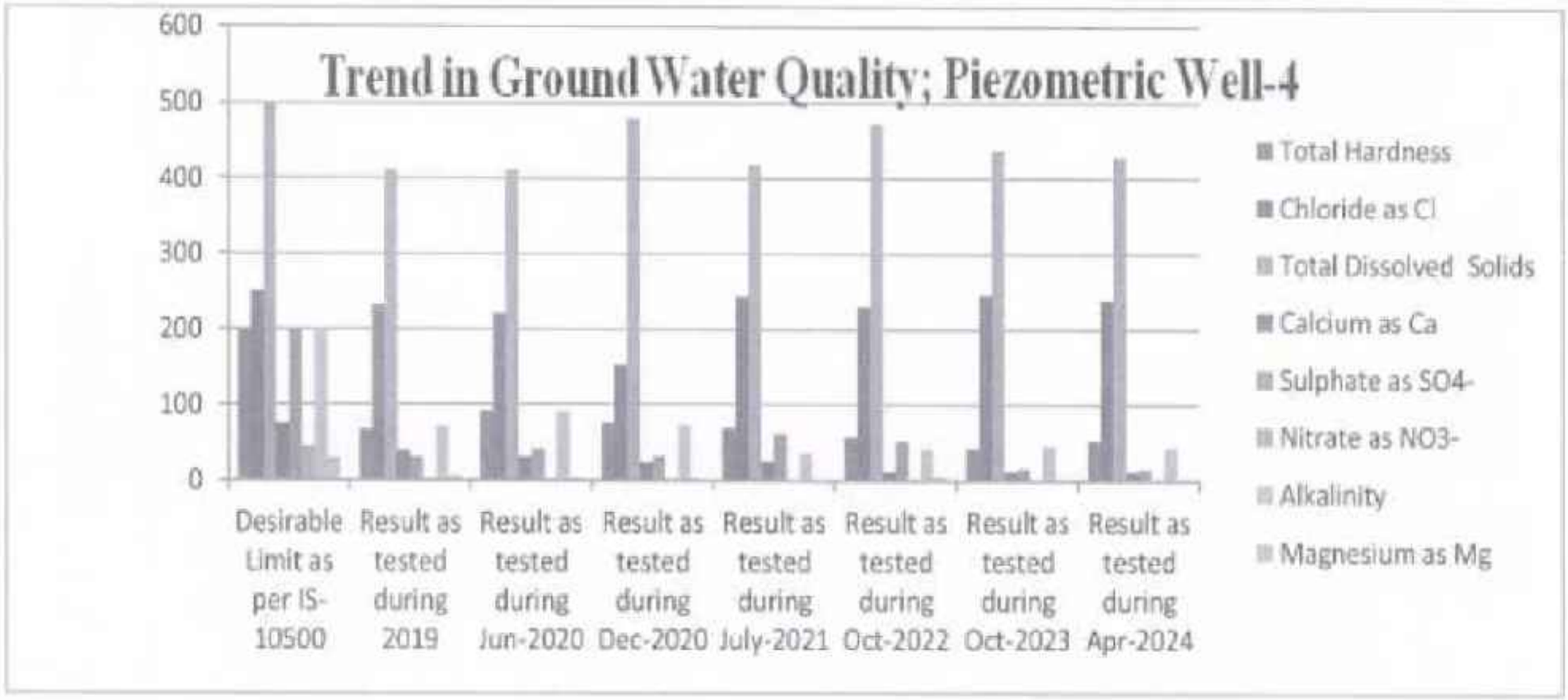

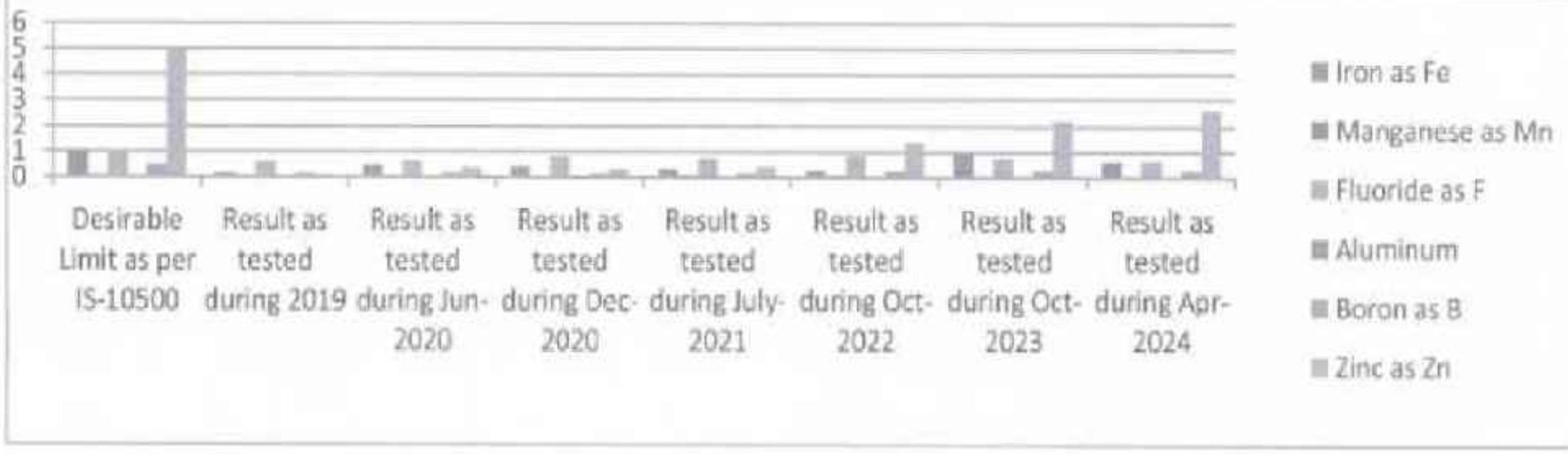

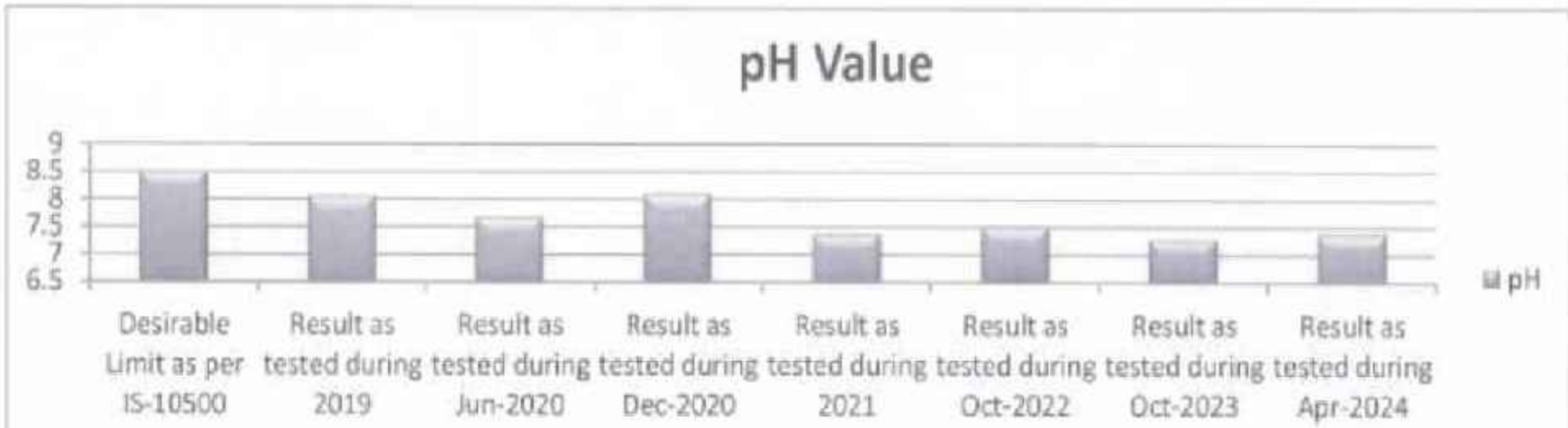

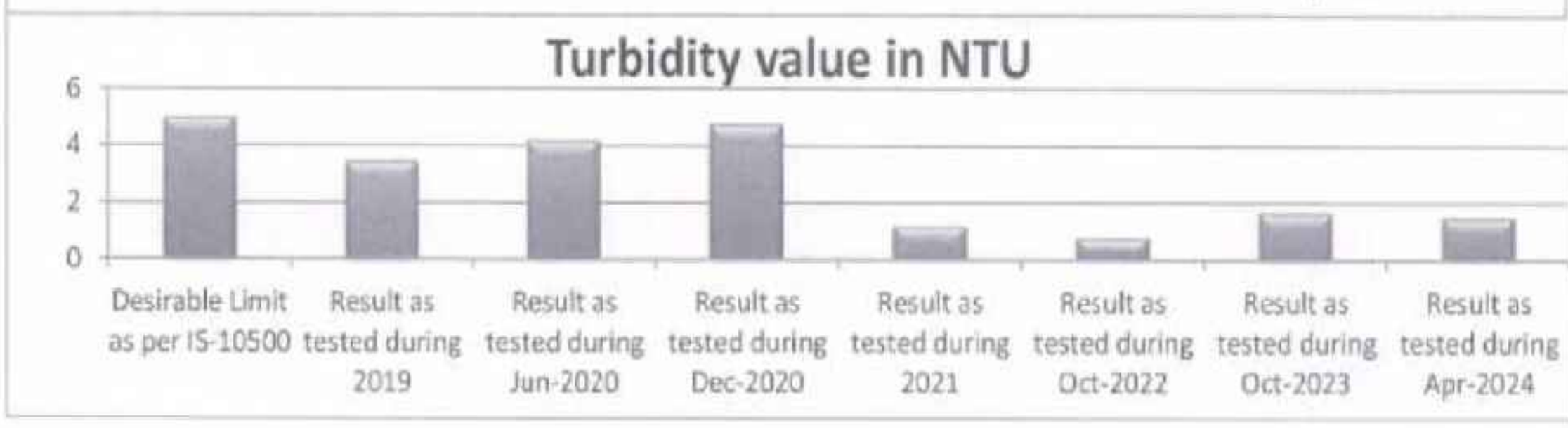

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4.2.2 Buffer Zone; Surrounding Village

Trend in Ground Water Quality; Location- GW5: Bore well at Durgapur Village

Sl. No.	Parameters	Unit	Desirable Limit as per IS-10500	Result as tested during 2019	Result as tested during Jun-2020	Result as tested during Dec-2020	Result as tested during July- 2021	Result as tested during Oct- 2022	Result as tested during Oct- 2023	Result as tested during Apr-2024
01	Colour	Hazen	5.0	CL	CL	<5	<5	<5	<5	<5
02	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
03	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
04	Turbidity	NTU	5	2.0	3.5	2.3	4.5	4.6	1.1	1.2
05	pH	-	6.5-8.5	7.51	7.08	7.17	6.9	7.08	7.04	7.12
06	Total Hardness	mg/l, Max	200	250	223	214.0	237	268	197.0	225.4
07	Iron as Fe	mg/l, Max	1.0	0.28	0.38	4.4	0.4	0.3	0.21	0.22
08	Chloride as Cl	mg/l, Max	250.0	37.5	47	38.5	40.0	43	24.7	23.8
09	Residual free Chlorine	mg/l, Max	0.2	ND	ND	ND	ND	ND	ND	ND
10	Total Dissolved Solids	mg/l, Max	500.0	463	463	476.0	423.0	473	497.0	485.0
11	Calcium as Ca	mg/l, Max	75.0	71	67	68.0	58.0	65	51.94	53.8
12	Copper as Cu	mg/l, Max	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13	Manganese as Mn	mg/l, Max	0.1	0.044	0.056	0.049	0.053	0.063	0.05	0.05
14	Sulphate as SO_4^-	mg/l, Max	200.0	20.7	36	29.7	10.7	12	57.41	56.8
15	Nitrate as NO_3^-	mg/l, Max	45.0	3.1	3.1	2.3	8.3	6.7	1.15	1.14
16	Fluoride as F	mg/l, Max	1.0	0.16	0.4	0.96	0.3	0.46	0.96	0.88
17	Phenolic Compound	mg/l, Max	0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Mercury as Hg	mg/l, Max	0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Cadmium as Cd	mg/l, Max	0.003	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Selenium as Se	mg/l, Max	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Arsenic as As	mg/l, Max	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cyanide as CN	mg/l, Max	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Lead as Pb	mg/l, Max	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Zinc as Zn	mg/l, Max	5.0	0.156	0.31	0.27	0.43	0.76	0.71	0.68
25	Anionic Detergent	mg/l, Max	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Hexa Chromium as Cr^{+6}	mg/l, Max	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mineral oil	mg/l, Max	0.5	ND	ND	ND	ND	ND	ND	ND
28	Alkalinity	mg/l, Max	200.0	190	188	190.0	178.0	180	175.0	184.2
29	Aluminum	mg/l, Max	0.03	0.018	0.021	0.018	BDL	BDL	BDL	BDL
30	Boron as B	mg/l, Max	0.5	0.12	0.16	0.13	0.11	0.24	0.25	0.24
31	Magnesium as Mg	mg/l, Max	30	18.2	9.0	10.7	22.4	21	23.98	22.2
32	Total Coliform	MPN/100ml	--	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8

Note: CL: Colourless, Al: Agreeable, ND: Not Detected
BDL (Below Detectable Limits) Values: Cu=0.02 mg/l, Mn=0.05 mg/l, C6H5OH=0.05 mg/l,Hg=0.002 mg/l, Cd=0.01 mg/l, Se=0.001 mg/l, As=0.004 mg/l, Pb=0.01mg/l, Zn=0.05 mg/l, Cr+6=0.02 mg/l, B=0.1 mg/l, TCMPN 0-0-0)=1.8

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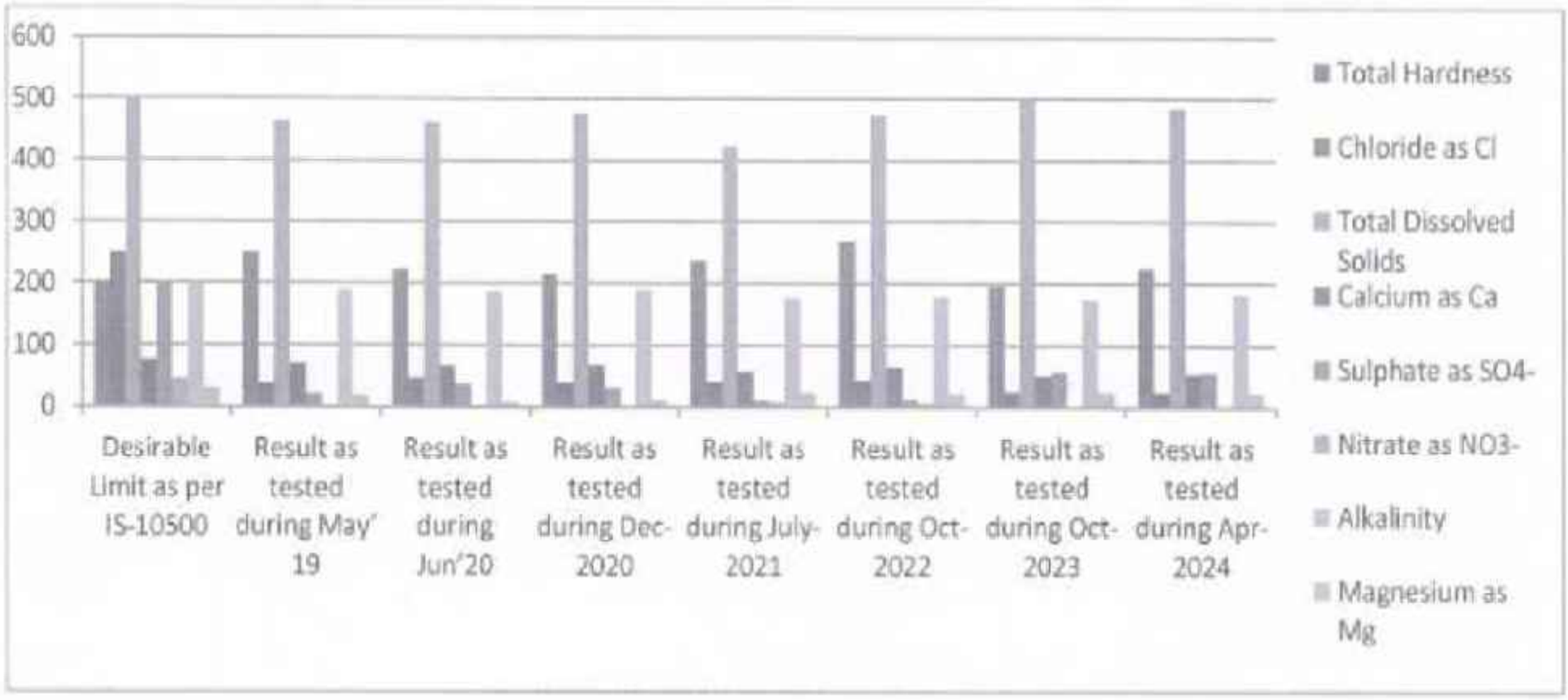
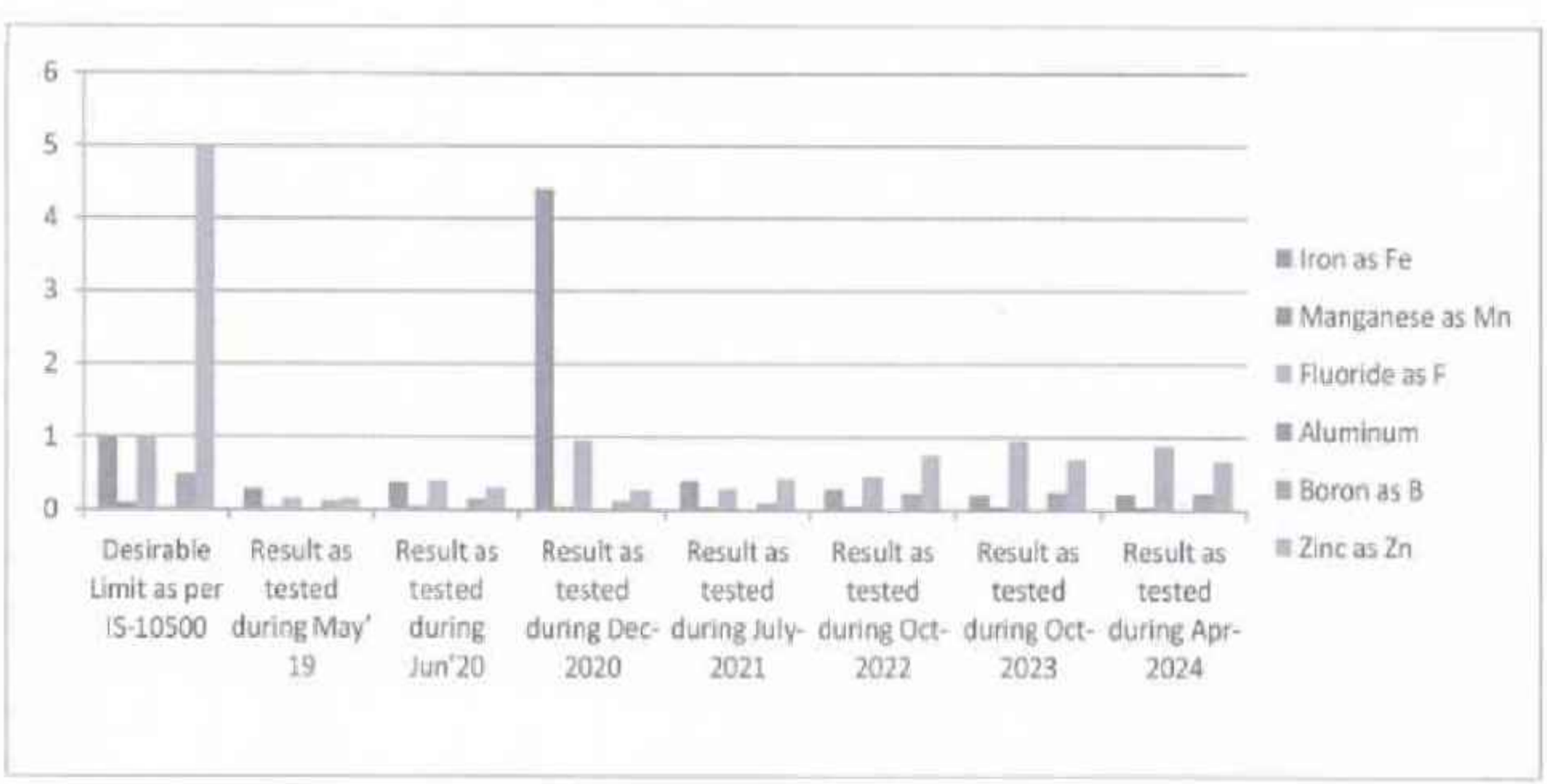
Trend in Ground Water Quality; Location- GW5: Bore well at Durgapur Village





Trend in Ground Water Quality; Location- GW6: Bore well at Manpur

Sl. No.	Parameters	Unit	Desirable Limit as per IS-10500	Result as tested during 2019	Result as tested during Jun-2020	Result as tested during Dec-2020	Result as tested during July- 2021	Result as tested during Oct- 2022	Result as tested during Oct- 2023	Result as tested during Apr-2024
01	Colour	Hazen	5.0	CL	CL	<5	<5	<5	<5	<5
02	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
03	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
04	Turbidity	NTU	5	2.7	4.1	2.9	4.8	4.2	1.4	1.3
05	pH	-	6.5-8.5	7.15	6.98	7.23	6.9	7.12	6.84	6.87
06	Total Hardness	mg/l, Max	200	174	209	224.0	215	296	263.52	259.6
07	Iron as Fe	mg/l, Max	1.0	0.14	0.24	0.72	0.46	0.71	0.17	0.18
08	Chloride as Cl	mg/l, Max	250.0	43	53	42.5	40.0	36	28.52	27.42
09	Residual free Chlorine	mg/l, Max	0.2	ND	ND	ND	ND	ND	ND	ND
10	Total Dissolved Solids	mg/l, Max	500.0	396	395	403.0	414.0	430	403.6	415.5
11	Calcium as Ca	mg/l, Max	75.0	59	69	70.0	78.0	80	74.45	76.3
12	Copper as Cu	mg/l, Max	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13	Manganese as Mn	mg/l, Max	0.1	0.046	0.052	0.053	0.042	0.053	0.051	0.046
14	Sulphate as SO_4^-	mg/l, Max	200.0	14.2	55.3	43.6	9.3	10.2	44.33	46.6
15	Nitrate as NO_3^-	mg/l, Max	45.0	1.2	0.34	0.46	4.8	4.45	0.79	0.78
16	Fluoride as F	mg/l, Max	1.0	0.12	0.6	0.52	0.4	BDL	0.79	0.83
17	Phenolic Compound	mg/l, Max	0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Mercury as Hg	mg/l, Max	0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Cadmium as Cd	mg/l, Max	0.003	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Selenium as Se	mg/l, Max	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Arsenic as As	mg/l, Max	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cyanide as CN	mg/l, Max	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Lead as Pb	mg/l, Max	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Zinc as Zn	mg/l, Max	5.0	0.118	0.18	0.15	0.32	0.25	0.52	0.62
25	Anionic Detergent	mg/l, Max	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Hexa Chromium as Cr^{+6}	mg/l, Max	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mineral oil	mg/l, Max	0.5	ND	ND	ND	ND	ND	ND	ND
28	Alkalinity	mg/l, Max	200.0	175	176	184.0	165.0	173	152.0	162.3
29	Aluminum	mg/l, Max	0.03	0.034	0.053	0.044	BDL	BDL	BDL	BDL
30	Boron as B	mg/l, Max	0.5	0.113	0.14	0.15	0.14	0.18	0.15	0.15
31	Magnesium as Mg	mg/l, Max	30	16.8	13.5	14.4	4.9	23.5	18.93	18.4
32	Total Coliform	MPN/100ml	--	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8

Note: CL: Colourless, Al: Agreeable, ND: Not Detected
BDL (Below Detectable Limits) Values: Cu= 0.02 mg/l, Mn= 0.05 mg/l, C6H5OH= 0.05 mg/l, Hg= 0.002 mg/l, Cd= 0.01 mg/l, Se= 0.001 mg/l, As= 0.004 mg/l, Pb= 0.01mg/l, Zn= 0.05 mg/l, Cr+6= 0.02 mg/l, Al= 0.1 mg/l, B= 0.1 mg/l, TCV(MPN/100ml)= 1.8

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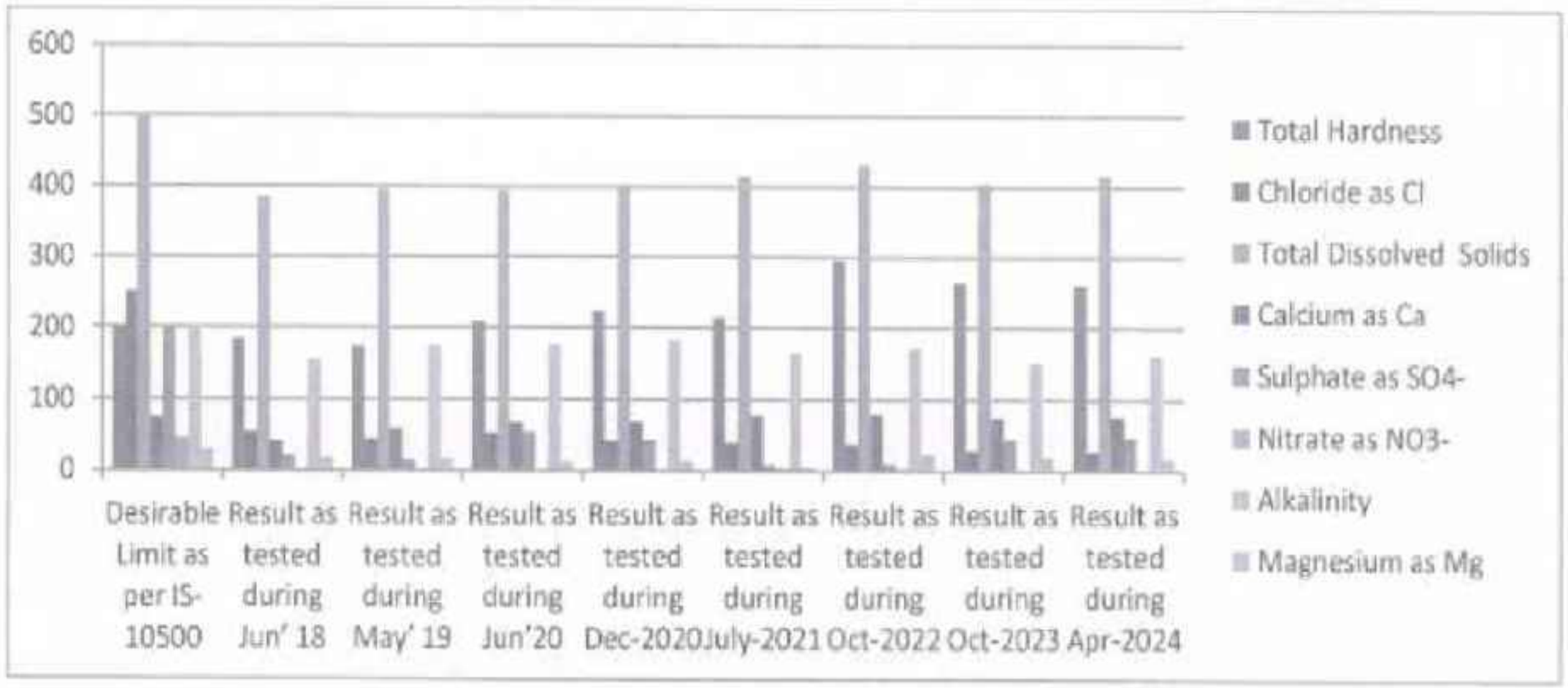
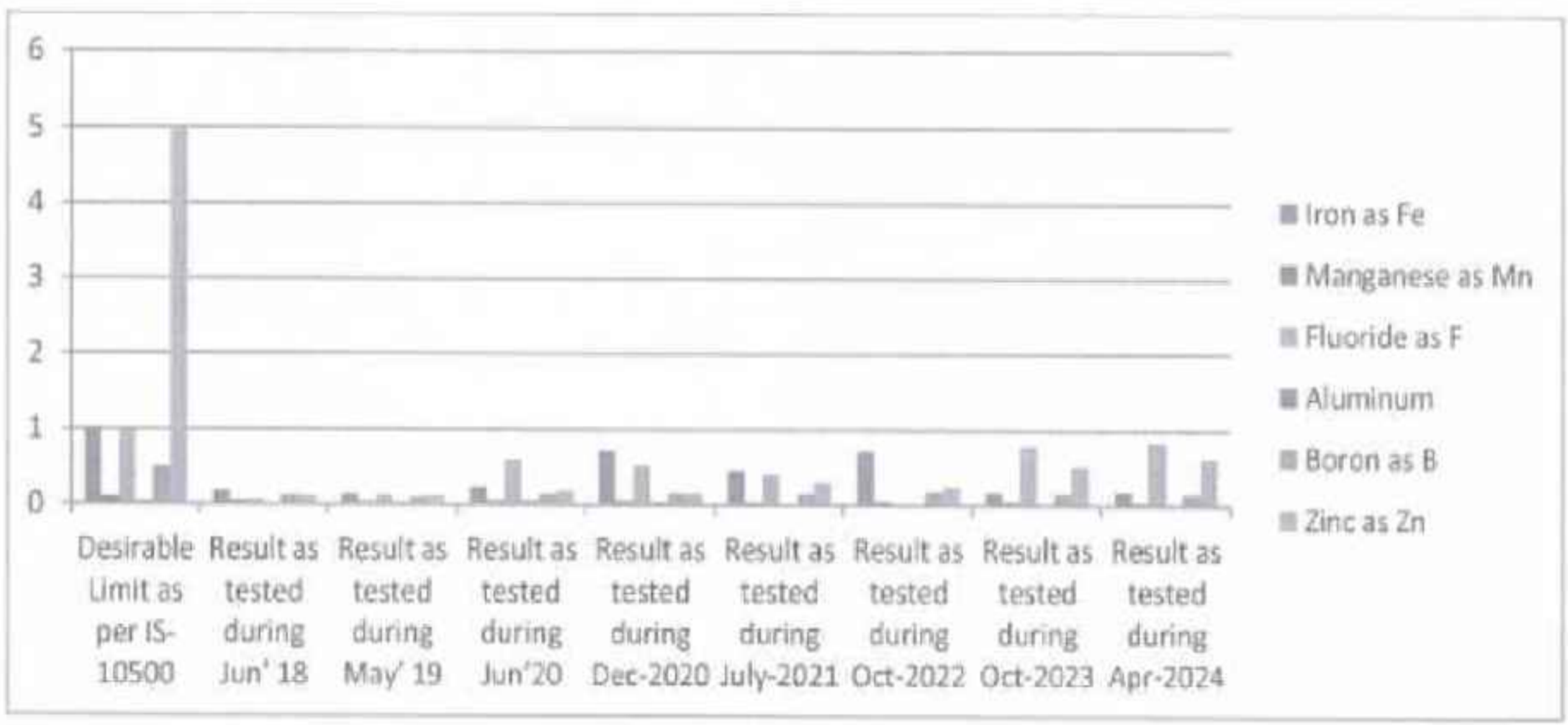
Trend in Ground Water Quality; Location- GW6: Bore well at Manpur





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Trend in Ground Water Quality; Location- GW7: Bore well at Barasahi

Sl. No.	Parameters	Unit	Desirable Limit as per IS-10500	Result as tested during 2019	Result as tested during Jun-2020	Result as tested during Dec-2020	Result as tested during July- 2021	Result as tested during Oct-2022	Result as tested during Oct-2023	Result as tested during Apr-2024
01	Colour	Hazen	5.0	CL	CL	<5	<5	<5	<5	<5
02	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
03	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
04	Turbidity	NTU	5	2.1	2.5	1.6	4.2	4.5	4.2	4.5
05	pH	-	6.5-8.5	7.24	6.87	7.06	7.2	6.7	7.03	7.15
06	Total Hardness	mg/l, Max	200	242	219	220.0	231	253	241.92	150.8
07	Iron as Fe	mg/l, Max	1.0	0.23	0.32	0.55	0.58	0.49	0.47	0.45
08	Chloride as Cl	mg/l, Max	250.0	14	64	39.5	27.0	31	17.10	16.8
09	Residual free Chlorine	mg/l, Max	0.2	ND	ND	ND	ND	ND	ND	ND
10	Total Dissolved Solids	mg/l, Max	500.0	377	398	381.0	435.0	529	445.2	438.2
11	Calcium as Ca	mg/l, Max	75.0	65	72	60.0	84.0	94	46.74	43.3
12	Copper as Cu	mg/l, Max	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13	Manganese as Mn	mg/l, Max	0.1	0.052	0.067	0.061	0.066	0.047	0.07	0.08
14	Sulphate as SO_4^-	mg/l, Max	200.0	13.4	16.2	20.3	8.4	9.1	22.3	23.5
15	Nitrate as NO_3^-	mg/l, Max	45.0	2.1	0.26	0.32	0.7	9.64	1.23	1.31
16	Fluoride as F	mg/l, Max	1.0	0.1	0.57	0.61	0.7	0.92	0.85	0.78
17	Phenolic Compound	mg/l, Max	0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Mercury as Hg	mg/l, Max	0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Cadmium as Cd	mg/l, Max	0.003	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Selenium as Se	mg/l, Max	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Arsenic as As	mg/l, Max	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cyanide as CN	mg/l, Max	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Lead as Pb	mg/l, Max	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Zinc as Zn	mg/l, Max	5.0	0.316	0.42	0.36	0.48	0.48	0.82	0.77
25	Anionic Detergent	mg/l, Max	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Hexa Chromium as Cr^{+6}	mg/l, Max	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mineral oil	mg/l, Max	0.5	ND	ND	ND	ND	ND	ND	ND
28	Alkalinity	mg/l, Max	200.0	160	169	192.0	174.0	178	142.0	155.2
29	Aluminum	mg/l, Max	0.03	0.021	0.046	0.037	BDL	BDL	BDL	BDL
30	Boron as B	mg/l, Max	0.5	0.14	0.15	0.12	0.11	0.37	0.22	0.26
31	Magnesium as Mg	mg/l, Max	30	20.6	15.0	17.1	5.2	4.6	10.7	11.2
32	Total Coliform	MPN/100ml	--	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8

Note: CL: Colourless, Al: Agreeable, ND: Not Detected
BDL (Below Detectable Limit) Values: Cu<0.02 mg/l, Mn<0.05 mg/l, C6H5OH< 0.05 mg/l, Hg< 0.002 mg/l, Cd< 0.01 mg/l, Se<0.001 mg/l, As<0.004 mg/l, Pb<0.01mg/l, Zn<0.05 mg/l, Cr+6<0.02 mg/l, Al< 0.1 mg/l, B<0.1 mg/l, TCI(MPN/100ml)<1.8.

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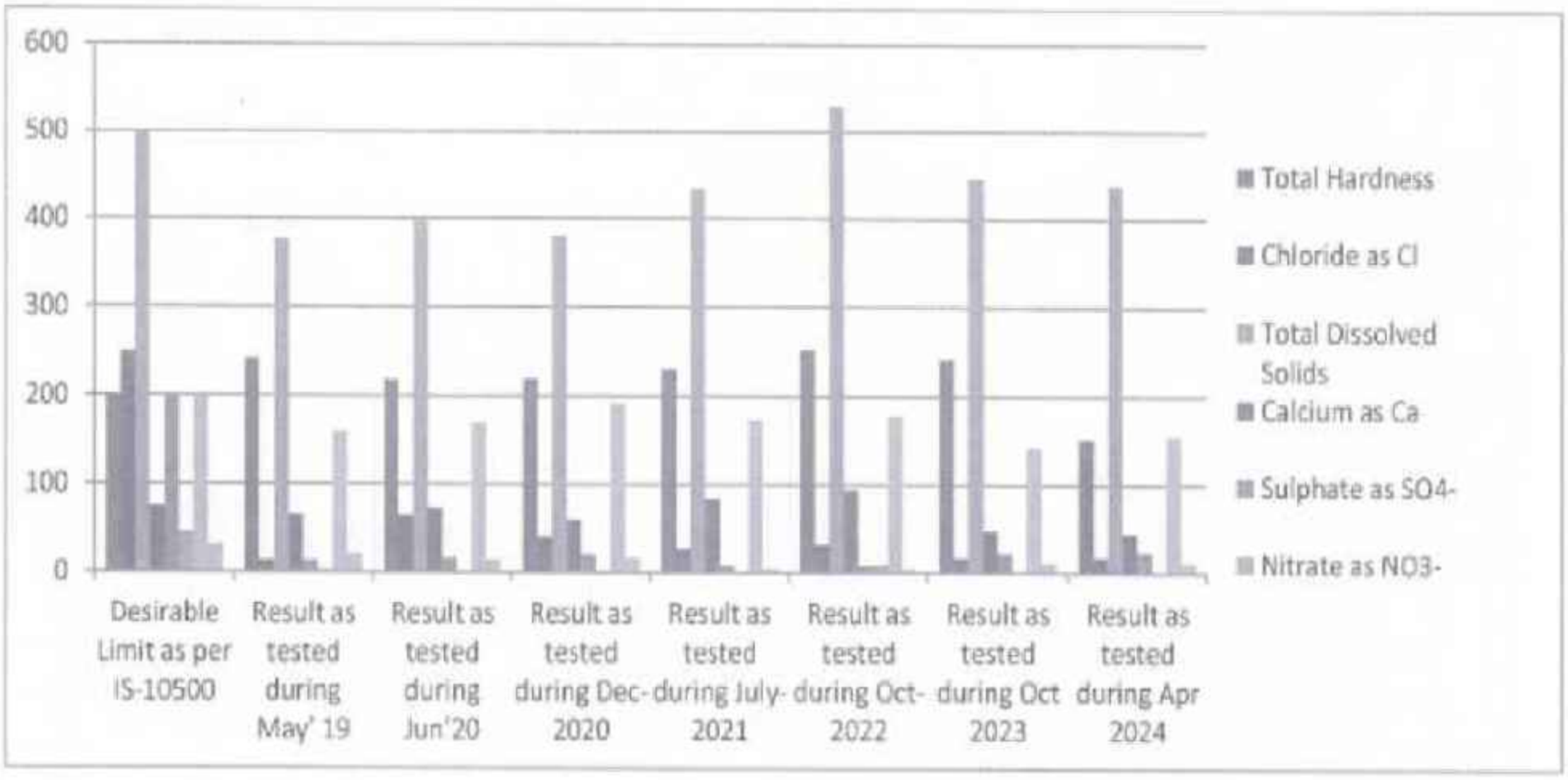
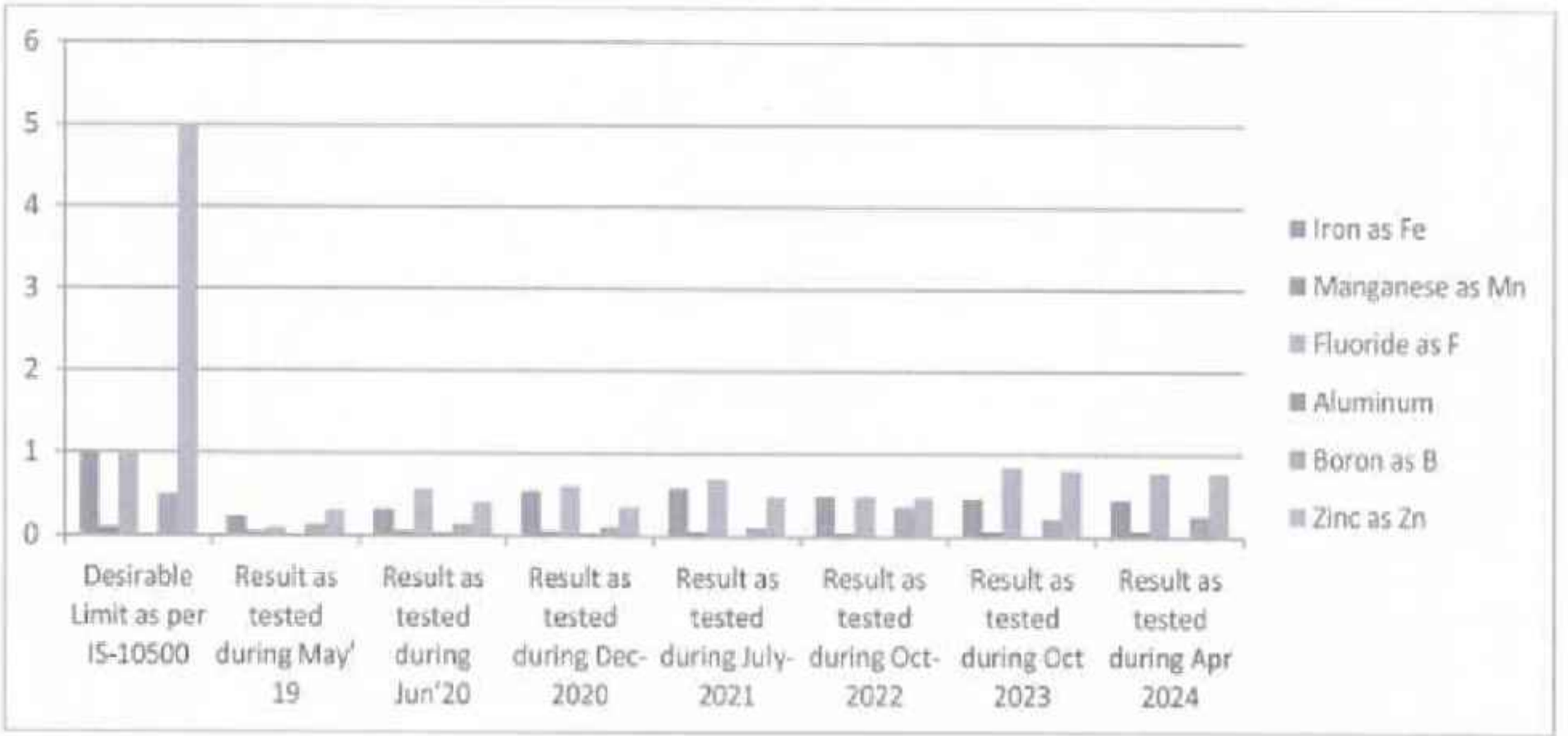
Trend in Ground Water Quality; Location- GW7: Bore well at Barasahi





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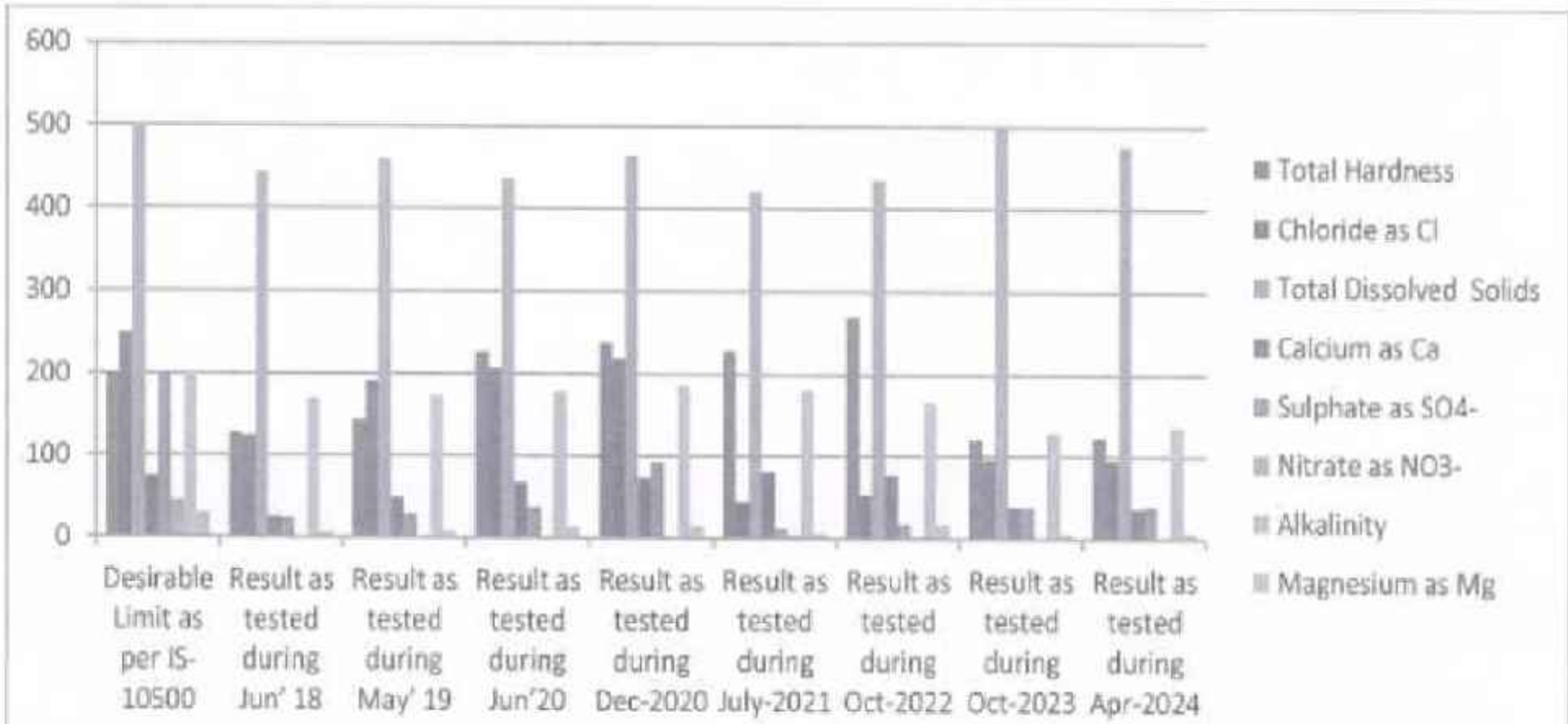
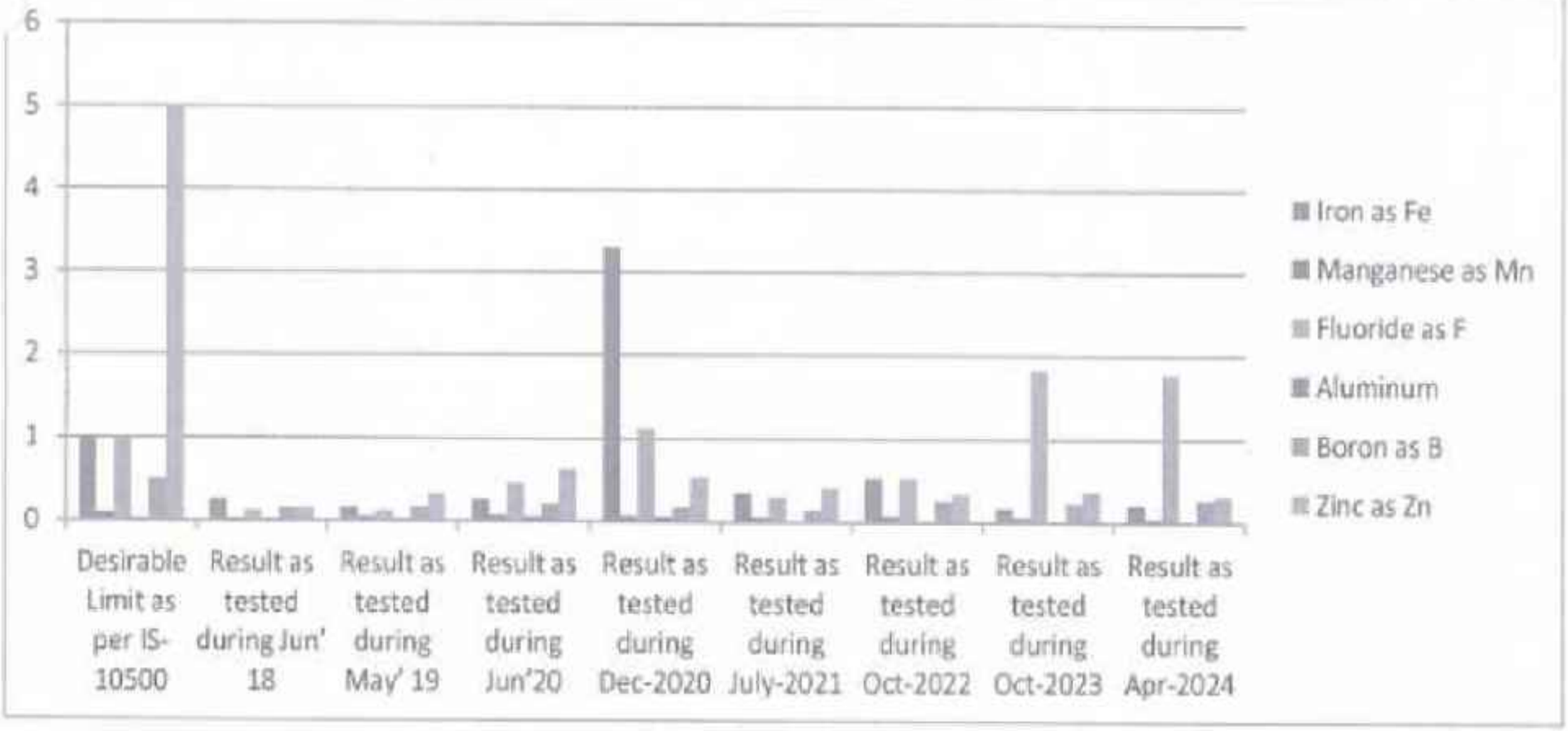
Trendin Ground Water Quality; Location- GW8 :Bore well at Budhapanka





GMR KAMALANGA ENERGY LTD.

Annexure-XI

GMR Kamalanga Energy Limited

Plant Office:
AT/PO: Kamalanga, PS: Kantabania,
VIA: Meramundali,
DIST: Dhenkanal - 759 121, Odisha
CIN U40101KA2007PLC044809
T +91 6762 663564
W www.gmrgroup.in

15-09/24

Ref. No. GKEL/CPCB/2024-25/8468
Dated – 21.10.2024

To
The Divisional Head – IPC II
Central Pollution Control Board
Parivesh Bhawan, East Arjun Nagar
New Delhi - 110032

Sub: Submission of Compliance status by TPPs with respect to Specific water consumption limit - reg.
Ref: Your office letter no B-33014/7/2019/IPC-II/TPP/ Email dated 8th July 2019

Dear Sir,

With reference to the above cited subject, we are submitting here with the quarterly specific water consumption report for Q – 2, FY 2024-25 of our 3x350 MW coal based Thermal Power Plant.

Kindly acknowledge receipt of the same.

Thanking you,

Yours sincerely,
for **GMR Kamalanga Energy Limited,**

Manoj Mishra
Plant Head

Encl. – As above

Copy for kind information to :-

1. The Member Secretary, State Pollution Control Board, Odisha, Bhubaneswar.
2. The Regional Officer, State Pollution Control Board, Odisha, Angul.

GMR KAMALANGA ENERGY LTD.

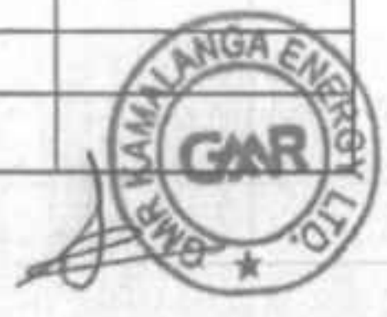
Registered Office:
Skip House, 25/1, Museum Road,
Bengaluru - 560 025

Format for quaterly reporting of water consumption data and compliance with respect to the limit notice vide notification dated 07.12.2015 of coal/lignite based thermal power plant.					
Name of the Power Plant	: GMR Kamalanga Energy Ltd., Dhenkanal , Odisha.				
Capacity	: Total - 1050 MW (3x350 MW each)				
Applicable SWC Standard	: 3.5 M3/MWh				
Zero waste water discharge condition mandatory OR not : Yes & Complied					
Q - 2 FY 2024-25	Date	Station Generation (MU)	Water Consumption (M3)	Specific Water Consumption (Daily Avg. in m3/mwh)	Remarks
July	01-07-2024	24.539	53283	2.17	
	02-07-2024	23.339	47365	2.03	
	03-07-2024	24.500	50577	2.06	
	04-07-2024	23.255	46392	1.99	
	05-07-2024	24.743	41744	1.69	
	06-07-2024	16.697	38311	2.29	
	07-07-2024	15.273	31769	2.08	
	08-07-2024	16.900	28687	1.70	
	09-07-2024	16.909	36929	2.18	
	10-07-2024	16.818	40634	2.42	
	11-07-2024	16.842	40783	2.42	
	12-07-2024	16.412	40164	2.45	
	13-07-2024	16.680	40694	2.44	
	14-07-2024	16.776	44142	2.63	
	15-07-2024	16.822	41496	2.47	
	16-07-2024	16.840	40440	2.40	
	17-07-2024	16.857	38665	2.29	
	18-07-2024	16.756	43749	2.61	
	19-07-2024	16.648	41378	2.49	
	20-07-2024	16.858	43109	2.56	
	21-07-2024	16.607	41415	2.49	
	22-07-2024	16.844	39369	2.34	
	23-07-2024	16.865	36972	2.19	
	24-07-2024	16.895	40782	2.41	
	25-07-2024	16.860	39020	2.31	
	26-07-2024	16.818	37913	2.25	
	27-07-2024	14.104	34663	2.46	
	28-07-2024	16.367	40835	2.49	
	29-07-2024	16.902	40991	2.43	
	30-07-2024	16.923	41081	2.43	
	31-07-2024	16.897	51714	3.06	
August	01-08-2024	14.813	40513	2.74	
	02-08-2024	15.399	42278	2.75	
	03-08-2024	15.140	30620	2.02	
	04-08-2024	15.106	32029	2.12	
	05-08-2024	15.921	30223	1.90	
	06-08-2024	16.184	33488	2.07	
	07-08-2024	16.656	36240	2.18	
	08-08-2024	16.862	36415	2.16	
	09-08-2024	16.660	39825	2.39	

GMR KAMALANGA ENERGY LTD. GMR

GMR KAMALANGA ENERGY LTD. GMR

	10-08-2024	16.424	31621	1.93	
	11-08-2024	18.344	42539	2.32	
	12-08-2024	17.760	37909	2.13	
	13-08-2024	16.511	36921	2.24	
	14-08-2024	16.656	35080	2.11	
	15-08-2024	19.816	43320	2.19	
	16-08-2024	24.274	48359	1.99	
	17-08-2024	23.312	46399	1.99	
	18-08-2024	22.874	52591	2.30	
	19-08-2024	24.364	44523	1.83	
	20-08-2024	23.009	46125	2.00	
	21-08-2024	24.673	46543	1.89	
	22-08-2024	24.916	47459	1.90	
	23-08-2024	24.486	49471	2.02	
	24-08-2024	24.096	50351	2.09	
	25-08-2024	21.128	48200	2.28	
	26-08-2024	22.797	45402	1.99	
	27-08-2024	20.646	39942	1.93	
	28-08-2024	22.363	48909	2.19	
	29-08-2024	22.030	41528	1.89	
	30-08-2024	24.107	46061	1.91	
	31-08-2024	23.938	51235	2.14	
September	01-09-2024	15.195	36763	2.42	
	02-09-2024	16.066	28381	1.77	
	03-09-2024	15.580	35036	2.25	
	04-09-2024	18.932	46342	2.45	
	05-09-2024	20.589	45421	2.21	
	06-09-2024	21.102	44871	2.13	
	07-09-2024	21.722	47585	2.19	
	08-09-2024	20.120	44822	2.23	
	09-09-2024	21.562	44777	2.08	
	10-09-2024	21.058	46977	2.23	
	11-09-2024	21.557	46712	2.17	
	12-09-2024	19.641	40531	2.06	
	13-09-2024	15.657	36297	2.32	
	14-09-2024	16.801	38047	2.26	
	15-09-2024	19.153	36810	1.92	
	16-09-2024	23.069	45818	1.99	
	17-09-2024	24.108	48202	2.00	
	18-09-2024	24.615	52972	2.15	
	19-09-2024	23.654	49731	2.10	
	20-09-2024	24.764	47948	1.94	
	21-09-2024	24.703	49786	2.02	
	22-09-2024	20.814	46300	2.22	
	23-09-2024	25.206	48491	1.92	
	24-09-2024	24.843	46809	1.88	
	25-09-2024	24.798	49597	2.00	
	26-09-2024	23.907	46790	1.96	
	27-09-2024	23.160	46134	1.99	
	28-09-2024	23.532	48042	2.04	
	29-09-2024	22.190	51080	2.30	
	30-09-2024	20.850	45877	2.20	
Quaterly Avg. Value		**19.70**	**42610.15**	**2.19**	



Annexure-XII

Visiontek Consultancy Services Pvt. Ltd.

(Committed For Better Environment)

ISO 9001:2015, ISO 14001:2015, ISO 45001:2018 (OH&S), ISO/IEC 17025:2017 Certified

VISIONTEK

Annexure-2

Ref: **Envlab/23-24/TR-11212** *Date: 26.10.2024*

GROUND WATER ANALYSIS REPORT

1. Name of the Industry : **M/s GMR Kamalanga Energy Ltd,Dhenkanal**
2. Sampling Location : **GW-1: Piezometric Well – 1 GW-2: Piezometric Well – 2**
   : GW-3: Piezometric Well – 3 GW-4: Piezometric Well – 4
3. Date of Sampling :07.10.2024
4. Date of Analysis :07.10.2024 to 16.10.2024
5. Sample Collected By :VCSPL Representative in presence of Client's Representative

Sl. No	Parameter	Unit	Testing Methods	Standard as per IS - 10500:2012	Analysis Results			
					GW-1	GW-2	GW-3	GW-4
1.	Colour	Hazen	APHA 2120 B	5.0	<5	<5	<5	<5
2.	Odour	--	APHA 2150B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3.	Taste	--	APHA 2160 C	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4.	Turbidity	NTU	APHA 2130 B	5	1.3	2.1	<1.0	<1.0
5.	pH Value	--	APHA 4500H$^+$B	6.5-8.5	7.92	7.94	7.72	7.54
6.	Total Hardness (as $CaCO_3$) (max)	mg/l	APHA 2340 C	200	86.0	67.0	54.0	20.0
7.	Iron (as Fe) (max)	mg/l	APHA 3500 Fe B	1.0	0.12	0.07	0.43	<0.3
8.	Chloride (as Cl) (max)	mg/l	APHA 4500 Cl B	250.0	124	81	27.1	155
9.	Residual, free Chlorine (min)	mg/l	APHA 4500 Cl B	0.2	ND	ND	ND	ND
10.	Dissolved Solids (max)	mg/l	APHA 2540 C	500.0	448.0	496.0	324.0	472.0
11.	Calcium (as Ca) (max)	mg/l	APHA 3500 Ca B	75.0	24.0	11.8	35.2	16.4
12.	Copper (as Cu) (max)	mg/l	APHA 3111 B,C	0.05	BDL	BDL	BDL	BDL
13.	Manganese (as Mn) (max)	mg/l	APHA 3500Mn B	0.1	0.047	0.53	0.073	0.03
14.	Sulphate (as SO_4) (max)	mg/l	APHA 4500 SO_4^{2-} E	200.0	30.4	24.32	24.2	14.19
15.	Nitrate (as NO_3) (max)	mg/l	APHA 4500 NO_3^- E	45.0	0.50	0.55	1.09	0.53
16.	Fluoride (as F) (max)	mg/l	APHA 4500 F,C	1.0	0.84	0.67	0.36	0.30
17.	Phenolic Compounds (as C_6H_5OH) (max)	mg/l	APHA 5530 B,D	0.001	BDL	BDL	BDL	BDL
18.	Mercury (as Hg) (max)	mg/l	APHA 3500 Hg	0.001	BDL	BDL	BDL	BDL
19.	Cadmium (as Cd) (max)	mg/l	APHA 3111 B,C	0.003	BDL	BDL	BDL	BDL
20.	Selenium (as Se) (max)	mg/l	APHA 3114 B	0.01	BDL	BDL	BDL	BDL
21.	Arsenic (as As) (max)	mg/l	APHA 3114 B	0.01	BDL	BDL	BDL	BDL
22.	Cyanide (as CN) (max)	mg/l	APHA 4500CN$^-$ C,D	0.05	BDL	BDL	BDL	BDL
23.	Lead (as Pb) (max)	mg/l	APHA 3111 B,C	0.01	BDL	BDL	BDL	BDL
24.	Zinc (as Zn) (max)	mg/l	APHA 3111 B,C	5.0	0.42	0.25	0.57	1.70
25.	Anionic Detergent (max)	mg/l	APHA 5540 C	0.2	BDL	BDL	BDL	BDL
26.	Chromium (as Cr^{+6}) (max)	mg/l	APHA 3500Cr B	--	BDL	BDL	BDL	BDL
27.	Mineral Oil (max)	mg/l	APHA 5520 B	0.5	ND	ND	ND	ND
28.	Alkalinity (max)	mg/l	APHA 2320 B	200.0	157.0	64.7	137.0	34.7
29.	Aluminium as Al (max)	mg/l	APHA 3500Al B	0.03	BDL	BDL	BDL	BDL
30.	Boron (max)	mg/l	APHA 4500 B,B	0.5	0.18	0.31	0.20	0.29
31.	Magnesium as Mg(max)	mg/l	APHA 3500Mg B	30	5.2	5.30	7.30	2.0
32.	Total Coliform (as TC)	MPN/100ml	APHA 9221 B	--	<1.8	<1.8	<1.8	<1.8

Note: CL: Colourless, Al: Agreeable, U/O: Unobjectionable, ND: Not Detected.
BDL (Below Detectable Limits) Values: Cu<0.02 mg/l, Mn<0.05 mg/l, C6H5OH<0.05 mg/l,Hg<0.002 mg/l, Cd<0.01 mg/l, Se<0.001 mg/l, As<0.004 mg/l, Pb<0.01mg/l, Zn<0.05 mg/l, Cr+6<0.02 mg/l, Al<0.1 mg/l, B<0.1 mg/l,. TC(MPN 0-0-0)<1.8.

Reviewed by *Approved by*

GMR KAMALANGA ENERGY LTD.

Visiontek Consultancy Services Pvt. Ltd.

(Committed For Better Environment)

ISO 9001:2015, ISO 14001:2015, ISO 45001:2018 (OH&S), ISO/IEC 17025:2017 Certified

Annexure-1

Ref: **Envlab/23-24/TR-11214** *Date: 26.10.2024*

GROUND WATER LEVEL REPORT

1. Name of the Industry : **M/s GMR Kamalanga Energy Ltd, Dhenkanal**

Sl. No.	Location Name	Date of Monitoring	Water Level in meters
Plant Premises-Core zone			
1	Piezometric well -1	07.10.2024	**3.3**
2	Piezometric well -2	07.10.2024	**2.5**
3	Piezometric well -3	07.10.2024	**2.7**
4	Piezometric well -4	07.10.2024	**3.1**
Outside Plant Premises-Buffer zone			
5	Bore Well at Durgapur	07.10.2024	**2.8**
6	Bore Well at Manpur	07.10.2024	**2.4**
7	Bore Well at Barasahi	07.10.2024	**2.3**
8	Bore Well at Budhapanka	07.10.2024	**3.6**

Reviewed by

Approvedby

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E-mail: visiontek@visiontek.org, visiontekin@gmail.com
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GMR KAMALANGA ENERGY LTD.

Annexure-XIII

Visiontek Consultancy Services Pvt. Ltd.

(Committed For Better Environment)

ISO 9001:2015, ISO 14001:2015, ISO 45001:2018 (OH&S), ISO/IEC 17025:2017 Certified

Ref: **Envlab/23-24/TR-10238** *Date:* **20.09.2024**

SURFACE WATER ANALYSIS REPORT (BUFFER ZONE)

1. Name of the Industry : **M/s GMR Kamalanga Energy Ltd, Dhenkanal**
2. Sampling Location : **SW1**: Brahmani River Upstream
   SW2: Brahmani River Downstream
   SW3: Pond at Maniabeda Village
3. Date of Sampling : 02.09.2024
4. Date of Analysis : 03.09.2024 to 09.09.2024
5. Sample Collected By : VCSPL Representative in presence of Client's Representative

Sl. No	Parameter	Unit	Testing Methods	Standard as per IS 2296:1992 Part C	Analysis Results		
					SW-1	SW-2	SW-3
1.	Colour	Hazen	APHA 2120 B	300.0	<5	<5	<5
2.	Odour	--	APHA 2150B	---	Agreeable	Agreeable	Agreeable
3.	pH	--	APHA 4500H⁺B	6.0-9.0	7.32	7.48	7.56
4.	Suspended Solids	mg/l	APHA 2540 D	---	32.8	32.4	38.6
5.	Total Dissolved Solids	mg/l	APHA 2540 C	1500.0	213.0	202.5	193.4
6.	Electrical Conductivity	µs/cm	APHA 2510 B	--	408	424	495
7.	Temperature	°C	APHA 2550 B	--	24.8	24.2	24.9
8.	Biochemical Oxygen Demand as BOD (3 days) at 27°C	mg/l	APHA 5210 B	3.0	2.0	2.4	2.6
9.	Chemical Oxygen Demand as COD	mg/l	APHA 5220 C	---	9.3	10.6	11.2
10.	Dissolved Oxygen	mg/l	APHA 4500 O C	4.0 (minimum)	5.6	6.3	4.7
11.	Oil & Grease	mg/l	APHA 5520 B	---	ND	ND	ND
12.	Arsenic (as As)	mg/l	APHA 3114 B	0.2	BDL	BDL	BDL
13.	Hexavalent Chromium (as Cr^{+6})	mg/l	APHA 3500 Cr B	0.05	BDL	BDL	BDL
14.	Total Chromium (as Cr)	mg/l	APHA 3111 B	---	BDL	BDL	BDL
15.	Copper (as Cu)	mg/l	APHA 3111 B,C	1.5	BDL	BDL	BDL
16.	Manganese (as Mn)	mg/l	APHA 3500 Mn B	---	BDL	BDL	BDL
17.	Lead (as Pb)	mg/l	APHA 3111 B,C	0.1	BDL	BDL	BDL
18.	Zinc (as Zn)	mg/l	APHA 3111 B,C	15	0.25	0.32	0.38
19.	Selenium (as Se)	mg/l	APHA 3114 B	0.05	BDL	BDL	BDL
20.	Iron (as Fe)	mg/l	APHA 3500Fe B	0.5	0.36	0.33	0.38
21.	Total Coli form	MPN/ 100ml	APHA 9221 B	5000	138	104	238
22.	Chloride (as Cl)	mg/l	APHA 4500Cl⁻ B	600	35.9	41.5	21.5
23.	Sodium Absorption Ratio	mg/l	By Calculation	---	0.28	0.33	0.30
24.	Boron (as B)	mg/l	APHA 4500 B,B	---	BDL	BDL	BDL
25.	Sulphate (as SO_4)	mg/l	APHA 4500 SO_4^{2-}	400	21.8	22.3	8.1
26.	Nitrates (as NO_3)	mg/l	APHA 4500 NO_3^-E	50	1.36	1.24	1.13
27.	Free Ammonia	mg/l	By Calculation	---	ND	ND	ND
28.	Fluorides (as F)	mg/l	APHA 4500 F,C	1.5	0.22	0.25	0.38
29.	Sodium (as Na)	mg/l	APHA 3500 Na B	---	7.8	8.1	5.2
30.	Calcium (as Ca)	mg/l	APHA 3500Ca B	---	32.8	34.5	22.5
31.	Magnesium (as Mg)	mg/l	APHA 3500Mg B	---	1.8	1.5	2.6
32.	Ammonical Nitrogen	mg/l	APHA 4500 NH_3F	---	1.84	1.55	1.76

Note: Colourless, Al: Agreeable, U/O: Unobjectionable, ND: Not Detected, BDL (Below Detectable Limit Values: Cu<0.05 mg/l, Ni<0.05 mg/l, Fe(OH)<0.001 mg/l, Hg<0.001 mg/l, Cd<0.01 mg/l, Se<0.005 mg/l, As<0.01 mg/l, Pb<0.01 mg/l, Zn<0.05 mg/l, Cr^{+6}<0.05 mg/l, Al<0.01 mg/l, B<0.01 mg/l.

VISIONTEK CONSULTANCY SERVICES PVT. LTD. BBSR

Reviewed by

VISIONTEK CONSULTANCY SERVICES PVT. LTD. BBSR

Approved by

GMR KAMALANGA ENERGY LTD. GMR

Annexure-XIV

ANNUAL CSR ACTIVITY REPORT - 2023-24

GMR KAMALANGA ENERGY LTD

&

GMR VARALAKSHMI FOUNDATION

GMR KAMALANGA ENERGY LTD.

Highlights of CSR Activities

During this year, focus was on enhancing performance of students of Std. IX and X in Govt. schools, enhancing minimum learning levels among primary school students, strengthening Anganwadis, health service through Mobile Medical Unit (MMU), Tele-medicine, eye check-ups, fogging, livelihood enhancement of farmers, fish farmers and SHG (Self Help Group) women. Odisha Idea Excellence Award 2023 to GMRVF, ISO 26000 Certification for Social Responsibility, completion of CSR impact study/evaluation are some of the highlights of this year.

Highlights of CSR activities around GMR Kamalanga Energy Ltd. in the year 2023-24 are as follows.

CSR Activities Undertaken Directly by GKEL

- Provided concession in school fees to 192 students from land loser families at GMR Varalakshmi DAV Public School
- Construction of Orphanage building at Mahulapada, Classrooms in Saraswati Sisu mandir, Supply of 50 LED bulbs to Doman Gram Panchayat, Coloring of Mangalpur Siva temple, Construction of extra room in Mangalpur Jagannath Temple are some of the important infrastructure works done during this year.

CSR Activities Undertaken by GMR Varalakshmi Foundation

Education

- Provided sliders to 16 Anganwadi centers in periphery villages
- Educative paintings done in the rooms of 2 Anganwadi centres
- Creative classes conducted in Anganwadi centers to improve learning level of children
- Engaged 10 support teachers (Vidya Volunteers) for primary class students of 8 Government schools.
- Engaged 3 support teachers for conducting tuition classes for 70 students of Std. IX and X
- Provided term-1 and 2 test papers to 148 students of Std. X from 2 high schools
- 28 students who scored more than 60% marks in Std. X Board Exam received award
- Cash award provided to 6 best performing students from 2 high schools
- Provided monthly scholarship to 15 girls and three boys
- 15 girls completed 6-months computer course and one batch of 10 girls continuing.
- 536 students received school bag and study kits, 403 students received school uniforms and 175 students received water filters

Health, Hygiene and Sanitation

- Provided Rs 5.26 lakhs as health treatment reimbursement support to 59 project affected families
- Four Nutrition Centers run by GMRVF benefited 53 pregnant and lactating women every month this year.
- Tele-medicine program organised with specialist doctors benefitted 642 persons.
- Mobile Medical Unit (MMU) provided 9135 treatments during the year
- Organized Adolescent mela and distributed 2500 sanitary napkins benefitting school going girls

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- Eye check-up camp for truck drivers organized benefitting 300 truck drivers in association with Kalinga Eye Hospital, Dhenkanal.
- Organized special Yoga classes for in 3 phases benefitting more than 50 women
- Fogging was done in 9 periphery villages for 4 months
- 50 old persons received dry food ration every month

Empowerment and Livelihoods

- Necessary market linkages made for selling of products made by Self Help Groups and Tailoring units
- Three tailoring units are supported in two villages benefiting 72 girls/women for stitching and selling of garments, bags etc.
- Supported 110 project affected families for paddy cultivation and 15 people for potato cultivation
- 15 farmers received sprayers
- 70 people received support for fish farming
- 15 persons including 10 women received support for mushroom farming
- 15 persons including 10 women received layer poultry birds
- 3 persons received honeybee boxes
- One Farmers' Producer Organisation (FPO) got registered.
- 4 Gramin Bazar events organised to enable local producers to sell their products directly to consumers

Employee involvement programs

- Implementation of four social volunteering projects going on. 45 employees of GKEL are actively involved in the projects.
- Employees and associates of GKEL contributed Rs. 17.91 lakhs to Daan Utsav and benefitted more than 3000 people.

Details of CSR Activities

Background of the Project

On 9th June 2006, GMR Energy Limited (GEL) signed an MOU with the Government of Odisha to set up a coal based Thermal Power Station (TPS) at Kamalanga in Dhenkanal district of Odisha through GMR Kamalanga Energy Limited (GKEL). For construction of the power plant, land was acquired from four villages of Dhenkanal district namely, Kamalanga, Mangalpur, Senapatiberena and Bhagabatpur. Among these villages, Senapatiberena and Bhagabatpur are uninhabited villages. Like in all GMR projects, GKEL integrated socio-economic transformation of the communities and environment sustainability aspects into its project management strategy. The strategy embraces, among others, creation of new livelihood opportunities for project affected people, creating and improving community access to quality education and quality health care through GMR Varalakshmi Foundation (GMRVF) besides bridging infrastructure gaps, and addressing local developmental needs in villages that are in the periphery of the GKEL plant.

GMRVF, which is the Corporate Social Responsibility arm of the GMR Group, was entrusted by GKEL to lead the role in fulfilling socio-economic commitments. As early as 2007, GMRVF launched participatory community development programs to enhance the quality of life of people dwelling in GKEL neighborhoods. These community development initiatives focus majorly on Education, Health, Hygiene and Sanitation and Empowerment and Livelihoods. The GMRVF team in Kamalanga constitutes of 4 staff members headed by a Sr. Program Leader.

As per requirement of the Companies Act, GKEL has formed a CSR Committee. The Committee and Board have reviewed the proposed annual CSR plan and approved the plan and budget for the year 2023-24.

CSR Activities under Direct Leadership of GKEL:

GMR Varalakshmi DAV Public School, Kamalanga: GKEL has set up an English Medium School in its campus affiliated to CBSE which is being run by DAV since last 10 years. Currently, more than 600 students (both boys and girls) study in this school from LKG to Std. XII. Children from community, families of GKEL employees and other corporates study in this school. During this reporting year, 100% students passed in the Std. X board examinations.

Fees Concession Support Provided to 192 Students of GMR DAV Public School: Fees concession was provided to students from LKG to Std. X after proper scrutiny of their application forms and documents. 192 students benefited from this support in the reporting year.

Hospital in GKEL Campus: GKEL has established a 27-bed hospital in its campus for providing health services to community as well as its employees. Samal Care Hospital has been managing the hospital providing outpatient services.

Drinking Water for the Community: In association with the Rural Water Supply Department of Govt. of Odisha, pipe water supply is continuing in Manpur village benefiting 600 families. Similarly drinking water is being supplied to villages in Kamalanga G.P.

Infrastructure Development Activities: The following infrastructure development activities have been taken up during the year based on the local needs and on the request of village elders.

- Construction of Orphanage building at Mahulapada
- Classrooms in Saraswati Sisu Mandir school
- Supply of 50 LED bulbs to Doman Gram Panchayat
- Construction of additional room and Coloring of community facilities at Mangalpur
- CC Road in Bhagamunda (Harijan Sahi), Kamalanga GP (250 mtr) and CC Road in Manpur village (330 mtr)
- Extended accommodation facility and toilets at Biswakuntala Children's Home at Baladiabandh

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CSR Activities taken up by GKEL through GMRVF:

EDUCATION

SUPPORT TO CHILDREN IN 16 ANGANWADI CENTRES

GMRVF provided 16 number of sliders to 16 Anganwadi centers which help to increase the attendance of children in Anganwadi centres.

Five creativity classes were held at Anganwadi centres and primary schools. These were facilitated by an external expert. Painting, Drawing, Art and craft, Song and dance were the methods used to educate the children on various concepts during these sessions.

Wall painting with learning items like Odia letters, cartoons, fruits etc. was done in two Anganwadi centers of M. .pur and Kamalanga villages. This would be helpful for about 50 children.

SUPPORT TO 10 GOVERNMENT SCHOOLS

GMRVF supports the Government schools in its project villages around GKEL with a view to improve the learning environment in the schools and learning levels of the children studying in those schools. GMRVF has taken up the following activities during this year in the 10 associated schools.

Engaging Vidya Volunteers in Schools: 12 Vidya volunteers are engaged in primary schools to teach students as there is shortage of teachers in these schools.

Tuition Classes for Std. IX and X Students: Tuition support was provided to about 65 students of Std. IX and X from Manpur and Kamalanga High schools in Maths and Science subjects. Periodic tests were conducted by the teachers and it is found that there is improvement in the standard of the students.

Distribution of Mock Test Papers to Students of Std. IX and X: Government of Odisha has implemented Term - 1 and 2 assessment for students of Std. X. So, to familiarise with the system and to prepare them well, model test papers were provided to 148 students of Std. X from 2 high schools.

Scholarship for Students: 15 girls and 3 boys received monthly scholarship for their education. Out of these, 8 are studying in high school, 5 are studying in college and 5 are in Engineering degree/Diploma courses.

Computer Class for Girls: Six month DCA (Diploma in Computer Applications) course was introduced at the Computer Education Center and one batch of 15 girls completed the course successfully during the year.

Awards to Meritorious Students: Awards were provided to 16 boys and 12 girls who have secured more than 60% in the Annual Board Examination of Std. X. In separate events in Manpur and Kamalanga high schools, awards were distributed to students by school teachers and members of Pragati ladies Club. Club members attended the events in the schools, encouraged pass out students to do well in college and also encouraged the present students of St ' X to do well in their upcoming examination.

Award to Best Students of the Year: To encourage students from class 6th to 10th in 2 High Schools as discussed with the school teachers, GMRVF provided a cash award to Best students of the year. The selection criteria include percentage of marks in last 2 exams, attendance, response to question answer, response of parents, cleanliness, participation and winning of prizes in sports etc. School teachers selected 3 students from each high school and awards were given to those students in their morning prayer session.

Support to Schools for Organising Important Days of Significance: On the eve of Children's Day, Debate, quiz, dance and drawing competitions were organised in Mangalpur Nodal school in which about 200 students participated and winning students received prizes.

A...iual sports were organized in Kamalanga and Manpur High schools for students. Various types of games played by students and winners received prizes. GMR Varalakshmi Foundation supported for prizes to winners in these various events.

Annual Day functions were held in Kamalanga and Mangalpur High schools respectively. Prizes distributed to students who have won in various sports competitions held during Annual sports Day. Students have performed cultural activities on the program day.

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Observance of Road Safety Month in Schools: Road Safety awareness rally followed by quiz was organized in Mangalpur school and speech competition was organised in Kamalanga High School. Both were facilitated by EHS (Environment, Health and Safety) Department of GKEL and it was very useful for the students.

Career Counseling for Students of Std. X: M/s Ravi Reddy, Sudhanshu Pattnaik, Tikan Mahapatra, Amol from GKEL have facilitated one career counselling session for students of Std. X in Manpur and Mangalpur High schools in which 130 students participated. Students and teachers felt this session very useful. Each student was given a leaflet with details of career opportunities after Std. X.

Support of Study Material to Students: During this year, the following items were given to students of government schools with the contributions mobilized from GKEL colleagues as part of Daan Utsav celebrations.

- 175 water filters
- 403 pairs of uniforms to Saraswati Sisu mandir students
- 536 school bags with study kits

HEALTH, HYGIENE AND SANITATION

Health Treatment Support to Project Affected Persons: GMRVF has been supporting the vulnerable people from project affected communities for taking health treatment at secondary and territory hospitals. A robust procedure has been in place for finalizing the beneficiaries for this support. A committee consisting of Sr. Program Leader of GMRVF, Head-HR and Head-TS of GKEL to scrutinize the documents submitted by the project affected persons. Shortlisted applications are submitted to the Plant Head, GKEL for final approval. Approved amount is transferred to applicant's bank account from GMRVF. During the year, 59 persons received financial support towards medical expenses reimbursement.

Support of Nutrion Supplements to Pregnant and Lactating Women: Nutritious food materials were provided to 50 pregnant and lactating women on a regular basis. Nutrition center volunteers delivered the food material to the pregnant and lactating women who are enrolled in 5 centers and ensured that they consume the same.

Tele-medicine Support: Considering the inaccessibility of health services in the villages, Tele-medicine program was continued for the remote villages with the help of specialised doctors like pediatrician, skin specialist etc. During this year, My Heart agency has managed the Tele-medicien program till

January and for the remaining two months, it was managed by Jana Kalyan Pratisthan(JKP).The process followed for the same is as follows:

- Volunteer selects the patients at village level for consultation with the doctor
- The date and time of consultation with the doctor is fixed in consultation with the doctor
- The filled-up patient card is sent to doctor through Wattsapp.
- Refering the patient card, the doctor discusses with the patients.
- After consultation, the doctor writes prescrition and send it to GMRVF
- The prescription is sent to the pharmacist of My Heart/JKP
- My Heart/JKP provides medicine as per prescription.These medicines are provided to the patients by volunteer.

During the year, 597 patients received consulation and medicine support.

Mobile Medical Unit (MMU): Partnership was made with My Heart agency for providing healthcare services to the community members using Mobile Medical Unit (MMU). The facility has been functioning for 14 days in a month and provided 9135 treatments to people from 9 villages in the reporting period.

The following process followed for health treatment:

- My Heart Agency supported one doctor, one pharmacist, one supporting person and medicine
- GMRVF in consultation with My Heart prepared monthly plan and shared with all concerned
- Village locations were selected with the help of village volunteers
- Patients come to the camp site with their registers (given earlier to them)
- The doctor, after consultation with the patients, prescribe medicines in the registers
- The Pharmacist issues medicine to the patient as per prescription and maintains daily patient register.

Adolescent Mela and Distribution of Sanitary Napkins: With the help of Anganwadi workers and helpers, GMRVF organized health awareness on personal and menstrual hygiene for school going girls in all the project villages. These sessions were organized at each Gram Panchayat level and after the sessions all the participant girls were given sanitary napkins. Total 1250 adolescent girls benefited from these programs.

Free Eye Check-up Camp for Truck Drivers: GMR Kamalanga Energy Ltd and GMR Varalakshmi Foundation in association with Kalinga Eye Hospital, Dhenkanal organized free eye check-up camp for truck drivers during this year. More than 300 truck drivers availed this facility. Out of this more than 100 received reading glasses and about 40 got power glasses.

Special Yoga Class Organized for Women: Community Yoga sessions were organized in Mangalpur village in 3 phases for 15 days. In each phase, about 50 women participated in the Yoga session every day from 3-5 PM.

Fogging Operation in Project Villages: Fogging operation was taken up in all the 9 periphery villages twice in every 4 months during this year with the help of Pest Control of India. This initiative helped in controlling the vector borne diseases.

Dry Food Ration Support to Old People: In the earlier years of CSR operations, it was found that there are several old and destitute people in the project villages who cannot do any livelihood activity and they have no one in their family to take care of them. Considering this, initially for 3 years, GMRVF supported 23 people with dry food ration through employee contribution. During this year, food ration was provided to 42 old people at their doorstep every month.

Empowerment & Livelihoods:

Support to Tailoring Trainees to Stitch and Sell Products: During this year, 72 girls/women regularly attended the Bhagamunda, Manpur and Mangalpur tailoring centers and stitched various clothes like kurti, petty coat etc. Sewing machines were provided to 13 women from Mangalpur centre.

Livelihood Support to Enhance Incomes through Farm/Non-farm Activities: The following supports were provided for increasing incomes of people through farm-based livelihood activities:

- Timely support of qualitative paddy seed is very critical to get good yield for the paddy farmers. This year, 5 types of paddy seeds like Kalachampa TL seed, Swarna white and red certified seed, CR-1009 Foundation seed and Hybrid were distributed to the paddy farmers in various project villages. 262 packets of bio potash was also distributed to these farmers to encourage use of organic fertilizers.
- All paddy farmers received Nano Urea and Nano DAP.
- Provided 30 kg of Arhar seeds to 8 farmers to promote the cultivation of Arhar as an intercrop
- Ten farmers collectively sold 50 quintals of paddy.
- It has been found that due to use of organic/bio fertilizer, Nano Urea, Nano DAP etc., cost of production has been reduced by 20% and income increased by 10%

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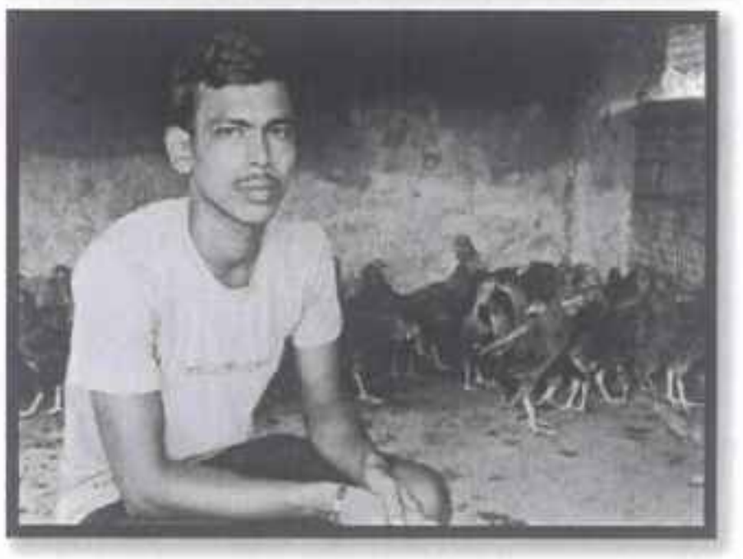
- Supported 15 farmers to receive sprayers from the Govt. on subsidy and another 15 farmers were supported with potato seeds
- Tissue culture banana saplings were provided to 40 farmers.
- Fish yearlings, lime, fish feed, grass carp fish yearlings were provided in association with Fisheries Department to 70 ponds for enhancing fish yield.

- Honey bee boxes were provided to 3 additional farmers this year. Total 10 boxes were installed in farmers' field for honey bee keeping.
- Partial support was provided to 5 farmers for field fencing work; to 3 fish farmers for purchasing net; to 2 farmers for purchasing pump set.



- Mushroom farming was promoted with 15 persons including 10 women and poultry layer birds were provided to 15 persons including 10 women.
- One Farmers' Producer Organization (FPO) formation process got completed and registration formalities also completed

Community Cricket Tournament: A cricket tournament was organised from 17th to 19th January 2024 inviting youth from 6 villages. The tournament was held for 3 days and finally Pandarbharania village team won the trophy. Plant Head-GKEL inaugurated the match and also distributed winning trophy to the winner and other teams during closing program.

International Women's Day: On the occasion of International Women's Day, an interactive session with more than 50 women was organized. P goli and quiz competitions were also organized on the occasion among the participants. A quiz program was also organized which was facilitated by GMRVF and Pragati Ladies Club. There was an awareness session on Electrical household safety facilitated by EHS & Electrical Department.

Employee Involvement

DAAN UTSAV Program: First week of October is commemorated as Daan Utsav Week with involvement of all employees of GKEL including the COO and HODs. A detailed list of activities to be implemented during the week was prepared in consultation with GKEL team. 32 agencies associated with GKEL and all employees contributed an amount of Rs.17.91 lakhs towards these activities. The following activities have been completed which benefited more than 2000 needy people.

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- Distribution of sari, lungi and towel to 100 old persons residing in old age homes
- Distribution of school bags with study kits to 536 students of Std. VI to X
- Distribution of dresses to 165 orphan children staying in the orphanages at Govindpur and Mahulapada.

- Distribution of fruits to 75 patients in Banarpal Samal Care hospital.
- Distribution of dresses to 496 poor children
- School uniforms supported to 403 students of Sisu Mandir
- Armchairs supported to 50 senior citizens
- Sliders provided to 16 Anganwadi centres.
- Sewing machine supported to 11 women

- One Blood donation program organized and 130 units of blood donated
- Supporting 50 dual desks to Kamalanga primary school
- Supporting armchairs to 50 senior citizens

Social Volunteering Programs (SVP): SVP is a special program of GMRVF under which teams of employees are encouraged to take up 4 months long social projects of their choice for which GMRVF provides financial support. During the year, under round-19, four number of SVP projects have been taken up GKEL colleagues and were successfully completed. Under round-20, four SVP projects got approved to implement by GKEL employees which are currently in progress.

Voluntary Blood Donation Program: During Daan Utsav Week, a voluntary blood donation camp was organised in association with District Blood Bank in which 134 units of blood was donated by employees of GKEL, RAXA, GMRVF etc.

In the year 2023-24, 925 person hours have been spent by 210 GKEL colleagues in 65 community programs benefiting over 3000 people.

Other Significant Updates:

GKEL Certified for ISO:26000: "GMR Kamalanga Energy Ltd (GKEL) has been certified under ISO 26000:2010 standard (ISO standard for CSR activities). This is the 2nd business unit within GMR group to receive this

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certification for the CSR processes and activities that are done by the Company. It is certified by a reputed assessment agency Bureau Veritas (BV). The validity of certificate is for 3 years.

CSR Impact Study: As part of GMRVF's quality improvement measures, impact assessment of CSR programs is being taken up once in every five years at all major project locations. In line with this process, GKEL-CSR impact assessment study has been conducted during the year by KIIT School of Rural Management, Bhubaneswar. The assessment team from KIIT conducted extensive field work and reviewed all the documents and submitted a detailed impact study report with their suggestions to enhance the effectiveness of the program.

Odisha Idea Excellence award-2023: Odisha CSR Forum, Bhubaneswar awarded GKEL as one of the recipient of Odisha Idea E llence Award-2023. Nine corporates received this award for their innovative CSR programs. This was received by Mr. Dillip Kar, Sr. Program Leader - GMRVF in a state level function on 25th November, 2023.

Challenges:

The major challenges faced during the reporting period are as follows:

- Community members have high expectations from the company.
- Sustainability of the enterprises
- Market linkage for products made by tailoring centers
- Ensuring contribution from community for any program
- Setting up of group level income generation activities by women Self Help Groups

Plans for the Next Year:

- Supporting tailoring center girls to prepare various products and sell to get some income
- Support to pregnant and lactating women with nutrition supplements and medical advice from experienced doctors
- Telemedicine, MMU programs to continue supporting community for health treatment
- Reimbursement of health treatment expenses to project affected persons
- Support of food ration to 50 old and destitute people who are most vulnerable
- Livelihood support to women SHGs, Farmer groups, Fish farmers
- Strengthening the activities of Farmer Producer Organization
- Strengthening youth clubs/cultural groups to promote sports /cultural events in the community

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FEEDBACK REPORT:

GMRVF introduced layer poultry birds which can be used for both egg and meat purpose. 15 persons including 10 women have received poultry layer birds of Sonali breed and later on Banaraj breed. Beneficiaries have got eggs from Sonali breed and sold locally as well as through GMRVF. Banaraj breed has not started laying eggs. GMR Varalakshmi Foundation conducted individual opinion survey from the beneficiaries to know the result of this program. The feedback from the beneficiaries is as below:

- 100% beneficiaries expressed satisfaction about the program
- They informed that they could able to sell eggs locally and got returns immediately
- All have expressed that they will continue to buy more layer birds even after selling the mother birds
- A suggestion from the beneficiaries is to provide technical orientation regarding healthcare of the poultry birds

Annexure – XIV

CSR SCHEME IMPLEMENTATION DETAILS

Status of CSR activities completed in 2020-21, 2021-22, 2022-23, 2023-24 and 2024-25-

GMR Kamalanga Energy Ltd. has been supporting the community for enhancing their socio economic condition through various CSR activities for the last 12 years. A comprehensive scheme was developed as per the felt needs of the communities. Different activities were undertaken in the thrust areas of Education, Health & Sanitation, livelihoods and Infrastructure Development in 9 villages.

A. Highlights of CSR activities around GKEL in the year 2020-21 are as follows-

- Provided concession in school fees to 177 children of land loser families at GMR DAV Public School.
- Installed 15,000 LPH capacity Potable Water Treatment Plant for Community Water Supply Scheme catering to the requirement of Kamalanga, Durgapur and Bhagamunda village. Treated water from the Potable water treatment plant is fed to the over ground reservoir for further distribution to the user end.
- Infrastructure development works under progress are as follows-

a) School boundary elevation work of Mangalpur Panchayat High school.
b) Anganwadi Centre at Kamalanga -1A.

Education:

- 400 masks provided to children of all 16 Anganwadi centers and 300 masks to 2 High schools.
- Engaged 10 support teachers (Vidya Volunteers) to organize on line and off line Tuition for primary class students of 8 Government Primary schools.
- Engaged 3 support teachers for conducting online Tuition classes for class 9th & 10th students benefitting 70 students.
- 16 students benefitted from coaching class for Navodaya entrance exam.
- Provided test papers to 141 students of Std. 10th from 2 High schools
- Construction of two class rooms in Kamalanga high school.
- Wall paintings done in primary school
- Smart phone with recharging distributed to 119 students to enable them to access on line classes.
- Six students including 3 girls who scored more than 60% marks in High School class 10th Board examination selected to receive cash award.
- Provided Scholarship to 18 girls and one boy for better education.
- Awareness on sanitization, wearing mask and hand wash explained to class 9th and 10th students in 02 high schools and materials provided to students. Sanitization done in 02 schools before reopening of schools.
- One batches of girls (8 girls) continuing basic computer learning course.

Health, Hygiene and Sanitation

- Provided health treatment support to 28 project affected families
- Three Nutrition Centers run by GMRVF benefited 43 pregnant and lactating women in this year. Nutritious food materials provided to pregnant and lactating mothers at their doorstep.
- Kitchen garden support provided to nutrition center pregnant & lactating mothers.

Empowerment and Livelihoods

- Necessary market linkages made for selling of products made by SHG and Tailoring units.

Community Development Activities

- Two tailoring units are supported in two villages benefiting about 36 girls for stitching and selling of garments, bags etc.

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Livelihood Restoration Program Undertaken by GKEL and GMRVF

- 19 project affected families received support for farming. This includes 06 new farmers and 13 last year farmers who have taken partial support for farming.
- 96 project affected families received support for developing various micro-enterprises (77 for enterprise development + 19 got cross breed jersey cow).
- Organized one animal health camp benefitting cow, bullock and sheep of 53 project affected families
- Organised one trainings for farmers and exhibition to promote organic farming and taking up of high value crops.
- Soil testing organised for farmers in association with District Soil Testing Laboratory benefitting 70 farmers.
- 50 old and poor people received dry food ration every month at their door step.

Employee involvement programs

- Implementation of Six social volunteering projects completed involving 45 employees of GKEL.
- Rs.10.76 lakhs donated by employees and contractors towards Daan Utsav. More than 1100 people benefitted through various programs under DAAN UTSAV.

Highlights of CSR activities around GKEL in the year 2021-22 are as follows

- Provided concession in school fees to 177 children from land loser families at GMR DAV Public School.
- Construction of CC road in Achalkote Village, CC Road Connecting RD road to Mangalpur Harijan Sahi, CC road Kshatriya Sahi to Gopal Sahi in Manpur Village, CC road from Harijan Sahi to Barik Sahi Manpur and Renovation of Laxmi temple at Brameswar temple Campus Manpur.

Education

- Engaged 10 support teachers (Vidya Volunteers) to organize on line and off line Tuition for primary class students of 8 Government Primary schools.
- Engaged 3 support teachers for doing on line Tuition classes for class 10th students benefitting 50 students.
- 25 students benefitted from coaching class for Navodaya, Adarsha and NMMS entrance exam.
- Provided test papers to 276 students of Std. 9th and 10th from 2 High schools.
- Prathama Story books provided to 202 students.
- Toys provided to 370 children in Anganwadi centers.
- Wall paintings done in one Anganwadi center.
- Four students who scored more than 70% marks in Class 10th Board examination received cash award.
- Provided Scholarship to 15 girls and one boy for better education.
- One batches of girls (10 girls) continuing basic computer learning course.

Health, Hygiene and Sanitation

- Provided Rs.7.43 lakhs as health treatment reimbursement support to 83 project affected families
- Three Nutrition Centers run by GMRVF benefited 40 pregnant and lactating women in this year. Nutritious food materials provided to pregnant and lactating mothers at their door step.
- Kitchen garden support provided to nutrition center pregnant & lactating mothers.
- Health treatment through telemedicine program benefitted 2133 persons.
- Health treatment using Mobile Medical Unit (MMU) benefitted 1782 persons.
- 1735 persons supported for on line, off line slot booking and conveyance support and vaccinated.

Empowerment and Livelihoods

- Necessary market linkages made for selling of products made by SHG and Tailoring units.

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Community Development Activities

- Two tailoring units are supported in two villages benefiting about 35 girls for stitching and selling of garments, bags etc.

Livelihood Restoration Program Undertaken by GKEL and GMRVF

- 07 project affected families received support for farming and 54 received support for strengthening micro enterprises.
- 50 old and poor people received dry food ration every month at their doorstep.

The cumulative status of Livelihood Restoration Program from 2016 to 2022 is as follows:

Year	Farm & Livestock	Skill	Micro enterprise	Total
2016-17	118	10	151	279
2017-18	206	0	332	538
2018-19	84	0	189	273
2019-20	23	0	221	244
2020-21	6	0	96	102
2021-22	7	0	54	61
Total	444	10	1043	1497

** Besides above 50 old people receive food ration every month.

Employee involvement programs

- Implementation of Six social volunteering projects completed involving 46 employees of GKEL.
- Rs.15.95 lakhs donated by employees and contractors towards Daan Utsav. More than 1200 people benefitted through various programs under DAAN UTSAV.

C. Highlights of CSR activities around GKEL in the year 2022-23.

- Provided concession in school fees to 198 students from land loser families at GMR Varalakshmi DAV Public School.
- Community Centre and Cart parking shed at Bhagamunda, bore well digging in Kamalanga, Pond desilting in Mangalpur, furniture supply to 2 G.P offices, supply of 16 no of solar lights, developing prayer ground at Kamalanga are some of the important infrastructure work done during this year.

Education

- Toys provided to 340 children in16 Anganwadi centers.
- Sliders provided to 10 Anganwadi center.
- Creative classes conducted in Anganwadi centers to improve learning level of children.
- Engaged 10 support teachers (Vidya Volunteers) for primary class students of 8 Government schools.
- Engaged 02 support teachers for conducting tuition classes for 50 students of Std. X.
- 10 students benefitted from coaching classes for Navodaya entrance exam.
- Provided term-1 and 2 test papers to 300 students of Std. IX and X from 2 high schools.
- Twenty-one students who scored more than 60% marks in Std. X Board Exam received cash award.
- Cash award provided to 6 students as best students of the year from 2 High schools.
- Provided Scholarship to 12 girls and three boys for higher education.
- 20 girls completed basic computer course and One batch of 10 girls continuing basic computer learning course.
- Special community level drive organized to encourage drop out students to go to school.

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- Schools were supported to organize annual sports, Children's Day and Teachers' Day and National safety week etc.

Health, Hygiene and Sanitation

- Provided Rs 7,55,700 as health treatment reimbursement support to 82 project affected families.
- Five Nutrition Centers run by GMRVF benefited 50 pregnant and lactating women this year.
- Tele-medicine program organised with specialist doctors like pediatrics and skin which benefitted 1510 persons.
- Mobile Medical Unit (MMU) provided 9640 treatments during the year.
- Facilitated vaccination for 958 persons through slot booking and conveyance support.
- Adolescent mela and distribution of 855 sanitary napkins benefitting school going girls.
- Two number of specialized health camps on diabetics organised benefitting about 180 patients.
- One free Eye checkup camp organized benefitting 232 patients in which 64 got reading glass,38 power glass,83 medicine and 10 cataract operations done successfully using BSKY.
- 10 differently abled persons received different aids.
- Special yoga class for women organized in 3 phases benefitting more than 50 women.
- Two round of fogging done in 9 periphery villages.

Empowerment and Livelihoods

- Necessary market linkages made for selling of products made by SHG and Tailoring units.
- Two tailoring units are supported in two villages benefiting about 45 girls for stitching and selling of garments, bags etc.
- 25 project affected families received support for paddy,15 for Rabi crops,25 for groundnut and potato.
- 90 people received support for fish farming.
- 15 persons including 13 women received support for mushroom farming.
- 10 women received layer poultry birds.
- 2 persons received honey bee boxes and 4 farmers started vermi compost.
- 47 old and poor people received dry food ration every month at their doorstep.

Employee involvement programs

- Implementation of four social volunteering projects going on. 45 employees of GKEL are actively involved in the projects.
- Employees and associates contributed Rs.16.95 lakhs to Daan Utsav and benefitted more than 3000 people.

D. Highlights of CSR activities around GKEL in the year 2023-24.

CSR Activities Undertaken Directly by GKEL

- Provided concession in school fees to 192 students from land loser families at GMR Varalakshmi DAV Public School
- Construction of Orphanage building at Mahulapada, Classrooms in Saraswati Sisu mandir, Supply of 50 LED bulbs to Doman Gram Panchayat, Coloring of Mangalpur Siva temple, Construction of extra room in Mangalpur Jagannath Temple are some of the important infrastructure works done during this year.

CSR Activities Undertaken by GMR Varalakshmi Foundation

Education

- Provided sliders to 16 Anganwadi centers in periphery villages
- Educative paintings done in the rooms of 2 Anganwadi centres
- Creative classes conducted in Anganwadi centers to improve learning level of children

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- Engaged 10 support teachers (Vidya Volunteers) for primary class students of 8 Government schools.
- Engaged 3 support teachers for conducting tuition classes for 70 students of Std. IX and X
- Provided term-1 and 2 test papers to 148 students of Std. X from 2 high schools
- 28 students who scored more than 60% marks in Std. X Board Exam received award
- Cash award provided to 6 best performing students from 2 high schools
- Provided monthly scholarship to 15 girls and three boys
- 15 girls completed 6-months computer course and one batch of 10 girls continuing.
- 536 students received school bag and study kits, 403 students received school uniforms and 175 students received water filters

Health, Hygiene and Sanitation

- Provided Rs 5.26 lakhs as health treatment reimbursement support to 59 project affected families
- Four Nutrition Centers run by GMRVF benefited 53 pregnant and lactating women every month this year.
- Tele-medicine program organised with specialist doctors benefitted 642 persons.
- Mobile Medical Unit (MMU) provided 9135 treatments during the year
- Organized Adolescent mela and distributed 2500 sanitary napkins benefitting school going girls
- Eye check-up camp for truck drivers organized benefitting 300 truck drivers in association with Kalinga Eye Hospital, Dhenkanal.
- Organized special Yoga classes for in 3 phases benefitting more than 50 women
- Fogging was done in 9 periphery villages for 4 months
- 50 old persons received dry food ration every month

Empowerment and Livelihoods

- Necessary market linkages made for selling of products made by Self Help Groups and Tailoring units
- Three tailoring units are supported in two villages benefiting 72 girls/women for stitching and selling of garments, bags etc.
- Supported 110 project affected families for paddy cultivation and 15 people for potato cultivation
- 15 farmers received sprayers
- 70 people received support for fish farming
- 15 persons including 10 women received support for mushroom farming
- 15 persons including 10 women received layer poultry birds
- 3 persons received honeybee boxes
- One Farmers' Producer Organisation (FPO) got registered.
- 4 Gramin Bazar events organised to enable local producers to sell their products directly to consumers

Employee involvement programs

- Implementation of four social volunteering projects going on. 45 employees of GKEL are actively involved in the projects.
- Employees and associates of GKEL contributed Rs. 17.91 lakhs to Daan Utsav and benefitted more than 3000 people.

E. Highlights of CSR activities around GKEL in the year 2024-25. (April,24 to Dec,24)

Infrastructure development work:

- Construction of CC Road from Lunikhia Tangar Sahi to Damol GP Office Length 350M
- Construction of Dola Mandap Achalkote CSR WORK
- Construction of Mahima Prayer Hall in Durgapur
- Renovation & Improvement of Durga Mandir Kamalanga
- Construction of Yang Mandap Durgapur

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- Construction of Gopal Sahi Pala Mandap Mangalpur
- Common prayer Hall near Sani Temple Mandap Kantabania
- Construction of Meeting Cum Rest Room for Senior Citizen
- Construction of Kshatriya Sahi Ladies Community Centre
- Implementation of 5S at Meramundli -B 400KV substation
- Installation of LED street light in Kamalanga Village
- Construction of Community Centre Kaliataila (600 SFT)
- Construction of CC Road from Rugudi Sahi to Canal. (100Mtr)
- Supply and Installation of 65" size smart board in class rooms with its operating hardware & software. (3 sets) DAV School
- Toilet Complex in Saraswati Sishu Mandir in Mangalpur
- Supply and Installation of Outdoor Gym Equipment.

EDUCATION:

- Working with 10 Govt. schools and 16 Anganwadi impacting 2000 number of children.
- Scholarship to 20 students and Computer education for girls on 6 month DAC course have encouraged girls to study for getting higher knowledge.
- School fees concession to students belong to project affected families increased the strength of students in DAV school
- Engaged 12 support teachers (Vidya Volunteers) for primary class students of 8 Government schools.
- Volunteers conduct three after school learning classes for class 9th and 10th students
- One mini science center started in Kamalanga high school

HEALTH:

- Telemedicine program benefits about 60 patients every month and MMU benefits about 900 patients every month.
- Reimbursement of health treatment expenses of 5.26 lakhs and 2.6 lakhs respectively provided to 59 project affected persons last year and 27 persons this year so far.
- Community Level Yoga class continue for women
- Nutritious food support provided to about 50 pregnant and lactating mothers

Livelihood:

- Support provided for Farm based livelihood like introduction of high yielding variety of paddy, Use of Nano Urea, Nano DAP, honey bee keeping, mushroom farming, fish farming, poultry layer bird keeping.
- Support provided for micro enterprise development by men and women entrepreneurs.
- Establishment of a Farmers' Producer Company.
- Set up of 1 paper plate making machines.

EMPLOYEE ENGAGEMENT:

- In FY 20-21 for Daan Utsav employees and contractors donated Rs.10.76 lakhs, in FY 21-22 donated Rs.15.95 lakhs, in FY 22-23 donated 16.96 lakhs, in 23-24 donated 17.91 lakhs and in FY 24-25 donated Rs,24.44 lakhs.
- More than 20 SVPs implemented by GKEL employees in last 5 years.

GMR KAMALANGA ENERGY LTD.

Annexure-XV

Cumulative plantation details rom 2011 to till date		
Tree plantation	Nos. of Tree planted	Species
FY: 2011-12	25000	Karanj , Teak, Peltophorum (Radhachuda), Akoshmone, Neem, Kassod (Rani chakkunda) , Shisham, Jamun, Bodom, Gamhar, Imali, Kadamb, Siris, Cheeku, Guava, Amrud, Amlatas, Maulsari, Ashok (Sita Ashok, Indian Cork Tree, White Cheesewood, Spathodea, Trumpet Tree, Bougainvillea, Krishna-chura, Guleturo, Kachnar, Kavior, Murraya (Marchula) Thevetia, kaner, Arjuna, Kachnar species, Mango, Rain tree, Acacia Species, Simarouba tree, Mahagani, Lemon, , Mosambi, Jamrul, Kamrakh, Pomagranate, Pitronjova, Karavir, pink siris, Sajana, Jack fruit, Ber etc.
FY: 2012-13	25000	
FY: 2013-14	43000	
FY: 2014-15	85134	
FY: 2015-16	50157	
FY: 2016-17	46441	
FY: 2017-18	43633	
FY: 2018-19	40350	
FY: 2019-20	24080	
FY: 2020-21	7213	
FY: 2021-22	2342	
FY: 2022-23	2958	
FY: 2023-24	2360	
FY: 2024-25	1435	
Total	**399103**	

GMR KAMALANGA ENERGY LTD.

Annexure-XVI

GMR Energy

GMR Kamalanga Energy Limited

GMR

Administration Office:
H/6 - 28, Gangadhar Meher Marg
Jaydev Vihar
Bhubaneswar 751 013
T +91-0674-2303995
F +91-0674-2303994
W www.gmrgroup.in

Ref.No. –GKEL/OSPCB/GKEL/13-14/3164
Dated - 31.07.2013

To
The Sr. Environment Engineer (C)
State Pollution Control Board, Odisha
(Deptt. of Forest & Environment, Govt. of Odisha)
Paribesh Bhavan, A/118, Nilakantha Nagar, Unit-VIII,
Bhubaneswar, Odisha – 751 012

Sub : Environment Management Cell in the industry – Regarding.
Ref : Your office letter no – 13020/ Ind – I – Con – 1402 dated 17.07.2013 received by us on 29.07.2013

Dear Sir,

With reference to the above subject and letter cited above, we are enclosing herewith the updated status of environment management cell of our thermal power plant for your kind information and perusal please.

Kindly acknowledge receipt of the same.

Thanking you,

Yours sincerely,
for GMR Kamalanga Energy Limited

(S.Nageswara Rao)
Associate Vice President & Project Head

Encls. : Status of Environment Management Cell (Six pages)

GMR KAMALANGA ENERGY LTD.

Regd. Office:
25/1, Skip House, Museum Road,
Bangalore-560 025
Site Office:
PO. Kamalanga, Via Meramundali,
P.S. Bhusana, Tahasil, Dhenkanal
Dist. Dhenkanal 759121, Orissa

STATUS OF ENVIRONMENTAL MANAGEMENT CELL IN M/S GMR KAMALANGA ENERGY LIMITED.

A. Total investment made for the factory:Rs.4100.00 Cr

Investment made on installation of pollution control measures: Rs.125 Cr

Recurring expenses on environmental protection (Per Annum): 1.06Cr

B. Details of persons available in the Cell:

Sl No	Name of the persons	Designation	Duty assigned	Mobil No/Email	Qualification	Experience
01	Susanta Sahoo	AGM - EHS	EHS	07894420913 susanta.sahoo@gmrgroup.in	B.Tech (Mechanical) + Diploma in Env. Management. + Diploma in Industrial Safety	19 Year
02	Chittaranjan Mahali	Manager-EHS	Environment. Conditions Compliance.	09178462822 chittaranjan.mahali@gmrgroup.in	B.Tech (Mechanical) + Post Diploma in Industrial Safety.	13 Years.
03	Sangram Dhal	Manager-Chemist	Lab In-charge	09777580328 Sangram.dhal@gmrgroup.in	B.Sc.(Chemistry) + M.Sc. (Pollution Control)	21 Years.
04	Shyamalendu Mohapatra	Associate Manager (Horticulture)	Plantation /Green belt Development	07894471103 Shyamalendu.Mohapatra@gmrgroup.in	B.Sc.(Ag) +M.sc (Horticulture)	07 years
05	Subash Rout	Co-ordinator (Chemist)	Water Lab	07894450366	B.Sc. (Chemistry)	05 Years
06	Jayakumar T.	Sr. Co-ordinator (Chemist)	Air Lab	07894471096	B.Sc (Chemistry)	11 Years

GMR KAMALANGA ENERGY LTD.

C. Pollution control management during night hours:

Sl No	Name of the Persons	Designation	Mobil No/Email
01	Chittaranjan Mahali	Manager (EHS)	09178462822 chittaranjan.mahali@gmrgroup.in
02	Sangram Dhal	Manager-Chemist	09777580328 Sangram.dhal@gmrgroup.in

D. Laboratory facility building infrastructure if any:

a. Building /infrastructure (Sq.ft) :8000 Sq.ft.

b. Parameters analysed critical parameters of air and water:- pH, Suspended solids, Total dissolved solids & Total suspended solid (TDS & TSS),Dissolved oxygen (DO),Chemical oxygen demand (COD),Biochemical oxygen demand (BOD),Sulphide ,Residual free chlorine, Oil and grease, Total ammonical nitrogen (NH3-N),Bacteriological contamination ,PM 10, PM 2.5, Sulphur dioxide (SO2) (µg/m3), Oxides of Nitrogen (NOx) (µg /m3), Carbon monoxide (CO) (mg).

GMR KAMALANGA ENERGY LTD.

c. Name of the equipment's:

Sl No	Name of Equipment	Unit	Quantity
1	Electrical anemograph	Set	1
2	Dew Point Meter.	Set	1
3	Rain Gauge.	Set	1
4	Mercury Barometer.	Set	1
5	Maximum & Minimum Thermometer.	Set	1
	Hygrometer.	Set	
6	Dry &Wet Bulb Thermometer.	Set	1
7	High Volume Sampler.	Set	1
8	Stack Monitoring Kit.	Set	1
9	Ion Activity Meter.	Set	1
10	COD Measure instrument.	Set	1
11	Biochemical incubator.	Set	1
12	BOD measuring instrument.	Set	1

GMR KAMALANGA ENERGY LTD.

13	Sound level meter.	Set	1
14	Redundant/ total chlorine Meter.	Set	1
15	Electromagnetic radiation detector.	Set	1

d. Accreditation if any: Action is being incited for accreditation from competent authority.

e. Frequency of sample collection and analysis

   i. Water: Thrice in a Month.
   ii. Air: Daily (on line monitoring system)
   iii. Stack: Air: Daily (on line monitoring system)

f. Monitoring done by 3rd party if any:

Name of the 3rd party	Parameter analyzed	Frequency of Monitoring
S. S. Environics (India) Pvt. Ltd.	**For Water & waste water analysis** pH DO (Minimum) Chloride Total Dissolved Solids Suspended Solids* Oil & Grease BOD (3) days at 270C Arsenic as As Lead as Pb Cadmium as Cd	Thrice in a Month

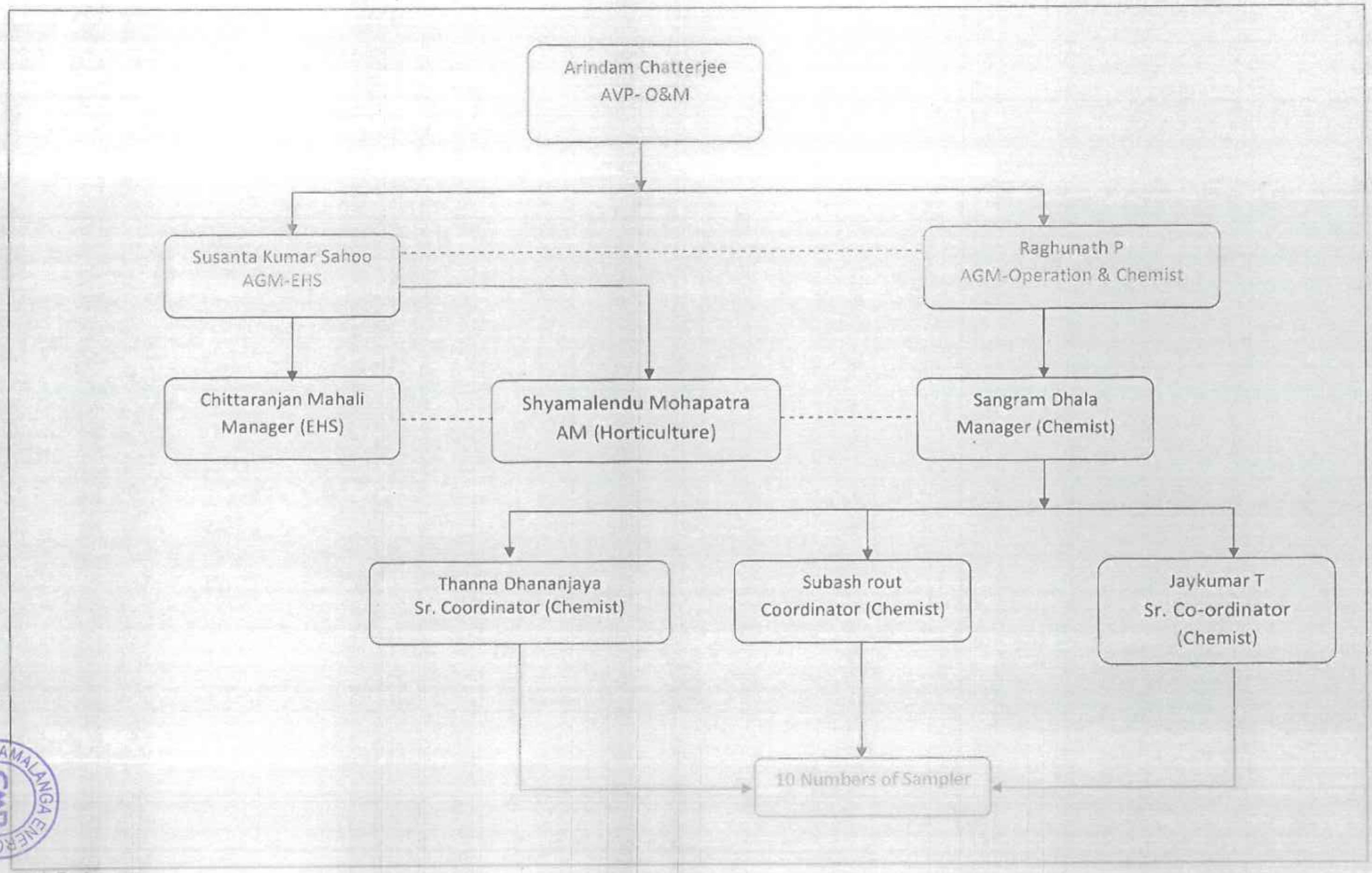
GMR KAMALANGA ENERGY LTD.

	Hexavalent Chromium as Cr +6 Copper as Cu Zinc as Zn Selenium as Se Cyanide as CN Fluoride as F Sulphates (SO4) Phenolic Compounds as C6H5OH Iron as Fe Nitrate as NO3	
	For AAQ Monitoring: PM 10 (particulate Matter size <10 microns)(µg/m3) PM 2.5 (particulate Matter size <2.5 microns)(µg/m3) Sulphur dioxide (SO2)(µg/m3) Oxides of Nitrogen (NOx) (µg /m3) Carbon monoxide (CO) (mg/m3)	Weekly 5 days.

E. Reporting system of the Environment Management cell (please enclose Organization Chart)

GMR KAMALANGA ENERGY LTD.

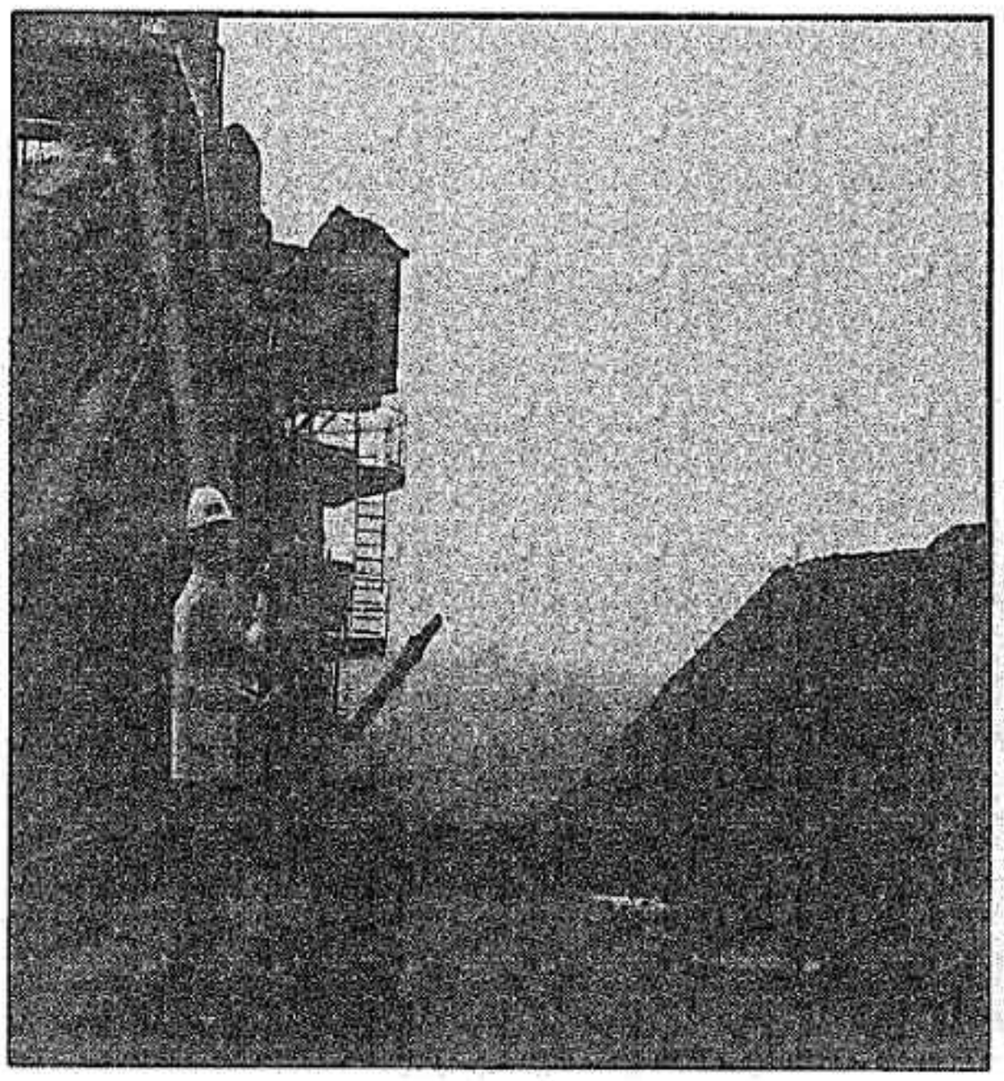
ORGANIS TION CHART OF ENVIRONMENT MANAG MENT CELL



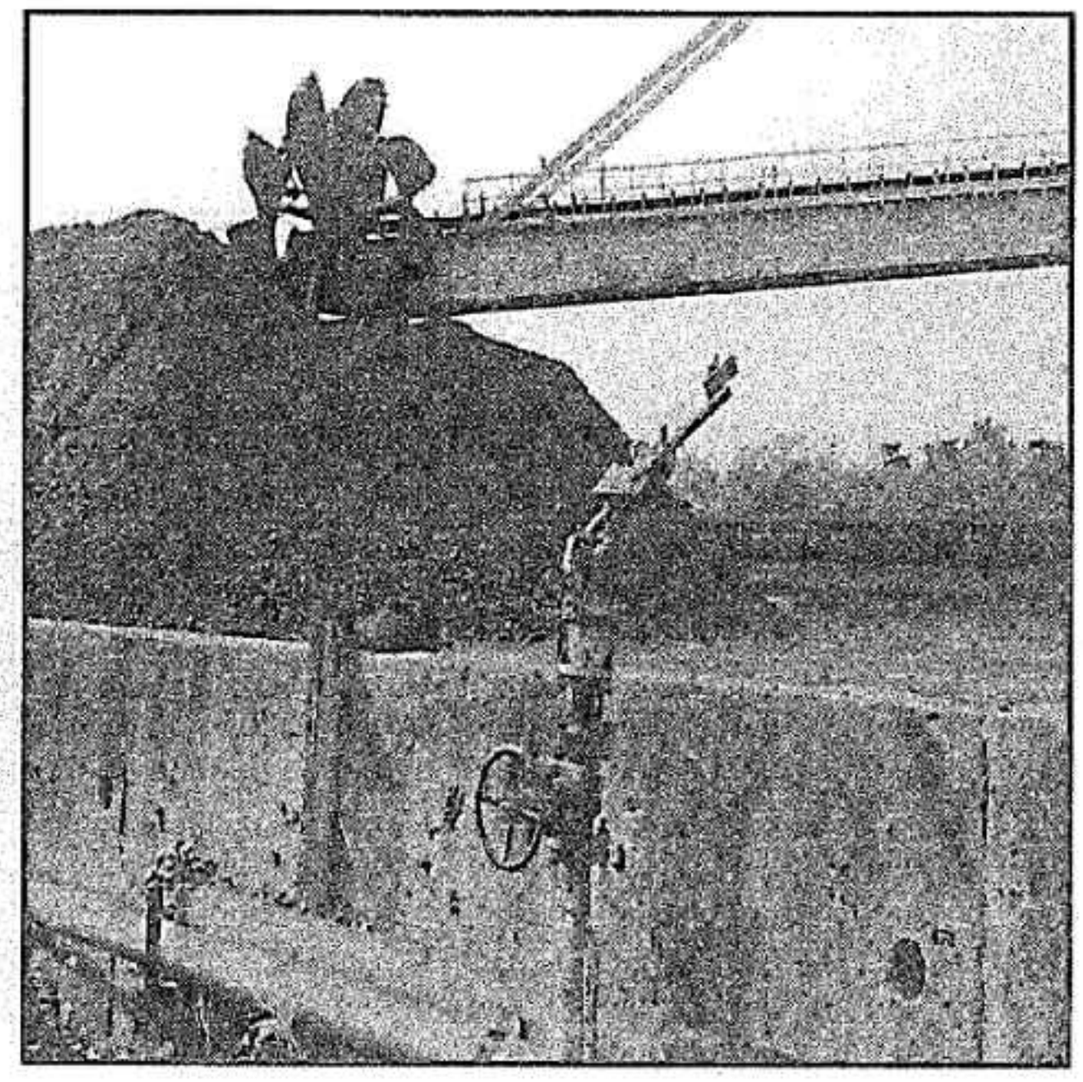
GMR KAMALANGA ENERGY LTD.

Annexure-XVII

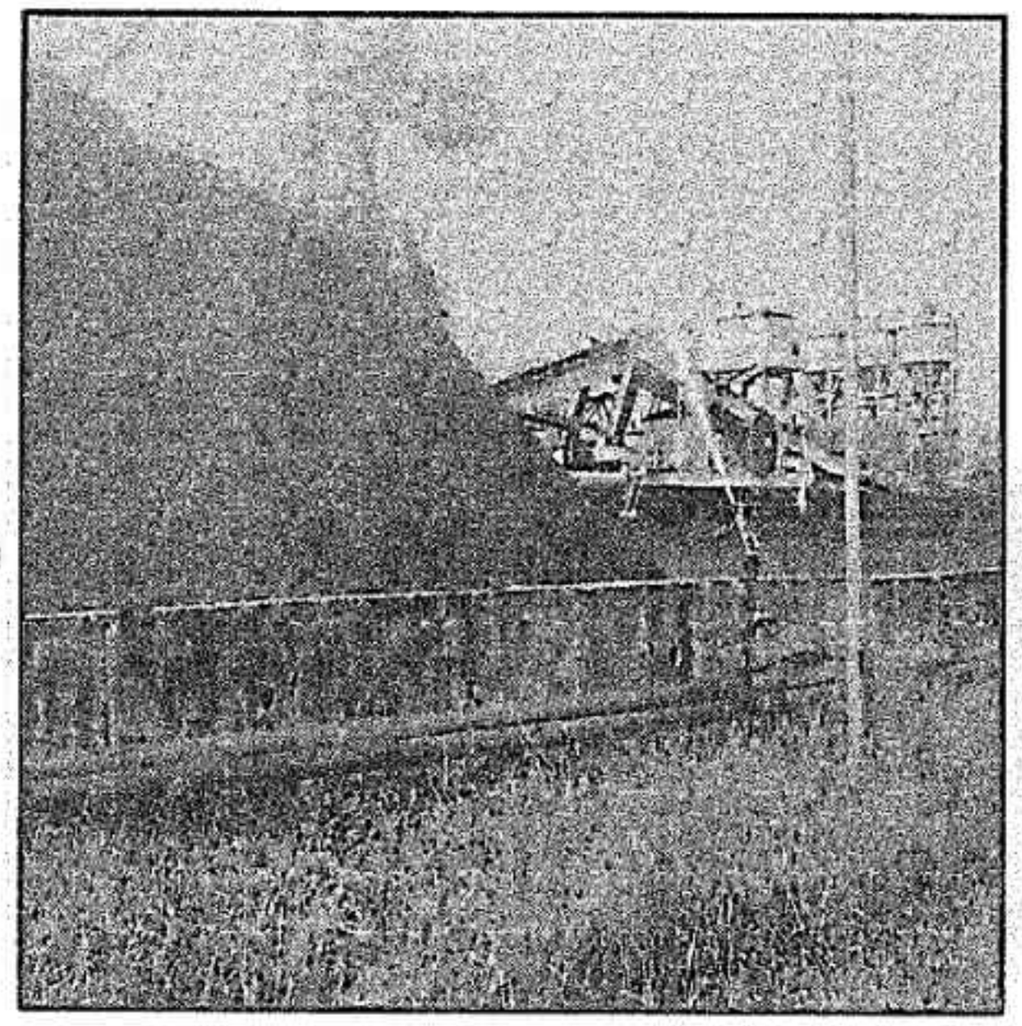
Fire Fighting equipment at Coal pile/stock yard



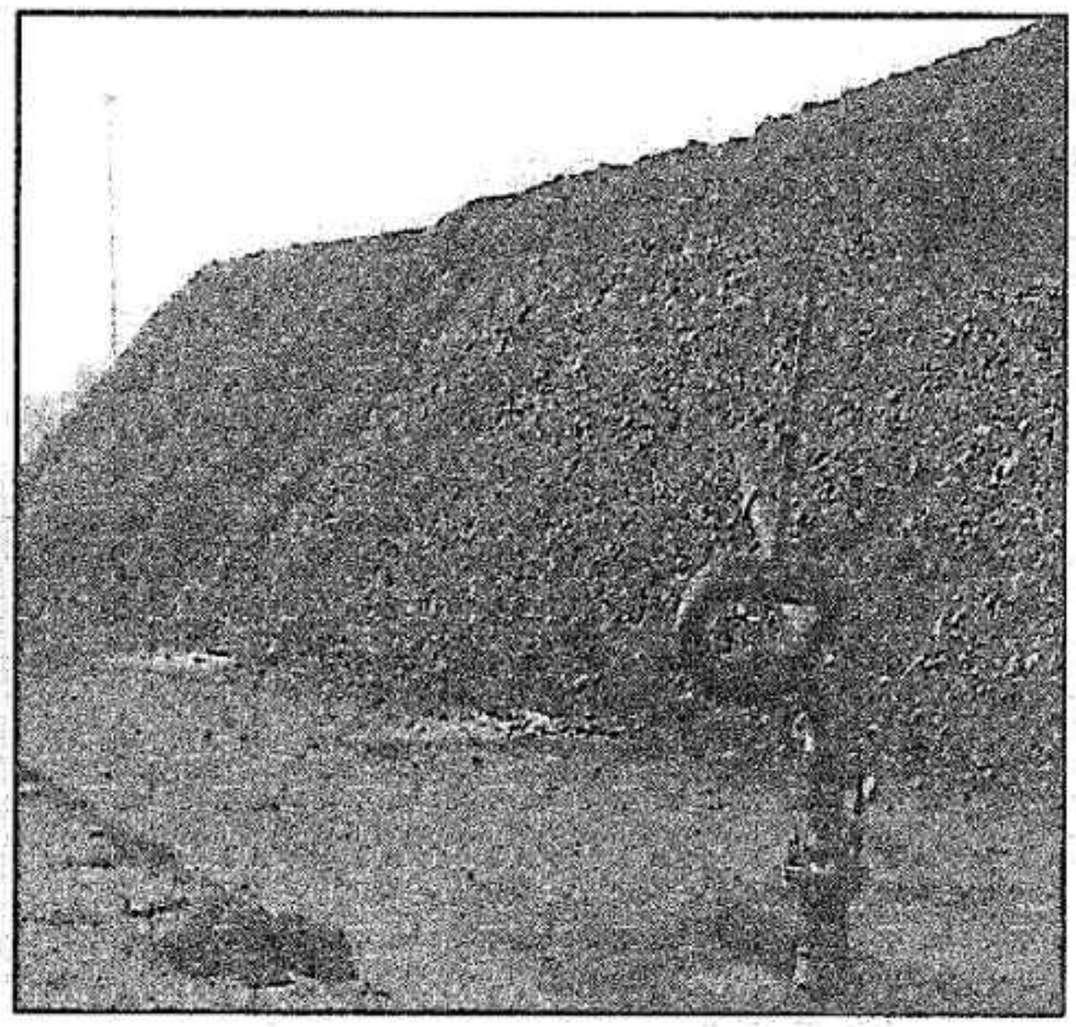
Fire Monitor point



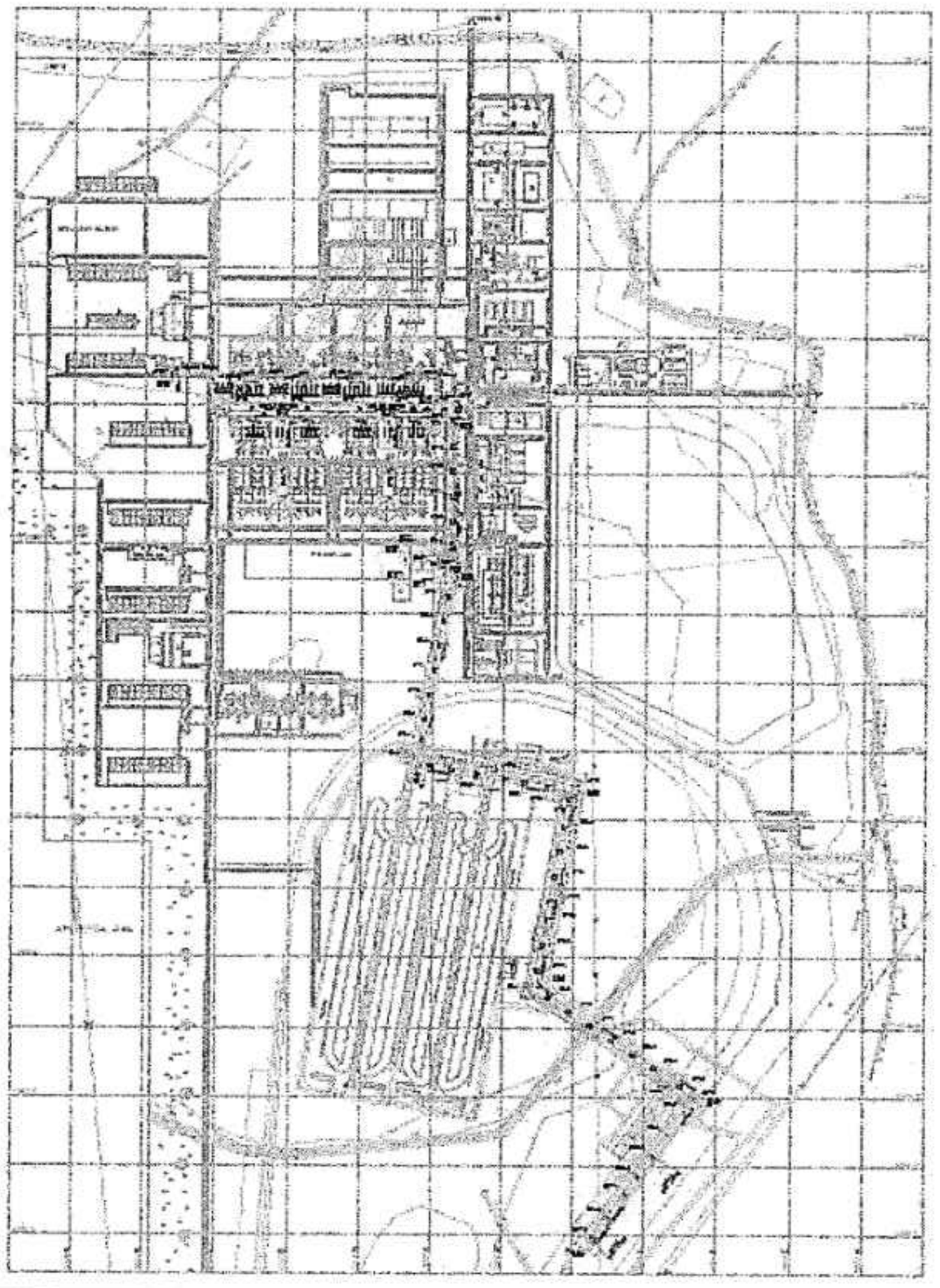
Fire rain gun

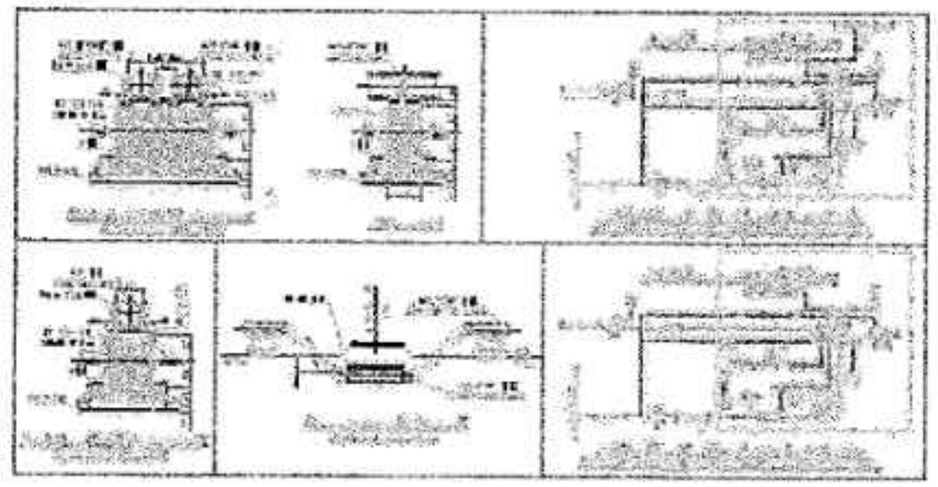


Rain gun (100 mtr length)



Moveable Fire monitor points(360°)





PROJECT	ADDITIONAL KAMALANGA THERMAL POWER PLANT
OWNER	GMR KAMALANGA ENERGY LIMITED
TITLE	FIRE DETECTION AND PROTECTION SYSTEM

Annexure-XVIII

भारत सरकार
Government of India
वाणिज्य और उद्योग मंत्रालय
Ministry of Commerce & Industry
पेट्रोलियम तथा विस्फोटक सुरक्षा संगठन (पेसो)
Petroleum & Explosives Safety Organisation (PESO)
पांचवा तल, ए-ब्लॉक, सी.जी.ओ.कॉम्प्लेक्स, सेमिनरी हिल्स
नागपुर- 440006
5th Floor, A-Block, CGO Complex, Seminary Hills,
Nagpur - 440006

स्पीड पोस्ट
SPEED POST

E-mail : explosives@explosives.gov.in
Phone/Fax No : 0712 -2510248, Fax-2510577

संख्या /No. : P/HQ/OR/15/1135 (P280320)

दिनांक /Dated : 04/10/2016

5 OCT 2016

सेवा में /To,

M/s GMR Kamalanga Energy Ltd,
Kamalaanga Dhenkanal,
DHENKANAL,
DHENKANAL,
District: DHENKANAL,
State: Odisha
PIN: 759121

विषय /Sub : Plot No, 4259,4288,4254,4260 Sr.No.40,257,1102,1322,1459, NA, Kamalanga, District: DHENKANAL, State: Odisha, PIN: 759121 में स्थित विद्यमान पेट्रोलियम वर्ग C अधिष्ठापन में अनुज्ञप्ति सं P/HQ/OR/15/1135 (P280320) के नवीकरण के संदर्भ में ।
Existing Petroleum Class C Installation at Plot No, 4259,4288,4254,4260 Sr.No.40,257,1102,1322,1459, NA, Kamalanga, District: DHENKANAL, State: Odisha, PIN: 759121 - Licence No. P/HQ/OR/15/1135 (P280320) - Renewal regarding.

महोदय /Sir (s),

कृपया आपके पत्र क्रमांक NIL दिनांक 26/09/2016 का अवलोकन करें ।
Please refer to your letter No.: NIL, dated 26/09/2016

अनुज्ञप्ति संख्या P/HQ/OR/15/1135 (P280320) दिनांक 22/06/2012 को दिनांक 31/12/2026 तक नवीनीकृत कर इस पत्र के साथ अग्रषित की जा रही है ।
Licence No. P/HQ/OR/15/1135 (P280320) dated 22/06/2012 is forwarded herewith duly renewed upto 31/12/2026.

कृपया पेट्रोलियम नियम 2002 के अधीन बनाए गए नियम 148 में दी गई प्रक्रिया का कडाई से पालन करें । अनुज्ञप्ति के नवीकरण हेतु समस्त दस्तावेजों को अनुज्ञप्ति की वैधता समाप्त होने की तिथि से कम से कम 30 दिन पूर्व Dy. Chief Controller of Explosives, Bhubaneswar कार्यालय को प्रेषित करें ।
Please follow the procedure strictly as laid down in rule 148 of the Petroleum Rules, 2002 and submit complete documents for the Renewal of the licence to Dy. Chief Controller of Explosives, Bhubaneswar, so as to reach his office on or before the date on which Licence expires.

कृपया पावती दें।
Please acknowledge the receipt.

भवदीय /Yours faithfully,

((डा.एस.एम.मन्नन)
(Dr. S. M. Mannan))
विस्फोटक नियंत्रक
Controller of Explosives
कृते मुख्य विस्फोटक नियंत्रक
For Chief Controller of Explosives
नागपुर
Nagpur

(अधिक जानकारी जैसे आवेदन की स्थिति, शुल्क तथा अन्य विवरण के लिए हमारी वेबसाइट : http://peso.gov.in देखें)
(For more information regarding status,fees and other details please visit our website: http://peso.gov.in)

GMR KAMALANGA ENERGY LTD.

1088

प्ररूप XV
(प्रथम अनुसूची का अनुच्छेद 6 देखिए)
FORM XV
(see Article 6 of the First Schedule)

अधिष्ठापनों में पेट्रोलियम के आयात और भंडारकरण के लिए अनुज्ञप्ति
LICENCE TO IMPORT AND STORE PETROLEUM IN AN INSTALLATION

अनुज्ञप्ति सं. (Licence No.) : **P/HQ/OR/15/1135(P280320)**

फीस रूपए (Fee Rs.) **15000/-** per year

M/s GMR Kamalanga Energy Ltd, Kamalaanga Dhenkanal, DHENKANAL, DHENKANAL, District: DHENKANAL, State: Odisha, PIN: 759121 को केवल इसमें यथा विनिर्दिष्टु वर्ग और मात्राओं में पेट्रोलियम **3500.00 KL** आयात करने के लिए और उसका, नीचे वर्णित और अनुमोदित नक्शा संख्या **P/HQ/OR/15/1135(P280320)** तारीख **10/09/2013** जो कि इससे उपाबद्ध हैं, में दिखाए गए स्थान पर भण्डारकरण के लिए पेट्रोलियम अधिनियम, 1934 के उपबंधों या उसके अधीन बनाए गए नियमों तथा इस अनुज्ञप्ति की अतिरिक्त शर्तों के अधीन रहते हुए, यह अनुज्ञप्ति अनुदत्त की जाती हैं ।

Licence is hereby granted to **M/s GMR Kamalanga Energy Ltd, Kamalaanga Dhenkanal, DHENKANAL, DHENKANAL, District: DHENKANAL, State: Odisha, PIN: 759121** valid only for the importation and storage of **3500.00 KL** Petroleum of the class and quantities as herein specified and storage thereof in the place described below and shown on the approved plan No **P/HQ/OR/15/1135(P280320)** dated **10/09/2013** attached hereto subject to the provisions of the Petroleum Act, 1934 and the rule made thereunder and to the further conditions of this Licence.

यह अनुज्ञप्ति **31st day of December 2026** तक प्रवृत रहेगी ।
The Licence shall remain in force till the **31st day of December 2026**

पेट्रोलियम का विवरण /Description of Petroleum	अनुज्ञप्त मात्रा (किलोलीटरों में) /Quantity licenced in KL
वर्ग क प्रपुंज पेट्रोलियम /Petroleum Class A in bulk	**NIL**
वर्ग क प्रपुंज पेट्रोलियम से भिन्न /Petroleum Class A, otherwise than in bulk	**NIL**
वर्ग ख प्रपुंज पेट्रोलियम /Petroleum Class B in bulk	**NIL**
वर्ग ख प्रपुंज पेट्रोलियम से भिन्न /Petroleum Class B, otherwise than in bulk	**NIL**
वर्ग ग प्रपुंज पेट्रोलियम /Petroleum Class C in bulk	**3500.00 KL**
वर्ग ग प्रपुंज पेट्रोलियम से भिन्न /Petroleum Class C,otherwise than in bulk	**NIL**
कुल क्षमता /Total Capacity	**3500.00 KL**

June 22, 2012

For Chief Controller of Explosives
HQ, Nagpur

अनुज्ञप्त परिसरों का विवरण और अवस्थान
DESCRIPTION AND LOCATION OF THE LICENSED PREMISES

अनुज्ञप्त परिसर जिसकी विन्यास सीमाएं अन्य विशिष्टयां संलग्न अनुमोदित नक्शों में दिखाई गई हैं **Plot No: 4259,4288,4254,4260 Sr.No.40,257,1102,1322,1459, NA, Kamalanga, District: DHENKANAL, State: Odisha, PIN: 759121** स्थान पर अवस्थित है तथा उसमें निम्नलिखित **Four aboveground petroleum storage tanks of class C together withother connected facilities** सम्मिलित हैं ।

The licensed premises, the layout , boundaries and other particulars of which are shown in the attached approved plan are situated at **Plot No: 4259,4288,4254,4260 Sr.No.40,257,1102,1322,1459, NA, Kamalanga, District: DHENKANAL, State: Odisha, PIN: 759121** and consists of **Four aboveground petroleum storage tanks of class C together withother connected facilities** together with connected facilities.

GMR KAMALANGA ENERGY LTD.

Annexure-XIX

GMR Kamalanga Energy Limited

Plant Office:
AT/PO: Kamalanga, PS: Kantabania,
VIA: Meramundali,
DIST: Dhenkanal - 759 121, Odisha
CIN U40101KA2007PLC044809
T +91 6762 663564
W www.gmrgroup.in

14-09/24

Ref. No. GKEL/MoEF&CC/2024-25/8467
Dated – 21.10.2024

To
The Director
Ministry of Environment Forest & Climate Change, Govt. of India,
Regional Office, A/3, Chandrasekharpur,
Bhubaneswar – 751023, Odisha.

Sub: Quarterly AAQ Monitoring Report (Q - 2) 2024-25.
Ref: EC vide letter no J-13011/64/2007-IA II (T) dated 05.02.2008.

Dear Sir,

In compliance to the EC condition regarding the above subject, we are submitting herewith the ambient air quality report of impact zone (both core & buffer zone) for Q – 2, FY 2024-25.

Kindly acknowledge receipt of the same.

Thanking you,

Yours sincerely,
for **GMR Kamalanga Energy Limited,**

Manoj Mishra
Plant Head

Encl. – As above

GMR KAMALANGA ENERGY LTD.

Registered Office:
Skip House, 25/1, Museum Road,
Bengaluru - 560 025

Visiontek Consultancy Services Pvt. Ltd.

(Committed For Better Environment)

Certified for : ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

Accredited by : NABET-A Grade, MOEF & CC/CPCB & SPCB-A Grade

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- Water Resource Management
- Environmental & Social Study
- Surface & Sub-Surface Investigation
- Quality Control & Project Management
- Renewable Energy
- Agricultural Development
- Information Technology
- Public Health Engineering
- Mine Planning & Design
- Mineral/Sub-Soil Exploration
- Waste Management Services

Laboratory Services
Environment Lab
Food Lab
Material Lab
Soil Lab
Mineral Lab
&
Microbiology Lab

Ref: Envlab/24-25/TR- 08477 *Date:*05.08.2024

AMBIENT AIR QUALITY MONITORING REPORT FOR July-2024 (CORE ZONE)

1. Name of the Industry : **M/s GMR Kamalanga Energy Ltd, Dhenkanal**
2. Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer,VOC Sampler
3. Sampling Location : **AAQMS-1: Near Rain Water pump House Pit**
4. Sample Collected By : VCSPL Representative in presence of Client's Representative

Date	PARAMETERS											
	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO (mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)
01.07.2024	53.8	28.1	14.7	26.3	9.6	0.55	22.5	BDL	BDL	BDL	BDL	BDL
04.07.2024	50.7	27.2	15.5	25.9	10.6	0.68	21.5	BDL	BDL	BDL	BDL	BDL
08.07.2024	49.7	26.6	14.0	24.9	10.5	0.59	23.2	BDL	BDL	BDL	BDL	BDL
11.07.2024	54.5	29.4	15.7	26.1	10.4	0.53	BDL	BDL	BDL	BDL	BDL	BDL
15.07.2024	51.8	28.4	14.2	25.6	10.5	0.62	24.4	BDL	BDL	BDL	BDL	BDL
18.07.2024	50.4	27.3	14.8	23.8	9.6	0.52	BDL	BDL	BDL	BDL	BDL	BDL
22.07.20.24	50.7	27.3	14.7	22.1	10.2	0.62	23.2	BDL	BDL	BDL	BDL	BDL
25.07.2024	50.5	26.2	15.5	21.4	10.8	0.67	23.1	BDL	BDL	BDL	BDL	BDL
Monthly Average	51.5	27.6	14.9	24.5	10.3	0.59	23.0	BDL	BDL	BDL	BDL	BDL
CPCB, New Delhi AAQ Standard	100	60	80	80	100	4	400	1	20	6	5	1
TEST METHOD	Gravimetric IS 5182: Part 23	Gravimetric EPA 1998	Improved West & Geake Method S 5182 (Part 2) RA2017	Modified Jacob &Hochheiser Method IS 5182 (Part-6) RA2017	Chemical Method Air Sampling , 3rd Edn.By James P. Lodge Method-411	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling , 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182(Part -22):2004			Gas Chromatography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

BDL Values:SO_2< 4 $\mu g/m^3$, NO_X< 6 $\mu g/m^3$,O_3<5 $\mu g/m^3$, NH_3<20 $\mu g/m^3$,Ni<0.01 ng/m^3, As < 0.001 ng/m^3, C_6H_6<0.001 $\mu g/m^3$, BaP<0.002 ng/m^3, Pb<0.001 $\mu g/m^3$, CO-<0.1 mg/m^3

Reviewed by

Approved by

GMR KAMALANGA ENERGY LTD.

Plot No.- M-22 & 23, Chandaka Industrial Estate, Patia, Bhubaneswar, Khurda, Odisha-751024, India Tel.: 0674-3511721
E-mail: visiontek@visiontek.org, visiontekin@gmail.com
Visit us at: www.visiontek.org

Visiontek Consultancy Services Pvt. Ltd.

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- Quality Control & Project Management
- Renewable Energy
- Agricultural Development
- Information Technology
- Public Health Engineering
- Mine Planning & Design
- Mineral/Sub-Soil Exploration
- Waste Management Services

Laboratory Services
Environment Lab
Food Lab
Material Lab
Soil Lab
Mineral Lab
&
Microbiology Lab

Ref: Envlab/24-25/TR- 08478 *Date:* 05.08.2024

AMBIENT AIR QUALITY MONITORING REPORT FOR JULY-2024 (CORE ZONE)

1. Name of the Industry : **M/s GMR Kamalanga Energy Ltd, Dhenkanal**
2. Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer, VOC Sample
3. Sampling Location : **AAQMS-2: Near Security Watch Tower - 3**
4. Sample Collected By : VCSPL Representative in presence of Client's Representative

Date	PARAMETERS											
	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO (mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)
01.07.2024	51.2	29.8	14.2	24.8	10.2	0.54	BDL	BDL	BDL	BDL	BDL	BDL
04.07.2024	51.5	31.2	14.6	22.5	9.8	0.55	22.3	BDL	BDL	BDL	BDL	BDL
08.07.2024	52.2	32.8	14.4	22.5	9.9	0.64	22.5	BDL	BDL	BDL	BDL	BDL
11.07.2024	51.5	28.5	14.6	22.3	10.6	0.55	22.6	BDL	BDL	BDL	BDL	BDL
15.07.2024	49.9	29.0	15.2	23.4	10.4	0.62	BDL	BDL	BDL	BDL	BDL	BDL
18.07.2024	51.1	28.6	15.3	24.9	10.3	0.67	23.8	BDL	BDL	BDL	BDL	BDL
22.07.20.24	53.2	28.1	16.4	21.7	10.5	0.6	23.7	BDL	BDL	BDL	BDL	BDL
25.07.2024	50.5	25.2	14.6	23.1	10.6	0.52	25.5	BDL	BDL	BDL	BDL	BDL
Monthly Average	51.4	29.1	14.9	23.2	10.3	0.58	23.4	BDL	BDL	BDL	BDL	BDL
CPCB, New Delhi AAQ Standard	100	60	80	80	100	4	400	1	20	6	5	1
TEST METHOD	Gravimetric IS 5182: Part 23	Gravimetric EPA 1998	Improved West & Geake Method IS 5182 (Part-2) RA2017	Modified Jacob &Hochheiser Method IS 5182 (Part-6) RA2017	Chemical Method Air Sampling , 3rd Edn.By James P. Lodge (Method-411)	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling , 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182(Part -22):2004			Gas Chromatography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

BDL Values: SO_2< 4 $\mu g/m^3$, NO_X< 6 $\mu g/m^3$, O_3<5 $\mu g/m^3$, NH_3<20 $\mu g/m^3$, Ni<0.01 ng/m^3, As < 0.001 ng/m^3, C_6H_6<0.001 $\mu g/m^3$, BaP<0.002 ng/m^3, Pb<0.001 $\mu g/m^3$, CO-<0.1 mg/m^3

Reviewed by

Approved by

GMR KAMALANGA ENERGY LTD.

Plot No.- M-22 & 23, Chandaka Industrial Estate, Patia, Bhubaneswar, Khurda, Odisha-751024, India Tel.: 0674-3511721
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- Information Technology
- Public Health Engineering
- Mine Planning & Design
- Mineral/Sub-Soil Exploration
- Waste Management Services

Laboratory Services
Environment Lab
Food Lab
Material Lab
Soil Lab
Mineral Lab
&
Microbiology Lab

Ref: Envlab/24-25/TR- 08479 *Date:* 05.08.2024

AMBIENT AIR QUALITY MONITORING REPORT FOR July -2024 (CORE ZONE)

1. Name of the Industry : **M/s GMR Kamalanga Energy Ltd, Dhenkanal**
2. Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer,VOC Sampler
3. Sampling Location : **AAQMS-3: Near Budhapanka Material Gate(Security Watch Tower No.1)**
4. Sample Collected By : VCSPL Representative in presence of Client's Representative

Date	PARAMETERS											
	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO (mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)
01.07.2024	54.4	29.5	16.8	24.6	9.8	0.64	23.4	BDL	BDL	BDL	BDL	BDL
04.07.2024	53.4	28.3	15.9	24.6	10.1	0.68	23.2	BDL	BDL	BDL	BDL	BDL
08.07.2024	54.0	30.7	15.5	24.3	9.6	0.65	22.2	BDL	BDL	BDL	BDL	BDL
11.07.2024	53.4	28.8	15.6	25.5	10.4	0.57	BDL	BDL	BDL	BDL	BDL	BDL
15.07.2024	53.2	28.5	17.3	24.9	10.4	0.61	24.4	BDL	BDL	BDL	BDL	BDL
18.07.2024	53.7	28.5	16.4	24.8	10.6	0.65	BDL	BDL	BDL	BDL	BDL	BDL
22.07.20.24	51.6	28.1	16.1	23.1	10.1	0.55	23.8	BDL	BDL	BDL	BDL	BDL
25.07.2024	50.9	28.8	15.8	25.3	9.8	0.53	BDL	BDL	BDL	BDL	BDL	BDL
Monthly Average	53.1	28.9	16.2	24.6	10.1	0.61	23.4	BDL	BDL	BDL	BDL	BDL
CPCB, New Delhi AAQ Standard	100	60	80	80	100	4	400	1	20	6	5	1
TEST METHOD	Gravimetric IS 5182: Part 23	Gravimetric EPA 1998	Improved West & Geake Method IS 5182 (Part-2) RA2017	Modified Jacob &Hochheiser Method IS 5182 (Part-6) RA2017	Chemical Method Air Sampling , 3rd Edn.By James P. Lodge Method-411	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling , 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182(Part -22):2004			Gas Chromatography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

BDL Values: SO_2< 4 $\mu g/m^3$, NO_X< 6 $\mu g/m^3$, O_3<5 $\mu g/m^3$, NH_3<20 $\mu g/m^3$, Ni<0.01 ng/m^3, As < 0.001 ng/m^3, C_6H_6<0.001 $\mu g/m^3$, BaP<0.002 ng/m^3, Pb<0.001 $\mu g/m^3$, CO-<0.1 mg/m^3

Reviewed by

Approved by

GMR KAMALANGA ENERGY LTD.

Plot No.- M-22 & 23, Chandaka Industrial Estate, Patia, Bhubaneswar, Khurda, Odisha-751024, India Tel.: 0674-3511721
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- Water Resource Management
- Environmental & Social Study
- Surface & Sub-Surface Investigation
- Quality Control & Project Management
- Renewable Energy
- Agricultural Development
- Information Technology
- Public Health Engineering
- Mine Planning & Design
- Mineral/Sub-Soil Exploration
- Waste Management Services

Laboratory Services
Environment Lab
Food Lab
Material Lab
Soil Lab
Mineral Lab
&
Microbiology Lab

Ref: Envlab/24-25/TR- 08480 *Date:* 05.08.2024

AMBIENT AIR QUALITY MONITORING REPORT FOR JULY -2024 (BUFFER ZONE)

1. Name of the Industry : **M/s GMR Kamalanga Energy Ltd, Dhenkanal**
2. Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer,VOC Sampler
3. Sample Collected By : VCSPL Representative in presence of Client's Representative

Location Name	Date	PARAMETERS											
		PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO (mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)
AAQMS1: Kamalanga (Township)	22.07.2024	53.5	28.9	15.5	26.8	7.8	0.52	21.5	BDL	BDL	BDL	BDL	BDL
AAQMS-2: Mangalpur	23.07.2024	53.5	29.6	16.2	17.2	8.6	0.62	24.5	BDL	BDL	BDL	BDL	BDL
AAQMS3: Budhapanka	24.07.2024	52.2	28.5	14.8	26.1	9.5	0.54	22.8	BDL	BDL	BDL	BDL	BDL
AAQMS4: Bhogamunda	25.07.2024	50.8	26.3	12.4	24.2	8.6	0.49	23.5	BDL	BDL	BDL	BDL	BDL
CPCB, New Delhi AAQ Standard		100	60	80	80	100	4	400	1	20	6	5	1
TEST METHOD		Gravimetric IS 5182: Part 23	Gravimetric EPA 1998	Improved West & Geake Method IS 5182 (Part-2) RA2017	Modified Jacob &Hochheiser Method IS 5182 (Part-6) RA2017	Chemical Method Air Sampling , 3rd Edn.By James P. Lodge (Method-411)	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling , 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182(Part -22):2004			Gas Chromatography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

BDL Values:SO_2< 4 $\mu g/m^3$, NO_X< 6 $\mu g/m^3$,O_3<5 $\mu g/m^3$, NH_3<20 $\mu g/m^3$,Ni<0.01 ng/m^3, As < 0.001 ng/m^3, C_6H_6<0.001 $\mu g/m^3$, BaP<0.002 ng/m^3, Pb<0.001 $\mu g/m^3$, CO-<0.1 mg/m^3

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GMR KAMALANGA ENERGY LTD. GMR

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- Mine Planning & Design
- Mineral/Sub-Soil Exploration
- Waste Management Services

Laboratory Services
Environment Lab
Food Lab
Material Lab
Soil Lab
Mineral Lab
&
Microbiology Lab

Ref: Envlab/23-24/TR- 08975 *Date:*02.09.2024

AMBIENT AIR QUALITY MONITORING REPORT FOR AUGUST-2024 (CORE ZONE)

1. Name of the Industry : **M/s GMR Kamalanga Energy Ltd, Dhenkanal**
2. Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer,VOC Sampler
3. Sampling Location : **AAQMS-1: Near Rain Water pump House Pit**
4. Sample Collected By : VCSPL Representative in presence of Client's Representative

Date	PARAMETERS											
	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO (mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)
01.08.2024	49.2	27.6	14.2	25.8	9.4	0.53	22.6	BDL	BDL	BDL	BDL	BDL
05.08.2024	50.2	26.8	15.2	25.6	10.2	0.63	22.1	BDL	BDL	BDL	BDL	BDL
08.08.2024	49.2	26.2	14.2	25.2	10.2	0.55	22.8	BDL	BDL	BDL	BDL	BDL
12.08.2024	54.3	29.3	15.1	25.5	10.3	0.52	BDL	BDL	BDL	BDL	BDL	BDL
16.08.2024	52.1	28.7	14.5	25.8	10.2	0.65	23.8	BDL	BDL	BDL	BDL	BDL
19.08.2024	49.9	26.8	14.2	23.2	9.2	0.55	BDL	BDL	BDL	BDL	BDL	BDL
22.08.2024	50.2	26.8	14.4	21.8	10.1	0.58	23.2	BDL	BDL	BDL	BDL	BDL
26.08.2024	50.2	25.8	15.1	21.1	10.4	0.55	22.8	BDL	BDL	BDL	BDL	BDL
29.08.2024	52.2	28.4	14.2	25.7	10.2	0.58	21.5	BDL	BDL	BDL	BDL	BDL
Monthly Average	50.8	27.4	14.6	24.4	10.0	0.57	22.7	BDL	BDL	BDL	BDL	BDL
CPCB, New Delhi AAQ Standard	100	60	80	80	100	4	400	1	20	6	5	1
TEST METHOD	Gravimetric IS 5182: Part 23	Gravimetric EPA 1998	Improved West & Geake Method S 5182 (Part 2) RA2017	Modified Jacob &Hochheiser Method IS 5182 (Part-6) RA2017	Chemical Method Air Sampling , 3rd Edn.By James P. Lodge Method-411	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling , 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182(Part -22):2004			Gas Chromatography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

BDL Values: SO_2< 4 $\mu g/m^3$, NOx< 6 $\mu g/m^3$, O_3<5 $\mu g/m^3$, NH_3<20 $\mu g/m^3$, Ni<0.01 ng/m^3, As < 0.001 ng/m^3, C_6H_6<0.001 $\mu g/m^3$, BaP<0.002 ng/m^3, Pb<0.001 $\mu g/m^3$, CO-<0.1 mg/m^3

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Food Lab
Material Lab
Soil Lab
Mineral Lab
&
Microbiology Lab

Ref: Envlab/23-24/TR- 08976 *Date:* 02.09.2024

AMBIENT AIR QUALITY MONITORING REPORT FOR AUGUST-2024 (CORE ZONE)

1. Name of the Industry : **M/s GMR Kamalanga Energy Ltd, Dhenkanal**
2. Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer, VOC Sample
3. Sampling Location : **AAQMS-2: Near Security Watch Tower - 3**
4. Sample Collected By : VCSPL Representative in presence of Client's Representative

Date	PARAMETERS											
	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO (mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)
01.08.2024	51.5	30.2	13.8	24.4	9.8	0.55	BDL	BDL	BDL	BDL	BDL	BDL
05.08.2024	50.5	30.3	14.2	22.1	9.2	0.56	21.8	BDL	BDL	BDL	BDL	BDL
08.08.2024	51.2	31.8	14.1	22.2	9.5	0.62	22.6	BDL	BDL	BDL	BDL	BDL
12.08.2024	51.1	28.1	14.2	21.8	10.2	0.58	21.8	BDL	BDL	BDL	BDL	BDL
16.08.2024	49.5	28.7	15.3	23.5	10.2	0.65	BDL	BDL	BDL	BDL	BDL	BDL
19.08.2024	50.8	28.5	14.8	24.4	10.1	0.66	22.7	BDL	BDL	BDL	BDL	BDL
22.08.2024	52.2	27.2	16.2	21.5	10.6	0.61	22.5	BDL	BDL	BDL	BDL	BDL
26.08.2024	50.1	24.8	14.1	22.6	9.8	0.55	25.2	BDL	BDL	BDL	BDL	BDL
29.08.2024	50.3	25.2	13.8	24.3	9.3	0.54	22.5	BDL	BDL	BDL	BDL	BDL
Monthly Average	50.8	28.3	14.5	23.0	9.9	0.59	22.7	BDL	BDL	BDL	BDL	BDL
CPCB, New Delhi AAQ Standard	100	60	80	80	100	4	400	1	20	6	5	1
TEST METHOD	Gravimetric IS 5182: Part 23	Gravimetric EPA 1998	mproved Wes & Geake Method IS 5182 (Part-2) RA2017	Modified Jacob &Hochheiser Method IS 5182 (Part-6) RA2017	Chemical Method Air Sampling , 3rd Edn.By James P. Lodge (Method-411)	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling , 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182(Part -22):2004			Gas Chromatography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

BDL Values: SO_2< 4 $\mu g/m^3$, NOx< 6 $\mu g/m^3$, O_3<5 $\mu g/m^3$, NH_3<20 $\mu g/m^3$, Ni<0.01 ng/m^3, As < 0.001 ng/m^3, C_6H_6<0.001 $\mu g/m^3$, BaP<0.002 ng/m^3, Pb<0.001 $\mu g/m^3$, CO-<0.1 mg/m^3

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VISIONTEK CONSULTANCY SERVICES PVT. LTD. BBSR *Approved by*

GMR KAMALANGA ENERGY LTD. GMR

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- Mine Planning & Design
- Mineral/Sub-Soil Exploration
- Waste Management Services

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Material Lab
Soil Lab
Mineral Lab
&
Microbiology Lab

Ref: Envlab/23-24/TR- 08977 *Date:* 02.09.2024

AMBIENT AIR QUALITY MONITORING REPORT FOR AUGUST -2024 (CORE ZONE)

1. Name of the Industry : **M/s GMR Kamalanga Energy Ltd, Dhenkanal**
2. Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer,VOC Sampler
3. Sampling Location : **AAQMS-3: Near Budhapanka Material Gate(Security Watch Tower No.1)**
4. Sample Collected By : VCSPL Representative in presence of Client's Representative

Date	PARAMETERS											
	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NOx (µg/m³)	O_3 (µg/m³)	CO (mg/m³)	NH_3 (µg/m³)	Pb (µg/m³)	Ni (ng/m³)	As (ng/m³)	C_6H_6 (µg/m³)	BaP (ng/m³)
01.08.2024	53.8	28.8	16.2	24.1	9.5	0.62	23.2	BDL	BDL	BDL	BDL	BDL
05.08.2024	53.2	28.2	15.2	24.5	9.8	0.65	22.5	BDL	BDL	BDL	BDL	BDL
08.08.2024	53.8	30.5	15.2	24.1	9.8	0.64	21.8	BDL	BDL	BDL	BDL	BDL
12.08.2024	53.1	28.5	15.5	25.3	10.2	0.55	BDL	BDL	BDL	BDL	BDL	BDL
16.08.2024	52.8	28.1	16.8	24.5	10.3	0.62	24.6	BDL	BDL	BDL	BDL	BDL
19.08.2024	53.2	28.1	16.2	24.4	10.2	0.63	BDL	BDL	BDL	BDL	BDL	BDL
22.08.2024	51.5	27.8	15.8	22.8	9.9	0.58	23.5	BDL	BDL	BDL	BDL	BDL
26.08.2024	50.2	28.1	15.5	25.1	9.6	0.55	BDL	BDL	BDL	BDL	BDL	BDL
29.08.2024	50.1	27.8	15.1	24.8	9.3	0.57	22.5	BDL	BDL	BDL	BDL	BDL
Monthly Average	52.4	28.4	15.7	24.4	9.8	0.60	23.1	BDL	BDL	BDL	BDL	BDL
CPCB, New Delhi AAQ Standard	100	60	80	80	100	4	400	1	20	6	5	1
TEST METHOD	Gravimetric IS 5182: Part 23	Gravimetric EPA 1998	Improved West & Geake Method IS 5182 (Part-2) RA2017	Modified Jacob &Hochheiser Method IS 5182 (Part-6) RA2017	Chemical Method Air Sampling , 3rd Edn.By James P. Lodge Method-411	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling , 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182(Part -22):2004			Gas Chromatography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

BDL Values: SO_2< 4 µg/m³, NO_X< 6 µg/m³,O_3<5 µg/m³, NH_3<20 µg/m³,Ni<0.01 ng/m³, As < 0.001 ng/m³, C_6H_6<0.001 µg/m³, BaP<0.002 ng/m³, Pb<0.001 µg/m³, CO-<0.1 mg/m³

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- Mine Planning & Design
- Mineral/Sub-Soil Exploration
- Waste Management Services

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Environment Lab
Food Lab
Material Lab
Soil Lab
Mineral Lab
&
Microbiology Lab

Ref: Envlab/23-24/TR- 08978 *Date:* 02.09.2024

AMBIENT AIR QUALITY MONITORING REPORT FOR AUGUST -2024 (BUFFER ZONE)

1. Name of the Industry : **M/s GMR Kamalanga Energy Ltd, Dhenkanal**
2. Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer,VOC Sampler
3. Sample Collected By : VCSPL Representative in presence of Client's Representative

Location Name	Date	PARAMETERS											
		PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO (mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)
AAQMS1: Kamalanga (Township)	19.08.2024	52.7	28.1	15.2	26.5	7.5	0.55	21.2	BDL	BDL	BDL	BDL	BDL
AAQMS-2: Mangalpur	20.08.2024	53.2	29.3	15.8	16.8	8.3	0.63	24.3	BDL	BDL	BDL	BDL	BDL
AAQMS3: Budhapanka	21.08.2024	51.8	28.2	14.4	25.8	9.2	0.55	22.5	BDL	BDL	BDL	BDL	BDL
AAQMS4: Bhogamunda	22.08.2024	50.4	26.1	12.2	24.1	8.6	0.53	23.2	BDL	BDL	BDL	BDL	BDL
CPCB, New Delhi AAQ Standard		100	60	80	80	100	4	400	1	20	6	5	1
TEST METHOD		Gravimetric IS 5182: Part 23	Gravimetric EPA 1998	Improved West & Geake Method IS 5182 (Part-2) RA2017	Modified Jacob &Hochheiser Method IS 5182 (Part-6) RA2017	Chemical Method Air Sampling , 3rd Edn.By James P. Lodge (Method-411)	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling , 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182(Part -22):2004			Gas Chromatography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

BDL Values: SO_2< 4 $\mu g/m^3$, NOx< 6 $\mu g/m^3$, O_3<5 $\mu g/m^3$, NH_3<20 $\mu g/m^3$, Ni<0.01 ng/m^3, As < 0.001 ng/m^3, C_6H_6<0.001 $\mu g/m^3$, BaP<0.002 ng/m^3, Pb<0.001 $\mu g/m^3$, CO-<0.1 mg/m^3

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GMR KAMALANGA ENERGY LTD. GMR

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Ref: **Envlab/23-24/TR- 10233** *Date:*30.09.2024

AMBIENT AIR QUALITY MONITORING REPORT FOR SEPTEMBER-2024 (CORE ZONE)

1. Name of the Industry : **M/s GMR Kamalanga Energy Ltd, Dhenkanal**
2. Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer,VOC Sampler
3. Sampling Location : **AAQMS-1: Near Rain Water pump House Pit**
4. Sample Collected By : VCSPL Representative in presence of Client's Representative

Date	PARAMETERS											
	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NOx (µg/m³)	O_3 (µg/m³)	CO (mg/m³)	NH_3 (µg/m³)	Pb (µg/m³)	Ni (ng/m³)	As (ng/m³)	C_6H_6 (µg/m³)	BaP (ng/m³)
02.09.2024	48.2	26.4	13.8	25.6	9.2	0.54	22.5	BDL	BDL	BDL	BDL	BDL
05.09.2024	49.3	25.8	15.3	25.7	9.8	0.62	21.3	BDL	BDL	BDL	BDL	BDL
09.09.2024	48.3	25.4	13.8	24.8	10.3	0.58	23.2	BDL	BDL	BDL	BDL	BDL
12.09.2024	54.2	29.1	14.8	25.2	10.1	0.54	BDL	BDL	BDL	BDL	BDL	BDL
16.09.2024	51.8	28.5	14.7	25.9	9.8	0.62	21.2	BDL	BDL	BDL	BDL	BDL
19.09.2024	49.5	26.4	13.8	22.8	9.3	0.58	BDL	BDL	BDL	BDL	BDL	BDL
23.09.2024	49.8	26.4	14.2	21.6	9.9	0.55	21.2	BDL	BDL	BDL	BDL	BDL
26.09.2024	49.9	25.6	15.2	21.3	10.2	0.57	23.2	BDL	BDL	BDL	BDL	BDL
30.09.2024	52.1	28.3	14.5	25.9	9.9	0.57	22.2	BDL	BDL	BDL	BDL	BDL
Monthly Average	50.3	26.9	14.5	24.3	9.8	0.57	22.1	BDL	BDL	BDL	BDL	BDL
CPCB, New Delhi AAQ Standard	100	60	80	80	100	4	400	1	20	6	5	1
TEST METHOD	Gravimetric IS 5182: Part 23	Gravimetric EPA 1998	Improved West & Geake Method IS 5182 (Part 2) RA2017	Modified Jacob &Hochheiser Method IS 5182 (Part-6) RA2017	Chemical Method Air Sampling ,3rd Edn.By James P. Lodge Method-411	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling , 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182(Part -22):2004			Gas Chromatography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

BDL Values:SO_2< 4 µg/m³, NO_X< 6 µg/m³,O_3<5 µg/m³, NH_3<20 µg/m³,Ni<0.01 ng/m³, As < 0.001 ng/m³, C_6H_6<0.001 µg/m³, BaP<0,002 ng/m³, Pb<0.001 µg/m³, CO-<0.1 mg/m³

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Ref: Envlab/23-24/TR- 10234 *Date:* 30.09.2024

AMBIENT AIR QUALITY MONITORING REPORT FOR SEPTEMBER-2024 (CORE ZONE)

1. Name of the Industry : **M/s GMR Kamalanga Energy Ltd, Dhenkanal**
2. Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer, VOC Sample
3. Sampling Location : **AAQMS-2: Near Security Watch Tower - 3**
4. Sample Collected By : VCSPL Representative in presence of Client's Representative

Date	PARAMETERS											
	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO (mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)
02.09.2024	50.5	29.4	13.2	23.8	9.5	0.58	BDL	BDL	BDL	BDL	BDL	BDL
05.09.2024	50.2	29.9	13.7	20.7	9.4	0.59	22.2	BDL	BDL	BDL	BDL	BDL
09.09.2024	50.8	31.5	13.8	21.8	9.6	0.66	21.2	BDL	BDL	BDL	BDL	BDL
12.09.2024	50.2	27.0	13.9	21.5	10.5	0.62	23.2	BDL	BDL	BDL	BDL	BDL
16.09.2024	48.4	27.6	14.8	23.1	9.8	0.63	BDL	BDL	BDL	BDL	BDL	BDL
19.09.2024	50.4	28.1	13.8	23.6	10.2	0.68	22.8	BDL	BDL	BDL	BDL	BDL
23.09.2024	51.2	26.2	15.1	20.4	10.1	0.55	21.8	BDL	BDL	BDL	BDL	BDL
26.09.2024	49.9	24.6	13.8	22.3	9.5	0.58	25.4	BDL	BDL	BDL	BDL	BDL
30.09.2024	50.2	25.3	13.5	24.1	9.2	0.57	23.2	BDL	BDL	BDL	BDL	BDL
Monthly Average	50.2	27.7	14.0	22.4	9.8	0.61	22.8	BDL	BDL	BDL	BDL	BDL
CPCB, New Delhi AAQ Standard	100	60	80	80	100	4	400	1	20	6	5	1
TEST METHOD	Gravimetric IS 5182: Part 23	Gravimetric EPA 1998	Improved West & Geake Method IS 5182 (Part-2) RA2017	Modified Jacob & Hochheiser Method IS 5182 (Part-6) RA2017	Chemical Method Air Sampling - 3rd Edn.By James P. Lodge (Method-411)	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling - 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182(Part -22):2004			Gas Chromatography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

BDL Values: SO_2< 4 $\mu g/m^3$, NO_X< 6 $\mu g/m^3$, O_3<5 $\mu g/m^3$, NH_3<20 $\mu g/m^3$, Ni<0.01 ng/m^3, As < 0.001 ng/m^3, C_6H_6<0.001 $\mu g/m^3$, BaP<0.002 ng/m^3, Pb<0.001 $\mu g/m^3$, CO-<0.1 mg/m^3

VISIONTEK CONSULTANCY SERVICES PVT. LTD. BBSR Reviewed by

VISIONTEK CONSULTANCY SERVICES PVT. LTD. BBSR Approved by

Plot No.- M-22 & 23, Chandaka Industrial Estate, Patia, Bhubaneswar, Khordha, Odisha-751024, India Tel.: 0674-3511721
E-mail: visiontek@visiontek.org, visiontekin@gmail.com
Visit us at: www.visiontek.org

GMR KAMALANGA ENERGY LTD.

Visiontek Consultancy Services Pvt. Ltd.

(Committed For Better Environment)

ISO 9001:2015, ISO 14001:2015, ISO 45001:2018 (OH&S), ISO/IEC 17025:2017 Certified

Ref: Envlab/23-24/TR- 10235 *Date:* 30.09.2024

AMBIENT AIR QUALITY MONITORING REPORT FOR SEPTEMBER -2024 (CORE ZONE)

1. Name of the Industry : **M/s GMR Kamalanga Energy Ltd, Dhenkanal**
2. Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer,VOC Sampler
3. Sampling Location : **AAQMS-3: Near Budhapanka Material Gate(Security Watch Tower No.1)**
4. Sample Collected By : VCSPL Representative in presence of Client's Representative

Date	PARAMETERS											
	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO (mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)
02.09.2024	52.8	27.7	16.5	24.4	9.6	0.65	22.8	BDL	BDL	BDL	BDL	BDL
05.09.2024	53.4	28.3	15.1	24.5	9.2	0.62	21.8	BDL	BDL	BDL	BDL	BDL
09.09.2024	52.7	29.4	15.5	24.5	9.2	0.61	22.5	BDL	BDL	BDL	BDL	BDL
12.09.2024	53.2	28.7	14.8	24.5	10.1	0.58	BDL	BDL	BDL	BDL	BDL	BDL
16.09.2024	50.8	26.5	16.2	23.8	9.8	0.68	23.8	BDL	BDL	BDL	BDL	BDL
19.09.2024	52.2	27.2	15.8	24.3	10.5	0.66	BDL	BDL	BDL	BDL	BDL	BDL
23.09.2024	50.5	26.8	15.1	22.2	9.5	0.57	22.8	BDL	BDL	BDL	BDL	BDL
26.09.2024	49.1	27.0	15.2	24.8	9.4	0.58	BDL	BDL	BDL	BDL	BDL	BDL
30.09.2024	50.2	27.6	15.2	25.1	9.5	0.58	21.6	BDL	BDL	BDL	BDL	BDL
Monthly Average	51.7	27.7	15.5	24.2	9.6	0.61	22.7	BDL	BDL	BDL	BDL	BDL
CPCB, New Delhi AAQ Standard	100	60	80	80	100	4	400	1	20	6	5	1
TEST METHOD	Gravimetric IS 5182: Part 23	Gravimetric EPA 1998	Improved West & Geake Method IS 5182 (Part-2) RA2017	Modified Jacob &Hochheiser Method IS 5182 (Part-6) RA2017	Chemical Method Air Sampling , 3rd Edn.By James P. Lodge (Method-411)	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling , 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182(Part -22):2004			Gas Chromatography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

BDL Values:SO_2< 4 $\mu g/m^3$, NOx< 6 $\mu g/m^3$,O_3<5 $\mu g/m^3$, NH_3<20 $\mu g/m^3$,Ni<0.01 ng/m^3, As < 0.001 ng/m^3, C_6H_6<0.001 $\mu g/m^3$, BaP<0.002 ng/m^3, Pb<0.001 $\mu g/m^3$, CO-<0.1 mg/m^3

VISIONTEK CONSULTANCY SERVICES PVT. LTD. BBSR *Reviewed by*

VISIONTEK CONSULTANCY SERVICES PVT. LTD. BBSR *Approved by*

Plot No.- M-22 & 23, Chandaka Industrial Estate, Patia, Bhubaneswar, Khordha, Odisha-751024, India Tel.: 0674-3511721
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GMR KAMALANGA ENERGY LTD.

Visiontek Consultancy Services Pvt. Ltd.

(Committed For Better Environment)

ISO 9001:2015, ISO 14001:2015, ISO 45001:2018 (OH&S), ISO/IEC 17025:2017 Certified

Ref: Envlab/23-24/TR- 10236 *Date:* 30.09.2024

AMBIENT AIR QUALITY MONITORING REPORT FOR SEPTEMBER -2024 (BUFFER ZONE)

1. Name of the Industry : **M/s GMR Kamalanga Energy Ltd, Dhenkanal**
2. Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer,VOC Sampler
3. Sample Collected By : VCSPL Representative in presence of Client's Representative

Location Name	Date	PARAMETERS											
		PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO (mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)
AAQMS1: Kamalanga (Township)	10.09.2024	51.6	27.0	15.4	26.6	7.8	0.62	21.4	BDL	BDL	BDL	BDL	BDL
AAQMS-2: Mangalpur	11.09.2024	52.1	28.2	15.4	16.2	8.1	0.61	24.5	BDL	BDL	BDL	BDL	BDL
AAQMS3: Budhapanka	12.09.2024	51.5	27.8	14.2	25.4	9.3	0.58	22.3	BDL	BDL	BDL	BDL	BDL
AAQMS4: Bhogamunda	13.09.2024	50.2	26.2	12.5	24.3	8.4	0.52	23.6	BDL	BDL	BDL	BDL	BDL
CPCB, New Delhi AAQ Standard		100	60	80	80	100	4	400	1	20	6	5	1
TEST METHOD		Gravimetric IS 5182: Part 23	Gravimetric EPA 1998	Improved West & Geake Method IS 5182 (Part-2) RA2017	Modified Jacob &Hochheiser Method IS 5182 (Part-6) RA2017	Chemical Method Air Sampling , 3rd Edn.By James P. Lodge (Method-411)	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling , 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182(Part -22):2004			Gas Chromatography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

BDL Values: SO_2< 4 $\mu g/m^3$, NO_x< 6 $\mu g/m^3$, O_3<5 $\mu g/m^3$, NH_3<20 $\mu g/m^3$, Ni<0.01 ng/m^3, As < 0.001 ng/m^3, C_6H_6<0.001 $\mu g/m^3$, BaP<0.002 ng/m^3, Pb<0.001 $\mu g/m^3$, CO-<0.1 mg/m^3

VISIONTEK CONSULTANCY SERVICES PVT. LTD. BBSR *Reviewed by*

VISIONTEK CONSULTANCY SERVICES PVT. LTD. BBSR *Approved by*

GMR KAMALANGA ENERGY LTD. GMR

Plot No.- M-22 & 23, Chandaka Industrial Estate, Patia, Bhubaneswar, Khordha, Odisha-751024, India Tel.: 0674-3511721
E-mail: visiontek@visiontek.org, visiontekin@gmail.com
Visit us at: www.visiontek.org

Annexure-XVI

The New Indian Express, Bhubaneswar, December 17, 2011

GMR

GMR Kamalanga Energy Limited

Regd. Office: No. 25/1, Skip House, Museum Road, Bengaluru – 560025

PUBLIC NOTICE

This is hereby informed to the general public that, Ministry of Environment and Forests, Government of India, New Delhi has accorded Environmental Clearance vide letter No. J-13012/73/2011-IA.II(T), dated 5th December 2011 for expansion of power plant by addition of 1X350 MW thermal power plant (Phase-II) of GMR Kamalanga Energy Ltd. at village Kamalanga, Taluk Odapada, District Dhenkanal, Odisha.

Copy of clearance letter is available with Odisha State Pollution Control Board, Bhubaneswar and may also be seen at MoEF website http://moef.nic.in

Sd/-

Sri. K.V.V. Rao

Managing Director

GMR GROUP – KE / 9 / PRIEM ASSOCIATES

GMR KAMALANGA ENERGY LTD.

Prragativadi, December 17, 2011

GMR

ଜି.ଏମ୍.ଆର. କମଳାଙ୍ଗ ଏନର୍ଜୀ ଲିମିଟେଡ୍

୨୫/୧, ସ୍ପିପ୍ ହାଉସ୍, ମ୍ୟୁକିୟମରୋଡ୍,
ବେଙ୍ଗାଲୁରୁ-୫୬୦୦୨୫

ସାଧାରଣ ବିଜ୍ଞପ୍ତି

ଏତଦ୍ଦ୍ୱାରା ସର୍ବସାଧାରଣଙ୍କ ଅବଗତି ନିମନ୍ତେ ଜଣାଇ ଦିଆଯାଉଛି ଯେ, ଜି.ଏମ୍.ଆର.କମଳାଙ୍ଗ ଏନର୍ଜୀ ଲିମିଟେଡ୍, ଓଡିଶାର ଢେଙ୍କାନାଳ ଜିଲ୍ଲା ଅନ୍ତର୍ଗତ ଓବଦଡା ତାଲୁକର କମଳାଙ୍ଗ ଗ୍ରାମରେ ତାପଜ ବିଦ୍ୟୁତ୍ ଶକ୍ତି ପ୍ରକଳ୍ପର ସଂପ୍ରସାରଣ ପାଇଁ (୧x ୩୫୦ ମେଗାୱାଟ୍) ଭାରତ ସରକାରଙ୍କ ପରିବେଶ ଓ ଜଙ୍ଗଲ ମନ୍ତ୍ରଣାଳୟ, ନୂଆଦିଲ୍ଲୀଠାରୁ ଚିଠି, ନଂ. J-13012/73/2011-IA.II (T) ତା.୦୫.୧୨.୨୦୧୧ ଦ୍ୱାରା ପରିବେଶୀୟ ମଞ୍ଜୁରୀ ପ୍ରଦାନ କରାଯାଇଛି।

ଉକ୍ତ ଅନୁମତି ସମ୍ବନ୍ଧିତ ଚିଠିର ନକଲ ଓଡିଶା ରାଜ୍ୟ ପ୍ରଦୂଷଣ ନିୟନ୍ତ୍ରଣ ବୋର୍ଡ, ଭୁବନେଶ୍ୱରଠାରେ ଉପଲବ୍ଧ ଅଟେ। ଏହାବ୍ୟତୀତ ପରିବେଶ ଓ ଜଙ୍ଗଲ ମନ୍ତ୍ରଣାଳୟ ୱେବସାଇଟ୍ http://moef.nic.in ଠିକଣାରେ ମଧ୍ୟ ଏହା ଅବଗତ କରାଯାଇପାରିବ।

ସ୍ୱା/-
ଶ୍ରୀଯୁକ୍ତ କେଭିବି ରାଓ
ପରିଚାଳନା ନିର୍ଦ୍ଦେଶକ

GMR KAMALANGA ENERGY LTD.

Annexure-XI

Sandeep Kumar

From: Sandeep Kumar
Sent: 25 September 2024 10:18
To: 'Office1 OSPCB'; 17 Category Head Office
Cc: roez.bsr-mef@nic.in; 'rospcb.angul@ospcboard.org'; GKEL kamalanga; Praveen Anant
Subject: GKEL_Submission of Annual Environment Statement for the year: 2023-24
Attachments: 8450 GKEL_Submission of Annual Environment Statement for FY 2023-24.pdf

Dear Sir,

Kindly find attached the Annual Environment Statement in **Form-V** for the financial year 2023-24 for our Coal based Thermal Power Plant, GMR Kamalanga Energy Limited, (3x350 MW) Dhenkanal, Odisha.

Annual Environment Statement already submitted through OCMMS online portal on 25.09.2024.

Kindly acknowledge receipt of the same.

With Regards,

Sandeep Kumar
Manager- EHS
GMR Kamlanga Energy Ltd,
Dhenkanal, Odisha
Mob. - 9479064292
Mail – sandeep.kumar2@gmrgroup.in

Cc:
Mr. Praveen Anant
Head- HSE
E-Mail- praveen.anant@gmrgroup.in

GMR KAMALANGA ENERGY LTD.

· GMR Kamalanga Energy Limited

GMR

Plant Office:
AT/PO: Kamalanga, PS: Kantabania,
VIA: Meramundali,
DIST: Dhenkanal - 759 121, Odisha
CIN U40101KA2007PLC044809
T +91 6762 663564
W www.gmrgroup.in

09-09/24

Ref. No. GKEL/OSPCB/2024-25/8450
Dated – 24.09.2024

To
The Member Secretary
State Pollution Control Board, Odisha.
Paribesh Bhawan, A/118, Nilakantha Nagar, Unit-VIII
Bhubaneswar, Odisha-751012

Sub: Submission of Annual Environment Statement for the year: 2023-24

Dear Sir,

With reference to the subject above, we are submitting herewith the Annual Environment Statement in **Form-V** for the financial year 2023-24 for our Thermal Power Plant, GMR Kamalanga Energy Limited, (3x350 MW) Dhenkanal, Odisha.

This is for your kind perusal please.

Kindly acknowledge receipt of the same.

Thanking you.

Yours sincerely,
for **GMR Kamalanga Energy Limited**

Dhananjay V. Deshpande
Chief Operating Officer

GMR KAMALANGA ENERGY LTD.

Encl.: Annual Environment Statement

Copy for kind information to:
1. The Director, Eastern Regional Office, MoEF&CC, Bhubaneswar, Odisha.
2. The Regional Officer, State Pollution Control Board, Odisha, Angul.

Registered Office:
Skip House, 25/1, Museum Road,

GMR KAMALANGA ENERGY LTD.
Kamalanga, Dhenkanal.

ENVIRONMENT STATEMENT FORM - V

(See Rule 14)

ENVIRONMENT STATEMENT FOR THE FINANCIAL YEAR ENDING THE 2023-24

PART – A

(i) Name and address of the Owner/ Occupier of the industry : **Shri Dhananjay V. Deshpande**
Chief Operating Officer
GMR Kamalanga Energy Limited,
At/Po- Kamalanga, Via- Meramandali
P.S-Kantabania, Dist. - Dhenkanal
Odisha, Pin-759121

Operation or Process

(ii) Industry category
Primary - (STC Code)
Secondary - (SIC Code) : Large Scale industry (Thermal Power plant)

(iii) Production capacity : 1050 MW (3 x 350MW)

(iv) Year of establishment : 2013

(v) Date of the last environmental Statement submitted : 27th Sept' 2023

PART - B

WATER AND RAW MATERIALS CONSUMPTION:

(1) ***Water consumption m^3/d.*** **(Annual Average daily consumption)**

Process	:	2135
Cooling	:	41073
Domestic	:	375
Total	:	**43583**

Name of products	Specific Water consumption per unit of product output	
	During the previous financial year (2022-23)	During the current financial year (2023-24)
Electric Power	2.12 m^3/MW	2.10 m^3/MW

GMR KAMALANGA ENERGY LTD.

(2) Raw Material Consumption

Name of Raw Materials	Name of Products	Consumption of Raw Material per unit of product output	
		During the current financial year (2022-23)	During the current financial year (2023-24)
Coal	Electric Power	0.71 kg/kWh	0.72 kg/kWh
Residual Oil (LDO)	Electric Power	0.07 ml/kWh	0.08 ml/kWh

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

PART - C

POLLUTION DISCHARGED TO ENVIRONMENT/UNIT OF OUTPUT:

(Parameter as specified in the consent issued)

Pollutants	Quantity of pollutants discharged (mass/day)	Concentration of pollutants in discharges (mass/volume)	Percentage of variation from prescribed standards with reasons
(a) Water	*Zero Liquid Discharge	-	No deviation
(b) Air		**Average annual result	
PM	5.20 tpd	37.84 mg/Nm^3	No deviation
SO_2	184.6 tpd	1332.34 mg/Nm^3	No deviation
NO_x	46.0 tpd	332.33 mg/Nm^3	No deviation
Hg	0.0023 tpd	0.016mg/Nm^3	No deviation
(c) Noise	• Daytime noise levels – 67.4 dBA max. and 45.7 dBA min. • Nighttime noise levels- 65.1 dBA max. and 43.5 dBA min.		No deviation

* Treated effluent water is being reused in various applications.

** Value as per 3rd party monitoring report, which were already submitted to the board on monthly basis.

PART – D

HAZARDOUS WASTES

(As specified u/d Hazardous & Other Wastes (Management & Transboundary Movement) Rules 2016)

Hazardous Wastes	Total Quantity (KG/KL)	
	During the previous financial year (2022-23)	During the current financial year(2023-24)
(a) From process • Used Oil • Waste containing oil • Empty Barrel/Drum • Spent Ion Exchange Resin • Used battery • E-waste	 11.34 KL 1.14 KL NIL NIL 10.63 MT 6.4 MT	 13.8 KL 9.4 KL 110 NIL 4.66 MT 6.85 MT
(b) From Pollution Control facilities	NIL	NIL

PART – E

SOLID WASTE

Solid Waste		Total Quantity (MT)	
		During the previous financial year (2022-23)	During the current financial year(2023-24)
a) From process	Bottom Ash	554820.05	622535.57
b) From pollution control facilities (ESP/STP)	Dry Fly Ash	1664460.793	1867601.63
	STP sludge	0.548	0.535
c) Quantity recycled or reutilized within the Unit.	*Fly Ash	873.00	970.00
	STP sludge	0.497	0.535
d) Sold			
e) Recycle/ Utilized	Fly Ash & Bottom Ash	*2516220	*2490137.20

*Including utilisation of Pond Ash of 296938.30 MT in FY: 2022-23. In-house brick making 873.00 MT.
* Including utilisation in-house brick making 970.00 MT in FY 2023-24.

PART - F

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

Quantity of the hazardous as well as solid wastes is as per mentioned above Part-D and Part-E and characterizations and disposal practice of both wasted is given in below: -

Categories of wastes.	Characteristics	Mode of disposal
Solid waste- (Fly Ash)	Non Hazardous	Fly Ash (Bottom Ash, Dry Ash & Pond) is being utilised for fly ash bricks, cement, Road constructions etc. as per the fly ash notification. Unutilized ash has been disposed in Ash pond through HCSD mode.
STP - Sludge	Non-Hazardous, Organic waste	Sludge has been used in horticulture development as manure.
Used & Waste oil	Hazardous	Safe storage facility provided for temporary storage. Sold to SPCB, Odisha authorized recycler.
Empty Barrels		
Spent Ion Exchange Resin	Hazardous	Safe storage facility is provided for temporary storage. Further, it will be send to authorised cement plant/ TSDF Centre.
Used Battery	Hazardous	Used batteries has been return back to authorized dealer/recycler
E-waste	Hazardous	E-waste has been replace/return back to service provider or sold to recycler.
Domestic solid waste	Non-Hazardous,	▪ Domestic waste is segregated into organic biodegradable waste (vegetable, Food waste etc.) and in non-biodegradable waste (paper, plastic, glass etc.) and collected in separate bin. ▪ Organic biodegradable waste is converting into compost though in-house mechanical food bio-digester. Compost is being used in horticulture development. ▪ Other non-biodegradable material is being sent to recycler/municipality authorised vendor for disposal.

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PART - G

Impact of the pollution abatement measures taken on conservation of natural resources and on the cost of production.

We have taken effective control measures, monitoring & green belt development for abatement of pollution & environmental protection. The recurring environmental expenditure per kWh of electrical power production is around 10.20 Paisa. At same time, we have also conserved natural resources by maintaining average CoC – 6.64; Specific water consumption was limited to 2.10 m^3/mw and Coal consumption 0.72 MT/MWh. Operational activities were also confirming to the quality standard of air, emission, noise level, water hence there is no significant adverse effect on the environment were observed. 100 % of fly ash has been utilised including pond ash as per the fly ash notification. The plantation has not only contributed to the aesthetics but also has been serving as a 'Sink' for the pollutants released from the station and thereby protecting the quality of ecology and environment in and around the projects site.

PART - H

Additional measures/investment proposed for environmental protection including abatement of pollution, prevention of pollution.

Capital and recurring investment on Environmental Protection Measures during 2023-24

Sl. No	Particulars	Capital Investment till March' 2024 (Rs. In Lakhs)	Recurring Investment for the year 2023-24 (Rs. In Lakhs)
1	Water Pollution Control System	6328.86	15.57
2	Air Pollution Control System	25501.1	484.38
3	Waste Management System (Fly Ash, Solid waste, Hazard waste etc. & Installation of Ash Brick making plant)	7511.79	6126.95
4	Green Belt development	508.76	173.57
5	Environmental Monitoring (Online & Manual)	195.84	43.05
6	Plant Housekeeping & Water sprinkling on Plant Roads	40.13	359.60
7	Environmental Studies /Consultancy Charges	-	1.65
8	Statutory Fee (CTO/CTE etc.)	-	0.00
9	Environmental Awareness Activities - WED, WWD, Earth Day etc.	-	1.07
10	Others (OHS & Fire management)	58.00	5.07
	Total (Amount in Lakh Rs.) =	**40144.48**	**7210.91**

GMR KAMALANGA ENERGY LTD.

GMR KAMALANGA ENERGY LTD.

PART – I

Any other particulars for improving the quality of the environment.

We have planted 397668 nos. of saplings till March 2024 (including 2360 saplings (gap filling) during 2023-24) to cover more than 382 Acres of land area. In addition to that, saplings of fruit bearing trees also being distributed every year to community including different schools for increase green cover in around the plant area. These are also helping to abatement of air pollution, reduce thermal impact and attenuate of noise in and around the area.

Name & signature of the Occupier
Date: 24.09.2024

Dhananjay V. Deshpande
Chief Operating Officer

GMR KAMALANGA ENERGY LTD.

Annexure-XXII

Capital and recurring investment on environmental management plans

Sl. No	Particulars	Capital Investment till September' 2024 (Rs. In Lakhs)	Recurring Investment for the year 2024-25 till September'2024 (Rs. In Lakhs)
1	Water Pollution Control System	6328.86	15.27
2	Air Pollution Control System	25501.1	263.65
3	Waste Management System (Fly Ash, Solid waste, Hazard waste etc. & Installation of Ash Brick making plant)	7511.79	3415.72
4	Green Belt development	508.76	95.34
5	Environmental Monitoring (Online & Manual)	195.84	43.05
6	Plant Housekeeping & Water sprinkling on Plant Roads	82.13	235.87
7	Environmental Studies /Consultancy Charges	-	1.65
8	Statutory Fee (CTO/CTE etc.)	-	0.00
9	Environmental Awareness Activities - WED, WWD, Earth Day etc.	-	1.07
10	Others (OHS & Fire management)	58.00	5.29
	Total (Amount in Lakh Rs.) =	**40186.48**	**4076.91**

GMR KAMALANGA ENERGY LTD.

Annexure-XXII

GMR Kamalanga Energy Limited

Plant Office:
AT/PO: Kamalanga, PS: Kantabania,
VIA: Meramundali,
DIST: Dhenkanal - 759 121, Odisha
CIN U40101KA2007PLC044809
T +91 6762 663564
W www.gmrgroup.in

Ref. No. GKEL/MOEF&CC/2019-20/6630
Dated – 12.04.2019

To
The Dy. Director & Scientist 'C'
Eastern Regional Office,
Ministry of Environment, Forests & Climate Change, Govt. of India
A/3, Chandrasekharpur, Bhubaneswar, Orissa-751023

Sub: Expansion by addition of 1 x 350 MW Imported Coal Based Thermal Power Plant (Phase-II) at village Kamalanga, in Odapada Taluk, in Dhenkanal district, in Odisha by M/s GMR Kamalanga Energy Limited – **EC Amendment Compliance/Action Taken Report reg.**

Ref: Your letter no. 101-756/11/EPE/552 dated 25.03.2019

Dear Sir,

With reference to the above cited subject, we are furnishing herewith the pointwise compliance to the conditions of Amendment EC dated 11.01.2019 for your kind information please.

Sr.	Conditions	Compliance/Action Taken
1	Condition no. v: details of Environmental Officer including name, designation, contact number and e-mail id	Mr. Pravind Kumar Shah Manager – EHS Mob.: 9937522825 E-mail: pravindkumar.shah@gmrgroup.in
2	Condition no. vi: copy of Forest diversion permission under FC Act,1980	Forest Diversion Proposal submitted in O/o the DFO, Dhenkanal and is under process.
3	Condition no. vii: Action plan and progress regarding CER activities to be carried out as per Ministry's OM No.22-65/2017-IA.II dated 01.05.2018	Complied GKEL has undertaken CSR activities since Project stage based on needs of the communities and expend around Rs. 37 Cr. till date for developing of community infrastructure like drinking water supply, construction of Hospital, School, Road, Restoration of village Pond, Rain water harvesting, promotion of Education, Health-Hygiene & Sanitation, Empowered & Livelihoods, creating Environmental Awareness etc. Summarised report is attached as **Annexure-1**

Kindly acknowledge receipt of the same.

Your Sincerely,
for GMR Kamalanga Energy Limited

Ramesh R Pai
Chief Operating Officer

Encl. – as above

GMR KAMALANGA ENERGY LTD.

Registered Office:
Skip House, 25/1, Museum Road,
Bengaluru - 560 025

Annexure-1

CSR activities by GKEL

GMR Kamalanga Energy Ltd. is a part of GMR group of companies. Being a responsible Corporate Citizen and as part of GMR Group's policy & GKEL's commitment towards inclusive growth, It has undertaken CSR activities since 2007. As per the law, CSR Committee and the Board have approved CSR activities and expenditure. CSR committee has been entrusted with the responsibility of formulating and recommending to the Board, a Corporate Social Responsibility Policy (CSR Policy), indicating the activities to be undertaken by the Company, monitoring the implementation of the framework of the CSR Policy and recommending the amount to be spent on CSR activities.

The CSR Committee has formulated and recommended to the Board, a Corporate Social Responsibility Policy indicating the activities to be undertaken by the Company, which has been approved by the Board.

GMR Group's vision itself mentions '.... making difference to society through creation of value.' which is inherited from the core values of the group –Social Responsibility. Due to its core value of expression of responsible behavior towards the society the company boasts sustainable practices which benefits the surrounding community & society in large.

More than 400 people from the community have been provided employment in the GKEL plant directly and through agencies. Structured Livelihood Restoration Program has already touched 967 project affected families and targets to cover 400 more.

GKEL has provided drinking water to most needy villages through water tanker for about 4 years. It has benefitted more than 1000 families. In 2017-18 GKEL in association with Rural Water Supply (RWSS) Department of Govt. Of Odisha has laid pipe lines for providing purified drinking water to 5 villages. This is benefitting about 2000 families to get purified drinking water.

Apart from this, the CSR extends to the neighboring communities and is active in Education, Health and Livelihoods as detailed below:

GMR Group believes Corporates have a special and continuing responsibility towards the society. The company performs its social responsibility through CSR team deployed from GMR Varalakshmi Foundation (GMRVF). The Corporate Social Responsibility (CSR) activities have been done with the communities neighboring GMR Kamalanga Energy Ltd. since June, 2007 through GMR Varalakshmi Foundation.

CSR Unit undertakes projects mainly on the following mandated thrust areas

- Education
- Health, Hygiene & Sanitation
- Empowerment & Livelihoods
- Community Development

GMR KAMALANGA ENERGY LTD.
GMR

GKEL as a company engages in responsible business behavior with the vision of giving back to society. All strategies and objectives of the company focus on nation building and empowering the society along with business development. GKEL implements all the CSR activities through GMR Varalakshmi Foundation which is the Corporate Social Responsibility arm of GMR Group and is mandated to reach out to the underserved communities around GMR businesses.

GKEL started working in the field of Education, Health, Empowerment and Community Development with the marginalized communities in the 9 periphery villages of Kamalanga and Mangalpur Gram Panchayat.

GKEL CSR is providing need based support to Anganwadi, Govt. Primary & High schools and is running a Library and After School Learning Centre etc. in the project villages. Students studying in Anganwadi and govt. schools receive regular support such as notebooks, shoes, school bags and other useful study materials. The schools are also provided with support such as maintenance of toilets, water tank, water pump/filter, building extra classrooms, benches etc. 16 Anganwadi centers and 11 Government schools are being supported which benefit about 1800 children every year.

GKEL CSR runs a private school in the township campus in partnership with DAV to provide quality education to the poor families. The school has strength of about 500 students studying

in different classes. The school provides education from LKG to 10th standard. 165 students belong to land loser families studying in GMR Varalakshmi DAV school avail fees concession.

GKEL CSR is running a 27 bedded hospital for the community members, nutrition centers for pregnant and lactating women in two villages. It is providing free treatments and medicines through Mobile Medical Unit for elderly group in 9 villages surrounding the power plant. About 500 elderly people benefit from MMU support every month. Health insurance is being facilitated for 2400 families from the 9 project villages. Safe drinking water is being provided to 5 villages reaching out to over 5000 families.

GKEL is implementing Livelihoods Restoration Program for the Project Affected Families and over 900 families were supported for farm, livestock and micro-entrepreneurial activities. Further, the Foundation is running Tailoring training centres in three villages through which about 100 women are trained every year.

Under the Livelihood restoration program, the objective is to enhance income of about 1500 project affected families on a sustainable basis. Besides provides inputs capacity building i.e. training, orientation, exposure visit are also given importance. Farmers are trained on low cost technology like preparation of Handikhata and Jeebamruta using cow dung, cow urine etc. The farmers are applying these in their paddy field and getting positive results.

GMR KAMALANGA ENERGY LTD.

Similarly, to sustain the livelihood activities the following Common Interest groups are formed These groups are:

1. Farmers' group
2. Dairy farmers group
3. Vegetable seller group
4. Tailor group
5. Mason group

Capacity building of all these groups have been initiated. In the coming years efforts shall be made to make these groups functional on a sustainable manner.

Infrastructure made in the periphery villages:

The followings are some of the assets created in the periphery area

Hospital in GKEL campus:

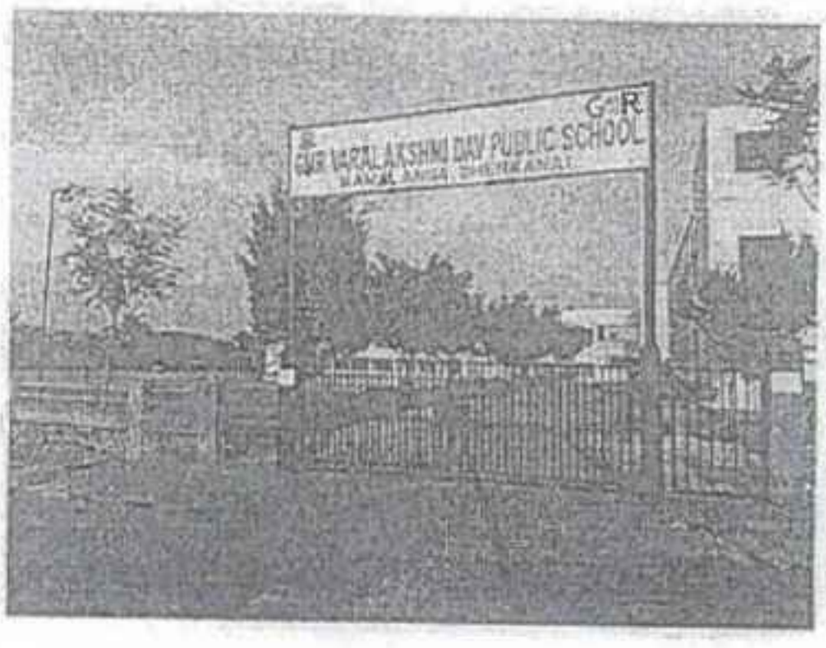
GKEL has established a 27 bed hospital in its campus for providing health services to community as well as its employees. It is run by Surendra Hospital.

It provides OPD services as well as surgery with specialized doctors on special call. Specialized doctors also visit on specific days to the hospital from other important hospitals in the state. One physiotherapy unit also opened in the hospital.

GKEL provides health insurance for the land loser families covering more than 2400 families. Surendra Hospital is one of the empaneled hospitals .GKEL has taken up health insurance policy for Outdoor patients also who gets treatment in Surendra hospital. Besides regular health check- up, employees of GKEL also do annual health check-up in Surendra hospital.

Mobile Medical Unit is also run in collaboration with Surendra Hospital and GMRVF . On an average 1000 treatments being provided to get health service at their door step every month.

GMR Varalakshmi DAV Public School, Kamalanga:



GKEL has set up an English Medium School in its campus affiliated to CBSE which is run by DAV since last 5 years. This is only English medium school available in the periphery villages. Currently 490 students (both boys and girls study in this school from LKG to Cl-X. Students from community, GKEL employees and families of other corporates study in this school. GKEL provides school fees concession to the students belongs to land loser families. Last year 165 students availed such facility.

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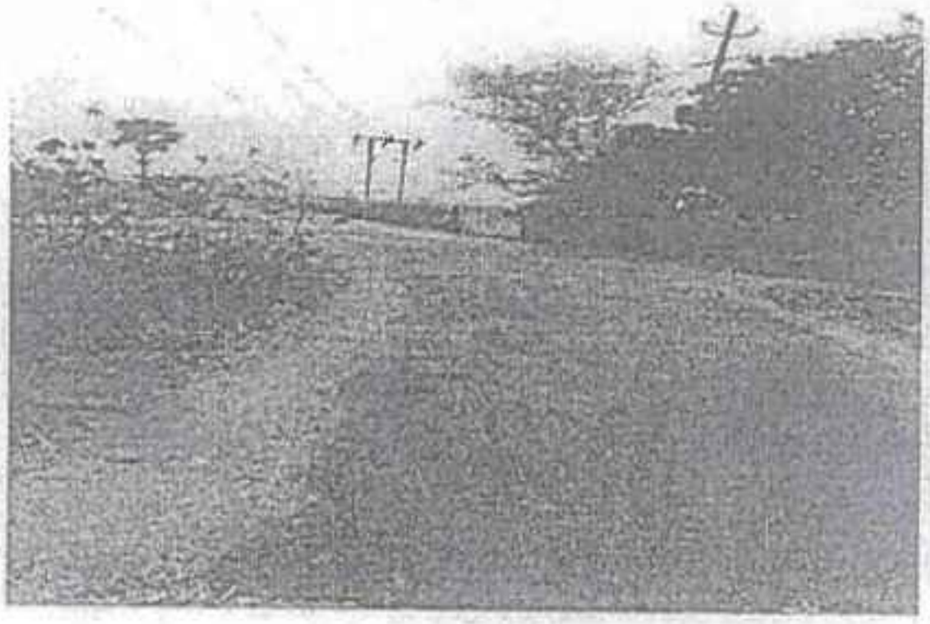
CSR activities undertaken by GKEL as per suggestion of District Administration/RPDAC

Project 1: Development of All Weather Road to Budhapanka Station (1400Mtr)

Brief description: Existing earthen road connecting to Budhapanka station from Manpur village was converted to an all-weather road with the following;

- Road embankment with Sub-base & base course is laid with granular material of 5m wide on top to prepare the surface for black topping;
- 4m wide carriage way is then blacktopped over the base course with dense bituminous mix and pre-mix carpet.



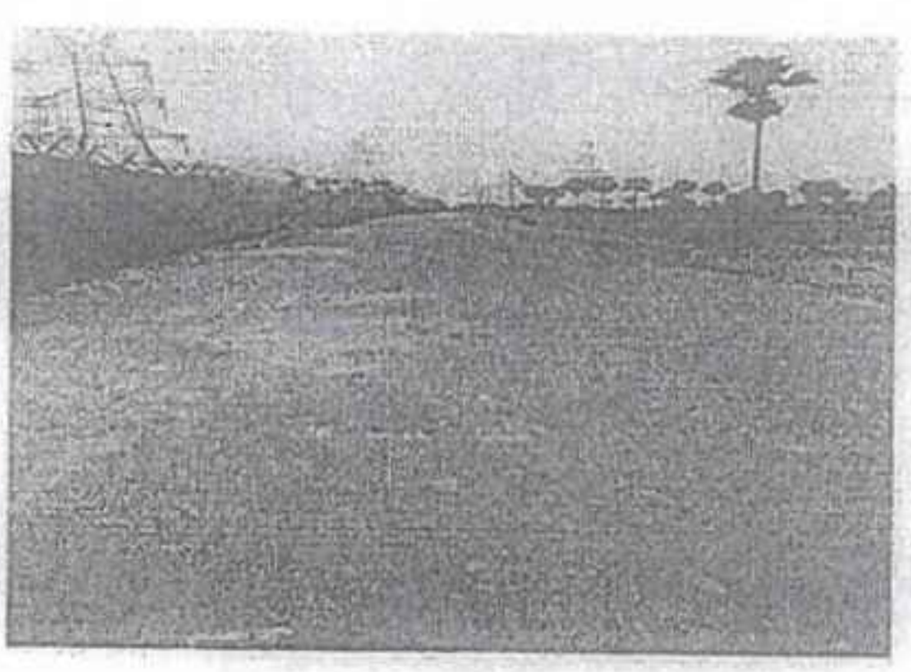
Expected Outcome: Fare weather road is developed; facilitate connectivity from village to station.

Project Cost: Rs. 72, 09,228/- including GST

Project 2- Black Topping of L-56 road (1270Mtr) connecting village Bhagamunda & Durgapur

Brief description: Existing damaged main road black topped with bituminous course by strengthening the surface with base course and blacktopping;

- Road embankment with Sub-base & base course is laid with granular material of 7m wide on top to prepare the surface for black topping;
- 4m wide carriage way is then blacktopped over the base course with dense bituminous mix and pre-mix carpet.



Expected Outcome: Smooth fare weather road is developed will facilitate connectivity from village to nearest highway (NH-55).

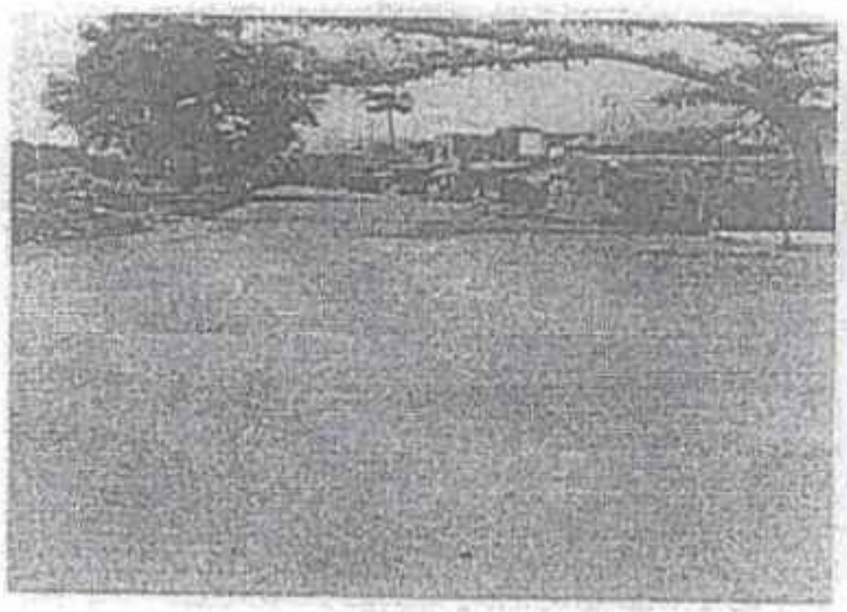
Project Cost: (Rs. 3,910,520.00 including GST)

Project 3: Black Topping of MANIABEDA main road (690Mtr)

Brief description: Existing damaged main road black topped with bituminous course by strengthening surface with base course and blacktopping;

GMR KAMALANGA ENERGY LTD.

- Road embankment with Sub-base & base course is laid with granular material of 7m wide on top to prepare the surface for black topping;
- 4m wide carriage way is then blacktopped over the base course with dense bituminous mix and pre-mix carpet.



Expected Outcome: Smooth fare weather road is developed will facilitate connectivity from village to nearest highway (NH-55).

Project Cost: (Rs. 3,270,701.00 including GST)

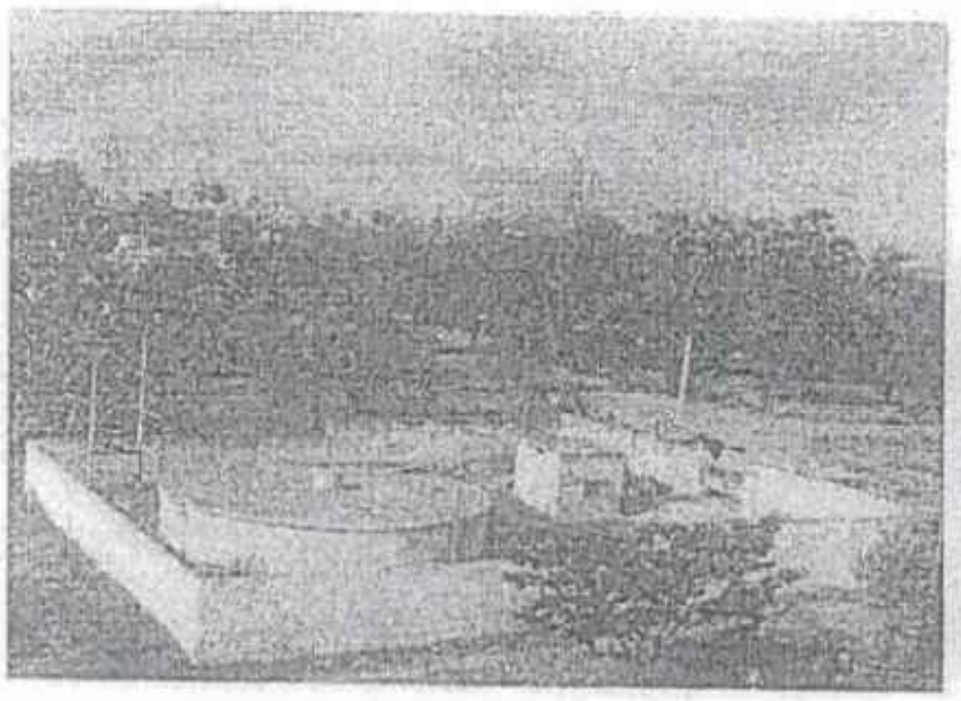
Project 4: Development of Potable water supply scheme for 5 villages of Kamalanga (Maniabeda, Achalkote, Barasahi & Kaliataila, Mangalpur & Manpur)

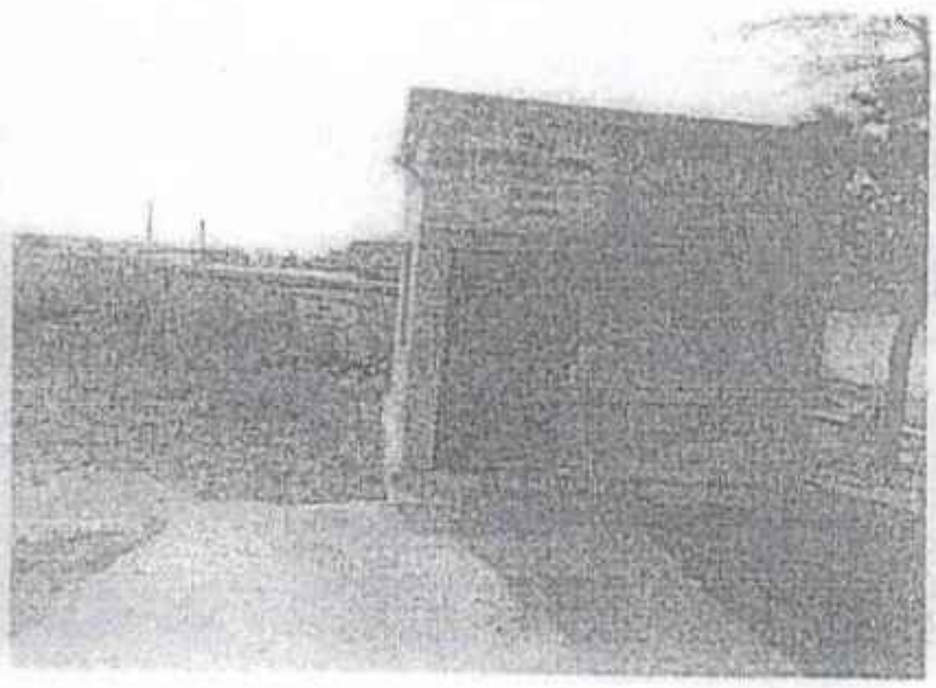
Brief description: This is a JV project with RWSS, Dhenkanal where GKEL has constructed the 500000Ltr capacity over ground reservoir(OGR) with power supply connectivity from CESU for pumping operation. GKEL has also provided requisite land (600SQM) for the entire set up. Rest other distribution piping network are done by RWSS with an overhead water tank of 100000 Ltr capacity. Key feature of the entire set up sponsored by GKEL is as follows;

- 500000 Ltrs. capacity over ground reservoir for storing treated water sourced from GKEL township;
- Perimeter boundary wall with a pump house for operating the system;
- 11KV/415v Power supply with transformer tapped from nearby CESU source;

Expected Outcome: Acute shortage of potable water in the said villages are resolved.

Project Cost: (Rs. 37,00,000/-)





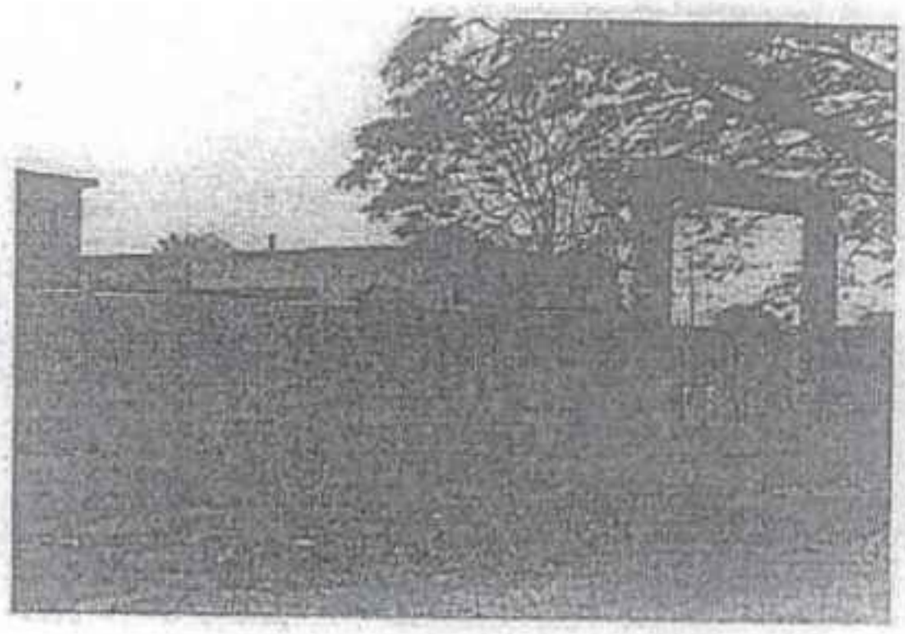
GMR KAMALANGA ENERGY LTD.

Project 5: Construction of Boundary wall of Manpur U.P School

<u>Brief description:</u> 210M length boundary wall with main gate structure was made with laterite stone masonry and RCC frame.

<u>Expected Outcome</u>: Such Infrastructure will create a confine campus with security for students.

<u>Project Cost</u>: (Rs.7,29,535.00 including GST)



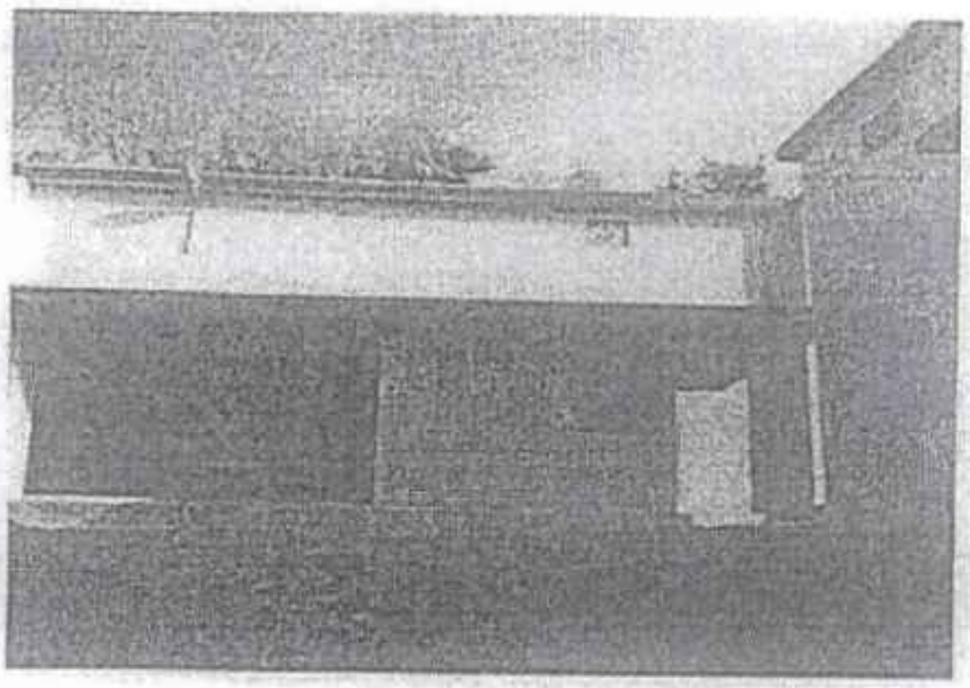
Project 6: Construction of Community Centre @ Mangalpur (Upar Sahi)

<u>Brief description:</u> Salient feature of the building;

- RCC framed structure of 1100 SFT with IPS flooring;
- MS fabricated Doors & windows;
- External painting with weather coat and internal with emulsion paints;
- Plinth protection with approach to main road.

<u>Expected Outcome</u>: Such Infrastructure will facilitate club activities of the community and other social needs.

<u>Project Cost</u>: (Rs.5,49,109.00 including GST)



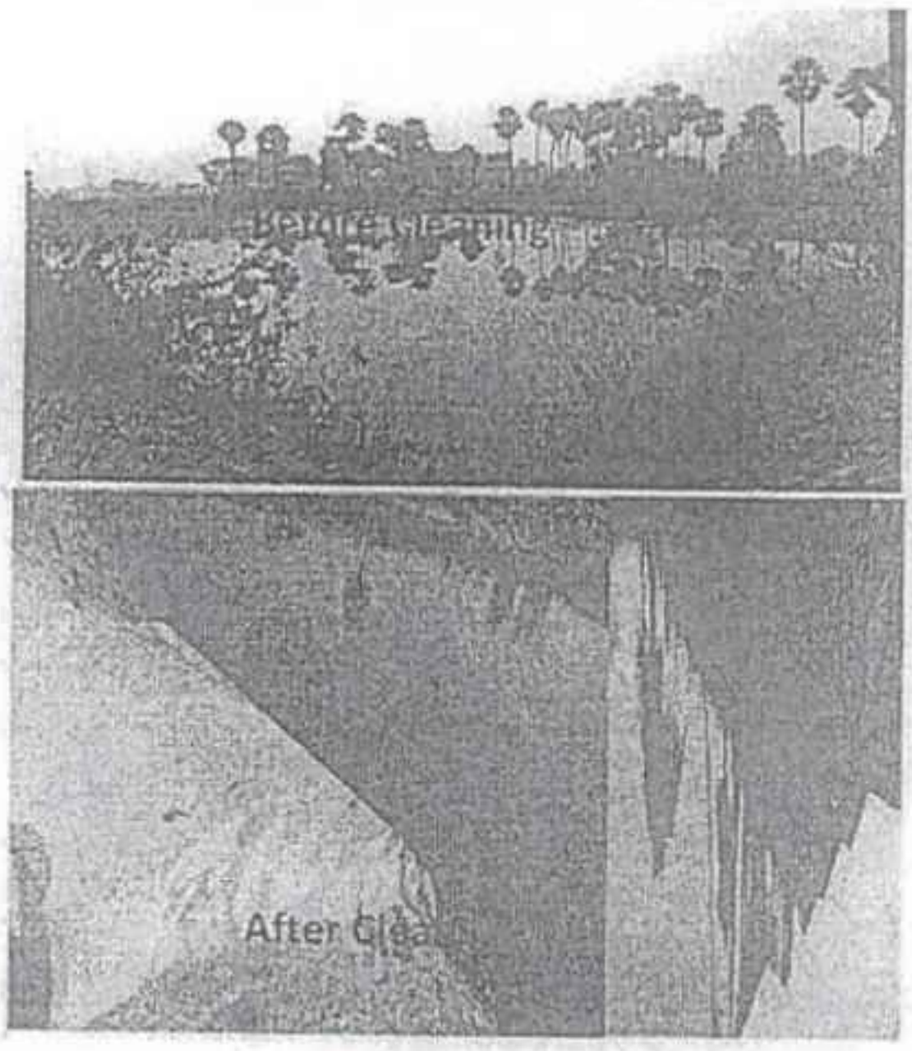
Project 6: Restoration of Pond of Maniabeda Village

<u>Brief description:</u> A very old community pond of Maniabeda Village under the Kamalanga gram panchayat has been restored by cleaning of silt and making a ***Bathing Ghats*** to facilitate villagers for use of pond water for bathing and other purposes.

Expenditure Incurred: Rs. 4.50Lakhs

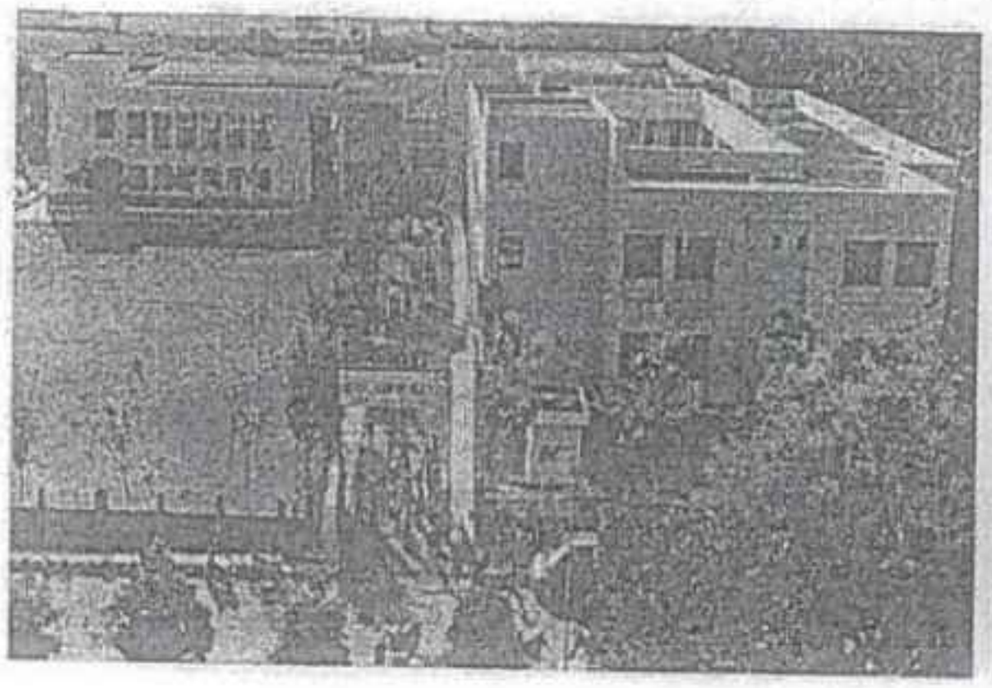
<u>Expected Outcome</u> **/Benefits:-**

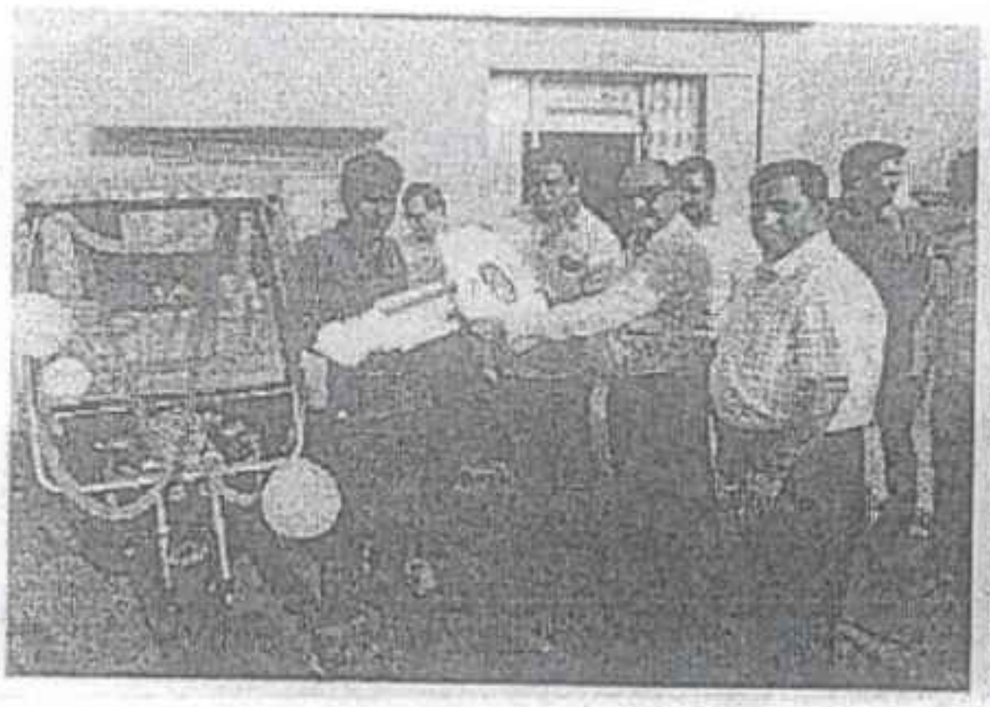
- Increase in water holding capacity of the pond;
- Reduce in emission of toxic gases & create pleasance ambience.
- Easily excess of pond water to use for bathing purposes.

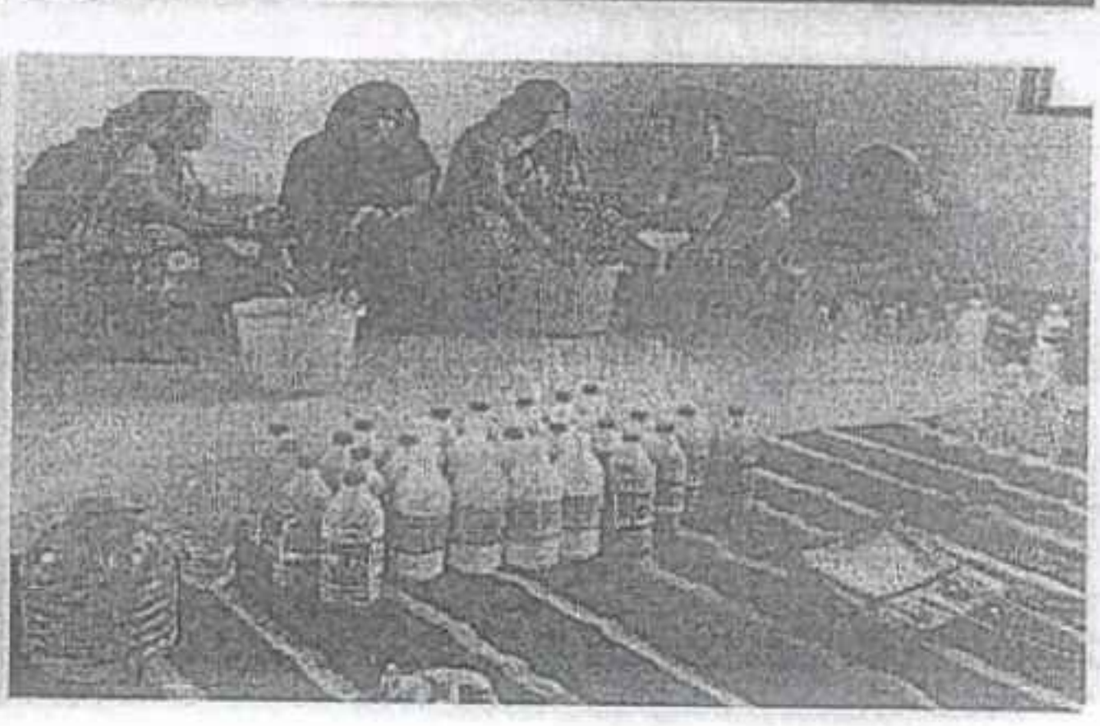


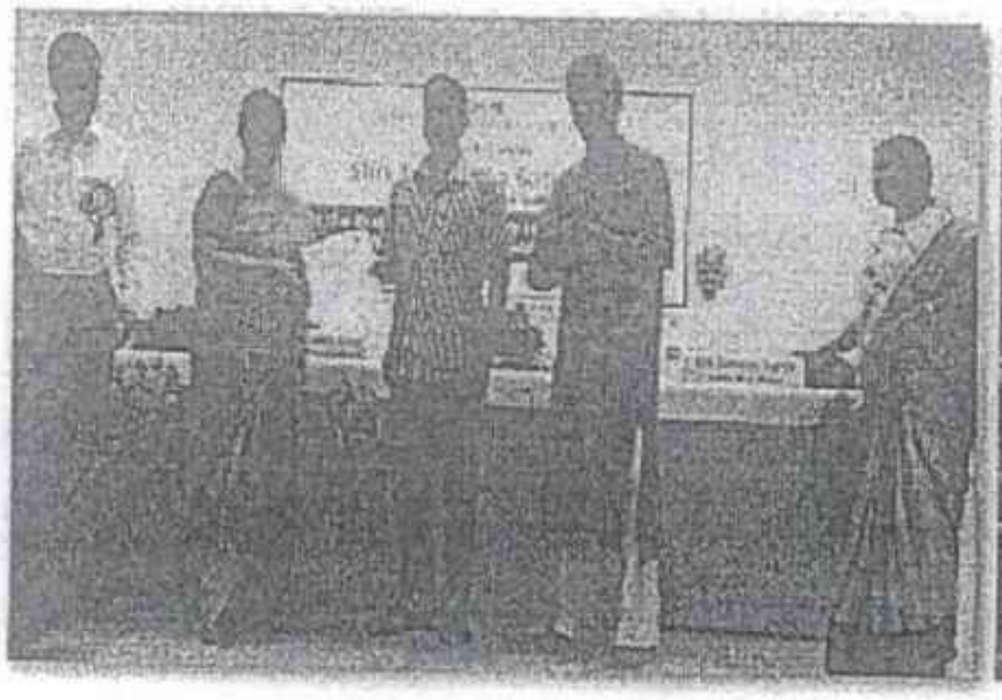
GMR KAMALANGA ENERGY LTD.

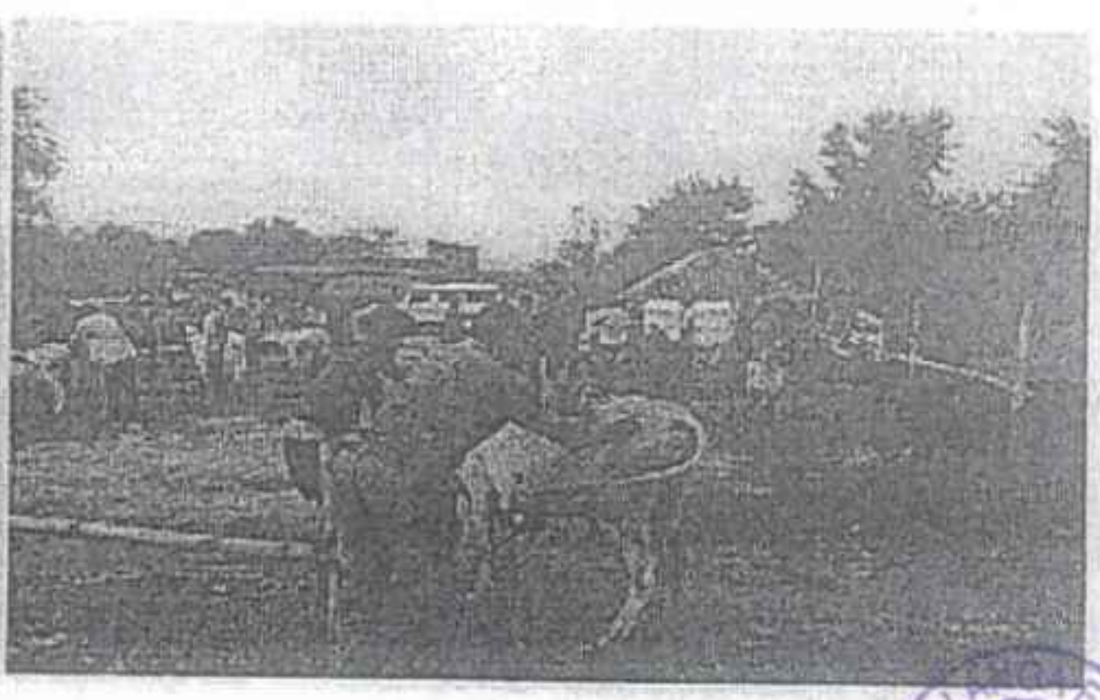
CSR ACTIVITIES PHOTOS

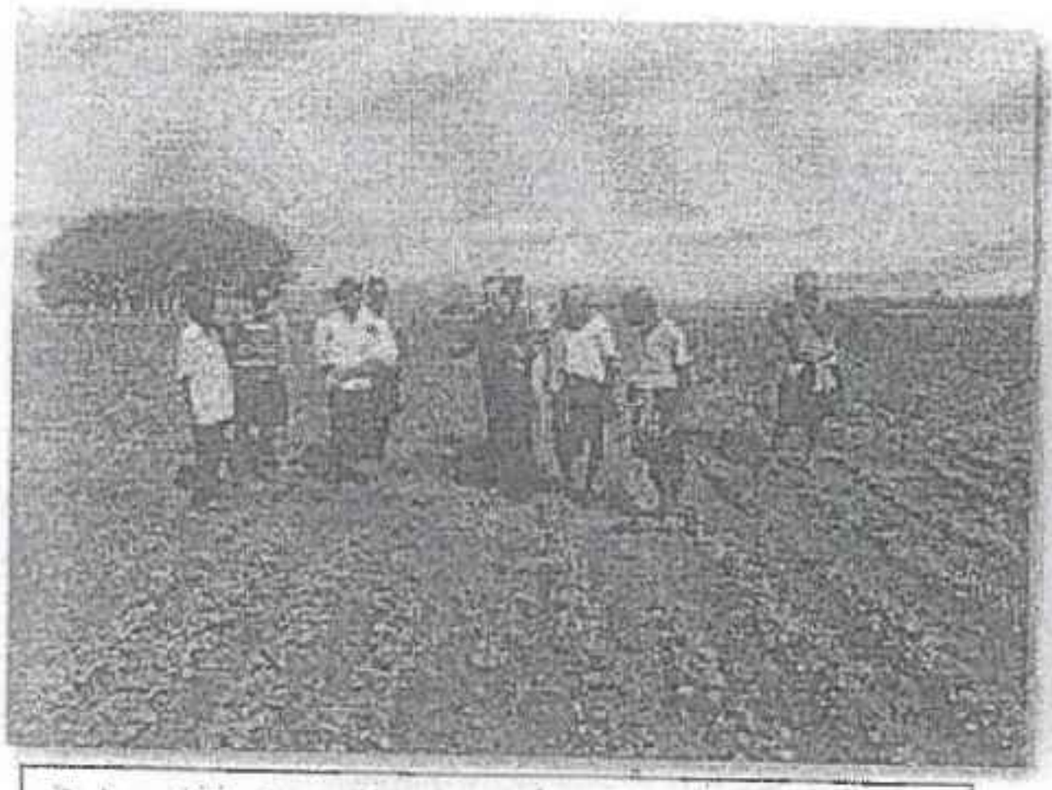




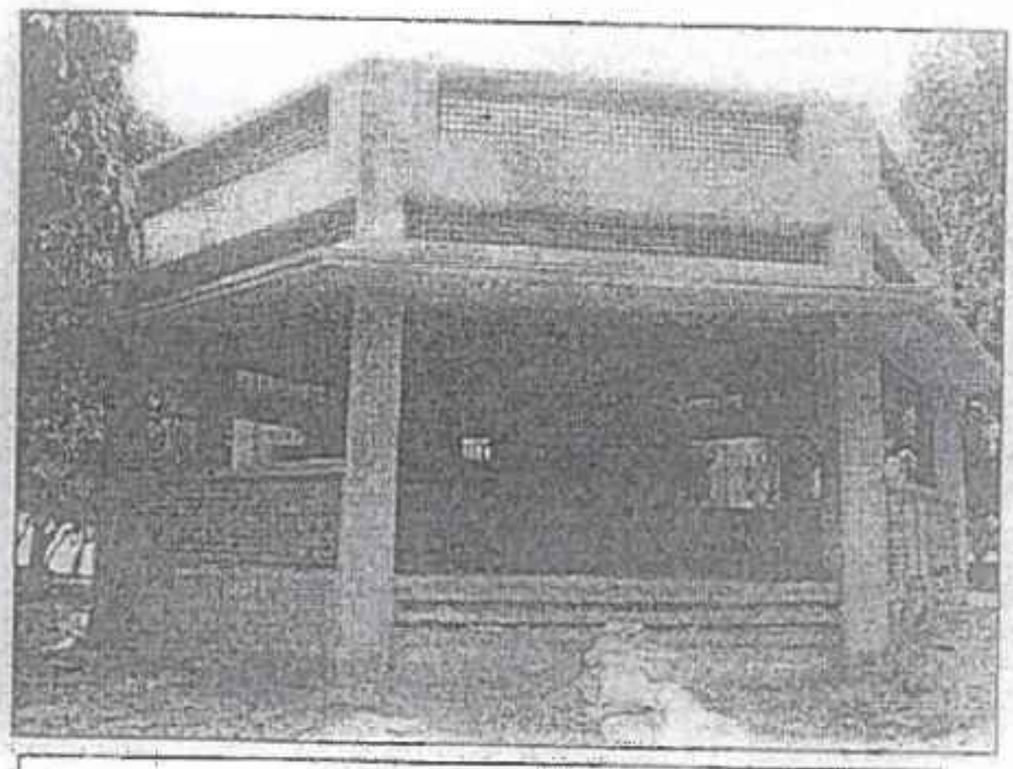




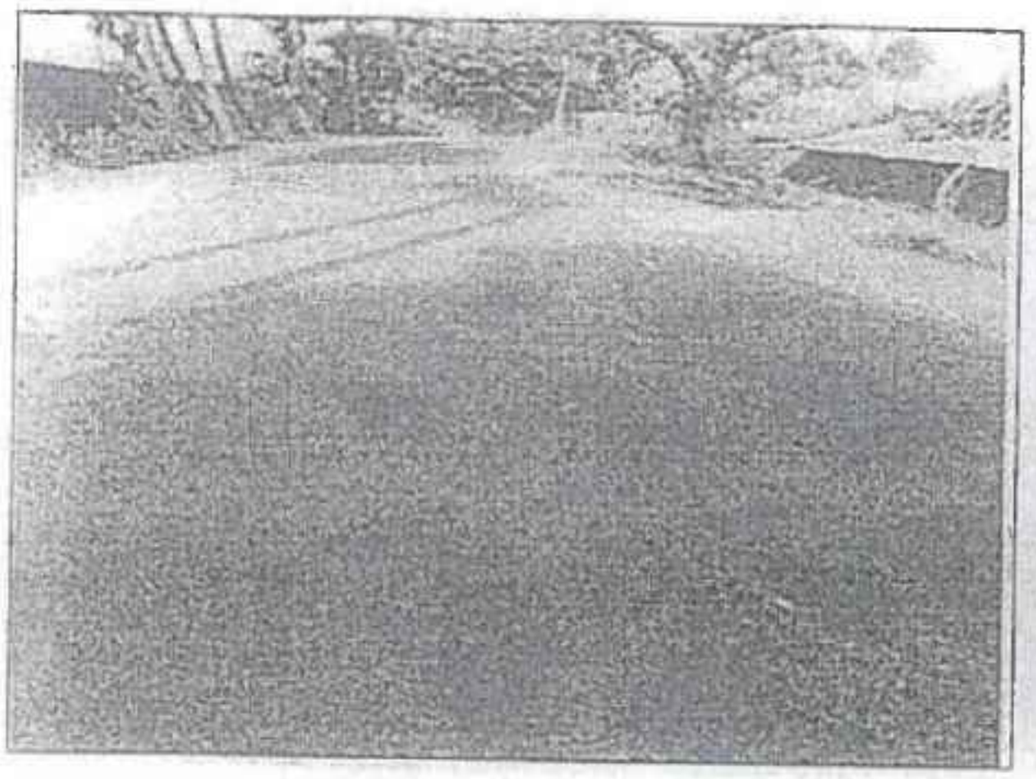




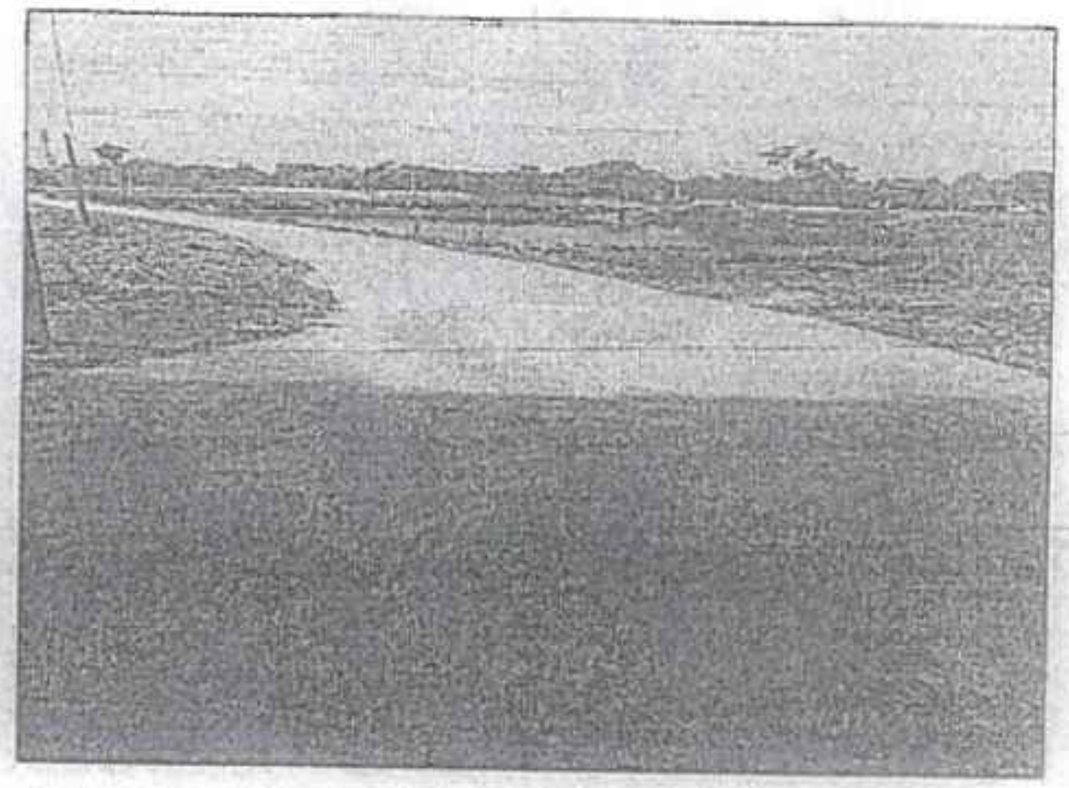
Scientific farming practice



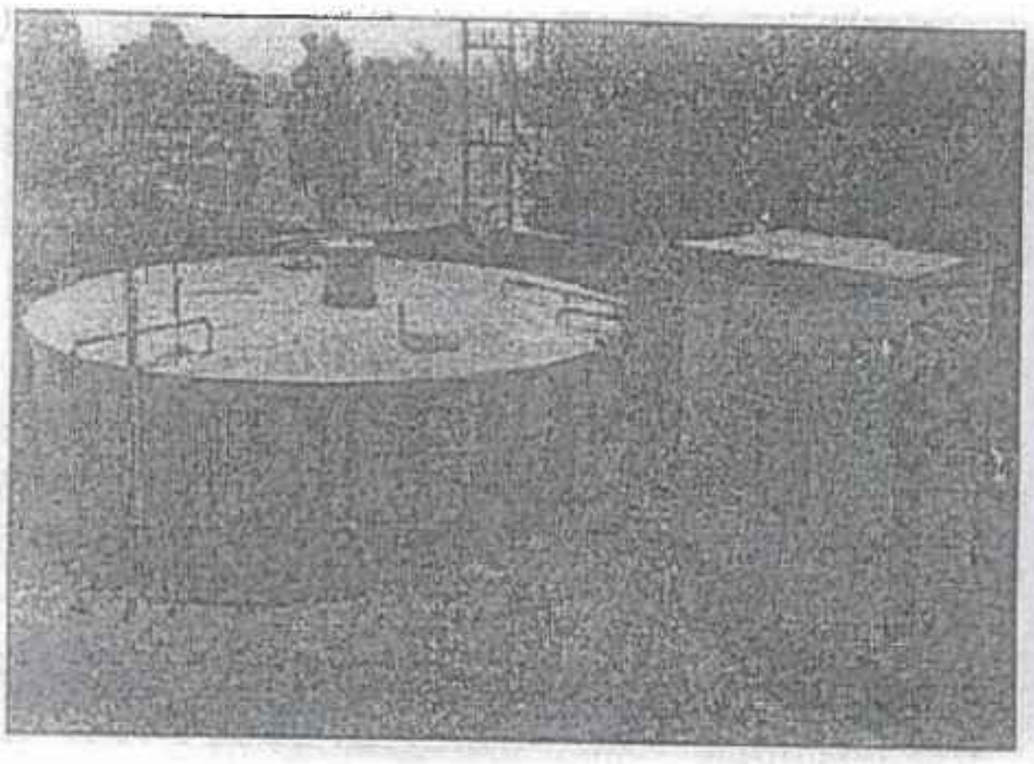
Yagna Mandap in Village Temple - Kamalanga



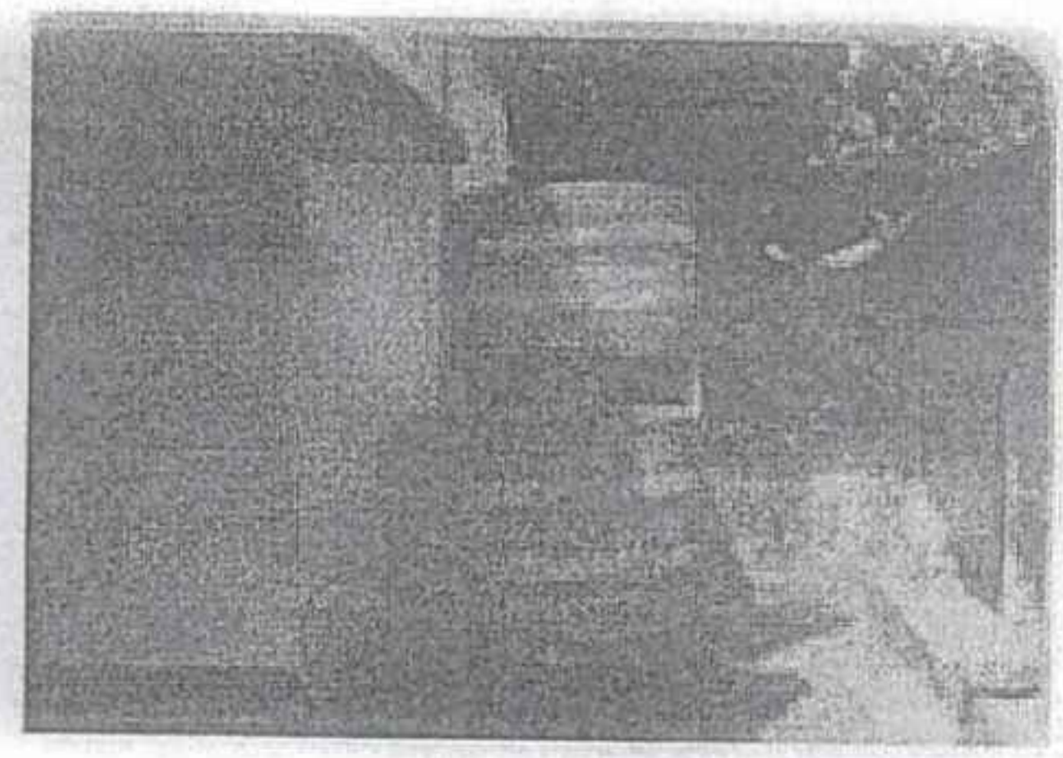
Black top road from Maniabeda to Durgapur village



400mtrs CC Road- Bhagamunda Village



Water Supply facility for community



Rain water harvesting in Kamalanga School

GMR KAMALANGA ENERGY LTD.

PROJECT STATUS

Sl. No.	Project components	% of Completion	Remark
A	**Infrastructure & other facilities**		
1	Direct Approach Road outside plant boundary	100	Road work completed & under operation.
2	Merry Go Round railway line outside plant boundary	100	Work completed & under operation.
3	Plantation	100	More than 357 Acres with 392,350 nos. of Saplings planted till date.
4	Ash Pond	100	Present ash pond will be used, as doing ash utilisation more that 100 % since last 5 years.
B	**Plant Facilities**		
5	Coal Bunker, Coal Mill, Boiler and ESP	15	• Civil foundation done and Coal Bunkers erected.
6	Turbine, Generator & Accessories and TG Building.	10	• Civil foundation done.
7	Chimney & Flue cane	100	• Completed
8	Switch Yard with Transformers	75	• Switch yard completed, transformers to be laid.
9	Cooling Towers & CW Pump house	15	• Civil & building work of pump house completed, • Cooling Tower - work to be done.
10	River Water pump house, pipeline Reservoir, Raw water Pump House and pipe lines.	81	• Major work Completed, Connecting pipe lines to be laid.
11	Water treatment plant & accessories & ETP / STP / RO system.	90	• Completed-Common facility • Blowdown pipeline to be laid.
12	Fuel oil Pump House	85	• Common facility, only pipe line from Pump house to Boiler to be laid.
13	Coal handling Plant	85	• Common Facility – Only Conveyor for Bunker bay to be laid.
14	Ash handling System	81	• Hydrobin & Silo – Completed. • As conveying Pipeline to be laid.
Cumulative progress of Plant Facilities		**63.7%**	

Annexure - XXII