

**Bharat Coking Coal Ltd.**

(A Subsidiary of Coal India Limited)

Office of the General Manager, Katras Area
P.O. KATRAS, P.S.- Jogta, Dhanbad-828121

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Ref. No.-BCCL/IV/2022/ 20

Dated- 28/05/2022

To
The Director,
Ministry of environment, forest and climate charge
Regional office (ECZ)
Bungalow office no.42, Shyamali colony
Ranchi-834002

Sub:-six monthly compliance report on implementation of environmental measures for the period from October 2021 to March 2022

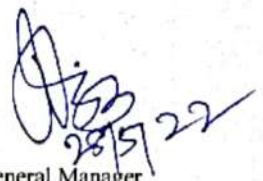
Dear Sir

Kindly find enclosed herewith the six monthly compliance report on implementation of environmental measures for the period from October 2021 to March 2022 in respect of cluster IV group of mines under Katras Area, BCCL.

Hope you will find in order.

Enclosed:-As Above.

Yours Faithfully


General Manager
Cluster-IV, BCCL

Copy:-

- 1.The Director,1A Monitoring cell,Paryavaran Bhawan,CGO Complex, New Delhi-110003
2. Central Pollution Control Board, Parivesh Bhawan, CBD-cum-Office Complex East Arjun Nagar, DELHI - 110 032, INDIA
3. The Director,(S) Ministry of Environment & Forest,Govt.of India -Bhuneshwar751023
- 4.The Member Secretary, Jharkhand state Pollution Control Board,Ranchi-834004
5. The Regional Officer, Jharkhand state Pollution Board,Dhanabad-826001
- 6.HOD,(ENV),BCCL,Koyla Bhawan,Dhanbad
- 6.Office Copy

SL	Mining	Compliance
1	The environmental clearance shall be valid for a period of one year from the issue of this letter. Further extension/continuance of the project shall be based on evaluation of the action taken on each of the observations of this Ministry's Regional Office during their site visit on 22nd August, 2016.	Agreed. Validity extension of Environmental clearance has been made. EC validity has been extended for life of mine or 30 years whichever is earlier vide EC order no J-11015/372/2013-IA-II(M), dated 23.10.2019. Annexure 1- EC order
2	The project proponent shall obtain Consent to establish from the State Pollution Control Boards of Jharkhand for the proposed peak capacity of 9.55 MTPA prior to commencement of the increased production.	Agreed.
3	Transportation of coal from face to Coal heap shall be carried out by truck. Further, the coal transportation from Coal heap to Coal Handling Plant shall be carried out through covered trucks.	It is being complied. Annexure 2- Pictures of Tarpaulin covered coal transportation in Cluster IV of Bharat Coking Coal Limited
4	Mitigative measures to be undertaken to control dust and other fugitive emissions all along the roads by providing sufficient numbers of water sprinklers.	It is being complied. Mobile water tanker is used for dust suppression. Fixed Water sprinkling system has been installed. 5 no's of Water tanker of capacity 28KL with mist fitting arrangement and 1 no's of truck mounted fog cannon of capacity 12 KL has been deployed in cluster IV group of mines. Apart from that installation of 2 no's of fixed type fog cannon is in process. Annexure 3- Pic of Mobile water tanker with mist fitting, truck mounted fog cannon and fixed water sprinkler.
5	Sufficient coal pillars shall be left un-extracted around the air shaft (within the subsidence influence area) to protect from any damage from subsidence, if any.	It is Being Complied. Sufficient coal pillars have been left un-extracted around the air shaft.
6	Solid barrier shall be left below the roads falling within the block to avoid any damage to the roads and no depillaring operation shall be carried out below the township/colony.	Solid barrier have been left below the roads falling within the block to avoid any damage to the roads and no depillaring operation have been carried out below the township/colony.
7	Depression due to subsidence resulting in water accumulating within the low lying areas shall be filled up or drained out by cutting drains.	It is being complied.
8	Sufficient number of pumps of adequate capacity shall be deployed to pump out mine water during peak rain fall.	It is being complied.
9	The company shall obtain approval of CGWA for use of groundwater for mining operations at its enhanced capacity of 9.55 MTPA.	No objection certificate for Ground water abstraction has been accorded by ministry of Jal Shakti vide noc ref letter no-CGWA/NOC/MIN/orig/2021/141. Annexure-3(A)
10	Continuous monitoring of occupational safety and other health hazards, and the corrective actions need to be ensured.	It is being complied. Safety talk is being given to workers at mine during starting of shift. PPE has been provided to workers. Annexure 4-safety talk pic and distribution list of PPE.

11	The fire dealing operations by excavating out fire should be expedited.	It is being complied. Annexure 5- Pic of fire dealing operation.
1	Mining shall be carried out under strict adherence to provisions of the Mines Act, 1952 and subordinate legislations made there-under as applicable.	It is being Complied.
2	Mining shall be carried out as per the approved mining plan(including Mine Closure Plan) abiding by mining laws related to coal mining and the relevant circulars issued by Directorate General Mines Safety (DGMS).	It is being Complied. Mining Plans of mines of Cluster-IV approved on 03.08.2017 on 333th Board Meeting. It is hereby informed that the mining operation at Katras Choitudih colliery under Cluster IV has been started again for fire dealing purpose after its discontinuation for the period from OCT-2019 to May-2021. Annexure 6- Copy of approved mining plan
3	No mining shall be carried out in forest land without obtaining Forestry Clearance as per Forest (Conservation) Act, 1980	There is no forest land existing under the leasehold of Cluster IV. Annexure 7- No forest land certificate
4	No change in mining method i.e. UG to OC, calendar programme and scope of work shall be made without obtaining prior approval of the Ministry of Environment, Forests and Climate Change (MoEFCC).	It is being Complied. OCP based on shovel-dumper combination and UG based on bord and pillar are in operation at present.
5	Underground work place environmental conditions shall be rendered ergonomic and air breathable with adequate illumination in conformance with DGMS standards.	It is being Complied.
Land reclamation and water conservation		
1	Digital Survey of entire lease hold area/core zone using Satellite Remote Sensing survey shall be carried out at least once in three years for monitoring land use pattern and report in 1:50,000 scale or as notified by the Ministry of Environment, Forest and Climate Change from time to time shall be submitted to MoEFCC/Regional Office.	The proponent has got a study carried out through NRSC Hyderabad. NRSC has been awarded the work to prepare time series map by isothermal mapping. NRSC has carried out the work of Isothermal Mapping in 2014, 2018 and 2021. Annexure 8- Last Time-series map of 2021
2	The surface drainage plan including surface water conservation plan for the area of influence affected by the said mining operations, considering the presence of river/rivulet/pond/lake etc, shall be prepared and implemented by the project proponent. The surface drainage plan and/or any diversion of natural water courses shall be as per the approved Mining Plan/EIAIEMP report and with due approval of the concerned State/Go I Authority. The construction of embankment to prevent any danger against inrush of surface water into the mine should be as per the approved Mining Plan and as per the permission of DGMS or any other authority as prescribed by the law.	The surface drainage plan is attached herewith. No diversion of natural water courses has been done. The construction of embankment to prevent any danger against inrush of surface water into the mine has been constructed. Annexure- 9- surface drainage plan

3	The final mine void depth should preferably be as per the approved Mine Closure Plan, and in case it exceeds 40 m, adequate engineering interventions shall be provided for sustenance of aquatic life therein. The remaining area shall be backfilled and covered with thick and alive top soil. Post-mining land be rendered usable for agricultural/forestry purposes and shall be diverted. Further action will be treated as specified in the guidelines for preparation of Mine Closure Plan issued by the Ministry of Coal dated 2th August, 2009.	The final mine void depth will preferably be as per the approved Mine Closure Plan. At the end of mining all the remaining excavated area will be leveled and reclaimed physically as well as Biologically.
4	The entire excavated area, backfilling, external OB dumping (including top soil) and afforestation plan shall be in conformity with the "during mining"/"post mining" land-use pattern, which is an integral part of the approved Mining Plan and the EIA/EMP submitted to this Ministry. Progressive compliance status vis-a-vis the post mining land use pattern shall be submitted to the MOEFCC/RO.	The entire excavated area, backfilling, external OB dumping (including top soil) and afforestation plan is being in conformity. Land use pattern has been submitted to ministry. Green belt over an area of 192.20 Ha (27.11 Ha over OB dumps, 165.09 Ha social forestry & Avenue Plantation) can be observed within IV as per CMPDIL land reclamation monitoring Report-2021. Annexure 10- land reclamation monitoring Report
5	Fly ash shall be used for external dump of overburden, backfilling or stowing of mine as per provisions contained in clause (i) and (ii) of subparagraph (8) of fly ash notification issued vide S.O.2804 (E) dated 3rd November, 2009 as amended from time to time. Efforts shall be made to utilize gypsum generated from Flue Gas Desulfurization (FGD), if any, along with fly ash for external dump of overburden, backfilling or stowing of mines. Compliance report shall be submitted to Regional Office of MoEF&CC, CPCB and SPCB.	There is no generation of fly ash in cluster IV.
6	It shall be ensured that as per the time schedule specified in mine closure plan it should remain live till the point of utilization. The top soil shall temporarily be stored at earmarked site(s) only and shall not be kept unutilized. The top soil shall be used for land reclamation and plantation purposes. Active OB dumps shall be stabilised with native grass species to prevent erosion and surface run off. The other overburden dumps shall be vegetated with native flora species. The excavated area shall be backfilled and afforested in line with the approved Mine Closure Plan. Monitoring and management of rehabilitated areas shall continue until the vegetation becomes self-sustaining. Compliance status shall be submitted to the Ministry.	It is being Complied. Top soil is being stored. Top soil is being utilized as plantation site. Grassing after preparing of seed ball has been done over 25 Ha OB area till date. Backfilling of excavated area is being done as per mine closure guidelines. Green belt over an area of 192.20 Ha (27.11 Ha over OB dumps, 165.09 Ha social forestry & Avenue Plantation) can be observed within IV as per CMPDIL land reclamation monitoring Report-2021. Annexure 10 A- Top soil storage plan Annexure 10 B- Plantation details (2014-15 to till date)
7	Post-mining land shall be rendered usable for agricultural/forestry purposes and handed over to the respective State Government, as specified in the Ministry of Coal Guidelines dated 27th August, 2009 for Preparation of Mine Closure Plan.	It will be complied. Annexure 11- Approval copy of Mine closer plan.

8	Regular monitoring of subsidence movement on the surface over and around the working areas and its impact on natural drainage pattern, water bodies, vegetation, structure, roads and surroundings shall be continued till movement ceases completely. In case of observation of any high rate of subsidence beyond the limit prescribed, appropriate effective mitigation measures shall be taken to avoid loss of life and materials. Cracks should be effectively plugged in with ballast and clay soil/suitable material.	No depillaring in underground mine is going on hence no mining induced subsidence is taking place. Regular monitoring of subsidence is being done by subsidence monitoring committee of the area.
9	A separate team for subsidence monitoring and surface mitigation measures shall be constituted and continuous monitoring & implementation of mitigation measures be carried out.	It is being complied. A Certificate of Project Officers and General Manager of the Cluster IV, indicating no subsidence due to mining operation is being attached. Annexure 12- Certificate Regarding no subsidence due to mining operation.
10	Thorough inspection of the mine lease area for any cracks developed at the surface due to mining activities below ground shall be carried out to prevent inrush of water in the mine.	It is being complied.
11	Native tree species shall be selected and planted over areas affected by subsidence.	Plants like . seesam, Gamhar, Aam, Peepal, Bargad, Sagwan, Kathal etc. has been planted over areas likely to be affected by subsidence.
Emissions, effluents, and waste disposal		
1	Transportation of coal, to the extent permitted by road, shall be carried out by covered trucks/conveyors. Effective control measures such as regular water/mist sprinkling/rain gun etc shall be carried out in critical areas prone to air pollution (with higher values of PM10/PM2.5) such as haul road, loading/unloading and transfer points. Fugitive dust emissions from all sources shall be controlled regularly. It shall be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the Central/State Pollution Control Board.	Vehicular emission is kept under control by proper maintenance of vehicles. Vehicular emissions are being monitored in every prescribed period. Only those vehicles are being allowed to run having PUC. In addition to the above coal transportation is done by tarpaulins covered and optimally loaded vehicles. The project authorities are regularly checking all the loaded trucks/dumpers coming inside the plant about their valid PUC. Total 40 nos of fixed water sprinkler at haul road has been deployed for control to air pollution. In addition to that 45 no of fixed sprinkler installed along the siding/CHP, throwing approx 10-12m and distance between sprinkler is about 10-15m. Annexure 13- PUC certificate
2	Greenbelt consisting of 3-tier plantation of width not less than 7.5 m shall be developed all along the mine lease area as soon as possible. The green belt comprising a mix of native species (endemic species should be given priority) shall be developed all along the major approach/ coal transportation roads.	For meeting the green belt development target we have assigned the work order to the DFO, Dhanbad in FY 2019-2020 & FY 2020-2021 for plantation over an area of 11 Ha & 13 Ha over Ob dump respectively. Plantation is

		being carried out in available spaces for creation of thick green belt. It is being Complied. Green belt over an area of 192.20 Ha (27.11 Ha over OB dumps, 165.09 Ha social forestry & Avenue Plantation) can be observed within IV as per CMPDIL land reclamation monitoring Report 2021. Apart of block plantation, 600 nos of avenue plantation in form of bamboo gabion plantation has been done in the FY 19-20 by DFO, Dhanbad. Two nos of Sneh Smriti upwan (Fruit orchid) site have been developed in around 1.5 Ha areas. Grass seed have been broadcasted in around 15 Ha over OB dump. Annexure 14 - 11 Ha & 13Ha plantation work order and plantation Pics.
3	The transportation of coal shall be carried out as per the provisions and route envisaged in the approved Mining Plan or environment monitoring plan. Transportation of the coal through the existing road passing through any village shall be avoided. In case, it is proposed to construct a 'bypass' road, it should be so constructed so that the impact of sound, dust and accidents could be appropriately mitigated.	Presently, road transportation is being done by covering vehicle with tarpaulin.
4	Vehicular emissions shall be kept under control and regularly monitored. All the vehicles engaged in mining and allied activities shall operate only after obtaining 'PUC' certificate from the authorized pollution testing centres.	Vehicular emissions are being monitored in every prescribed period. Only those vehicles are being allowed to run having PUC. In addition to the above coal transportation is done by tarpaulins covered and optimally loaded vehicles. The project authorities are regularly checking all the loaded trucks/dumpers coming inside the plant about their valid PUC.
5	Coal stock pile/crusher/feeder and breaker material transfer points shall invariably be provided with dust suppression system. Belt-conveyors shall be fully covered to avoid air borne dust. Side cladding all along the conveyor gantry should be made to avoid air borne dust. Drills shall be wet operated or fitted with dust extractors.	It is being complied. Dust suppression arrangement has been made at crusher. Fixed type water sprinkler have been installed. Installation of Belt conveyor system may leads to fire Hazard as the existence of fiery coal seam in our command area. Annexure 15- Dust suppression arrangement at coal loading point of CHP.
6	Coal handling plant shall be operated with effective control measures w.r.t. Various environmental parameters. Environmental friendly sustainable technology should be implemented for mitigating such parameters.	It is being complied. Dust suppression arrangement has been made at coal Handling plants. 3 mobile water sprinkler have been deployed for control to air pollution in CHP. In addition to that 45 no of fixed sprinkler installed along the siding/CHP, throwing range approx 10-12m and distance between sprinklers is about 10-15m. Mobile water tanker is used for dust suppression. 1 no's of truck mounted fog cannon

		of capacity 12 KL has been deployed in cluster IV group of mines. Apart from that installation of 2 no's of fixed type fog cannon is in process.
7	Ground water, excluding mine water, shall not be used for mining operations. Rainwater harvesting shall be implemented for conservation and augmentation of ground water resources.	It is being complied. Only mine water is used for industrial purpose i.e fire dealing, watering the mine area, roads, green belt development etc. Regular monitoring of ground water level and quality are being monitored by CMPDIL, Ranchi. Rain water Harvesting arrangement has been made. Roof top rain water harvesting system has also been developed at coal dump colony under cluster IV. Annexure 16- Ground water monitoring report Annexure 17- Rain water harvesting arrangement.
8	Catch and or garland drains and siltation ponds in adequate numbers and appropriate size shall be constructed around the mine working, coal heaps & OB dumps to prevent run off of water and flow of sediments directly into the river and water bodies. Further, dump material shall be properly consolidated/ compacted and accumulation of water over dumps shall be avoided by providing adequate channels for flow of silt into the drains. The drains/ ponds so constructed shall be regularly desilted particularly before onset of monsoon and maintained properly. Sump capacity should provide adequate retention period to allow proper settling of silt material. The water so collected in the sump shall be utilised for dust suppression and green belt development and other industrial use. Dimension of the retaining wall constructed, if any, at the toe of the OB dumps within the mine to check run-off and siltation should be based on the rainfall data. The plantation of native species to be made between toe of the dump and adjacent field/habitation/water bodies.	It is being complied. Annexure 18- Pic of toe wall made along OB dump. Annexure 19- Pic of siltation pond.
9	Adequate groundwater recharge measures shall be taken up for augmentation of ground water. The project authorities shall meet water requirement of nearby village(s) after due treatment conforming to the specific requirement (standards).	Five nos of Rain water Harvesting pond has been created. Water is being supplying to nearby villages after treatment of mine water as per requirement.
10	Solid waste/hazardous waste generated in the mines shall be addressed in accordance to the MSW Rules, 2016.	It is being complied. Solid waste/hazardous waste generated in the mines is being addressed in accordance to the MSW Rules, 2016.
11	The water pumped out from the mine, after siltation, shall be utilized for industrial purpose viz. watering the mine area, roads, green belt development etc. The drains shall be regularly desilted particularly after monsoon and maintained properly.	It is being complied. Pumped out water are being utilized for water sprinkling on haul road, green belt development, fire dealing etc.
12	Major approach roads shall be black topped and properly maintained.	It is being complied.
13	The project proponent shall not alter major water channels	The embankment constructed along the river

	around the site. Appropriate embankment shall be provided along the side of the river/nallah flowing near or adjacent to the mine. The embankment constructed along the river/nallah boundary shall be of suitable dimensions and critical patches shall be strengthened by stone pitching on the river front side, stabilized with plantation so as to withstand the peak water pressure preventing any chance of mine inundation.	boundary is of suitable dimension and critical patches has been strengthened by concreting and stone pitching as per design made by Central Mine Planning and Design Institute Limited (CMPDIL) on the river front side and stabilized with plantation to withstand the peak water flow and prevent mine inundation. Construction of concrete embankment at critical patch of nallah/Jore has been done. Total length of constructed embankment is 3000 m. Annexure 20-Pic of embankment constructed.
14	Garland drains (of suitable size, gradient and length) around the critical areas i.e. mine shaft and low lying areas, shall be designed keeping at least 50% safety margin over and above the peak sudden rainfall and maximum discharge in the area adjoining the mine sites. The sump capacity shall also provide adequate retention period to allow proper settling of silt material of the surface runoff.	It is being complied. Garland drains (of suitable size, gradient and length) around the critical areas i.e. mine shaft and low lying areas, has been designed.
15	Industrial waste water from coal handling plant and mine water shall be properly collected and treated so as to conform to the standards prescribed under the Environment (Protection) Act, 1986 and the Rules made there under, and as amended from time to time. Oil and grease trap shall be installed before discharge of workshop effluent. Sewage treatment plant of adequate capacity shall be installed for treatment of domestic waste water.	Mine water is being reused in mine for industrial purposes (sprinkling, fire control etc.) Oil and grease trap has been installed at the workshops. Annexure 21- Pic of Oil & Grease trap
Illumination, noise & vibration		
1	Adequate illumination shall be ensured in all mine locations (as per DGMS standards) and monitored weekly. The report on the same shall be submitted to this ministry & its RO on six-monthly basis.	It is being complied. Latest report of the same is being attached herewith. Annexure 22- Illumination monitoring report.
2	Adequate measures shall be taken for control of noise levels as per noise pollution Rules, 2016 in the work environment. Workers engaged in blasting and drilling operations, operation of HEMM, etc shall be provided with personal protective equipments (PPE) like ear plugs/muffs in conformity with the prescribed norms and guidelines in this regard. Adequate awareness programme for users to be conducted.	Personnel operating near HEMMs, drilling machine comply with safety regulation and are equipped with Personal Protective Equipment. Awareness programmes are being given to all the personnel at Vocational training center and mine site.
3	Controlled blasting techniques shall be practiced in order to mitigate ground vibrations, fly rocks, noise and air blast etc. as per the guidelines prescribed by the DGMS.	It is being complied. Controlled blasting techniques are being practiced in order to mitigate ground vibrations, fly rocks, noise and air blast etc. as per the guidelines prescribed by the DGMS. Annexure 23- Ground vibration report.
4	The noise level survey shall be carried out as per the prescribed guidelines to assess noise exposure of the workmen at vulnerable points in the mine premises, and report in this regard shall be submitted to the Ministry/RO on six-monthly basis.	It is being complied. Noise level is being monitored by CMPDIL. Annexure 24- Noise level Monitoring Report

Occupational health & safety		
1	The project proponent shall undertake occupational health survey for initial and periodical medical examination of the personnel engaged in the project and maintain records accordingly as per the provisions of the Mines Rules, 1955 and DGMS circulars. Besides regular periodic health check-up, 20% of the personnel identified from workforce engaged in active mining operations shall be subjected to health check-up for occupational diseases and hearing impairment, if any, as amended time to time.	IME/PME is done periodically for the workers to observe any contractions due to exposure to dust and to take corrective measures, if needed and records maintained thereof. Annexure 25- IME/PME report
2	Personnel working in core zone shall wear protective respiratory devices and shall also be provided with adequate training and information on safety and health aspects.	Training and awareness programmes are being given to all the personnel working in dusty areas. Total 1500 Nos of Dust masks have been provided to the personnel engaged in mining and working under cluster IV. Annexure 26- training photograph
Ecosystem and biodiversity conservation		
1	The project proponent shall take all precautionary measures during mining operation for conservation and protection of endangered/endemic flora/fauna, if any, spotted/reported in the study area. The Action plan in this regard, if any, shall be prepared and implemented in consultation with the State Forest and Wildlife Department.	Ecological restoration are being done in consultation with FRI, dehradun. Road Map of Ecological restoration has been made. Annexure 27- Afforestation Programme of cluster-IV
2	The project proponent shall take all precautionary measures to ensure riverine/riparian ecosystem in and around the coal mine upto a distance of 5 km. A riverine/riparian ecosystem conservation and management plan should be prepared and implemented in consultation with the irrigation/water resource department in the State Government.	Monitoring of river water is being done regularly. Special affords has been made for cleaning of river water, drives like swachhta pakhwada are being organised regularly.
Public Hearing, R&R and CSR		
1	Implementation of the action plan on the issues raised during the public hearing shall be ensured. The project proponent shall undertake all the tasks/measures as per the action plan submitted with budgetary provisions during the public hearing. Land oustees shall be compensated as per the norms laid down in the R&R policy of the company/State Government/Central Government, as applicable.	It is being complied. Compliance report of public hearing has been sent to ministry. Land oustees are getting their compensation as per norms laid down in R&R policy of the company.
2	The project proponent shall ensure the expenditure towards socio-economic development in and around the mine every financial year in pursuance of the Corporate Social Responsibility Policy as per the provisions under Section 135 of the Companies Act, 2013.	It is being complied. Expenditure towards socio-economic development has been ensured. During the COVID-19 pandemic distribution of food packets, mask, sanitizer and other essentials has been provided to local peoples. Annexure 28- List of activities undertaken in and around the mine in pursuance of CSR policy.

3	The project proponent shall follow the mitigation measures provided in this Ministry's OM NO.Z-11013/5712014-IA.11 (M) dated 29th October, 2014, titled 'Impact of mining activities on habitations-issues related to the mining projects wherein habitations and villages are the part of mine lease areas or habitations and villages are surrounded by the mine lease area'.	It is being complied.
4	The project proponent shall make necessary alternative arrangements, if grazing land is involved in core zone, in consultation with the State government to provide alternate areas for livestock grazing, if any. In this context, the project proponent shall implement the directions of Hon'ble Supreme Court with regard to acquiring grazing land.	No grazing land is involved in core zone.
Corporate environment responsibility		
1	The Company shall have a well laid down environment policy duly approved by Board of Directors. The environment policy should prescribe for standard operating procedures to have proper checks and balances and to bring into focus any infringements/deviation/violation of the environmental or forest norms/conditions. Also, the company shall have a defined system of reporting of non-compliances/violations of environmental norms to the Board of Directors and/or shareholders/stakeholders.	It is being complied. Corporate Environmental policy has been made, approved by CMD of M/s BCCL and it is being implemented. Environment management cell has also been made to ensure implementation of environmental management plan. A parasnath udhyan as an eco-park has been made under corporate environment responsibility. The said park was inaugurated by honorable home minister shri Amit Shah on dated 23-July-2020 in presence of honorable coal minister shri pralhad joshi. Annexure 29- CER policy
2	The project proponent shall comply with the provisions contained in this Ministry's OM dated 1st May, 2018, as applicable, regarding Corporate Environment Responsibility.	It is being complied. Corporate Environmental policy has been made, approved by CMD of M/s BCCL and it is being implemented.
3	A separate environmental management cell both at the project and company headquarter level, with suitable qualified personnel shall be set-up under the control of a Senior Executive, who will report directly to the Board level executive/Head of the Organization.	A full-fledged Environment Department, headed by a HoD (Environment) along with a suitable qualified multidisciplinary team of executives has been established at the Headquarters. At the area level, one Executive in each area has been nominated as Nodal Officer (Environment). Management Trainees/Asst. Managers (Environment) have also been deputed at area level. The activities are monitored on regular basis at Area and at Headquarters levels. DGM (Environment) at head quarter level, co-ordinates with all the Areas and reports to

		the Director (Technical) and in turn he reports to the CMD of the company.
4	Action plan for implementing EMP and environmental conditions along with responsibility matrix of the company shall be prepared and shall be duly approved by competent authority. The year wise funds earmarked for environmental protection measures shall be kept in separate account and not to be diverted for any other purpose. Year wise progress of implementation of action plan shall be reported to the Ministry/Regional Office along with the Six Monthly Compliance Report.	It is being complied. Action plan has been made, work is being done accordingly. Year wise funds earmarked for environmental protection measure has been kept separately. Annexure 30- Environmental protection measure expenditure details
5	Self environmental audit shall be conducted annually. Every three years third party environmental audit shall be carried out.	It is being complied. CCO has been engaged for the audit of plantation done per year. IEST, Shibpur is attached for auditing of Mine closure activity done in Katras Area.
6	Skill training as per safety norms specified by DGMS shall be provided to all workmen including the outsourcing employees to ensure high safety standards in mines.	Skill training as per safety norms specified by DGMS are being provided to all workmen including the outsourcing employees to ensure high safety standards in mines.
7	Effective arrangement shall be made to provide and maintain at suitable points conveniently situated, a sufficient supply of drinking water for all the persons employed.	It is being Complied.
	Statutory Obligations	
1	This environmental clearance shall be subject to obtaining Forest Clearance from the concerned regulatory authority, Wildlife clearance from the Standing Committee of National Board for Wildlife, as applicable to the project.	There is no forest land existing under the leasehold of Cluster IV.
2	The project proponent shall obtain the necessary permission from the Central Ground Water Authority (CGWA) if applicable.	NOC have been accorded from ministry of Jal Shakti. Annexure 31- NOC for ground water abstraction
3	The Environmental clearance shall be subject to orders of Hon'ble Supreme Court of India, Hon'ble High Courts, NGT and any other Court of Law, from time to time, and as applicable to the project.	It is being complied.
4	The project proponent shall obtain Consent to Establish/Operate under the Air (Prevention & Control of Pollution) Act, 1981 and the Water (Prevention & Control of Pollution) Act, 1974 from concerned SPCB	It is being complied.

	Monitoring of project	
1	Continuous ambient air quality monitoring stations as prescribed in the statute be established in the core zone as well as in the buffer zone for monitoring of pollutants, namely PM10, PM2.5, SO2 and NOx. Location of the stations shall be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board. Online ambient air quality monitoring stations may also be installed in addition to the regular monitoring stations as per the requirement and/or in consultation with the SPCB. Monitoring of heavy metals such as Hg, As, Ni, Cd, Cr, etc to be carried out at least once in six months.	Location of Monitoring station in the Jharia Coal Field have been finalized with the Jharkhand State Pollution Control Board. Five ambient air quality monitoring station has been established two at core zone and three at buffer zone. At core zone station established at AARC (Ramkanali) & Katras Chotudih Mine office and at buffer zone station established at Mine office-Block-IV, Nichitpur and RudhiBasti respectively. Presently air quality monitoring is being done as per norms at each location. Monitoring data regularly submitted to the Ministry including its Regional Office at Ranchi. Monitoring of air quality is being done by Central Mining & Planning Design Institute (CMPDIL), Dhanbad. Administrative approval has been accorded for the installation of CoAAQMS and the location has been finalized by Regional Officer, JSPCB Dhanbad. Tendering for installation of Coaaqms has been done several times but no bidder qualified. Retendering will be done. Annexure 31- Monitoring station location details and Coaaqms tender copy
2	The Ambient Air Quality monitoring in the core zone shall be carried out to ensure the Coal Industry Standards notified vide GSR 742 (E) dated 25.9.2000 and as amended from time to time by the Central Pollution Control Board. Data on ambient air quality and heavy metals such as Hg, As, Ni, Cd, Cr and other monitoring data shall be regularly reported to the Ministry/Regional Office and to the CPCB/SPCB.	It is being complied. CMPDIL has been engaged for Air Quality monitoring as well as heavy metals. Annexure 32- Ambient Air quality monitoring report
3	The effluent discharge (mine waste water, workshop effluent) shall be monitored in terms of the parameters notified under the Water Act, 1974 Coal Industry Standards vide GSR 742 (E) dated 25th September, 2000 and as amended from time to time by the Central Pollution Control Board.	Monitoring of River water are being done by CMPDIL regularly in Upstream and Downstream. Annexure 33- Monitoring Report
4	The monitoring data shall be uploaded on the company's website and displayed at the project site at a suitable location. The circular No. J-20012/1/2006-IA.11 (M) dated 27th May, 2009 issued by the Ministry shall also be referred in this regard for compliance.	It is being complied.

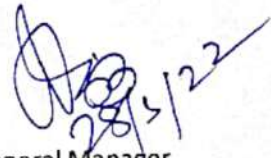
5	Regular monitoring of ground water level and quality shall be carried out in and around the mine lease area by establishing a network of existing wells and constructing new piezometers during the mining operations. The monitoring of ground water levels shall be carried out four times a year i.e. pre-monsoon, monsoon, post-monsoon and winter and water quality once a year, and the data thus collected shall be sent regularly to MoEFCC/RO.	2 nos of Piezometer have been installed at cluster IV group of mines.
6	Monitoring of water quality upstream and downstream of water bodies shall be carried out once in six months and record of monitoring data shall be maintained and submitted to the Ministry of Environment, Forest and Climate Change/Regional Office.	It is being complied. Monitoring of water quality upstream and downstream of water bodies is being carried out once in six months and record of monitoring data has been maintained and submitted to the Ministry of Environment, Forest and Climate Change/Regional Office. Annexure 35- Water quality Monitoring Report enclosed as an Annexure 33
7	The project proponent shall submit six monthly reports on the status of the implementation of the stipulated environmental conditions to the MOEFCC/RO. For half yearly monitoring reports, the data should be monitored for the period of April to September and October to March of the financial years.	It is being Complied. Six monthly reports on the status of the implementation of the stipulated environmental conditions are being submitted to the MOEFCC/RO. Annexure 36 - Forwarding letter of last six monthly compliance report
8	The Regional Office of this Ministry shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data / information/monitoring reports.	It is being complied.
	Miscellaneous	
1	Efforts should be made to reduce energy consumption by conservation, efficiency improvements and use of renewable energy.	LED bulb has been distributed among employees. Training has also been provided regarding the same. Solar panel have been installed at cluster IV. (Pic attached) Installation of Roof top solar system at cluster IV, head office is also in line, tender has been floated for the same.
2	The project authorities shall inform to the Regional Office of the MOEFCC regarding commencement of mining operations.	Complied.

3	A copy of the environmental clearance shall be marked to concerned Panchayat. A copy of the same shall also be sent to the concerned State Pollution Control Board, Regional Office of the MOEFCC, District Industries Centre and Collector's Office/Tehsildar Office for information in public domain within 30 days.	complied.
4	The EC shall be uploaded on the company's website. The compliance status of the stipulated EC conditions shall also be uploaded by the project authorities on their website and updated at least once every six months so as to bring the same in public domain.	It is being Complied. EC has uploaded on the company's website. Six monthly compliance status are also being uploaded on company's website.
5	The project authorities shall advertise at least in two local newspapers widely circulated, one of which shall be in the vernacular language of the locality concerned, within 7 days of the issue of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and also at web site of this Ministry at www.environmentclearance.nic.in and a copy of the same shall be forwarded to the Regional Office.	Complied. Annexure 37- Copy of newspaper advertisement.
6	The environmental statement for each financial year ending 31st March in Form-V is mandated to be submitted by the project proponent for the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be uploaded on the Company's website along with the status of compliance of EC conditions and shall be sent to the respective Regional Offices of the MoEF&CC by email.	Complied regularly on time
7	The project proponent shall abide by all the commitments and recommendations made in the EIA/EMP report and also that during their presentation to the EAC.	It is being Complied. EIA/EMP is being implemented.
8	Concealing factual data or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in revocation of this EC and attract action under the provisions of Environment (Protection) Act, 1986.	Agreed.
9	The above conditions will be enforced inter-alia, under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Public Liability Insurance Act, 1991 along with their amendments and Rules and any other orders passed by the Hon'ble Supreme Court of India/High Courts and any other Court of Law relating to the subject matter.	Agreed.

10

Adequate ambient air quality monitoring stations shall be established in the core zone as well as in the buffer zone for monitoring of pollutants, namely particulates, SO₂ and NO_x. Location of the stations shall be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive receptors in consultation with the State Pollution Control Board. Monitoring of heavy metals such as Hg, As, Ni, Cd, Cr, etc. to be carried out at least once in six months. Online ambient air quality monitoring station/stations may also be installed in addition to the regular air monitoring stations as per the requirement and/or in consultation with the SPCB.

Location of Monitoring station in the Jharia Coal Field have been finalized with the Jharkhand State Pollution Control Board. Five ambient air quality monitoring station has been established two at core zone and three at buffer zone. At core zone station established at AARC (Ramkanali) & Katras Chotudih Mine office and at buffer zone station established at Mine office-Block-IV, Nichitpur and RudhiBasti respectively. Presently air quality monitoring is being done as per norms at each location. Monitoring data regularly submitted to the Ministry including its Regional Office at Ranchi. Monitoring of air quality is being done by Central Mining & Planning Design Institute (CMPDIL), Dhanbad.


General Manager
Cluster IV, BCCL

Ritesh Kumar

No.J-11015/372/2013-IA-II (M)
Government of India
Ministry of Environment, Forest and Climate Change
IA Division (Coal Mining)

Indira Paryavaran Bhawan,
Jorbagh Road, N Delhi-3
Dated: 23rd October, 2019

To,
The General Manager (E&F)
M/s Bharat Coking Coal Ltd,
Koyala Bhawan,
District **Dhanbad** (Jharkhand)
Email: envbccl@gmail.com

Sub: Expansion of Cluster-IV (5 mixed mines) Coal Mining Project from 3.706 MTPA (Peak) to 7.34 MTPA (Normative)/9.55 MTPA (Peak) in ML area of 1123.79 ha of M/s Bharat Coking Coal Ltd, District Dhanbad (Jharkhand) – Continuation of Environmental Clearance - reg.

Sir,

This has reference to your online proposal No. IA/JH/CMIN/109351/2019 dated 28th June, 2019 on the above-mentioned subject.

2. The Ministry of Environment, Forest and Climate Change vide letter dated 20th February, 2018, has granted environmental clearance to the Cluster-IV (Group of 5 mixed mines) Coal Mining Project from 3.706 MTPA to 9.55 MTPA of M/s Bharat Coking Coal Limited in Mine Lease area of 1123.79 ha in District Dhanbad, (Jharkhand), subject to compliance of certain terms and conditions, which *inter-alia* included the following:-

'The environmental clearance shall be valid for a period of one year from the issue of this letter. Further extension/continuance of the project shall be based on evaluation of the action taken on each of the observations of this Ministry's Regional Office during their site visit on 22nd August, 2016.

3. In line with the above condition, site inspection was carried out by Ministry's Regional Office at Ranchi on 17-18 May, 2019 to monitor compliance status of the conditions stipulated in the said environmental clearance. The report in this regard has been forwarded by the Regional Office vide letter dated 22nd June, 2019.

4. The proposal was considered by the sectoral Expert Appraisal Committee (EAC) in its meeting held on 22nd August, 2019 and recommended for continuance of the project beyond 16th July, 2019 and validity of environmental clearance dated 16th July, 2018 for a period of 30 years or life of the mine, whichever is earlier. Based on recommendations of the EAC, the Ministry of Environment, Forest and Climate Change hereby accords approval for continuance of the Cluster-IV (Group of 5 mixed mines) Coal Mining Project from 3.706 MTPA to 9.55 MTPA of M/s Bharat Coking Coal Limited in Mine Lease area of 1123.79 ha in District Dhanbad, (Jharkhand), for a period of 30 years or life of the mine, whichever is earlier, under the provisions of the Environment Impact Assessment Notification, 2006 and subsequent amendments/circulars thereto,

5. The project proponent shall carryout source apportionment study and establishment of piezometers, within 3 years from the date of issue of this letter.

6. All other terms and conditions stipulated in the said environmental clearance dated 16th July, 2018 shall remain unchanged.


(Sharath Kumar Pallerla)
Scientist F

Copy to:

1. The Secretary, Ministry of Coal, Shastri Bhawan, New Delhi
2. The Secretary, Department of Environment & Forests, Government of Jharkhand, Secretariat, Ranchi
3. The Additional Principal Chief Conservator of Forests, Regional office (ECZ), Ministry of Environment Forests and Climate Change, Bungalow No. A-2, Shyamali Colony, Ranchi - 834002
4. The Member Secretary, Jharkhand State Pollution Control Board, TA Building, HEC Complex, PO Dhurwa, Ranchi
5. The Member Secretary, Central Pollution Control Board, CBD-cum-Office Complex, East Arjun Nagar, Delhi - 32
6. The Member Secretary, Central Ground Water Authority, Ministry of Water Resources, Curzon Road Barracks, A-2, W-3 Kasturba Gandhi Marg, New Delhi
7. The District Collector, **Dhanbad**, Government of Jharkhand
8. Monitoring File 10. Guard File 11. Record File. 12. Notice Board


(Sharath Kumar Pallerla)
Scientist F

No.J-11015/372/2013 -IA-II (M)
Government of India
Ministry of Environment, Forest and Climate Change
IA-II (Coal Mining) Division

Indira Paryavaran Bhawan,
Jorbagh Road, N Delhi-3
Dated: 16th July, 2018

To,
The General Manager (E&F)
M/s Bharat Coking Coal Ltd,
Koyala Bhawan,
District **Dhanbad** (Jharkhand) Email: envbccl@gmail.com

Sub: Expansion of Cluster-IV (Group of 5 mixed mines) Coal Mining Project from 3.706 MTPA to 9.55 MTPA of M/s Bharat Coking Coal Limited in Mine Lease area of 1123.79 ha in District Dhanbad (Jharkhand) - Environmental Clearance - reg.

Sir,

This has reference to your letter No. BCCL/GM (Katras) /F-EC/15 4709 dated 2nd December, 2015 along with online proposal No.IA/JH/CMIN/20227/2013 dated 8th December, 2014 and subsequent letters dated 13.1.2015, 15.1.2015, 17.8.2015, 1.12.2015, 1.1.2016, 8.1.2016, 15.2.2016, 3.8.2017, 20.8.2017, 23.8.2017, 31.8.2017, 12.2.2018, 15.2.2018 and 10.3.2018 on the above mentioned subject.

2. The Ministry of Environment, Forest and Climate Change has considered the proposal for environmental clearance to expansion of Cluster-IV (Group of 5 mixed mines) Coal Mining Project from 3.706 MTPA to 7.34 MTPA (Normative)/9.55 MTPA (Peak) of M/s Bharat Coking Coal Ltd in mine lease area of 1123.79 ha located in District Dhanbad (Jharkhand).

3. The proposal was considered by the Expert Appraisal Committee (EAC) in the Ministry for Thermal & Coal Mining Sector in its 29th meeting held on 15 -16 January, 2015, 49th meeting on 7-8 January, 2016, 17th meeting on 31st August, 2017, 26th meeting on 15-16 February, 2018 and 30th meeting held on 17-18 May, 2018. The details of the project, as per the documents submitted by the project proponent, and also as informed during the meeting, are as under:-

- (i) Earlier, Cluster-IV Coal Mining project for capacity of 3.706 MTPA in an area of 1123.79 ha was granted environmental clearance on 6th February, 2013. The present proposal is for expansion of the project to implement Jharia Master Plan to deal with the fire in the coal field.
- (ii) The project was accorded ToR vide letter dated 10.02.2014 with exemption from fresh public hearing for preparation of EIA/EMP report.
- (iii) The latitude and longitude of the project are 23°46'31.71" N to 23°49'1.87" N and 86°17'25.11" E to 86°20'13.13" E respectively.
- (iv) Joint Venture: No Joint Venture.
- (v) Employment Generated/To be generated: 5359 persons deployed.
- (vi) Benefits of the project: Providing valuable coking coal to steel plant and coal to power plant; liquidating fire to conserve coal reserve and dovetailing EC condition with Jharia Master Plan; liquidating fire to prevent further spread of fire and safeguard population; Liquidating fire to improve environmental condition of the region.



(vii) Coal Linkage: The coal from the cluster is linked to power plants and steel plants via rail and road.

Mode	Railway Siding	Linkages	
		Power Plants	Steel Plants
Rail	KDS 2	Panipat, Paricha, Panki, Uchhahar, BGB, HGJ (Harduaganj), Farakka, PMRG, DTPS, DSTP, Roper, Koderma Pit, Kanti, CTPS BTPS, Budge-Budge, DGTP	Panipat, B.T.I., Nangal
Road		MPL, Moonidih, RGNTPR (Raghunathpur), RNPTS, CTPS	

(viii) The land usage of the project will be as follows:

Pre-Mining:

S.N.	LANDUSE	Within ML Area (ha)	Outside ML Area(ha)	TOTAL
1.	Agricultural land	21.22	0	21.22
2.	Forest land	0	0	0
3.	Wasteland	455.27	0	455.27
4.	Grazing land	0	0	0
5.	Surface water bodies	48.42	0	48.42
6.	Settlements	136.87	0	136.87
7.	Infrastructure	134.40	0	134.40
8.	Quarry	294.65	0	294.65
9.	OB Dump	28.89	0	28.89
10.	Plantation	4.07	0	4.07
	Total	1123.79	0	1123.79

Post- Mining & Core Area:

S.N.	Land use during Mining	Land Use (ha)				TOTAL
		Plantation	Water Body	Public Use	Undisturbed	
1	External OB Dump	28.89	0	0	0	28.89
2	Top soil Dump	-	-	-	-	0
3	Excavation	608.95	10.76	0	0	619.71
4	Roads& Rail	0	0	106.52	0	106.52
5	Built up area	18.52	0	0	72.5	91.02
6	Green Belt	0	0	0	4.07	4.07
7	Undisturbed Area	9.36	0	0	264.22	273.58
	TOTAL	665.72	10.76	106.52	340.79	1123.79

(ix) Total geological reserve, mineable reserve and extractable reserve are 228.5 MT, 201.67 MT and 99.607 MT respectively. Thus, percent of extraction would be 49.39 %.

(x) The coal grade is W-IV to ST-II. The stripping ratio in AKWMC is 1:2.54, in Gaslitand is 1:9, in Katras Choitudih is 1: 10.54 and in Salanpur colliery is 1:2.434. The average gradient of the seams is 1 in 5 and thickness of seams is worked to be 1.32 to 8 m.

(xi) Total estimated water requirement for the project is 9678 m³/day. The level of ground water ranges from 0.85-9.65 m. A request in this regard has been made to the CGWB, New Delhi on 26th August, 2017.

(xii) The method of mining would be mixed i.e. with opencast and underground mining technologies.

	Salanpur Colliery	Katras Choitudih Colliery	Amalgamated Keshalpur West Mudidih Colliery	Angarpathra colliery & Ramkanali colliery	Gaslitand colliery
Method of mining	Bord & Pillar (UG) & Shovel- dumper Combination (OC)	Shovel-dumper Combination (OC)	Shovel-dumper in OC and Bord & Pillar in (UG)	Bord & Pillar (UG)	Shovel-dumper (OC)

(xiii) There are 6 external OB dumps with quantity of 9.903 Mcum in an area of 37.84 ha with height of 30 m above the surface level. There are 4 internal dumps with quantity of 174.38 Mcum in an area of 257.67 ha with height up to ground level.

(xiv) The final mine void would be in an area of 10.76 ha with depth of 20-30 m which is proposed to be converted into a water body. Out of the total quarry area of 603.4 ha, backfilled quarry area of 592.64 ha shall be reclaimed with plantation.

(xv) The seasonal data for ambient air quality has been documented and all results at all stations are within prescribed limits.

(xvi) The life of mines are:

	Salanpur Colliery	Katras Choitudih Colliery	Amalgamated Keshalpur West Mudidih Colliery	Angarpathra colliery & Ramkanali colliery	Gaslitand colliery
Life of mine (yrs)	10 years	4 years	20 years	Over 30 years	3 years

(xvii) There are 7012 project affected families. R&R cost for the project is Rs.299.22 Crore.

(xviii) Total capital cost of the project is Rs 346.36 Crores. CSR shall be done on actual production basis. An amount of Rs. 191.0 Lakhs will be used for the CSR works per year for the project at the peak production i.e. 9.55 Mt. The fund for CSR will be allocated on 2% of the average net profit of the Company for the three immediate preceding financial years or Rs 2.00 per tonne of Coal production of previous year whichever is higher. Environmental Management Cost shall be provided as per norm.

(xix) Katri Nallah flows within the cluster whereas Khudia Nallah, Jarian Nallah and Kumari Jore are on the west, east and north side respectively of the Cluster-IV and flow southwardly.

(xx) Almost all the mines of BCCL are taken over from the erstwhile private owners. Therefore, the mine does not have structured mining plans. The mining operations are being continued as amalgamated collieries in Cluster-IV. BCCL Board has approved the mining plans & Mine Closure Plans of Salanpur, AKWMC & AARC in 305th meeting held on 12.03.2014 and of Katras choitudih in its 312th meeting held on 13th December, 2014.

(xxi) There are no national park, wildlife sanctuary and biosphere reserves located in 10 km buffer zone.

(xxii) There is no forest area involved.

(xxiii) Total afforestation plan shall be implemented covering an area of 665.72 ha at the end of mining operations. Green belt shall be developed over an area of 105.55 ha having density of tree plantation as 2500 trees/ ha.

(xxiv) Jharkhand State Pollution Control Board had issued closure orders for all the mines of BCCL in August, 2011 and March 2012 stating that BCCL is operating all its mines without the environmental clearances. M/s BCCL filed Writ Petition in the Hon'ble High Court of Jharkhand, Ranchi for legal relief against closure of mines by JSPCB with the fact that M/s BCCL had already initiated the process of seeking environmental clearances in 2008 onwards with the approved cluster concept in 2009.

(xxv) Public hearing for the project was conducted on 21st January, 2012 at Katras Club, Sijua for 3.706 MTPA (Peak) in an area of 1123.79 ha. There being no change in lease hold area for the present project, urgency for controlling the mine fires and on the request of the project proponent, the EAC recommended the ToR providing exemption from fresh public hearing.

(xxvi) Regional office, MOEF&CC, Ranchi has sent the certified Compliance Report to the Ministry vide letter no.103-398/ROR-2015/189 dated 22.08.2016.

(xxvii) Mining Plan and Mine Closure Plan of Cluster-IV was approved by M/s BCCL Board, for a peak capacity of 9.55 MTPA on 3rd August, 2017 and 2nd February, 2018 respectively. The Final Mine Closure plan will be submitted 5 years before final closure.

4. The Expert Appraisal Committee in its 26th meeting held on 15-16 February, 2018 has recommended the project for grant of environmental clearance. Based on recommendations of the EAC and subsequent revision of minutes in its meeting held on 17-18 May, 2018, the Ministry of Environment, Forest and Climate Change hereby accords environmental clearance to the project for expansion of Cluster-IV (Group of 5 mixed mines) Coal Mining project from 3.706 MTPA to 9.55 MTPA (Peak) of M/s Bharat Coking Coal Ltd in mine lease area of 1123.79 ha located at Tehsil Baghmara, District Dhanbad (Jharkhand), under the provisions of the Environment Impact Assessment Notification, 2006 and subsequent amendments/circulars thereto subject to the compliance of the terms & conditions and environmental safeguards mentioned below:-

(i) The environmental clearance shall be valid for a period of one year from the issue of this letter. Further extension/continuance of the project shall be based on evaluation of the action taken on each of the observations of this Ministry's Regional Office during their site visit on 22nd August, 2016.

(ii) The project proponent shall obtain Consent to establish from the State Pollution Control Boards of Jharkhand for the proposed peak capacity of 9.55 MTPA prior to commencement of the increased production.

(iii) Transportation of coal from face to Coal heap shall be carried out by truck. Further, the coal transportation from Coal heap to Coal Handling Plant shall be carried out through covered trucks.

(iv) Mitigative measures to be undertaken to control dust and other fugitive emissions all along the roads by providing sufficient numbers of water sprinklers.

(v) Sufficient coal pillars shall be left un-extracted around the air shaft (within the subsidence influence area) to protect from any damage from subsidence, if any.

(vi) Solid barrier shall be left below the roads falling within the block to avoid any damage to the roads and no depillaring operation shall be carried out below the township/colony.

(vii) Depression due to subsidence resulting in water accumulating within the low lying areas shall be filled up or drained out by cutting drains.

(viii) Sufficient number of pumps of adequate capacity shall be deployed to pump out mine water during peak rain fall.

(ix) The company shall obtain approval of CGWA for use of groundwater for mining operations at its enhanced capacity of 9.55 MTPA.

(x) Continuous monitoring of occupational safety and other health hazards, and the corrective actions need to be ensured.

(xi) The fire dealing operations by excavating out fire should be expedited.

4.1 The grant of EC is further subject to compliance of standard EC conditions are as under:

(a) Mining

(i) Mining shall be carried out under strict adherence to provisions of the Mines Act, 1952 and subordinate legislations made there-under as applicable.

(ii) Mining shall be carried out as per the approved mining plan(including Mine Closure Plan) abiding by mining laws related to coal mining and the relevant circulars issued by Directorate General Mines Safety (DGMS).

(iii) No mining shall be carried out in forest land without obtaining Forestry Clearance as per Forest (Conservation) Act, 1980

(iv) No change in mining method i.e. UG to OC, calendar programme and scope of work shall be made without obtaining prior approval of the Ministry of Environment, Forests and Climate Change (MoEFCC).

(v) Underground work place environmental conditions shall be rendered ergonomic and air breathable with adequate illumination in conformance with DGMS standards.

(b) Land reclamation and water conservation

(i) Digital Survey of entire lease hold area/core zone using Satellite Remote Sensing survey shall be carried out at least once in three years for monitoring land use pattern and report in 1:50,000 scale or as notified by the Ministry of Environment, Forest and Climate Change from time to time shall be submitted to MoEFCC/Regional Office.

(ii) The surface drainage plan including surface water conservation plan for the area of influence affected by the said mining operations, considering the presence of river/rivulet/pond/lake etc, shall be prepared and implemented by the project proponent. The surface drainage plan and/or any diversion of natural water courses shall be as per the approved Mining Plan/EIA/EMP report and with due approval of the concerned State/Gol Authority. The construction of embankment to prevent any danger against inrush of surface water into the mine should be as per the approved Mining Plan and as per the permission of DGMS or any other authority as prescribed by the law.

(iii) The final mine void depth should preferably be as per the approved Mine Closure Plan, and in case it exceeds 40 m, adequate engineering interventions shall be provided for sustenance of aquatic life therein. The remaining area shall be backfilled and covered with thick and alive top soil. Post-mining land be rendered usable for agricultural/forestry purposes and shall be diverted. Further action will be treated as specified in the guidelines for preparation of Mine Closure Plan issued by the Ministry of Coal dated 27th August, 2009.

(iv) The entire excavated area, backfilling, external OB dumping (including top soil) and afforestation plan shall be in conformity with the "during mining"/"post mining" land-use pattern, which is an integral part of the approved Mining Plan and the EIA/EMP submitted to this Ministry. Progressive compliance status vis-a-vis the post mining land use pattern shall be submitted to the MOEFCC/RO.

(v) Fly ash shall be used for external dump of overburden, backfilling or stowing of mine as per provisions contained in clause (i) and (ii) of subparagraph (8) of fly ash notification issued

vide S.O.2804 (E) dated 3rd November, 2009 as amended from time to time. Efforts shall be made to utilize gypsum generated from Flue Gas Desulfurization (FGD), if any, along with fly ash for external dump of overburden, backfilling or stowing of mines. Compliance report shall be submitted to Regional Office of MoEF&CC, CPCB and SPCB.

(vi) It shall be ensured that as per the time schedule specified in mine closure plan it should remain live till the point of utilization. The top soil shall temporarily be stored at earmarked site(s) only and shall not be kept unutilized. The top soil shall be used for land reclamation and plantation purposes. Active OB dumps shall be stabilised with native grass species to prevent erosion and surface run off. The other overburden dumps shall be vegetated with native flora species. The excavated area shall be backfilled and afforested in line with the approved Mine Closure Plan. Monitoring and management of rehabilitated areas shall continue until the vegetation becomes self-sustaining. Compliance status shall be submitted to the Ministry.

(vii) Post-mining land shall be rendered usable for agricultural/forestry purposes and handed over to the respective State Government, as specified in the Ministry of Coal Guidelines dated 27th August, 2009 for Preparation of Mine Closure Plan.

(viii) Regular monitoring of subsidence movement on the surface over and around the working areas and its impact on natural drainage pattern, water bodies, vegetation, structure, roads and surroundings shall be continued till movement ceases completely. In case of observation of any high rate of subsidence beyond the limit prescribed, appropriate effective mitigation measures shall be taken to avoid loss of life and materials. Cracks should be effectively plugged in with ballast and clay soil/suitable material.

(ix) A separate team for subsidence monitoring and surface mitigation measures shall be constituted and continuous monitoring & implementation of mitigation measures be carried out.

(x) Thorough inspection of the mine lease area for any cracks developed at the surface due to mining activities below ground shall be carried out to prevent inrush of water in the mine.

(xi) Native tree species shall be selected and planted over areas affected by subsidence.

(c) Emissions, effluents, and waste disposal

(i) Transportation of coal, to the extent permitted by road, shall be carried out by covered trucks/conveyors. Effective control measures such as regular water/mist sprinkling/rain gun etc shall be carried out in critical areas prone to air pollution (with higher values of PM₁₀/PM_{2.5}) such as haul road, loading/unloading and transfer points. Fugitive dust emissions from all sources shall be controlled regularly. It shall be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the Central/State Pollution Control Board.

(ii) Greenbelt consisting of 3-tier plantation of width not less than 7.5 m shall be developed all along the mine lease area as soon as possible. The green belt comprising a mix of native species (endemic species should be given priority) shall be developed all along the major approach/ coal transportation roads.

(iii) The transportation of coal shall be carried out as per the provisions and route envisaged in the approved Mining Plan or environment monitoring plan. Transportation of the coal through the existing road passing through any village shall be avoided. In case, it is proposed to construct a 'bypass' road, it should be so constructed so that the impact of sound, dust and accidents could be appropriately mitigated.

- (iv) Vehicular emissions shall be kept under control and regularly monitored. All the vehicles engaged in mining and allied activities shall operate only after obtaining 'PUC' certificate from the authorized pollution testing centres.
- (v) Coal stock pile/crusher/feeder and breaker material transfer points shall invariably be provided with dust suppression system. Belt-conveyors shall be fully covered to avoid air borne dust. Side cladding all along the conveyor gantry should be made to avoid air borne dust. Drills shall be wet operated or fitted with dust extractors.
- (vi) Coal handling plant shall be operated with effective control measures w.r.t. various environmental parameters. Environmental friendly sustainable technology should be implemented for mitigating such parameters.
- (vii) Ground water, excluding mine water, shall not be used for mining operations. Rainwater harvesting shall be implemented for conservation and augmentation of ground water resources.
- (viii) Catch and or garland drains and siltation ponds in adequate numbers and appropriate size shall be constructed around the mine working, coal heaps & OB dumps to prevent run off of water and flow of sediments directly into the river and water bodies. Further, dump material shall be properly consolidated/ compacted and accumulation of water over dumps shall be avoided by providing adequate channels for flow of silt into the drains. The drains/ ponds so constructed shall be regularly de-silted particularly before onset of monsoon and maintained properly. Sump capacity should provide adequate retention period to allow proper settling of silt material. The water so collected in the sump shall be utilised for dust suppression and green belt development and other industrial use. Dimension of the retaining wall constructed, if any, at the toe of the OB dumps within the mine to check run-off and siltation should be based on the rainfall data. The plantation of native species to be made between toe of the dump and adjacent field/habitation/water bodies.
- (ix) Adequate groundwater recharge measures shall be taken up for augmentation of ground water. The project authorities shall meet water requirement of nearby village(s) after due treatment conforming to the specific requirement (standards).
- (x) Solid waste/hazardous waste generated in the mines shall be addressed in accordance to the MSW Rules, 2016.
- (xi) The water pumped out from the mine, after siltation, shall be utilized for industrial purpose viz. watering the mine area, roads, green belt development etc. The drains shall be regularly desilted particularly after monsoon and maintained properly.
- (xi) Major approach roads shall be black topped and properly maintained.
- (xii) The project proponent shall not alter major water channels around the site. Appropriate embankment shall be provided along the side of the river/nallah flowing near or adjacent to the mine. The embankment constructed along the river/nallah boundary shall be of suitable dimensions and critical patches shall be strengthened by stone pitching on the river front side, stabilized with plantation so as to withstand the peak water pressure preventing any chance of mine inundation.
- (xiii) Garland drains (of suitable size, gradient and length) around the critical areas i.e. mine shaft and low lying areas, shall be designed keeping at least 50% safety margin over and above the peak sudden rainfall and maximum discharge in the area adjoining the mine sites. The

sump capacity shall also provide adequate retention period to allow proper settling of silt material of the surface runoff.

(xiv) Industrial waste water from coal handling plant and mine water shall be properly collected and treated so as to conform to the standards prescribed under the Environment (Protection) Act, 1986 and the Rules made thereunder, and as amended from time to time. Oil and grease trap shall be installed before discharge of workshop effluent. Sewage treatment plant of adequate capacity shall be installed for treatment of domestic waste water.

(d) Illumination, noise & vibration

(i) Adequate illumination shall be ensured in all mine locations (as per DGMS standards) and monitored weekly. The report on the same shall be submitted to this ministry & its RO on six-monthly basis.

(ii) Adequate measures shall be taken for control of noise levels as per noise pollution Rules, 2016 in the work environment. Workers engaged in blasting and drilling operations, operation of HEMM, etc shall be provided with personal protective equipments (PPE) like ear plugs/muffs in conformity with the prescribed norms and guidelines in this regard. Adequate awareness programme for users to be conducted.

(iii) Controlled blasting techniques shall be practiced in order to mitigate ground vibrations, fly rocks, noise and air blast etc. as per the guidelines prescribed by the DGMS.

(iv) The noise level survey shall be carried out as per the prescribed guidelines to assess noise exposure of the workmen at vulnerable points in the mine premises, and report in this regard shall be submitted to the Ministry/RO on six-monthly basis.

(e) Occupational health & safety

(i) The project proponent shall undertake occupational health survey for initial and periodical medical examination of the personnel engaged in the project and maintain records accordingly as per the provisions of the Mines Rules, 1955 and DGMS circulars. Besides regular periodic health check-up, 20% of the personnel identified from workforce engaged in active mining operations shall be subjected to health check-up for occupational diseases and hearing impairment, if any, as amended time to time.

(ii) Personnel working in core zone shall wear protective respiratory devices and shall also be provided with adequate training and information on safety and health aspects.

(f) Ecosystem and biodiversity conservation

(i) The project proponent shall take all precautionary measures during mining operation for conservation and protection of endangered/endemic flora/fauna, if any, spotted/reported in the study area. The Action plan in this regard, if any, shall be prepared and implemented in consultation with the State Forest and Wildlife Department.

(ii) The project proponent shall take all precautionary measures to ensure riverine/riparian ecosystem in and around the coal mine upto a distance of 5 km. A riverine/riparian ecosystem conservation and management plan should be prepared and implemented in consultation with the irrigation/water resource department in the State Government.



(g) Public Hearing, R&R and CSR

(i) Implementation of the action plan on the issues raised during the public hearing shall be ensured. The project proponent shall undertake all the tasks/measures as per the action plan submitted with budgetary provisions during the public hearing. Land oustees shall be compensated as per the norms laid down in the R&R policy of the company/State Government/Central Government, as applicable.

(ii) The project proponent shall ensure the expenditure towards socio-economic development in and around the mine every financial year in pursuance of the Corporate Social Responsibility Policy as per the provisions under Section 135 of the Companies Act, 2013.

(iii) The project proponent shall follow the mitigation measures provided in this Ministry's OM No.Z-11013/5712014-IA.11 (M) dated 29th October, 2014, titled 'Impact of mining activities on habitations-issues related to the mining projects wherein habitations and villages are the part of mine lease areas or habitations and villages are surrounded by the mine lease area'.

(iv) The project proponent shall make necessary alternative arrangements, if grazing land is involved in core zone, in consultation with the State government to provide alternate areas for livestock grazing, if any. In this context, the project proponent shall implement the directions of Hon'ble Supreme Court with regard to acquiring grazing land.

(h) Corporate environment responsibility

(i) The Company shall have a well laid down environment policy duly approved by Board of Directors. The environment policy should prescribe for standard operating procedures to have proper checks and balances and to bring into focus any infringements/deviation/violation of the environmental or forest norms/conditions. Also, the company shall have a defined system of reporting of non-compliances/violations of environmental norms to the Board of Directors and/or shareholders/stakeholders.

(ii) The project proponent shall comply with the provisions contained in this Ministry's OM dated 1st May, 2018, as applicable, regarding Corporate Environment Responsibility.

(iii) A separate environmental management cell both at the project and company headquarter level, with suitable qualified personnel shall be set-up under the control of a Senior Executive, who will report directly to the Board level executive/Head of the Organization.

(iv) Action plan for implementing EMP and environmental conditions along with responsibility matrix of the company shall be prepared and shall be duly approved by competent authority. The year wise funds earmarked for environmental protection measures shall be kept in separate account and not to be diverted for any other purpose. Year wise progress of implementation of action plan shall be reported to the Ministry/Regional Office along with the Six Monthly Compliance Report.

(v) Self environmental audit shall be conducted annually. Every three years third party environmental audit shall be carried out.

(vi) Skill training as per safety norms specified by DGMS shall be provided to all workmen including the outsourcing employees to ensure high safety standards in mines.

(vii) Effective arrangement shall be made to provide and maintain at suitable points conveniently situated, a sufficient supply of drinking water for all the persons employed.

(i) Statutory Obligations

(i) This environmental clearance shall be subject to obtaining Forest Clearance from the concerned regulatory authority, Wildlife clearance from the Standing Committee of National Board for Wildlife, as applicable to the project.

(ii) The project proponent shall obtain the necessary permission from the Central Ground Water Authority (CGWA) if applicable.

(iii) The Environmental clearance shall be subject to orders of Hon'ble Supreme Court of India, Hon'ble High Courts, NGT and any other Court of Law, from time to time, and as applicable to the project.

(iv) The project proponent shall obtain Consent to Establish/Operate under the Air (Prevention & Control of Pollution) Act, 1981 and the Water (Prevention & Control of Pollution) Act, 1974 from concerned SPCB.

(i) Monitoring of project

(i) Continuous ambient air quality monitoring stations as prescribed in the statute be established in the core zone as well as in the buffer zone for monitoring of pollutants, namely PM₁₀, PM_{2.5}, SO₂ and NO_x. Location of the stations shall be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board. Online ambient air quality monitoring stations may also be installed in addition to the regular monitoring stations as per the requirement and/or in consultation with the SPCB. Monitoring of heavy metals such as Hg, As, Ni, Cd, Cr, etc to be carried out at least once in six months.

(ii) The Ambient Air Quality monitoring in the core zone shall be carried out to ensure the Coal Industry Standards notified vide GSR 742 (E) dated 25.9.2000 and as amended from time to time by the Central Pollution Control Board. Data on ambient air quality and heavy metals such as Hg, As, Ni, Cd, Cr and other monitoring data shall be regularly reported to the Ministry/Regional Office and to the CPCB/SPCB.

(iii) The effluent discharge (mine waste water, workshop effluent) shall be monitored in terms of the parameters notified under the Water Act, 1974 Coal Industry Standards vide GSR 742 (E) dated 25th September, 2000 and as amended from time to time by the Central Pollution Control Board.

(iv) The monitoring data shall be uploaded on the company's website and displayed at the project site at a suitable location. The circular No. J-20012/1/2006-IA.11 (M) dated 27th May, 2009 issued by the Ministry shall also be referred in this regard for compliance.

(v) Regular monitoring of ground water level and quality shall be carried out in and around the mine lease area by establishing a network of existing wells and constructing new piezometers during the mining operations. The monitoring of ground water levels shall be carried out four times a year i.e. pre-monsoon, monsoon, post-monsoon and winter and water quality once a year, and the data thus collected shall be sent regularly to MoEFCC/RO.

(vi) Monitoring of water quality upstream and downstream of water bodies shall be carried out once in six months and record of monitoring data shall be maintained and submitted to the Ministry of Environment, Forest and Climate Change/Regional Office.

(vii) The project proponent shall submit six monthly reports on the status of the implementation of the stipulated environmental conditions to the MOEFCC/RO. For half yearly monitoring reports, the data should be monitored for the period of April to September and October to March of the financial years.

(viii) The Regional Office of this Ministry shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data / information/monitoring reports.

(k) Miscellaneous

(i) Efforts should be made to reduce energy consumption by conservation, efficiency improvements and use of renewable energy.

(ii) The project authorities shall inform to the Regional Office of the MOEFCC regarding commencement of mining operations.

(iii) A copy of the environmental clearance shall be marked to concerned Panchayat. A copy of the same shall also be sent to the concerned State Pollution Control Board, Regional Office of the MOEFCC, District Industries Centre and Collector's Office/Tehsildar Office for information in public domain within 30 days.

(iv) The EC shall be uploaded on the company's website. The compliance status of the stipulated EC conditions shall also be uploaded by the project authorities on their website and updated at least once every six months so as to bring the same in public domain.

(v) The project authorities shall advertise at least in two local newspapers widely circulated, one of which shall be in the vernacular language of the locality concerned, within 7 days of the issue of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and also at web site of this Ministry at www.environmentclearance.nic.in and a copy of the same shall be forwarded to the Regional Office.

(vi) The environmental statement for each financial year ending 31st March in Form-V is mandated to be submitted by the project proponent for the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be uploaded on the Company's website along with the status of compliance of EC conditions and shall be sent to the respective Regional Offices of the MoEF&CC by e-mail.

(vii) The project proponent shall abide by all the commitments and recommendations made in the EIA/EMP report and also that during their presentation to the EAC.

(viii) Concealing factual data or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in revocation of this EC and attract action under the provisions of Environment (Protection) Act, 1986.

(ix) The above conditions will be enforced inter-alia, under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Public Liability Insurance Act, 1991 along with their amendments and Rules and any other orders passed by the Hon'ble Supreme Court of India/High Courts and any other Court of Law relating to the subject matter.



(x) Adequate ambient air quality monitoring stations shall be established in the core zone as well as in the buffer zone for monitoring of pollutants, namely particulates, SO₂ and NO_x. Location of the stations shall be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive receptors in consultation with the State Pollution Control Board. Monitoring of heavy metals such as Hg, As, Ni, Cd, Cr, etc. to be carried out at least once in six months. Online ambient air quality monitoring station/stations may also be installed in addition to the regular air monitoring stations as per the requirement and/or in consultation with the SPCB.

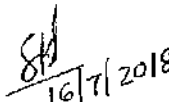
5. The proponent shall obtain all necessary clearances/approvals that may be required before the start of the project. The Ministry or any other competent authority may stipulate any further condition for environmental protection. The Ministry or any other competent authority may stipulate any further condition for environmental protection.

6. The coal company/project proponent shall be liable to pay the compensation against the illegal mining, if any, and as raised by the respective State Governments at any point of time, in terms of the orders dated 2nd August, 2017 of Hon'ble Supreme Court in WP (Civil) No.114/2014 in the matter of 'Common Cause Vs Union of India & others'.

7. The concerned State Government shall ensure that no mining operations shall be carried out till the entire compensation for illegal mining, if any, is paid by the project proponent through their respective Department of Mining & Geology, in strict compliance of the judgment of Hon'ble Supreme Court.

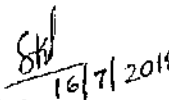
8. This environmental clearance shall not be operational till such time the project proponent complies with the above said judgment of Hon'ble Supreme Court, as applicable, and other statutory requirements.

9. This environmental clearance supersedes the earlier environmental clearance granted vide letter no. J-11015/212/2010-IA-II(M) dated 6th February, 2013.


(S K Srivastava)
Scientist E

Copy to:

1. The Secretary, Ministry of Coal, Shastri Bhawan, New Delhi
2. The Secretary, Deptt of Environment & Forests, Govt of Jharkhand, Secretariat, Ranchi
3. The Additional PCCF, Regional office (ECZ), Ministry of Environment Forests and Climate Change, Bungalow No. A-2, Shyamali Colony, Ranchi - 834002
4. The Member Secretary, Jharkhand State Pollution Control Board, TA Building, HEC Complex, PO Dhurwa, Ranchi
5. The Member Secretary, Central Pollution Control Board, CBD-cum-Office Complex, East Arjun Nagar, Delhi - 32
6. The Member Secretary, Central Ground Water Authority, Ministry of Water Resources, Curzon Road Barracks, A-2, W-3 Kasturba Gandhi Marg, New Delhi
7. The Advisor, Coal India Ltd, SCOPE Minar, Core-I, 4th Floor, Vikas Marg, Laxmi Nagar, N Delhi
8. The District Collector, Dhanbad, Government of Jharkhand
9. Monitoring File 10. Guard File 11. Record File. 12. Notice Board


(S K Srivastava)
Scientist E

A comparative representation of productions from mines in the cluster for which EC was granted and proposed productions are as given below:

Table 1.1: Comparative representation of productions from mines in the cluster for which EC was granted and Proposed productions

Sl. No.	Name of Mine		Production Capacity (MTY) As per EC granted in Feb 2013		Production Capacity (MTY) Proposed		Lease Hold Area (Ha)	Remarks
			Normative	Peak	Normative	Peak		
1	Salanpur Colliery	UG	0.15	0.195	0.13	0.17	177.49	-
		OC	-	-	0.42	0.55		For curbing illegal mining
		Total	0.15	0.195	0.55	0.72		-
2	Katras Choitudih Colliery	UG	0.22	0.286	0.00	0.00	228.00	-
		OC	-	-	0.50	0.65		For fire dealing as per approved Master Plan
		Total	0.22	0.286	0.50	0.65		-
3	Amalgamated Keshalpur-West Mududih Colliery	UG	0.19	0.247	0.6	0.78	325.00	-
		OC	2.00	2.6	4.9	6.37		For fire dealing as per approved Master Plan
		Total	2.19	2.847	5.5	7.15		-
4	Amalgamated Angarpathra - Ramkanali colliery	UG	0.291	0.378	0.19	0.25	254.64	-
5	Gaslitand Colliery	UG (Closed)	0.00	0.00	0.00	0.00	138.66	-
		OC	-	-	0.60	0.78		For fire dealing as per approved Master Plan
		Total	0.00	0.00	0.60	0.78		-
Total UG			0.851	1.106	0.92	1.2		
Total OC			2	2.6	6.42	8.35		
Grand Total			2.851	3.706	7.34	9.55	1123.79	

The proposed capacity of cluster IV group of mines is as under:

Name of Project		Normative Production (in MTY)	Peak Production (in MTY)	Leasehold (in Ha)
Cluster IV Group of Mines	UG	0.92	1.2	1123.79
	OC	6.42	8.35	
	Total	7.34	9.55	

EIAEMP OF CLUSTER-IV (Revised) OF BCCL

I-3

Job No. 200308025

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Water Sprinkling at Coal Dump



05 18 2019



Mist Sprinkler in Cluster-IV





भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन, नदी विकास
और गंगा संरक्षण विभाग
केन्द्रीय भूमि जल प्राधिकरण
Government of India
Ministry of Jal Shakti
Department of Water Resources,
River Development & Ganga Rejuvenation
Central Ground Water Authority

(भूजल निकासी हेतु अनापत्ति प्रमाण पत्र)

NO OBJECTION CERTIFICATE (NOC) FOR GROUND WATER ABSTRACTION

Project Name:	Cluster Iv Mines Of Bccl		
Project Address:	Office Of The General Manager, Katras Area, M/s Bccl, Po- Sijua		
Town:	Malkera (ct)	Block:	Baghmara
District:	Dhanbad	State:	Jharkhand
Pin Code:			
Communication Address:	Office Of General Manager, Katras Area, M/s Bccl, Post Office- Sijua, Dhanbad, Dhanbad, Jharkhand - 828121		
Address of CGWB Regional Office :	Central Ground Water Board Mid Eastern Region, 6th & 7th Floor, Lok Nayak Jai Prakash Bhawan, Frazer Road Dak Banglow, Patna, Bihar - 800011		

1.	NOC No.:	CGWA/NOC/MIN/ORIG/2021/14162													
2.	Application No.:	21-4/320/JH/MIN/2018					3.	Category: (GWRE 2020)			Safe				
4.	Project Status:	Existing Project					5.	NOC Type:			New				
6.	Valid from:	27/12/2021					7.	Valid up to:			26/12/2023				
8.	Ground Water Abstraction Permitted:														
Fresh Water		Saline Water				Dewatering				Total					
m³/day		m³/year		m³/day		m³/year		m³/day		m³/year		m³/day		m³/year	
40.00		14600.00						5900.00		2153500.00					
9.	Details of ground water abstraction /Dewatering structures														
Total Existing No.:1							Total Proposed No.:0								
		DW	DCB	BW	TW	MP	MPu	DW	DCB	BW	TW	MP	MPu		
Abstraction Structure*		1	0	0	0	0	0	0	0	0	0	0	0		
Dewatering Structure*		0	0	0	0	0	1	0	0	0	0	0	0		
*DW- Dug Well; DCB-Dug-cum-Bore Well; BW-Bore Well; TW-Tube Well; MP-Mine Pit;MPu-Mine Pumps															
10.	Ground Water Abstraction/Restoration Charges paid (Rs.):							8672400.00							
11.	Number of Piezometers(Observation wells) to be constructed/ monitored & Monitoring mechanism.					No. of Piezometers		Monitoring Mechanism							
Manual								DWLR**		DWLR With Telemetry					
**DWLR - Digital Water Level Recorder						2		0		1		1			

(Compliance Conditions given overleaf)

This is an auto generated document & need not to be signed.

18/11, जामनगर हाउस, मानसिंह रोड, नई दिल्ली - 110011 / 18/11, Jamnagar House, Mansingh Road, New Delhi-110011

Phone: (011) 23383561 Fax: 23382051, 23386743

Website: cgwa-noc.gov.in

पानी बचाये - जीवन बचाये
SAVE WATER - SAVE LIFE

Validity of this NOC shall be subject to compliance of the following conditions:

Mandatory conditions:

- 1) Installation of tamper proof digital water flow meter with telemetry on all the abstraction structure(s) shall be mandatory for all users seeking No Objection Certificate and intimation regarding their installation shall be communicated to the CGWA within 30 days of grant of No Objection Certificate.
- 2) Proponents shall mandatorily get water flow meter calibrated from an authorized agency once in a year.
- 3) Construction of purpose-built observation wells (piezometers) for ground water level monitoring shall be mandatory as per Section 14 of Guidelines. Water level data shall be made available to CGWA through web portal. Detailed guidelines for construction of piezometers are given in Annexure-II of the guidelines.
- 4) Proponents shall monitor quality of ground water from the abstraction structure(s) once in a year. Water samples from bore wells/ tube wells / dug wells shall be collected during April/May every year and analysed in NABL accredited laboratories for basic parameters (cations and anions), heavy metals, pesticides/ organic compounds etc. Water quality data shall be made available to CGWA through the web portal.
- 5) In case of mining projects, additional key wells shall be established in consultation with the Regional Director, CGWB for ground water level monitoring four (4) times a year (January, May, August and November) in core as well as buffer zones of the mine.
- 6) In case of mining project the firm shall submit water quality report of mine discharge/ seepage from Govt. approved/ NABL accredited lab.
- 7) The firm shall report compliance of the NOC conditions online in the website (www.cgwa-noc.gov.in) within one year from the date of issue of this NOC.
- 8) Industries abstracting ground water in excess of 100 m³/d shall undertake annual water audit through certified auditors and submit audit reports within three months of completion of the same to CGWA. All such industries shall be required to reduce their ground water use by at least 20% over the next three years through appropriate means.
- 9) Application for renewal can be submitted online from 90 days before the expiry of NOC. Ground water withdrawal, if any, after expiry of NOC shall be illegal & liable for legal action as per provisions of Environment (Protection) Act, 1986.
- 10) This NOC is subject to prevailing Central/State Government rules/laws/norms or Court orders related to construction of tube well/ground water abstraction structure / recharge or conservation structure/discharge of effluents or any such matter as applicable.

General conditions:

- 11) No additional ground water abstraction and/or de-watering structures shall be constructed for this purpose without prior approval of the Central Ground Water Authority (CGWA).
- 12) The proponent shall seek prior permission from CGWA for any increase in quantum of groundwater abstraction (more than that permitted in NOC for specific period).
- 13) Proponents shall install roof top rain water harvesting in the premise as per the existing building bye laws in the premise.
- 14) The project proponent shall take all necessary measures to prevent contamination of ground water in the premises failing which the firm shall be responsible for any consequences arising thereupon.
- 15) In case of industries that are likely to contaminate the ground water, no recharge measures shall be taken up by the firm inside the plant premises. The runoff generated from the rooftop shall be stored and put to beneficial use by the firm.
- 16) Wherever feasible, requirement of water for greenbelt (horticulture) shall be met from recycled / treated waste water.
- 17) Wherever the NOC is for abstraction of saline water and the existing wells (s) is /are yielding fresh water, the same shall be sealed and new tubewell(s) tapping saline water zone shall be constructed within 3 months of the issuance of NOC. The firm shall also ensure safe disposal of saline residue, if any.
- 18) Unexpected variations in inflow of ground water into the mine pit, if any, shall be reported to the concerned Regional Director, Central Ground Water Board.
- 19) In case of violation of any NOC conditions, the applicant shall be liable to pay the penalties as per Section 16 of Guidelines.
- 20) This NOC does not absolve the proponents of their obligation / requirement to obtain other statutory and administrative clearances from appropriate authorities.
- 21) The issue of this NOC does not imply that other statutory / administrative clearances shall be granted to the project by the concerned authorities. Such authorities would consider the project on merits and take decisions independently of the NOC.
- 22) In case of change of ownership, new owner of the industry will have to apply for incorporation of necessary changes in the No Objection Certificate with documentary proof within 60 days of taking over possession of the premises.
- 23) This NOC is being issued without any prejudice to the directions of the Hon'ble NGT/court orders in cases related to ground water or any other related matters.
- 24) Proponents, who have installed/constructed artificial recharge structures in compliance of the NOC granted to them previously and have availed rebate of upto 50% (fifty percent) in the ground water abstraction charges/ground water restoration charges, shall continue to regularly maintain artificial recharge structures.
- 25) Industries which are likely to cause ground water pollution e.g. Tanning, Slaughter Houses, Dye, Chemical/ Petrochemical, Coal washeries, pharmaceutical, other hazardous units etc. (as per CPCB list) need to undertake necessary well head protection measures to ensure prevention of ground water pollution as per Annexure III of the guidelines.
- 26) In case of new infrastructure projects having ground water abstraction of more than 20 m³/day, the firm/entity shall ensure implementation of dual water supply system in the projects.
- 27) In case of infrastructure projects, paved/parking area must be covered with interlocking/perforated tiles or other suitable measures to ensure groundwater infiltration/harvesting.
- 28) In case of coal and other base metal mining projects, the project proponent shall use the advance dewatering technology (by construction of series of dewatering abstraction structures) to avoid contamination of surface water.
- 29) The NOC issued is conditional subject to the conditions mentioned in the Public notice dated 27.01.2021 failing which penalty/EC/cancellation of NOC shall be imposed as the case may be.
- 30) This NOC is issued subject to the clearance of Expert Appraisal Committee (EAC) (if applicable).

(Non-compliance of the conditions mentioned above is likely to result in the cancellation of NOC and legal action against the proponent.)

PPE distribution details of FY 2021-22 in respect of Cluster IV group of mine

SI No.	ITEMS	Total distribution in nos
1	Mining Shoes	900
2	GUMBOOT	750
3	HELMET	205
4	DUST MASK	1900
5	Fluorescent Jackets	912













Annexure - I

NOTING SHEET

Deptt: Environment Deptt. *77/N*

Ref: DyGM(Env)/F-EMP /15/ *77/N* Dated 19-01-2015 *20*

Sub.: Preparation of Mine Plan, based on Feasibility Reports prepared by CMPDI for obtaining environment Clearance under cluster concept, and approval thereof

The Expert Appraisal Committee (Coal & Thermal) of MOEFCC, in its meeting on 15.01.2015 while considering proposal for EC capacity enhancement of Cluster-IV group of mines, observed that BCCL has not submitted Mining Plan approved by its Board of Directors.

It was submitted by BCCL that since almost all the collieries / mines of BCCL are taken over from the erstwhile private owners, the mine does not have structured mining plans. The mining operations are being continued as amalgamated collieries. However BCCL is submitting feasibility Reports for the purpose.

The committee agreed for granting EC enhancement to Cluster-IV but directed BCCL to submit Mine Plans of all the mines in this cluster as well as of mines of other clusters for which EC has been granted.

It is proposed to prepare Mine Plan through CMPDI, on the basis of Feasibility Reports, prepared by CMPDI and already submitted along with Form-I, while making application to MOEFCC. The Mine Plan shall be submitted to MOEFCC after approval by BCCL Board of Directors.

The committee, in the meeting, also directed BCCL to submit the Cluster concept duly approved by Company Board of Directors. The document has already been submitted to MOEFCC on 10-11-2009 and approved by MOEFCC on 2-12-2009. It is proposed to obtain post facto approval of BCCL Board of Directors.

Competent authority is requested to direct RD CMPDI, RI-II for preparing Mine Plan for all the mines of Clusters for which EC has been granted/applied, based on Feasibility report already submitted to MOEFCC so that the same can be placed before Board of Directors of BCCL for approval. The list of Feasibility Reports prepared by CMPDI and submitted to MOEFCC is enclosed as Annexure-A.

G. M. (Env)
Dy GM(Env)

Director (MOp) *For per. action*
20/1/15

RD, RI II

Copy - D.T. (F&T) - for information
H. (M) *20/1/15*

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Annexure-A

List of Feasibility Reports prepared by CMPDI and submitted to MOEFCC alongwith Form-I Application

Sl No	Cluster	Name of mine	Normative Capacity	Peak Capacity	LEASE HOLD AREA
	I	Damoda Colliery (Albion OCP)	0.20	0.26	575.0 Ha
		Damoda Colliery (UG)	0.10	0.13	
		Damoda Colliery (BJ Section OCP)	0.60	0.78	
	II	Block II Colliery(Mixed)	4.45	5.785	852.00
		Jamunia OCP	1.2	1.56	55.00
		Shatabdi OCP	1.4	1.82	181.30
		Muraidih Colliery (Mixed)	5.5	7.15	536.41
		Phularitand OCP	3.0	3.90	401.00
	III	Jogidih Colliery	0.244	0.317	167.00
		Maheshpur Colliery	0.070	0.091	292.68
		South Govindpur Colliery (Closed)	Nil	Nil	182.00
		Teturiya Colliery (Closed)	Nil	Nil	123.00
		Govindpur Colliery	0.140	0.182	159.55
		New Akashkinaree Mine Opencast Project UG Mine	1.000 0.135	1.300 0.176	347.38
		Block-IV/Kooridih Mixed Mine Opencast Project UG Mine	1.100 0.080	1.430 0.104	149.00
	IV	Salanpur Colliery UG	0.13	0.17	
		Salanpur Colliery OC	0.42	0.55	
		Katras Choitudih Colliery OC	0.5	0.65	228.00
		a) Amalgamated Keshalpur & West Mududih UG	0.60	0.78	325.00
		b) Amalgamated Keshalpur & West Mududih OC	4.9	6.37	
		Amalgamated Angarpathra & Ramkanali colliery UG	0.190	0.25	254.64
	V	Nichitpur OC Mine	0.6	0.78	150
		Tetulmari Colliery (Mixed)	0.795	1.033	317
		Mudidih Colliery (Mixed)	1.553	2.019	378.05
		Sendra Bansjore Colliery (Mixed)	0.75	0.975	249.63
		Kankanee Colliery (Mixed)	0.48	0.624	258.12
		Bansdeopur Colliery (Mixed)	0.676	0.879	104.72
		Loyabad UG Mine (closed for coal production)	0	0	499.56

X	Bhowrah North (Mixed)	0.53	0.689	208.83
	Bhowrah South (Mixed)	0.683	0.887	571.58
	Patherdih (Mixed)	0.274	0.356	244.34
	Sudamdih Incline mine(UG)	0.09	0.117	254.27
	Sudamdih Shaft mine(UG)	0.185	0.240	391.50
	Anilabad UG mine (Closed for coal production)	0	0	386.95
	Sudamdih Coal Washery	1.6	2.08	
XI	Gopalichak UG Project	0.11	0.143	241.94
	Kachi Balihari 10/12 Pit UG Mine	0.09	0.117	60.00
	PB Project (UG Mine)	0.80	1.040	89.00
	Bhagabandh UG Mine	0.08	0.104	581.17
	Moonidih UG Mine	4.0	5.20	2063.45
	Kendwadih UG Mine (Closed for production)	Nil	Nil	217.54
	Pootkee UG Mine (Closed for production)	Nil	Nil	153.77
	Kachi Balihari 5/6 Pit UG Mine (Closed for production)	Nil	Nil	120.71
	Moonidih Washery	1.60	1.60	0.27*
XIII	Murulidih 20/21 pits	0.18	0.234	571.32
	Bhurungiya colliery	nil	nil	170.44
	Muchraidih colliery	nil	nil	83.23
	Hantoodih colliery	nil	nil	193.41
	Padugora colliery	nil	nil	17.6
	Murulidih colliery	nil	nil	547.0
	Bhatdee colliery	nil	nil	315.62
XIV	Lohapatty UG Mine	0.03	0.039	1577.22
	Lohapatty OC Mine	0.375	0.487	
XV	Kharkharee Colliery	0.092	0.12	584.00
	Madhuband Colliery	0.113	0.147	393.77
	Phularitand Colliery	0.120	0.156	340.88
	Dharmaband Colliery	0	0	377.90
XVI	Dahibari Basantimata OCP	1.30	1.69	385.68
	Basantimata UG	0.21	0.273	417.00
	New Laikdih OCP-(Abandoned) -Includes prop. Dahibari Washery	0.00	0.00	305.1
	Laikdih Deep UG (Abandoned)	0.00	0.00	281.00
	Chanch UG	0.00	0.00	575.43
XVII	Begunia UG	0	0	306.00
	Victoria West UG	0	0	310.00
	Victoria UG	0	0	223.00
	Damagoria Colliery	0	0	620.0
	Proposed Kalayaneshwari OCP	4	5.2	851.83
	Proposed Kalayaneshwari Washery	3.65	3.65	15.66

VI	East Bassuriya Colliery	1.500	1.950	141.07
	Bassuriya Colliery	0.120	0.156	162.76
	Gondudih Khas kusunda Colliery	2.000	2.600	410
	Godhur Colliery	2.000	2.6	162.72
VII	Dhansar UG	0.372	0.484	174.12
	Dhansar OC	0.800	1.040	
	Kusunda OC	2.000	2.600	247.7
	Industry UG (Closed)	-	-	137.20
	Alkusa UG	0.115	0.150	101.77
	Ena OC	0.170	0.221	181.3
	South Jharia/ Rajapur OCP	1.300	1.690	207.48
	Burragarh UG	0.170	0.221	147.83
	Sinlabahal UG	0.250	0.325	178.13
	Hurriladih UG	0.090	0.117	127.17
	Bhutgoria UG (Re-opening Proposed)	0.360	0.468	131.67
	Kustor UG (Closed)	-	-	250.71
	East Bhuggatdih UG (Closed)	-	-	242.62
	Vishwakarma OC (Proposed)	0.700	0.910	43.5 (Within Dhansar & Industry LH
VIII	Bastacolla OCP	0.10	0.130	239.45
	Bastacolla UG	0.33	0.429	
	Bera OCP	0.15	0.195	209.56
	Bera UG	0.19	0.247	
	Dobari Colliery (UG)	0.24	0.312	146.90
	Kuya OCP	0.60	0.780	
	Kuya UG	0.10	0.130	340.50
	Goluckdih (NC) OCP (Proposed)	1.2	1.560	
	Ghanoodih Colliery (OCP)	1.40	1.820	73.00
	Kujama Colliery (OCP)	0.60	0.780	191.00
IX	Lodna (UG)	0.115	0.150	391.64
	North Tisra (UG)	0.15	0.195	246.24
	NT/ST (OCP)	1.65	2.145	256.15
	Jalgora (UG) Closed	NIL	NIL	138.00
	Bagdigi (UG)	0.11	0.143	61.00
	Joyrampur (UG)	0.153	0.199	98.04
	Jeenagora (OC)	0.7	0.91	276.05
	Bararee (UG)	0.17	0.221	475.00
	NT/ST EXPANSION (OCP)	6.0	7.8	755.15

Annexure - II

भारत कोकिंग कोल लिमिटेड (एक मिनी रत्न कंपनी) योजना एवं परियोजना विभाग कोयला भवन कोयला नगर धनबाद- 826005 दूरभाष-0326-2230276 ईमेल: gmpp@bccl.gov.in CIN: U10101JH1972GO1000918		Bharat Coking Coal Limited (A Mini Ratna Company) Planning & Project Division Koyla Bhawan, Koyla Nagar Dhanbad- 826 005 Telephone-0326-2230276 Email- gmpp@bccl.gov.in CIN: U10101JH1972GO1000918
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पत्रांक: बी.सी.सी.एल/ मु० महाप्रबंधक (यो. ए. परि.)/फ-15/15/ 23)

Dated-17.06.2015

सेवा में

क्षेत्रीय निदेशक,

सी एम पी डी आई,

क्षेत्रीय संस्थान-II,

कोयला भवन परिसर , धनबाद

**विषय: Draft Mining Plan for AKWM Colliery (Cluster IV).**

महोदय,

Please find enclosed herewith the comments of Project Manager, AKWMC on the above subject. The report has been found to be in order.

This is for your kind information and further needful action at your end.

Thanking you.

भवदीय

संलग्नक: यथोपरि

[Signature]
 महाप्रबंधक (योजना एवं परियोजना)

प्रतिलिपि:

महाप्रबंधक, कतरास एरिया, बी सी सी एल, धनबाद



BHARAT COKING COAL LIMITED
"A Mini Ratna Company"
(A Subsidiary of Coal India Limited)
OFFICE OF THE PROJECT OFFICER/AGENT
Amalgamated Keshalpur West Modidih Colliery
KATRAS AREA, PO: Sijua, Dist: - Dhanbad (Jharkhand) – 828121

Ref.No. AKWM/ 1377

Dated: - 26/05/2015

To,
The General Manager(P&P)
Koyla Bhawan, Dhanbad

Subject:- Submission of draft Mining Plan of AKWM Colliery(Cluster-IV).

D/Sir,

After going through the draft Mining Plan, it is found OK as per our Draft Plan.

This is for your kind information and necessary action please.

Thanking you

PROJECT OFFICER
AKWMC

Annexure-III

भारत कोकिंग कोल लिमिटेड (एक मिनी रत्न कंपनी) योजना एवं परियोजना विभाग कोयला भवन कोयला नगर धनबाद- 826005 दूरभाष-0326-2230276 ईमेल: grmpp.bccl@coalindia.in CIN: U10101JH1972GO1000918		Bharat Coking Coal Limited (A Mini Ratna Company) Planning & Project Division Koyla Bhawan, Koyla Nagar Dhanbad- 826 005 Telephone-0326-2230276 Email- grmpp.bccl@coalindia.in CIN: U10101JH1972GO1000918
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पत्रांक : बी.सी.सी.एल/महाप्रबंधक (यो. ए. परि.)/फ-76/17/ 63 (H) Dated-02.01.2017

सेवा में

✓ क्षेत्रीय निदेशक,
सी एम पी डी आई,
क्षेत्रीय संस्थान-II,
कोयला भवन परिसर, धनबाद.



विषय: Preparation of Mining Plan of all the mines of Cluster IV alongwith modified Mine Closure Plan for those mines.

महोदय,

The Expert appraisal committee (Coal & Thermal) of MOEFCC in its meeting on 15.01.2015 while considering proposal for EC capacity enhancement of Cluster-IV group of mines observed that BCCL has not submitted approved mining plan. The Project was accorded TOR vide letter no. J-11015/372/2013-IA.II(M) Dated 10.02.2014 exempting Public hearing for preparation of EIA/EMP report.

The proposal is for cluster IV Coal Mining Project (7.34 MTPA normative and 9.55 peak in an ML area of 1123.79 ha of Bharat Coking Coal Limited. The capacity enhancement is proposed from existing capacity of 2.851 MTPA normative & 3.706 MTPA peak.

The expansion of the project is required to implement the Master Plan to deal with the fire in Jharia Coalfield.

Empowered Sub Committee of BCCL Board pointed out during ESC meeting on 30.12.2016 that Mining Plans for all the mines of Cluster IV, alongwith modified Mine Closure Plan of all the mines of Cluster IV should be placed before the committee.

In the view of above you are requested to prepare and submit the above document on an urgent basis.

Matter most urgent.

भवदीय

महाप्रबंधक (योजना एवं परियोजना)

Annexure-IV

भारत कोकिंग कोल लिमिटेड
(कोल इंडिया लिमिटेड का एक अंग)
कोयला भवन, कोयला नगर, धनबाद - 826005
A Mini Ratna Company
पर्यावरण विभाग



Bharat Coking Coal Limited
(A Subsidiary of Coal India Limited)
Regd. Off: Koyla Bhawan, Koyla Nagar
CIN: U10101JH1972GOI000918
Environment Department

पत्र संख्या: भाकोकोलि/उप महाप्रबंधक(पर्या)/फाईल- Cluster-IV /2016/251- दिनांक : 16.01.2017
254/11)

सेवा में,
महाप्रबंधक - योजना एवं परियोजना
भा0को0को0लि0, धनबाद ।



विषय :- Approved Mining Plan for EC Capacity enhancement of Cluster-IV

महोदय,

For EC capacity enhancement of Cluster-IV (Katras Area) from existing 3.706 MTPA peak to 9.55 MTPA peak, application was made to MoEFCC in 2013.

- TOR granted on 10th Feb 2014 with waiver of Baseline and recommendation of waiver of PH
- EMP considered in EAC meeting of 15.01.2015 and after submission of certified copy of compliance from RO, MoEFCC & Mining Plan approved by Director under delegated power, further considered on 08.01.2016.
- Expert appraisal Committee of MoEFCC desired Mining Plan approved by Board & Revised certified from R.O. MoEFCC, Ranchi for further consideration.
- R.O. MoEFCC made fresh inspection on 22.08.2016 & revised report is now uploaded

You are therefore requested to expedite Mining Plan preparation and approval for submission to MoEFCC for further consideration.

भवदीय,

[Signature] 16/1/17

उप महाप्रबंधक (पर्यावरण)

प्रतिलिपि:

1. क्षेत्रीय निदेशक, क्षेत्रीय संस्थान -2, सी.एम.पी.डी.आई. धनबाद ।
2. महाप्रबंधक, कतरास क्षेत्र ।

Annexure - I**NOTING SHEET**

Deptt: Environment Deptt.

Ref: DyGM(Env)/F-EMP/15/77/11 Dated 19-01-2015

Sub.: Preparation of Mine Plan, based on Feasibility Reports prepared by CMPDI for obtaining environment Clearance under cluster concept, and approval thereof

The Expert Appraisal Committee (Coal & Thermal) of MOEFCC, in its meeting on 15.01.2015 while considering proposal for EC capacity enhancement of Cluster-IV group of mines, observed that BCCL has not submitted Mining Plan approved by its Board of Directors:

It was submitted by BCCL that since almost all the collieries / mines of BCCL are taken over from the erstwhile private owners, the mine does not have structured mining plans. The mining operations are being continued as amalgamated collieries. However BCCL is submitting feasibility Reports for the purpose.

The committee agreed for granting EC enhancement to Cluster-IV but directed BCCL to submit Mine Plans of all the mines in this cluster as well as of mines of other clusters for which EC has been granted.

It is proposed to prepare Mine Plan through CMPDI, on the basis of Feasibility Reports, prepared by CMPDI and already submitted along with Form-I, while making application to MOEFCC. The Mine Plan shall be submitted to MOEFCC after approval by BCCL Board of Directors.

The committee, in the meeting, also directed BCCL to submit the Cluster concept duly approved by Company Board of Directors. The document has already been submitted to MOEFCC on 10-11-2009 and approved by MOEFCC on 2-12-2009. It is proposed to obtain post facto approval of BCCL Board of Directors.

Competent authority is requested to direct RD CMPDI, RI-II for preparing Mine Plan for all the mines of Clusters for which EC has been granted/applied, based on Feasibility report already submitted to MOEFCC so that the same can be placed before Board of Directors of BCCL for approval. The list of Feasibility Reports prepared by CMPDI and submitted to MOEFCC is enclosed as Annexure-A.

[Signature]
Dy GM(Env) 19/1/15

Director (T)Op

✓ RD, RI II

Copy - D.T. (P.T.) - for information

This Space is not for use.

BCCL Press: 64/28/13-14-300 Pads. x 100 Lvs.

10/5

Annexure-A

List of Feasibility Reports prepared by CMPDI and submitted to MOEFCC alongwith Form-I Application

Sl No	Cluster	Name of mine	Normative Capacity	Peak Capacity	LEASE HOLD AREA
	I	Damoda Colliery (Albion OCP)	0.20	0.26	575.0 Ha
		Damoda Colliery (UG)	0.10	0.13	
		Damoda Colliery (BJ Section OCP)	0.60	0.78	
	II	Block II Colliery(Mixed)	4.45	5.785	852.00
		Jamunia OCP	1.2	1.56	55.00
		Shatabdi OCP	1.4	1.82	181.30
		Muraidih Colliery (Mixed)	5.5	7.15	536.41
		Phularitand OCP	3.0	3.90	401.00
	III	Jogidih Colliery	0.244	0.317	167.00
		Maheshpur Colliery	0.070	0.091	292.68
		South Govindpur Colliery (Closed)	Nil	Nil	182.00
		Teturiya Colliery (Closed)	Nil	Nil	123.00
		Govindpur Colliery	0.140	0.182	159.55
		New Akashkinaree Mine Opencast Project UG Mine	1.000 0.135	1.300 0.176	347.38
		Block-IV/Kooridih Mixed Mine Opencast Project UG Mine	1.100 0.080	1.430 0.104	149.00
	IV	Salanpur Colliery UG	0.13	0.17	
		Salanpur Colliery OC	0.42	0.55	
		Katras Choitudih Colliery OC	0.5	0.65	228.00
		a) Amalgamated Keshalpur & West Mududih UG	0.60	0.78	325.00
		b) Amalgamated Keshalpur & West Mududih OC	4.9	6.37	
		Amalgamated Angarpathra & Ramkanali colliery UG	0.190	0.25	254.64
	V	Nichitpur OC Mine	0.6	0.78	150
		Tetulmari Colliery (Mixed)	0.795	1.033	317
		Mudidih Colliery (Mixed)	1.553	2.019	378.05
		Sendra Bansjore Colliery (Mixed)	0.75	0.975	249.63
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		Bansdeopur Colliery (Mixed)	0.676	0.879	104.72
		Loyabad UG Mine (closed for coal production)	0	0	499.56

X	Bhowrah North (Mixed)	0.53	0.689	208.83
	Bhowrah South (Mixed)	0.683	0.887	571.58
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	Kachi Balihari 5/6 Pit UG Mine (Closed for production)	Nil	Nil	120.71
	Moonidih Washery	1.60	1.60	0.27*
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	Bhurungiya colliery	nil	nil	170.44
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	Padugora colliery	nil	nil	17.6
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XV	Kharkharee Colliery	0.092	0.12	584.00
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	Dharmaband Colliery	0	0	377.90
XVI	Dahibari Basantimata OCP	1.30	1.69	385.68
	Basantimata UG	0.21	0.273	417.00
	New Laikdih OCP-(Abandoned) -Includes prop. Dahibari Washery	0.00	0.00	305.1
	Laikdih Deep UG (Abandoned)	0.00	0.00	281.00
	Chanch UG	0.00	0.00	575.43
XVII	Begunia UG	0	0	306.00
	Victoria West UG	0	0	310.00
	Victoria UG	0	0	223.00
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	Proposed Kalayaneswari OCP	4	5.2	851.83
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	Gondudih Khas kusunda Colliery	2.000	2.600	410
	Godhur Colliery	2.000	2.6	162.72
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	Kusunda OC	2.000	2.600	247.7
	Industry UG (Closed)	-	-	137.20
	Alkusa UG	0.115	0.150	101.77
	Ena OC	0.170	0.221	181.3
	South Jharia/ Rajapur OCP	1.300	1.690	207.48
	Burragarh UG	0.170	0.221	147.83
	Simlabahal UG	0.250	0.325	178.13
	Hurriladih UG	0.090	0.117	127.17
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	Kustor UG (Closed)	-	-	250.71
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	Bastacolla UG	0.33	0.429	
	Bera OCP	0.15	0.195	209.56
	Bera UG	0.19	0.247	
	Dobari Colliery (UG)	0.24	0.312	146.90
	Kuya OCP	0.60	0.780	
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	Ghanoodih Colliery (OCP)	1.40	1.820	73.00
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IX	Lodna (UG)	0.115	0.150	391.64
	North Tisra (UG)	0.15	0.195	246.24
	NT/ST (OCP)	1.65	2.145	256.15
	Jalgora (UG) Closed	NIL	NIL	138.00
	Bagdigi (UG)	0.11	0.143	61.00
	Joyrampur (UG)	0.153	0.199	98.04
	Jeenagora (OC)	0.7	0.91	276.05
	Bararee (UG)	0.17	0.221	475.00
	NT/ST EXPANSION (OCP)	6.0	7.8	755.15

Annexure-II

भारत कोकिंग कोल लिमिटेड (एक मिनी रत्न कंपनी) योजना एवं परियोजना विभाग कोयला भवन कोयला नगर धनबाद- 826005 दूरभाष-0326-2230276 ईमेल: gmpp@bccl.gov.in CIN: U10101JH1972GO1000918		Bharat Coking Coal Limited (A Mini Ratna Company) Planning & Project Division Koyla Bhawan, Koyla Nagar Dhanbad- 826 005 Telephone-0326-2230276 Email- gmpp@bccl.gov.in CIN: U10101JH1972GO1000918
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पत्रांक: बी.सी.सी.एल/महाप्रबंधक (यो. ए. परि.)/फ-76/16/ 194

Dated-28.03.2016

सेवा में
 क्षेत्रीय निदेशक,
 सी एम पी डी आई, क्षेत्रीय संस्थान-II,
 कोयला भवन परिसर, धनबाद



विषय: Modification of Mining Plan of AARC Mine of Cluster-IV.

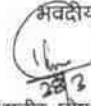
संदर्भ: Letter No. BCCL/KA-IV/GM/2016/1289 dated 09.03.2016.

महोदय,

As per the above referred letter of GM, Katras Area, a Mining Plan of AARC was prepared by CMPDI in April, 2015 which is yet to be approved by BCCL Board, the capacity as per the Mining Plan is 0.075 MTY however as per enclosed production plan of AARC the normative mine capacity of the said mine will be 0.19 MTY.

You are requested to take necessary action for modification of Mining Plan of AARC accordingly and submit the document at the earliest possible.

संलग्नक: यथोपरि

भवदीय

 (सुबीर घोष)

महाप्रबंधक (योजना एवं परियोजना)

प्रतिलिपि: सूचनार्थ
 महाप्रबंधक, कतरास, बी.सी.सी.एल.
 विभागाध्यक्षक (पर्यावरण), बी.सी.सी.एल.

D:\BCCL\Letter-16

77

Annexure-III

भारत कोकिंग कोल लिमिटेड (एक मिनी रत्न कंपनी) योजना एवं परियोजना विभाग कोयला भवन कोयला नगर धनबाद- 826005 दूरभाष-0326-2230276 ईमेल: grmpp.bccl@coalindia.in CIN: U10101JH1972GO1000918		Bharat Coking Coal Limited (A Mini Ratna Company) Planning & Project Division Koyla Bhawan, Koyla Nagar Dhanbad- 826 005 Telephone-0326-2230276 Email- grmpp.bccl@coalindia.in CIN: U10101JH1972GO1000918
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पत्रांक : बी.सी.सी.एल/महाप्रबंधक (यो. ए. परि.)/फ-76/17/ 63 (H) Dated-02.01.2017

सेवा में

✓ क्षेत्रीय निदेशक,
सी एम पी डी आई,
क्षेत्रीय संस्थान-II,
कोयला भवन परिसर, धनबाद.



विषय: Preparation of Mining Plan of all the mines of Cluster IV alongwith modified Mine Closure Plan for those mines.

महोदय,

The Expert appraisal committee (Coal & Thermal) of MOEFCC in its meeting on 15.01.2015 while considering proposal for EC capacity enhancement of Cluster-IV group of mines observed that BCCL has not submitted approved mining plan. The Project was accorded TOR vide letter no. J-11015/372/2013-IA.II(M) Dated 10.02.2014 exempting Public hearing for preparation of EIA/EMP report.

The proposal is for cluster IV Coal Mining Project (7.34 MTPA normative and 9.55 peak in an ML area of 1123.79 ha of Bharat Coking Coal Limited. The capacity enhancement is proposed from existing capacity of 2.851 MTPA normative & 3.706 MTPA peak.

The expansion of the project is required to implement the Master Plan to deal with the fire in Jharia Coalfield.

Empowered Sub Committee of BCCL Board pointed out during ESC meeting on 30.12.2016 that Mining Plans for all the mines of Cluster IV, alongwith modified Mine Closure Plan of all the mines of Cluster IV should be placed before the committee.

In the view of above you are requested to prepare and submit the above document on an urgent basis.

Matter most urgent.

भवदीय

महाप्रबंधक (योजना एवं परियोजना)

Annexure-IV

भारत कोकिंग कोल लिमिटेड
(कोल इंडिया लिमिटेड का एक अंग)
कोयला भवन, कोयला नगर, धनबाद - 826005
A Mini Ratna Company
पर्यावरण विभाग



Bharat Coking Coal Limited
(A Subsidiary of Coal India Limited)
Regd. Off: Koyla Bhawan, Koyla Nagar
CIN: U10101JH1972GOI000918
Environment Department

पत्र संख्या: भाकोकोलि/उप महाप्रबंधक(पर्या)/फाईल- Cluster-IV /2016/251- दिनांक : 16.01.2017
254/11)

सेवा में,
महाप्रबंधक - योजना एवं परियोजना
भा0को0को0लि0, धनबाद ।



विषय :- Approved Mining Plan for EC Capacity enhancement of Cluster-IV

महोदय,

For EC capacity enhancement of Cluster-IV (Katras Area) from existing 3.706 MTPA peak to 9.55 MTPA peak, application was made to MoEFCC in 2013.

- TOR granted on 10th Feb 2014 with waiver of Baseline and recommendation of waiver of PH
- EMP considered in EAC meeting of 15.01.2015 and after submission of certified copy of compliance from RO, MoEFCC & Mining Plan approved by Director under delegated power, further considered on 08.01.2016.
- Expert appraisal Committee of MoEFCC desired Mining Plan approved by Board & Revised certified from R.O. MoEFCC, Ranchi for further consideration.
- R.O. MoEFCC made fresh inspection on 22.08.2016 & revised report is now uploaded

You are therefore requested to expedite Mining Plan preparation and approval for submission to MoEFCC for further consideration.

भवदीय,

[Signature] 16/1/17

उप महाप्रबंधक (पर्यावरण)

प्रतिलिपि:

1. क्षेत्रीय निदेशक, क्षेत्रीय संस्थान -2, सी.एम.पी.डी.आई. धनबाद ।
2. महाप्रबंधक, कतरास क्षेत्र ।

Annexure-I

NOTING SHEET

Deptt: Environment Deptt. 77/11

Ref: DyGM(Env)/F-EMP/11/77/11 Dated 19-01-2015 20

Subj: Preparation of Mine Plan, based on Feasibility Reports prepared by CMPDI for obtaining environment Clearance under cluster concept, and approval thereof

The Expert Appraisal Committee (Coal & Thermal) of MOEFCC, in its meeting on 15.01.2015 while considering proposal for EC capacity enhancement of Cluster-IV group of mines, observed that BCCL has not submitted Mining Plan approved by its Board of Directors.

It was submitted by BCCL that since almost all the collieries / mines of BCCL are taken over from the erstwhile private owners, the mine does not have structured mining plans. The mining operations are being continued as amalgamated collieries. However BCCL is submitting feasibility Reports for the purpose.

The committee agreed for granting EC enhancement to Cluster-IV but directed BCCL to submit Mine Plans of all the mines in this cluster as well as of mines of other clusters for which EC has been granted.

It is proposed to prepare Mine Plan through CMPDI, on the basis of Feasibility Reports, prepared by CMPDI and already submitted along with Form-I, while making application to MOEFCC. The Mine Plan shall be submitted to MOEFCC after approval by BCCL Board of Directors.

The committee, in the meeting, also directed BCCL to submit the Cluster concept duly approved by Company Board of Directors. The document has already been submitted to MOEFCC on 10-11-2009 and approved by MOEFCC on 2-12-2009. It is proposed to obtain post facto approval of BCCL Board of Directors.

Competent authority is requested to direct RD CMPDI, RI-II for preparing Mine Plan for all the mines of Clusters for which EC has been granted/applied, based on Feasibility report already submitted to MOEFCC so that the same can be placed before Board of Directors of BCCL for approval. The list of Feasibility Reports prepared by CMPDI and submitted to MOEFCC is enclosed as Annexure-A.

Dy GM(Env)

Director (DOP) For per. action

RD, RI II 20/1/15

Copy - D.T. (DOP) - For information

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BCCL Press (44/25/13-H-200) Pages 100 Lvs

Annexure-II

BCCL



भारत कोकिंग कोल लिमिटेड

(एक मिनी रत्न कंपनी)

(कोल इण्डिया लिमिटेड का एक उपक्रम)

महाप्रबंधक का कार्यालय, कतरास क्षेत्र

पोस्ट: सिजुआ, धनबाद पिन: 828121

CIN U10101JH1972GOI000918

www.bccl.gov.in

सन्दर्भ : भा०को०को०लि०म०प्र०क०क्ष०/15/A-2/1210

दिनांक : 11.04.2015

सेवा में,

The Chief General Manager (P&P)

BCCL/Koyla Bhawan

Dhanbad.

13/04/15

विषय : Draft Mining Plan for Gaslitand Colliery.

Ref: Your letter no. BCCL/CGM/(P&P)/F-15/15/46 Dated 31/03/1015.

महाशय,

The Draft Mining Plan sent by you, has been checked from our side. The relevant mining data with respect to Gaslitand mine seems to be in order.

You are requested to please do the needful from your end for finalization of plan by RI-II, CMPDI.

आपका विश्वासी

महाप्रबंधक
कतरास क्षेत्र

संलग्नक :

1. Draft Mining Plan

प्रतिलिपि :

(1) Project Officer, GTC – without enclosure.

(2) Office Copy



ANNEXURE-I

NOTING SHEET

Deptt: Environment Deptt.

Ref: DyGM(Env)/F-EMP/15/77/N Dated 19-01-2015

Sub.: Preparation of Mine Plan, based on Feasibility Reports prepared by CMPDI for obtaining environment Clearance under cluster concept, and approval thereof

The Expert Appraisal Committee (Coal & Thermal) of MOEFCC, in its meeting on 15.01.2015 while considering proposal for EC capacity enhancement of Cluster-IV group of mines, observed that BCCL has not submitted Mining Plan approved by its Board of Directors.

It was submitted by BCCL that since almost all the collieries / mines of BCCL are taken over from the erstwhile private owners, the mine does not have structured mining plans. The mining operations are being continued as amalgamated collieries. However BCCL is submitting feasibility Reports for the purpose.

The committee agreed for granting EC enhancement to Cluster-IV but directed BCCL to submit Mine Plans of all the mines in this cluster as well as of mines of other clusters for which EC has been granted.

It is proposed to prepare Mine Plan through CMPDI, on the basis of Feasibility Reports, prepared by CMPDI and already submitted along with Form-I, while making application to MOEFCC. The Mine Plan shall be submitted to MOEFCC after approval by BCCL Board of Directors.

The committee, in the meeting, also directed BCCL to submit the Cluster concept duly approved by Company Board of Directors. The document has already been submitted to MOEFCC on 10-11-2009 and approved by MOEFCC on 2-12-2009. It is proposed to obtain post facto approval of BCCL Board of Directors.

Competent authority is requested to direct RD CMPDI, RI-II for preparing Mine Plan for all the mines of Clusters for which EC has been granted/applied, based on Feasibility report already submitted to MOEFCC so that the same can be placed before Board of Directors of BCCL for approval. The list of Feasibility Reports prepared by CMPDI and submitted to MOEFCC is enclosed as Annexure-A.

Dy GM(Env) 19/1/15

Director (Top)

RD, RI II

Copy - D.T. (P&T) - For information

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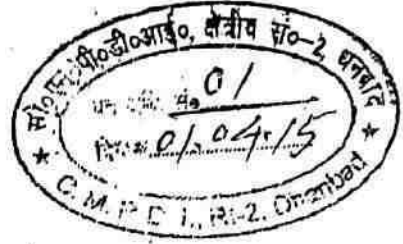
BCCL Form 64/35/13-14-200 Page 1/100 Lys

भारत कोकिंग कोल लिमिटेड (एक मिनी रत्न कंपनी) योजना एवं परियोजना विभाग कोयला भवन कोयला नगर धनबाद- 826005 टूरभाष-0326-2230276 ईमेल: gmpp@bccl.gov.in CIN: U10101JH1972GO1000918		Bharat Coking Coal Limited (A Mini Ratna Company) Planning & Project Division Koyla Bhawan, Koyla Nagar Dhanbad- 826 005 Telephone-0326-2230276 Email- gmpp@bccl.gov.in CIN: U10101JH1972GO1000918
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पत्रांक: बी.सी.सी.एल/ मु० महाप्रबंधक (यो. ए. परि.)/फ-15/15/ 129

Dated-31.03.2015

सेवा में
 क्षेत्रीय निदेशक,
 सी एम पी डी आई,
 क्षेत्रीय संस्थान-II,
 कोयला भवन परिसर, धनबाद



विषय: Draft Mining Plan for Katras Choitodih Colliery.

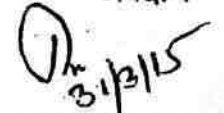
महोदय,

Please find enclosed herewith the comments of General Manager, Katras Area on the above subject. The report has been found to be in order.

This is for your kind information and further needful action at your end.

Thanking you.

संतुलनक: यथोपरि

भवदीय

 (आर एन प्रसाद)

मुख्य महाप्रबंधक (योजना एवं परियोजना)

प्रतिलिपि:

श्री एस के अग्रवाल, वरीय प्रबंधक(खनन), योजना एवं परियोजना

4/10/15

 1/4/15



9

BHARAT COKING COAL LIMITED

(A subsidiary of coal India limited)

Office of General Manager

Katras Area IV

PO: Sijua, Dhanbad - 828121

Ref : KA/GM/HQ(Mining Plan)/15/A 2/ 1197

Dated 30.03.015

To

✓ The General Manager (P&P)

Koila Bhawan, BCCL

Dhanbad

Sub : Draft Mining Plan for Katras Choitodih Colliery

Dear Sir,

The draft Mining Plan sent by you, has been checked from our side. The relevant mining data with respect to Katras Choitodih Mine seems to be in order.

You are requested to pl. do the needful from your end for finalization of plan by RI-II, CMPDI.

Yours Faithfully

General Manager

Katras Area

Annexure - I

NOTING SHEET

Deptt: Environment Deptt. *77/N*
 Ref: DyGM(Env)/F-EMP/15/*77/N* Dated 19-01-2015
30

Sub.: Preparation of Mine Plan, based on Feasibility Reports prepared by CMPDI for obtaining environment Clearance under cluster concept, and approval thereof

The Expert Appraisal Committee (Coal & Thermal) of MOEFCC, in its meeting on 15.01.2015 while considering proposal for EC capacity enhancement of Cluster-IV group of mines, observed that BCCL has not submitted Mining Plan approved by its Board of Directors:

It was submitted by BCCL that since almost all the collieries / mines of BCCL are taken over from the erstwhile private owners, the mine does not have structured mining plans. The mining operations are being continued as amalgamated collieries. However BCCL is submitting feasibility Reports for the purpose.

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Er. M. L. Singh
Dy GM(Env) 19/1/15

Director (T)Op *For given action*
20/1/15

✓ *RD, RI II*

Copy - D.T. (F&T) - for information
HOD (T) vs HOD
20/1/15

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BCCL Press 64/28/13-14-300 Pairs. x 100 Lvs.

Annexure-A

List of Feasibility Reports prepared by CMPDI and submitted to MOEFCC alongwith Form-I Application

Sl No	Cluster	Name of mine	Normative Capacity	Peak Capacity	LEASE HOLD AREA
	I	Damoda Colliery (Albion OCP)	0.20	0.26	575.0 Ha
		Damoda Colliery (UG)	0.10	0.13	
		Damoda Colliery (BJ Section OCP)	0.60	0.78	
	II	Block II Colliery(Mixed)	4.45	5.785	852.00
		Jamunia OCP	1.2	1.56	55.00
		Shatabdi OCP	1.4	1.82	181.30
		Muraidih Colliery (Mixed)	5.5	7.15	536.41
		Phularitand OCP	3.0	3.90	401.00
	III	Jogdih Colliery	0.244	0.317	167.00
		Maheshpur Colliery	0.070	0.091	292.68
		South Govindpur Colliery (Closed)	Nil	Nil	182.00
		Teturiya Colliery (Closed)	Nil	Nil	123.00
		Govindpur Colliery	0.140	0.182	159.55
		New Akashkinaree Mine Opencast Project UG Mine	1.000 0.135	1.300 0.176	347.38
		Block-IV/Kooridih Mixed Mine Opencast Project UG Mine	1.100 0.080	1.430 0.104	149.00
	IV	Salanpur Colliery UG	0.13	0.17	
		Salanpur Colliery OC	0.42	0.55	
		Katras Choitudih Colliery OC	0.5	0.65	228.00
		a) Amalgamated Keshalpur & West Mududih UG	0.60	0.78	325.00
		b) Amalgamated Keshalpur & West Mududih OC	4.9	6.37	
		Amalgamated Angarpathra & Ramkanali colliery UG	0.190	0.25	254.64
	V	Nichitpur OC Mine	0.6	0.78	150
		Tetulmari Colliery (Mixed)	0.795	1.033	317
		Mudidih Colliery (Mixed)	1.553	2.019	378.05
		Sendra Bansjore Colliery (Mixed)	0.75	0.975	249.63
		Kankanee Colliery (Mixed)	0.48	0.624	258.12
		Bansdeopur Colliery (Mixed)	0.676	0.879	104.72
		Loyabad UG Mine (closed for coal production)	0	0	499.56

X	Bhowrah North (Mixed)	0.53	0.689	208.83
	Bhowrah South (Mixed)	0.683	0.887	571.58
	Patherdih (Mixed)	0.274	0.356	244.34
	Sudamdih Incline mine(UG)	0.09	0.117	254.27
	Sudamdih Shaft mine(UG)	0.185	0.240	391.50
	Anlabad UG mine (Closed for coal production)	0	0	386.95
	Sudamdih Coal Washery	1.6	2.08	
XI	Gopalchak UG Project	0.11	0.143	241.94
	Kachi Balihari 10/12 Pit UG Mine	0.09	0.117	60.00
	PB Project (UG Mine)	0.80	1.040	89.00
	Bhagabandh UG Mine	0.08	0.104	581.17
	Moonidih UG Mine	4.0	5.20	2063.45
	Kendwadih UG Mine (Closed for production)	Nil	Nil	217.54
	Pootkee UG Mine (Closed for production)	Nil	Nil	153.77
	Kachi Balihari 5/6 Pit UG Mine (Closed for production)	Nil	Nil	120.71
	Moonidih Washery	1.60	1.60	0.27*
XIII	Murulidih 20/21 pits	0.18	0.234	571.32
	Bhurungiya colliery	nil	nil	170.44
	Muchraidih colliery	nil	nil	83.23
	Hantoodih colliery	nil	nil	193.41
	Padugora colliery	nil	nil	17.6
	Murulidih colliery	nil	nil	547.0
	Bhatdee colliery	nil	nil	315.62
XIV	Lohapatty UG Mine	0.03	0.039	1577.22
	Lohapatty OC Mine	0.375	0.487	
XV	Kharkharee Colliery	0.092	0.12	584.00
	Madhuband Colliery	0.113	0.147	393.77
	Phularitand Colliery	0.120	0.156	340.88
	Dharmaband Colliery	0	0	377.90
XVI	Dahibari Basantimata OCP	1.30	1.69	385.68
	Basantimata UG	0.21	0.273	417.00
	New Laikdih OCP-(Abandoned) -Includes prop. Dahibari Washery	0.00	0.00	305.1
	Laikdih Deep UG (Abandoned)	0.00	0.00	281.00
	Chanch UG	0.00	0.00	575.43
XVII	Begunia UG	0	0	306.00
	Victoria West UG	0	0	310.00
	Victoria UG	0	0	223.00
	Damagoria Colliery	0	0	620.0
	Proposed Kalayaneshwari OCP	4	5.2	851.83
	Proposed Kalayaneshwari Washery	3.65	3.65	15.66

VI	East Bassuriya Colliery	1.500	1.950	141.07
	Bassuriya Colliery	0.120	0.156	162.76
	Gondudih Khas kusunda Colliery	2.000	2.600	410
	Godhur Colliery	2.000	2.6	162.72
VII	Dhansar UG	0.372	0.484	174.12
	Dhansar OC	0.800	1.040	
	Kusunda OC	2.000	2.600	247.7
	Industry UG (Closed)	-	-	137.20
	Alkusa UG	0.115	0.150	101.77
	Ena OC	0.170	0.221	181.3
	South Jharia/ Rajapur OCP	1.300	1.690	207.48
	Burragarh UG	0.170	0.221	147.83
	Simlabahal UG	0.250	0.325	178.13
	Hurriladih UG	0.090	0.117	127.17
	Bhutgoria UG (Re-opening Proposed)	0.360	0.468	131.67
	Kustor UG (Closed)	-	-	250.71
	East Bhuggatdih UG (Closed)	-	-	242.62
	Vishwakarma OC (Proposed)	0.700	0.910	43.5 (Within Dhansar & Industry LH
VIII	Bastacolla OCP	0.10	0.130	239.45
	Bastacolla UG	0.33	0.429	
	Bera OCP	0.15	0.195	209.56
	Bera UG	0.19	0.247	
	Dobari Colliery (UG)	0.24	0.312	146.90
	Kuya OCP	0.60	0.780	
	Kuya UG	0.10	0.130	340.50
	Goluckdih (NC) OCP (Proposed)	1.2	1.560	
	Ghanoodih Colliery (OCP)	1.40	1.820	73.00
	Kujama Colliery (OCP)	0.60	0.780	191.00
IX	Lodna (UG)	0.115	0.150	391.64
	North Tisra (UG)	0.15	0.195	246.24
	NT/ST (OCP)	1.65	2.145	256.15
	Jalgora (UG) Closed	NIL	NIL	138.00
	Bagdigi (UG)	0.11	0.143	61.00
	Joyrampur (UG)	0.153	0.199	98.04
	Jeenagora (OC)	0.7	0.91	276.05
	Bararee (UG)	0.17	0.221	475.00
	NT/ST EXPANSION (OCP)	6.0	7.8	755.15

Annexure-II

भारत कोकिंग कोल लिमिटेड (एक मिनी रत्न कंपनी) योजना एवं परियोजना विभाग कोयला भवन कोयला नगर धनबाद- 826005 दूरभाष-0326-2230276 ईमेल: gmpp@bccl.gov.in CIN: U10101JH1972GO1000918		Bharat Coking Coal Limited (A Mini Ratna Company) Planning & Project Division Koyla Bhawan, Koyla Nagar Dhanbad- 826 005 Telephone-0326-2230276 Email- gmpp@bccl.gov.in CIN: U10101JH1972GO1000918
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पत्रांक: बी.सी.सी.एल/ मु० महाप्रबंधक (यो. ए. परि.)/फ-15/15/51

Dated-07.04.2015

सेवा में
 क्षेत्रीय निदेशक,
 सी एम पी डी आई,
 क्षेत्रीय संस्थान-II,
 कोयला भवन परिसर, धनबाद

विषय: Draft Mining Plan for Salanpur Colliery.

महोदय,

Please find enclosed herewith the comments of General Manager, Katras Area on the above subject. The report has been found to be in order.

This is for your kind information and further needful action at your end.

Thanking you.

संलग्नक: यथोपरि

KOD(M)

Le
 14/4/15
 प्रतिलिपि:

भवदीय

07/4/15
 (आर एन प्रसाद)

मुख्य महाप्रबंधक (योजना एवं परियोजना)

महाप्रबंधक, कतरास एरिया, बी सी सी एल, धनबाद

श्री एस के अग्रवाल, वरीय प्रबंधक(खनन), योजना एवं परियोजना

Annexure-III

भारत कोकिंग कोल लिमिटेड (एक मिनी रत्न कंपनी) योजना एवं परियोजना विभाग कोयला भवन कोयला नगर धनबाद- 826005 दूरभाष-0326-2230276 ईमेल: grmpp.bccl@coalindia.in CIN: U10101JH1972GO1000918		Bharat Coking Coal Limited (A Mini Ratna Company) Planning & Project Division Koyla Bhawan, Koyla Nagar Dhanbad- 826 005 Telephone-0326-2230276 Email- grmpp.bccl@coalindia.in CIN: U10101JH1972GO1000918
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पत्रांक : बी.सी.सी.एल/महाप्रबंधक (यो. ए. परि.)/फ-76/17/ 63 (H)

Dated-02.01.2017

सेवा में

✓ क्षेत्रीय निदेशक,
सी एम पी डी आई,
क्षेत्रीय संस्थान-II,
कोयला भवन परिसर, धनबाद.



विषय: Preparation of Mining Plan of all the mines of Cluster IV alongwith modified Mine Closure Plan for those mines.

महोदय,

The Expert appraisal committee (Coal & Thermal) of MOEFCC in its meeting on 15.01.2015 while considering proposal for EC capacity enhancement of Cluster-IV group of mines observed that BCCL has not submitted approved mining plan. The Project was accorded TOR vide letter no. J-11015/372/2013-IA.II(M) Dated 10.02.2014 exempting Public hearing for preparation of EIA/EMP report.

The proposal is for cluster IV Coal Mining Project (7.34 MTPA normative and 9.55 peak in an ML area of 1123.79 ha of Bharat Coking Coal Limited. The capacity enhancement is proposed from existing capacity of 2.851 MTPA normative & 3.706 MTPA peak.

The expansion of the project is required to implement the Master Plan to deal with the fire in Jharia Coalfield.

Empowered Sub Committee of BCCL Board pointed out during ESC meeting on 30.12.2016 that Mining Plans for all the mines of Cluster IV, alongwith modified Mine Closure Plan of all the mines of Cluster IV should be placed before the committee.

In the view of above you are requested to prepare and submit the above document on an urgent basis.

Matter most urgent.

भवदीय

महाप्रबंधक (योजना एवं परियोजना)

Annexure-IV

भारत कोकिंग कोल लिमिटेड
(कोल इंडिया लिमिटेड का एक अंग)
कोयला भवन, कोयला नगर, धनबाद - 826005
A Mini Ratna Company
पर्यावरण विभाग



Bharat Coking Coal Limited
(A Subsidiary of Coal India Limited)
Regd. Off: Koyla Bhawan, Koyla Nagar
CIN: U10101JH1972GOI000918
Environment Department

पत्र संख्या: भाकोकोलि/उप महाप्रबंधक(पर्या)/फाईल- Cluster-IV /2016/251- दिनांक : 16.01.2017
254/11)

सेवा में,
महाप्रबंधक - योजना एवं परियोजना
भा0को0को0लि0, धनबाद ।



विषय :- Approved Mining Plan for EC Capacity enhancement of Cluster-IV

महोदय,

For EC capacity enhancement of Cluster-IV (Katras Area) from existing 3.706 MTPA peak to 9.55 MTPA peak, application was made to MoEFCC in 2013.

- TOR granted on 10th Feb 2014 with waiver of Baseline and recommendation of waiver of PH
- EMP considered in EAC meeting of 15.01.2015 and after submission of certified copy of compliance from RO, MoEFCC & Mining Plan approved by Director under delegated power, further considered on 08.01.2016.
- Expert appraisal Committee of MoEFCC desired Mining Plan approved by Board & Revised certified from R.O. MoEFCC, Ranchi for further consideration.
- R.O. MoEFCC made fresh inspection on 22.08.2016 & revised report is now uploaded

You are therefore requested to expedite Mining Plan preparation and approval for submission to MoEFCC for further consideration.

भवदीय,

[Signature] 16/1/17

उप महाप्रबंधक (पर्यावरण)

प्रतिलिपि:

1. क्षेत्रीय निदेशक, क्षेत्रीय संस्थान -2, सी.एम.पी.डी.आई. धनबाद ।
2. महाप्रबंधक, कतरास क्षेत्र ।



BHARAT COKING COAL LIMITED
(A Subsidiary of Coal India Limited)
Office of the General Manager
Katras Area.
CIN U10101JH1972GU100918

Ref.IV/GM/EST/Legal/17/ **8257**

Date: 15.3.2017

To,

D.F.O
Combined Building
DHANBAD

Sub: Details of Jungle Jari under Katras Area of BCCL

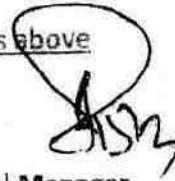
Dear Sir,

Enclosed herewith please find details of Jungle Jari land under Baghmara Circle received from Circle Office, Baghmara. (Annex 1) .The record of Jungle Jhari land received from Circle Office, Baghmara shows that Jungle Jhari land exist only in Mouza Nagrikalan 230 which is partly under Katras Area after reorganization of the areas by DGMS . So, after reorganization of the areas of Katras & Sijua Areas by DGMS, plot No 1 & 3 in Mouza Nagrikalan 230 is under the jurisdiction of Sijua Area where Jungle Jhari exists as per the above record of Circle Office, Baghmara . Hence there is no Jungle Jhari land under the jurisdiction of Katras Area, BCCL .

The Mouzas of land under the jurisdiction of Katras Area, BCCL is also enclosed herewith for your reference please.

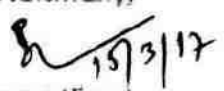
This is for your information please.

Encl. As above


General Manager
Katras Area, BCCL

Cc to: The General Manager, Katras Area
Cc to: The AM(Estate), Katras Area
Cc to: Office copy

Yours faithfully,


Chief Manager (Env.)
Katras Area
BCCL


15/3/17

Annexure - 1

गैरभजसुआ जंगल-झाड़ी (Deemed Forest) भूमि की विवरणी (प्रपत्र III)

अंचल का नाम - बाघमारा, जिला का नाम - धनबाद

अंचल का नाम - बाघमारा, जिला का नाम - धनबाद														
क्रमांक	अंचल	मौजा	थाना नं०	खेता	प्लॉट	रकबा	किसम	बंदोबस्त / इस्तेमालीत / की विवरणी (7-9)				अभिपुष्टि		
								खेता	प्लॉट	रकबा	खेता		प्लॉट	रकबा
1	2	3	4	5	6	7	8	9				10	11	
1	बाघमारा	गोपालपुर	62	-	37,111,38,613,438 447,201,614,300,255,2	270.88								
2	सोहनडीह		63		15.34	23.84								
3	बोराठी		65		1.158	21.4								
4	तिलैया		69		87.7,18,29,725,747,699, 663,701,702,603,602	19.52								
5	नारायणपुर		70		2,53,191,184,202, 408,453,394,299, 309,314	60.98								
6	दुखी		71		2,308,373,433,503, 521,500,452,31	283.5								
7	हुरसोडीह		72		123,127,156,179	47.68								
8	खानूडीह		73		20,23,212,238,236 237,67,68,673,672 671,889,898,1064 1061,983,1062,239	336.32								
9	मार्टीगाढ़ा		74		5,6,113,114,115 118,119,32,33, 116,120,112	443.2								
10	झोमवलकरो		75		48,52,37,38,55,51,1,46	246.91								
11	मीमकनाली		76		2,6,248,355,261,262,273	195.03								
12	बक्सपुरा		80		3,11,219,28	80.7								

क्रमांक	खंचल	मौजा	शाना नं०	खाला	प्लॉट	रकबा	किसम	बंदोबस्त/हस्तांतरित/लीज गुमि की रिकवरी				अभियुक्ति		
								की रिकवरी (7-9)						
								खाला	प्लॉट	रकबा	खाला		प्लॉट	रकबा
1	2	3	4	5	6	7	8	9				10	11	
13	लुत्तीपडाही		81		2,13,148,160,5,14	73.44								
14	आमडीह		64		5,154	12.1								
15	टामझलाडीह		66		1,3,75,82,201,203,85,246,288,130,98	131.55								
16	नावाडीह		102		327,328,331,389	61.2								
17	बैहराकुट्ट		117		1077	12.55								
18	झगराही		118		475	9.83								
19	बरमसिया		105		340,339,357,356,345,275,337,374,4	107.97								
20	महेशपुर		308		4	15.82								
21	जसमुई		181		1	4.8								
22	महेशपुर		185		118	1.72								
23	कणपुरा		186		1,71	5.75								
24	लालचक		207		142,119,88,87,80,78,74,402	14.47								
25	बागादाडा		217		2,968,2960,2971,2975,2980,2935,2083,2331,2324,345,2	80.12								
			217		9434,3433,3421,3231,3230,3227,3218,3208									

क्रमांक	अंचल	मौजा	थाना नं०	खाला	प्लॉट	रकबा	किस्म	बंदोबस्त/हरतारित/ बीज भूमि की विवरणी			की विवरणी (7-8)		अभियुक्ति
								खाला	प्लॉट	रकबा	खाला	प्लॉट	
1	2	3	4	5	6	7	8	9			10		11
					3203,3438,3215,2972,2946								
			217		1482								
26	बौआकला		228		1,11,2326,2715,2400,2420, 2711,2712,2794,78,	85.34							
27	महलीटोड		180		3.40	18.8							
28	तिलाटोड		213		369,383,385,1387,1,2,3,4,7 65,77,78,89,80,81,82,132,1 38, 134,135,383,384,385	132.11							
29	फाटमाहुल		222		137,148,626,1833,1954	76.67							
30	गोविन्दगढ़ी		221		833,1,1362,2094	200.57							
31	धारजोरी		225		1,200,2421,2449,2641	21.92							
32	पंचरुखी		220		774	50							
33	नगरीकला		230		1,3	35.3							
34	हरिणा		101		225,226	34							
35	मधुगोडा		214		454,343	54.25							
36	चुगी		191		519,1232	8.81							
37	लोहपिटी		319		17,28,32,83,1604,2294, 2078,3278	59.96							

क्रमांक	अंचल	गौजा	क्षेत्र नं०	खाला	प्लॉट	परांता	किस्सा	मंदोबरल/हस्तांतरित/			की विवरणी			अभियुक्ति
								खाला	प्लॉट	रकबा	खाला	प्लॉट	रकबा	
1	2	3	4	5	6	7	8	9			10			11
38	तेलमच्यो		320		2782,2798,2755,2943,2982 2942,2754,2797,2807	102.9								
39	कुर्ची		321		1,3,25,754,26,435,131,135, 142,436,434,850,814,812,7 01 ,800,801,751,685,794,255, 739,	167.48								
40	तारगा		305		1352,1676,1411,	68.96								
					कुल	3678.35								

**DELINEATION OF SURFACE COAL FIRE AND
ASSOCIATED LAND SUBSIDENCE IN THE
JHARIA COALFIELD, USING SATELLITE
BASED REMOTE SENSING TECHNIQUES**



**GEODYNAMICS AND GEOHAZARDS DIVISION
GEOSCIENCES GROUP
REMOTE SENSING APPLICATIONS AREA
NATIONAL REMOTE SENSING CENTRE
INDIAN SPACE RESEARCH ORGANISATION
DEPT. OF SPACE, GOVT. OF INDIA
HYDERABAD-500 037**

AUGUST, 2021

data is difficult as it requires visible signatures of subsidence in the form of cracks on the ground and damage to anthropogenic structures. In this study, data analysis and consequent field verification resulted in identification of 4 subsidence areas, within the BCCL mine boundary. Of these, the major area where considerable ground subsidence is occurring is the Moonidih UG project. Long term underground mining has resulted in continuous subsidence in the area. Apart from this, the other three areas are south of South Govindpur, Bagdigi and Bhagaband mines, however, the field evidences of the same are not conclusive. No quantitative estimates of the subsidence have been carried out in the study.

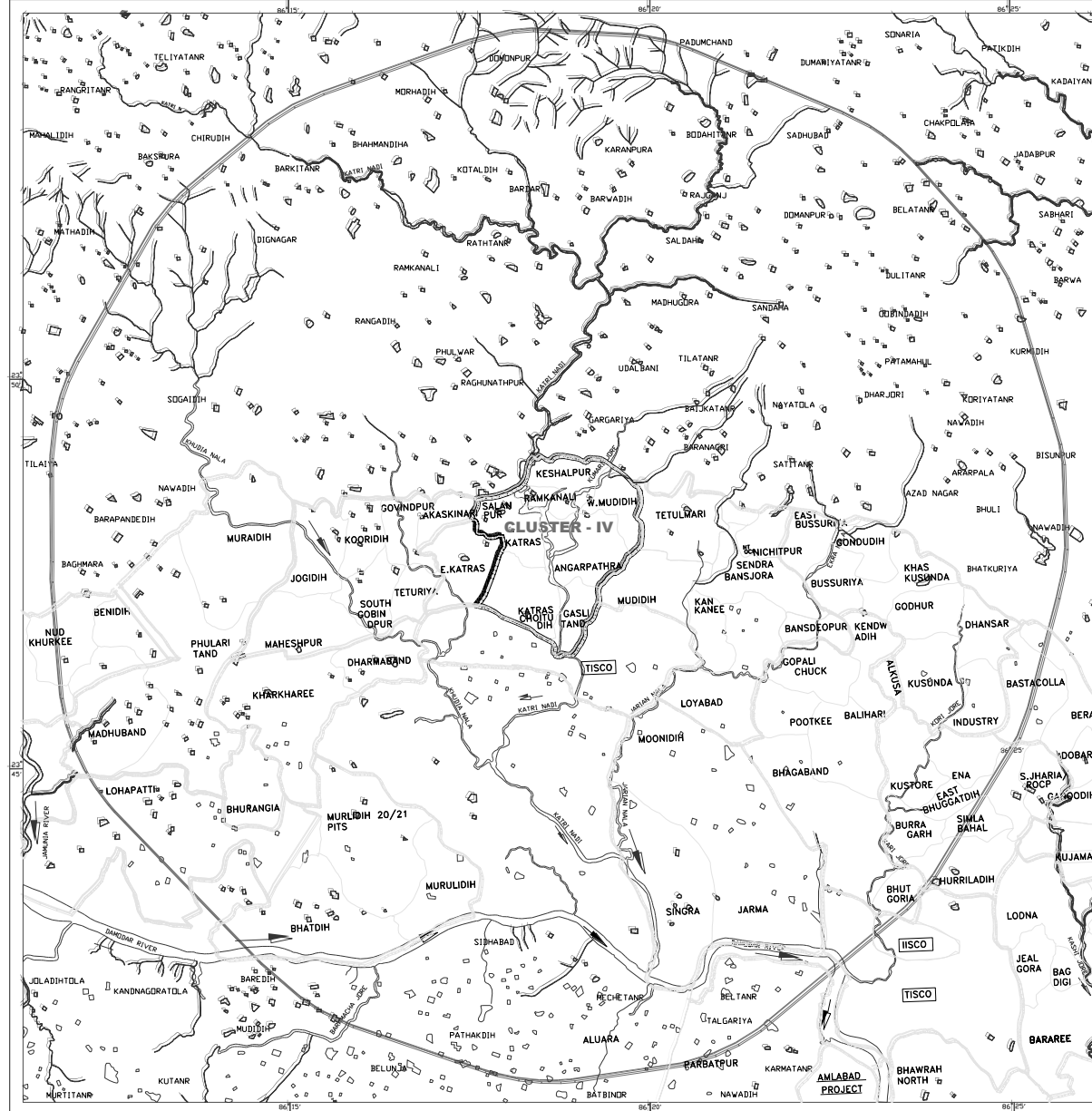
7.2 Conclusions

The following conclusions can be made:

1. As of the date of study in the year 2020 and in comparison with the previous study done in 2017, there has been a change in areal extent and disposition of the fire affected areas. On the other hand, persistent subsidence is seen in the Moonidih area due to underground mining activities.
2. Compared to 2012, the eastern flanks (Lodna, Tisra, Bhulanbarai areas) show considerable decrease in fire disposition and the western flank (Shatabdi and Block II area) show diminished fire presence.
3. The fires are continuation of existing fire affected areas as seen in the 2017 study.
4. The mines in Kusunda remain to be the worst affected with maximum presence of active fires.
5. There is a decrease in areal extent of the fire from 2017 to 2020. As compared 2017, when the total fire affected extent of the JCF was about 3.28 km²; in 2020 total fire affected extent is about 1.89 km² (including TISCO mines). Within the mining lease of BCCL (excluding TISCO) in comparison 2017, when the total fire affected extent of the JCF was about 3.27 km²; in 2020 total fire affected extent is about 1.86 km².

***Note:** The minimum mapable unit from satellite image is 30m by 30m or 0.0009 km². Estimations of fire extent (in terms of sq.km.) both in 2017 and in the present 2020 study are pixel based. They may differ from the actual ground area under fire. These estimations are made for comparative purpose only, to indicate the increase or decrease of areal disposition of fire. Hence, they should not be quoted as fire area on the ground.*

STUDY AREA MAP OF CLUSTER - IV SHOWING HYDROLOGICAL FEATURES

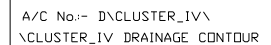


INDEX

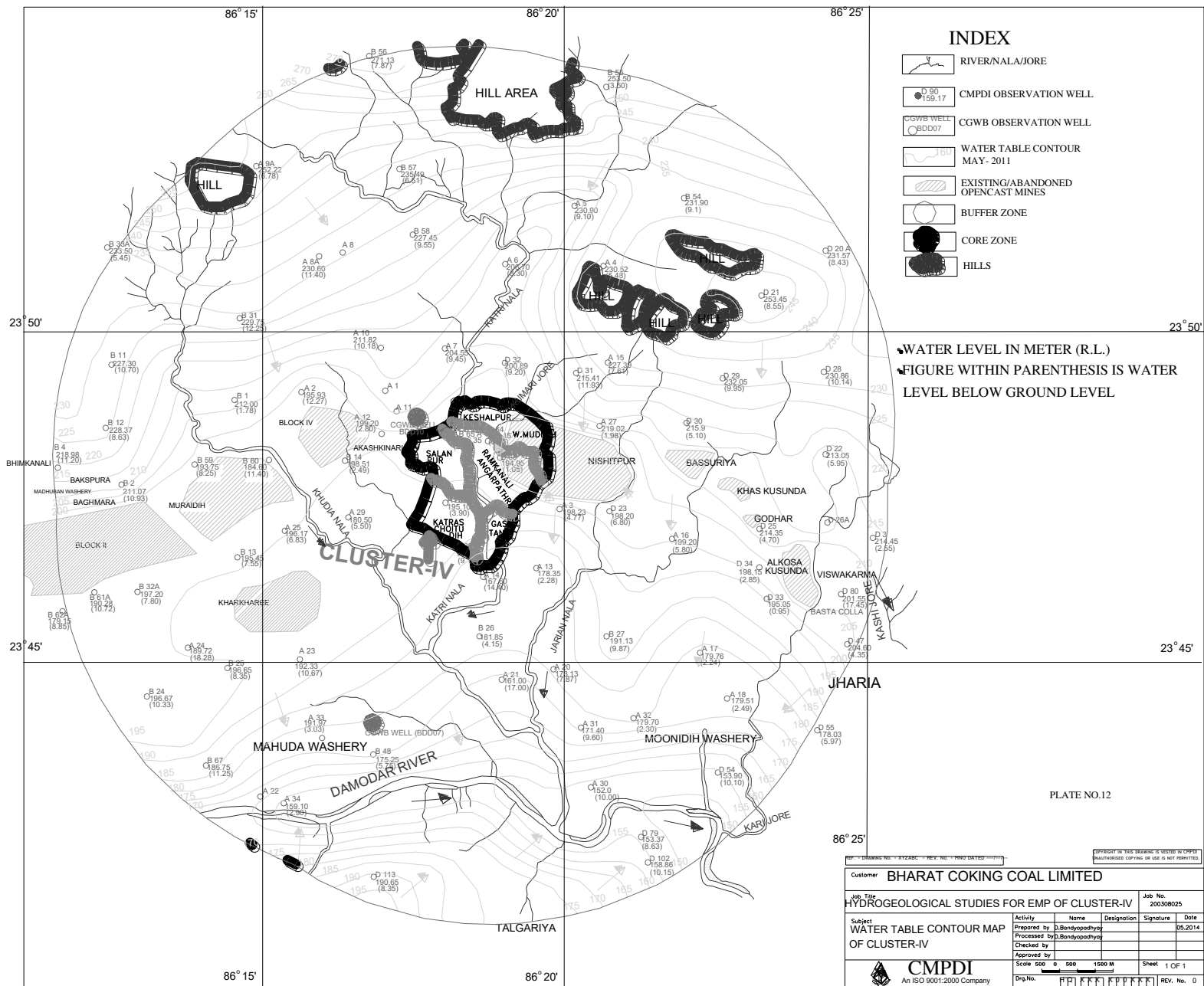
-  POND
-  RIVER
-  PROPOSED PROJECT (CORE ZONE)
-  BUFFER ZONE

PLATE NO-10

A/C NO. D\CLUSTER_IV/
HYDROLOGICAL PLAN

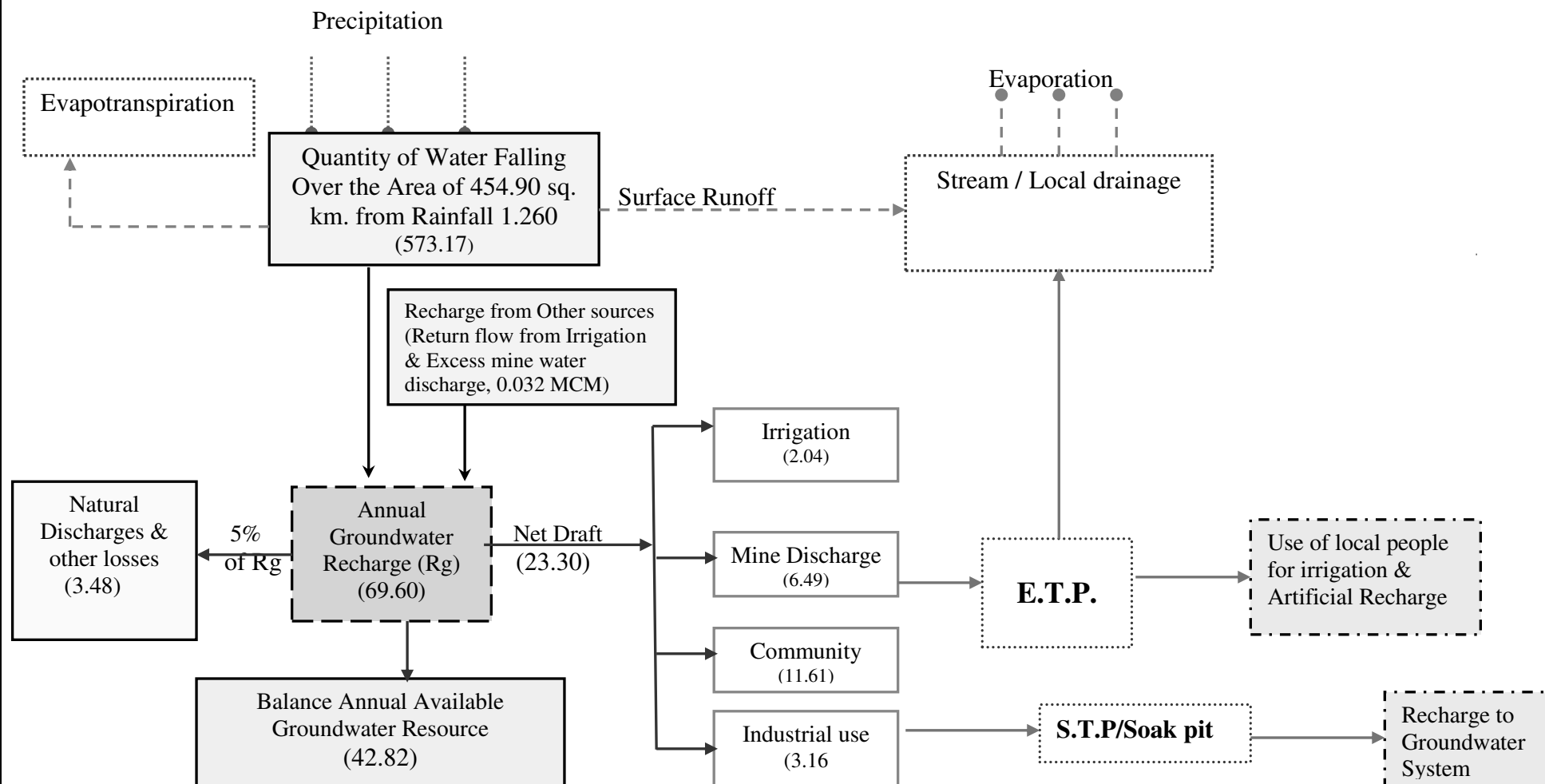


WATER TABLE CONTOUR MAP OF CLUSTER-IV



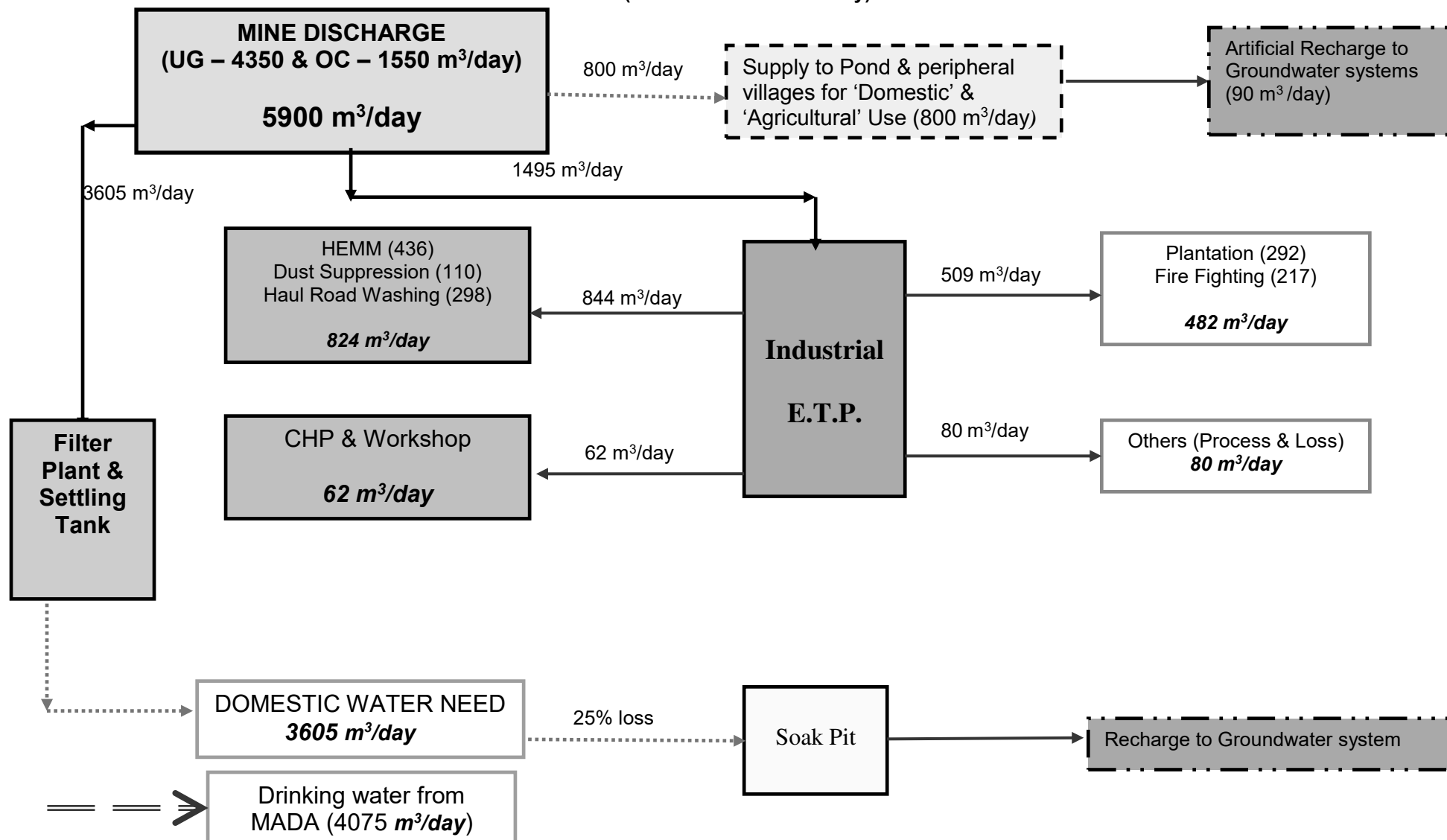
GROUNDWATER BALANCE FLOW DIAGRAM, BUFFER ZONE OF CLUSTER-IV

(All Values are in M.Cu.m)



WATER USAGE DIAGRAM OF CLUSTER-IV MINES

(All Values are in m³ / day)



**GROUND WATER RECHARGE BALANCE - BUFFER ZONE OF Cluster IV
(Mcum &%)**

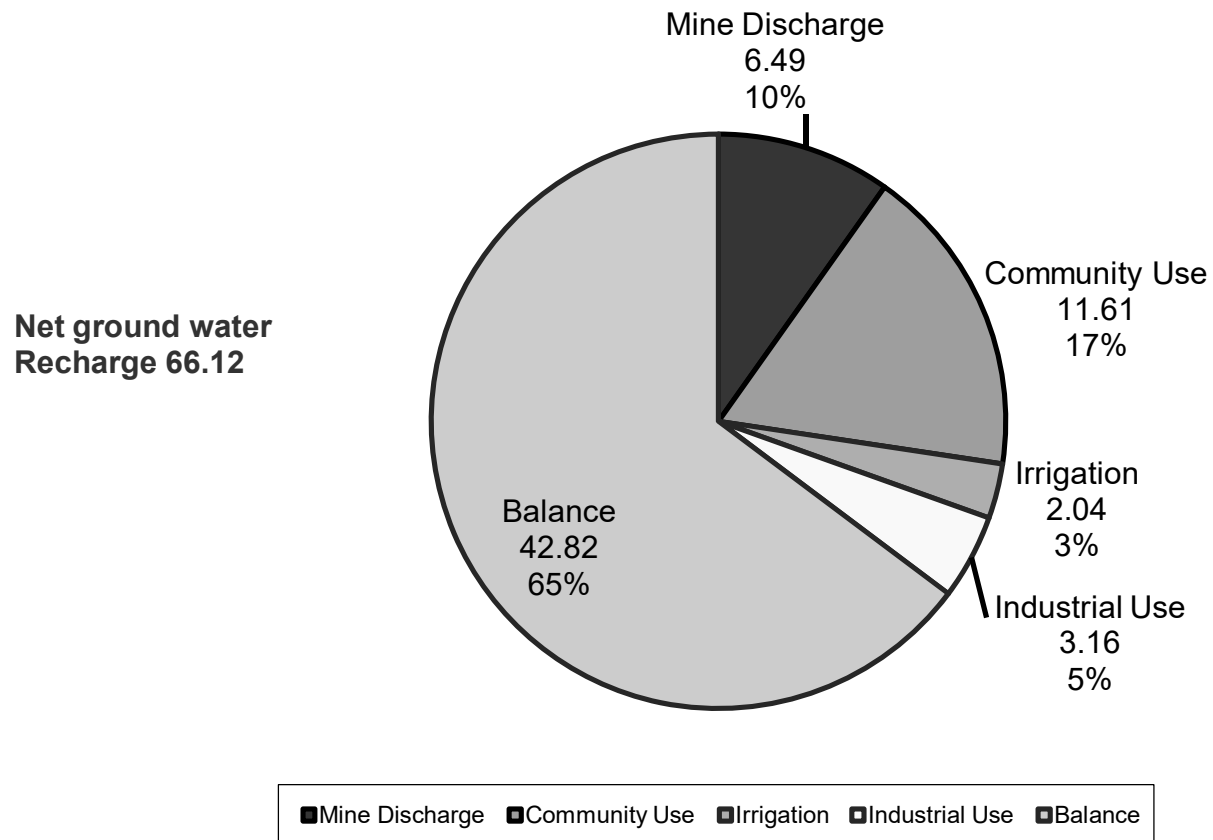
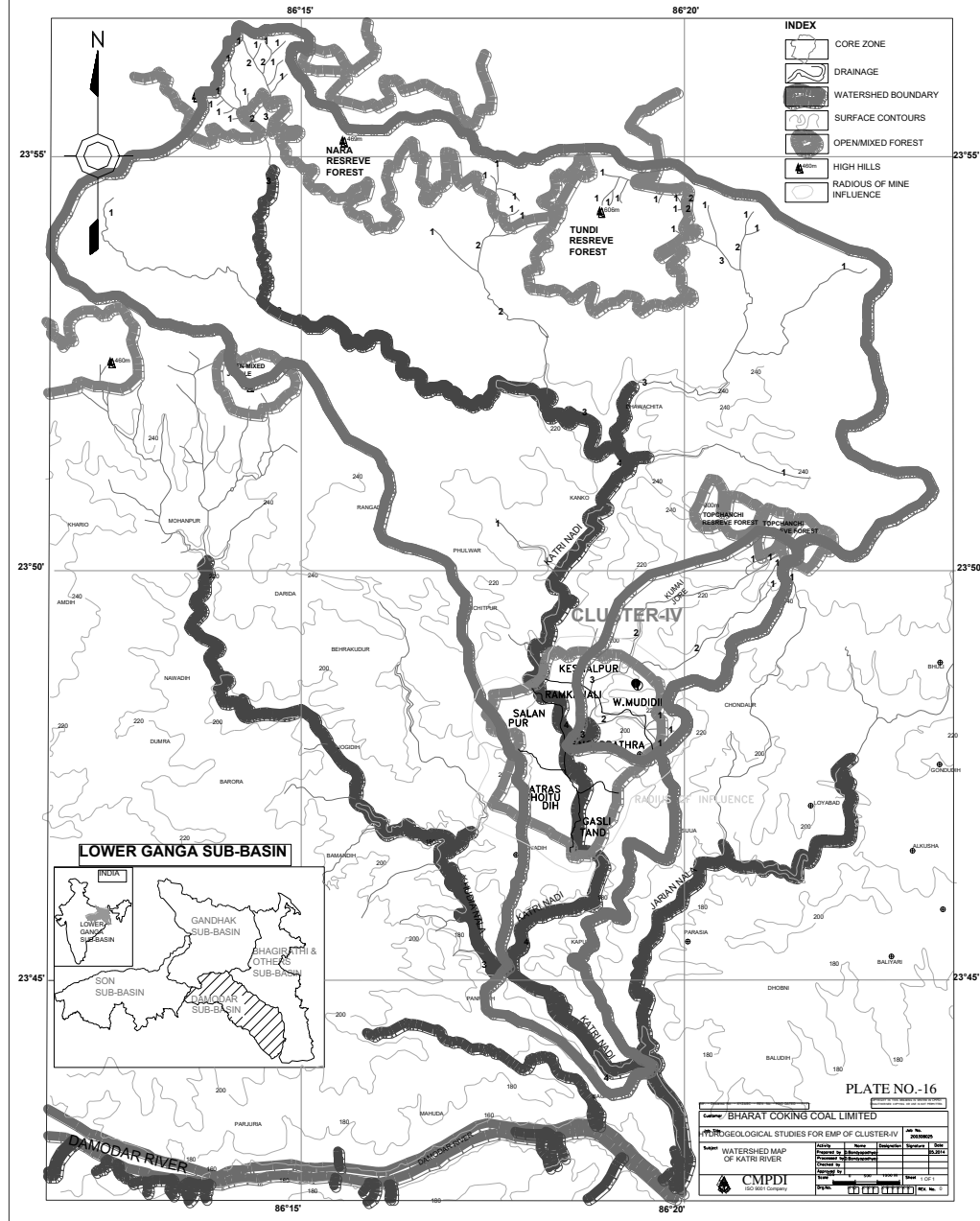
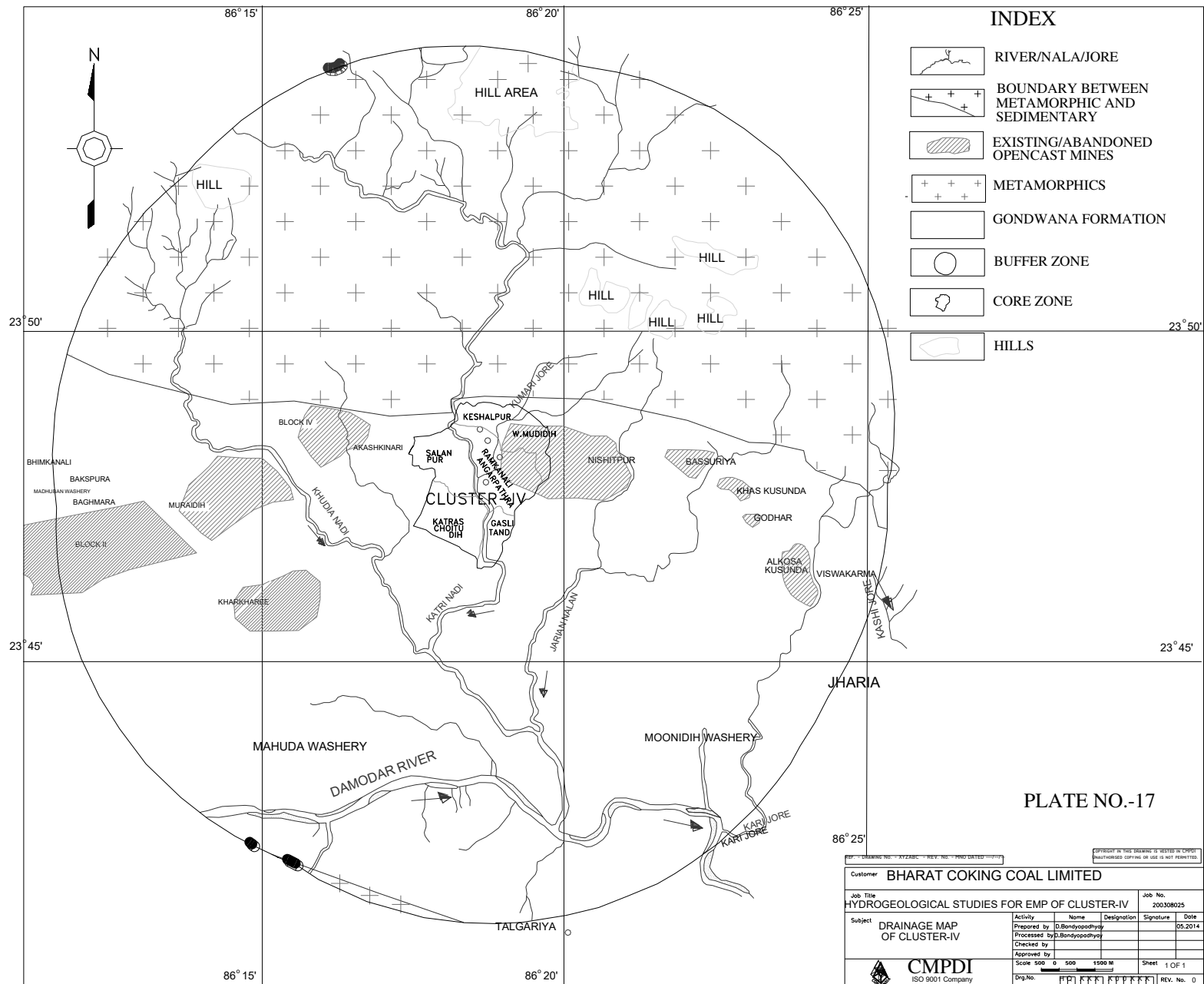


PLATE NO-15

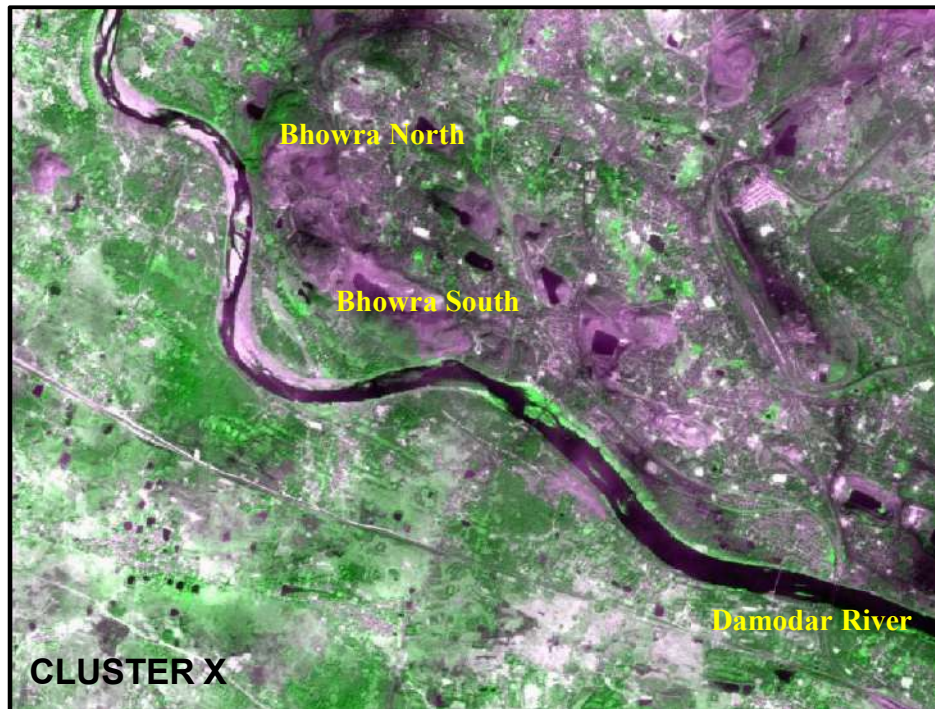
WATERSHED MAP OF CLUSTER IV



DRAINAGE MAP OF THE CLUSTER-IV



Land Reclamation/ Restoration Monitoring of Five Clusters of (Opencast + Underground) Coal Mines of Bharat Coking Coal Limited based on Satellite Data of the Year 2021



Submitted to
Bharat Coking Coal Limited



cmpdi
A Mini-Ratna Company

**Land Reclamation/ Restoration Monitoring of Five Clusters
of (Opencast + Underground) Coal Mines of Bharat Coking
Coal Limited based on Satellite Data of the Year 2021**

March - 2022



**Remote Sensing Cell
Geomatics Division
CMPDI, Ranchi**

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Executive Summary

1. **Project** Land reclamation/ restoration monitoring of five clusters of (Opencast + Underground) coal mines of Bharat Coking Coal Ltd. (BCCL) based on satellite data on every three-year basis.
2. **Objective** Objective of land reclamation/ restoration monitoring is to assess the area of backfilled, plantation, social forestry, active mining area, water bodies, distribution of wasteland, agricultural land and forest in the leasehold area of the project. This will help in assessing the progressive status of mined land reclamation and to take up remedial measures, if any, required for environmental protection.
3. **Salient Findings**
 - Out of 5 Clusters of mines viz. I, IV, VII, X and XI considered for land reclamation monitoring during the year 2021-22; cluster XI group of mines is added during the year 2021-22. These clusters consist of mainly opencast mines.
 - Out of the total mine leasehold area of 9411.54 Ha. of the 05 clusters considered for monitoring during the year 2021-22; total excavated area is 1218.18 Ha. out of which 61.92 Ha. area (5.08%) has been planted on backfill (Biological Reclamation) and 712.90 Ha. area (58.52%) is under backfilling (Technical Reclamation) and 443.36 Ha. area (36.40%) is under active mining. Cluster wise details of land reclamation of the above Clusters is given in Table-1.
 - Total area under plantation (green cover) covers an area of 968.94 Ha. which is 10.30% of total leasehold area.
 - This report and the findings will be considered as basis for further monitoring and reclamation related activities.

Table 1

Land Reclamation Status in five Clusters (Underground + Opencast Mines) of BCCL based on Satellite Data of the Year 2021

(Area in Hectare)

Sl. No.	Cluster No.	Total Leasehold Area		Technical Reclamation		Plantation						Area under Active Mining		Total Excavated Area		Total Area under Plantation (% Green Cover Generated in Leasehold)		Total Area under Reclamation	
						Biological Reclamation		Other Plantations											
				Area under Backfilling		Plantation on Excavated / Backfilled Area		Plantation on External OB Dumps		Social Forestry, Avaneue Plantation Etc.									
1	2	3		4		5		6		7		8		9 (=4+5+8)		10 (=5+6+7)		11(=4+5)	
		2018	2021	2018	2021	2018	2021	2018	2021	2018	2021	2018	2021	2018	2021	2018	2021	2018	2021
1	Cluster I	575.00	575.00	10.11	11.10	7.29	7.29	47.99	45.21	25.53	25.53	28.39	27.61	45.79	46.00	80.81	78.03	17.40	18.39
				22.08%	24.13%	15.92%	15.85%					62.00%	60.02%			14.05%	13.57%	38.00%	39.98%
2	Cluster IV	1123.79	1123.79	147.22	176.03	0.00	0.00	27.11	27.11	165.09	165.09	166.67	152.29	313.89	328.32	192.20	192.20	147.22	176.03
				46.90%	53.62%	0.00%	0.00%					53.10%	46.38%			17.10%	17.10%	46.90%	53.62%
3	Cluster VII	2127.70	2127.70	351.54	351.68	37.47	25.47	15.52	11.43	238.67	238.67	122.23	183.42	511.24	560.57	291.66	275.57	389.01	377.15
				68.76%	62.74%	7.33%	4.54%					23.91%	32.72%			13.71%	12.95%	76.09%	67.28%
4	Cluster X	2057.47	2057.47	116.28	143.64	29.16	29.16	66.09	66.09	140.75	140.75	59.41	45.71	204.85	218.51	236.00	236.00	145.44	172.80
				56.76%	65.74%	14.23%	13.34%					29.00%	20.92%			11.47%	11.47%	71.00%	79.08%
5	Cluster XI	-	3527.58	-	30.45	-	0.00	-	0.00	-	187.14	-	34.33	-	64.78	-	187.14	-	30.45
					47.01%		0.00%						52.99%				5.31%		47.01%
	TOTAL	5883.96	9411.54	625.15	712.90	73.92	61.92	156.71	149.84	570.04	757.18	376.70	443.36	1075.77	1218.18	800.67	968.94	699.07	774.82
				58.11%	58.52%	6.87%	5.08%					35.02%	36.40%			13.61%	10.30%	64.98%	63.60%
(% is calculated with respect to Excavated Area as applicable)																			

(% is calculated with respect to Excavated Area as applicable)

Note: In reference of the above Table, different parameters are classified as follows: (Cluster XI started from current year)

1. Area under Biological Reclamation includes Areas under Plantation done on Backfilled Area Only.
2. Area under Technical Reclamation includes Area under Barren Backfilling only.
3. Area under Active Mining Includes Coal Quarry, Advance Quarry Site and Quarry filled with water etc., if any.
4. Social Forestry and Plantation on External OB Dumps are not included in Biological Reclamation and are put under separate categories as shown in the above Table.
5. (%) calculated in the above Table is in respect to Total Excavated Area except for "Total Area under Plantation" where % is in terms of "Leasehold Area".

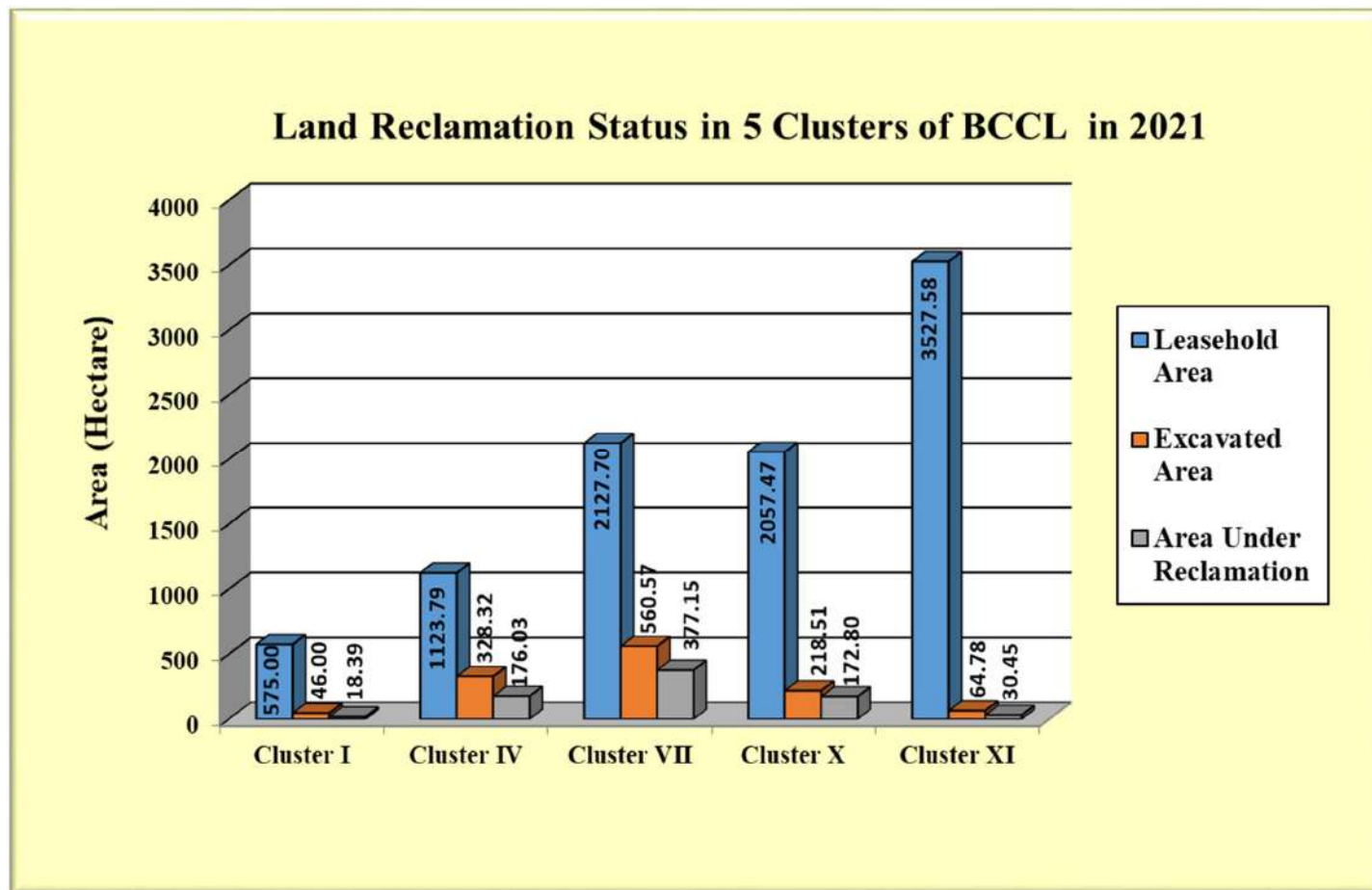


Fig. 1: Cluster wise Land Reclamation Status in five Clusters - 2021 (BCCL)

1. Background

- 1.1** Land is the most important natural resource which embodies soil, water, flora, fauna and total ecosystem. All human activities are based on the land which is the scarcest natural resource in our country. Mining is a site specific industry and it could not be shifted anywhere else from the location where mineral occurs. It is a fact that surface mining activities do affect the land environment due to ground breaking. Therefore, there is an urgent need to reclaim and restore the mined out land for its productive use for sustainable development of mining. This will not only mitigate environmental degradation, but would also help in creating a more congenial environment for land acquisition by coal companies in future.
- 1.2** Keeping above in view, Coal India Ltd. (CIL) issued a work order vide letter no. CIL/WBP/ENV/2017/DP/8391 dated 22.06.2017 to Central Mine Planning & Design Institute (CMPDI), Ranchi, for monitoring of clusters with coal mines (both underground and open cast projects) having less than 5 million m³ per annum capacity (Coal +OB) at an interval of three years based on remote sensing satellite data for sustainable development of mining. Earlier, CMPDI used to carry out land reclamation monitoring for individual projects of less than 5 million capacity, but from 2017 the same was carried out cluster wise for mines of BCCL. For operational reasons and convenience, underground and opencast mines (often with multiple overlapping seams), have now been clustered together. The result of land reclamation status of all such mines are hosted on the website of CIL, (www.coalindia.in), CMPDI (www.cmpdi.co.in) and the concerned coal companies in public domain. Detailed report is submitted to Coal India and respective subsidiaries.

- 1.3** Land reclamation monitoring of all cluster coal mining projects would also comply the statutory requirements of Ministry of Environment, Forest & Climate Change (**MoEF&CC**). Such monitoring would not only facilitate in taking timely mitigation measures against environmental degradation, but would also enable coal companies to utilize the reclaimed land for larger socio-economic benefits in a planned way.
- 1.4** Present report is embodying the finding of the study based on satellite data of the year 2021 carried out for five clusters of mines comprising both underground and OC projects for Bharat Coking Coal Ltd.

2. Objective

Objective of the land reclamation/restoration monitoring is to assess the area of backfilled, plantation, OB dumps, social forestry, active mining area, settlements and water bodies, distribution of wasteland, agricultural land and forest land in the leasehold area of the project. This is an important step taken up for assessing the progressive status of mined land reclamation and for taking up remedial measures, if any, required for environmental protection.

3. Methodology

There are number of steps involved between raw satellite data procurement and preparation of final map. National Remote Sensing Centre (NRSC) Hyderabad, being the nodal agency for satellite data supply in India, provides only raw digital satellite data, which needs further digital image processing for extracting the information and map preparation before uploading the same in the website. Methodology for land reclamation monitoring is given in fig 2. Following steps are involved in land reclamation/restoration monitoring:

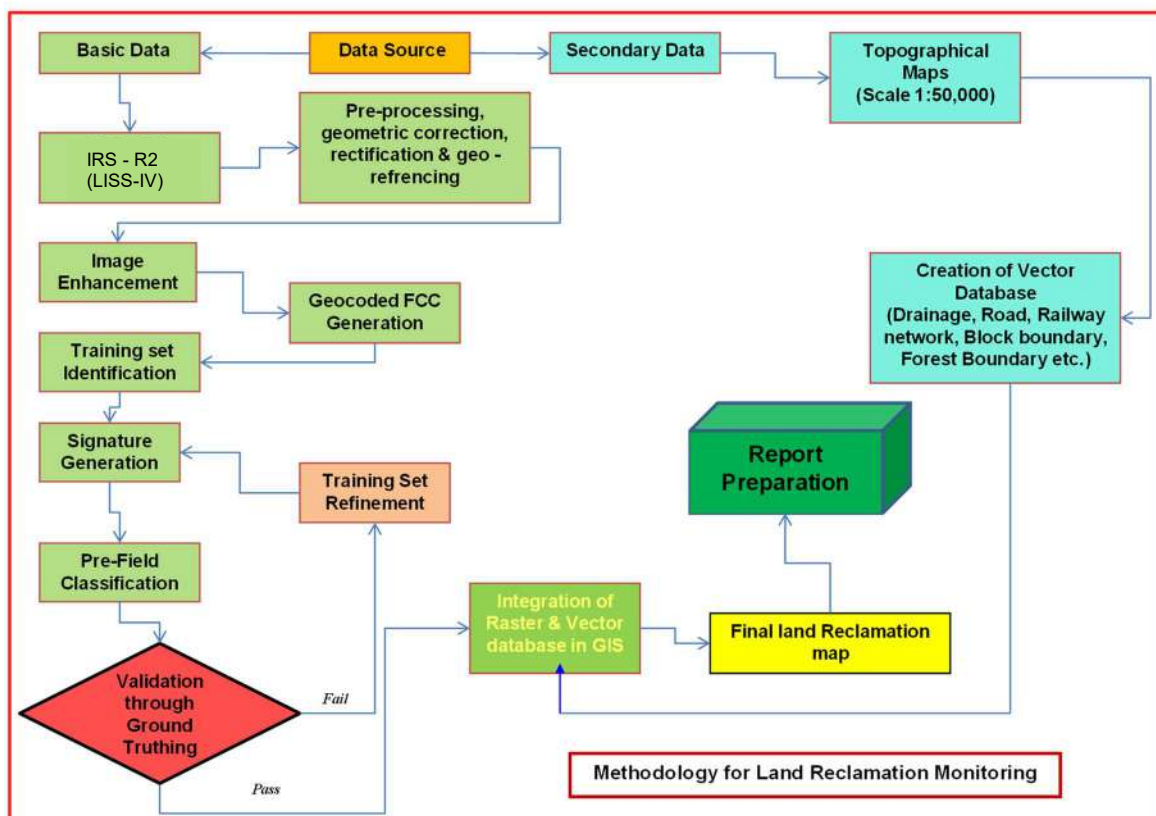


Fig. 2: Methodology of Land Reclamation Monitoring

3.1 Data Procurement: After browsing the data quality and date of pass on internet, supply order for data is placed to NRSC. Secondary data like leasehold boundary, toposheet are procured for creation of vector database.

3.2 Satellite Data Processing: Satellite data are processed using ERDAS IMAGINE digital image processing s/w. Methodology involves the following major steps:

- **Rectification & Geo-referencing:** Inaccuracies in digital imagery may occur due to 'systematic errors' attributed to earth curvature and rotation as well as 'non-systematic errors' attributed to satellite receiving station itself. Raw digital images may contain geometric distortions, which make

them unusable as maps. Therefore, geo-referencing is required for correction of image data using ground control points (GCP) to make it compatible with the new series WGS-84 compatible Sol toposheet.

- **Image enhancement:**

To improve the interpretability of the raw data, image enhancement is necessary. Local operations modify the value of each pixel based on brightness value of neighbouring pixels using ERDAS IMAGINE 14.0 s/w. and enhance the image quality for interpretation.

- **Training set selection**

Training set requires to be selected, so that software can classify the image data accurately. The image data are analysed based on the interpretation keys. These keys are evolved from certain fundamental image-elements such as tone/colour, size, shape, texture, pattern, location, association and shadow. Based on the image-elements and other geo-technical elements like land form, drainage pattern and physiography; training sets were selected/identified for each land use/cover class. Field survey was carried out by taking selective traverses in order to collect the ground information (or reference data) so that training sets are selected accurately in the image. This was intended to serve as an aid for classification.

- **Classification and Accuracy assessment**

Image classification is carried out using the maximum likelihood algorithm. The classification proceeds through the following steps: (a) calculation of statistics [i.e. signature generation] for the identified training areas, and (b) the decision boundary of maximum probability based on the mean vector, variance, covariance and correlation matrix of the pixels. After evaluating the statistical parameters of the training sets, reliability test of training sets is conducted by measuring the statistical separation between

the classes that resulted from computing divergence matrix. The overall accuracy of the classification was finally assessed with reference to ground truth data.

- **Area calculation**

The area of each land use class in the leasehold is determined using ERDAS IMAGINE v. 14.0 s/w.

- **Overlay of Vector data base**

Vector data base is created based on secondary data. Vector layer like drainage, railway line, leasehold boundary, forest boundary etc. are superimposed on the image as vector layer in the Arc GIS database.

- **Pre-field map preparation**

Pre-field map is prepared for validation of the classification result.

3.3 Ground Truthing:

Selective ground verification of the land use classes are carried out in the field and necessary corrections if required, are incorporated before map finalization.

3.4 Land reclamation database on GIS:

Land reclamation database is created on GIS platform to identify the temporal changes identified from satellite data of different cut - of dates. The database boundary shape files (.shp), kml files and the maps thus prepared confirm to the WGS-84 datum and UTM projected co-ordinate system.

4. Land Reclamation Status in Bharat Coking Coal Ltd.

4.1 Following 5 clusters of mines comprising both underground and opencast projects of Bharat Coking Coal Ltd. have been taken up for land reclamation monitoring during the year 2021-22:

- **Cluster I** (Damoda OCP)
- **Cluster IV** (Salanpur Colliery, Amalgamated Keshalpur West Mudidih Colliery, Amalgamated Gaslitand Katras Choitudih Colliery)
- **Cluster VII** (Kusunda OCP, Kustore OCP, Alkusa OCP, Dhansar OCP, Industry, Ena OCP, Rajapur OCP, Amalgamated East Bhuggatdih Simlabahal Colliery)
- **Cluster X** (Bhowra North Colliery, Bhowra South Colliery, Patherdih Colliery, Sudamdih Shaft, Sudamdih INC, Amlabad Colliery)
- **Cluster XI** (Gopalichuck, Pootkee, Kendwadih)

4.2 Cluster wise Land Reclamation status of above mentioned clusters in BCCL is given in Table 1 and also shown graphically in Fig 1. Area statistics of different land use classes present in the mine leasehold of the above clusters for the year 2021 are shown in Table 2. Land use maps derived from the satellite data are shown in Plate 1 - 5. Different land use classes based on satellite data are depicted in bar charts in Fig. 3 - 7.

4.3 Study reveals that out of total mine leasehold area of 9411.54 Ha. of the 5 clusters of mines (Underground + Opencast) of BCCL mentioned above taken for this study in 2021-22, total excavated area is 1218.18 Ha. out of which 61.92 Ha. (5.08%) has been planted (*Biologically Reclaimed*), 712.90 Ha. (58.52%) is under backfilling (*Technically Reclaimed*) and balance 443.36 Ha. (36.40%) is under active mining.

- 4.4** Land reclamation monitoring for cluster XI of BCCL is taken up for the first time in the year 2021-22. Hence comparison of this cluster in year 2021 has not been made with respect to year 2018. The data thus generated in the year 2021 will be considered as base data for comparison of land reclamation of this cluster of mines at the interval of every three years.
- 4.5** Study indicates that overall all the projects of BCCL considered for this study in the year 2021-22 indicate increase or static trend in Technical reclamation (area under backfill) with respect to the year 2018.
- 4.6** After analyzing the satellite data of the year 2018 vs 2021, it reveals that area under total plantation (Green cover) carried out on backfilled area, OB dumps as well as under social forestry in all the clusters of BCCL has increased from 800.67 Ha. (13.61%) to 968.94 Ha. (10.30%) in span of last three years. This significant increase of 168.27 Ha. area under total plantation (Green Cover) in the leasehold boundary during three years is due to addition of cluster-XI.
- 4.7** On comparing the status of land reclamation for the year 2021 with respect to the year 2018 in all cluster of mines of BCCL considered for land reclamation in the year 2021-22, it is evident from the analysis that area under total land reclamation has increased from 699.07 Ha. (Yr 2018) to 774.82 Ha. (Yr 2021). This increase of 75.75 Ha. area under total land reclamation in the period of three years is the result of sincere effort made by BCCL towards land reclamation.
- 4.8** In Cluster VII, it is seen that area under plantation on backfill (Biological Reclamation) has decreased from 37.47 Ha. in the year 2018 to 25.47 Ha. in the year 2021. This decrease of 12 Ha. area in Biological reclamation is due to rehandling of backfill and also there is effect of mine fire in this

cluster. Hence total area under plantation on backfill has decreased from 73.92 Ha. (Yr 2018) to 61.92 Ha. (Yr 2021).

4.9 Out of the 5 Clusters in BCCL considered for satellite data based land reclamation monitoring in 2021, Cluster X tops with 79.08% reclamation followed by Cluster VII with 67.28%, Cluster IV with 53.62%, Cluster XI with 47.01% and Cluster I with 39.98%.

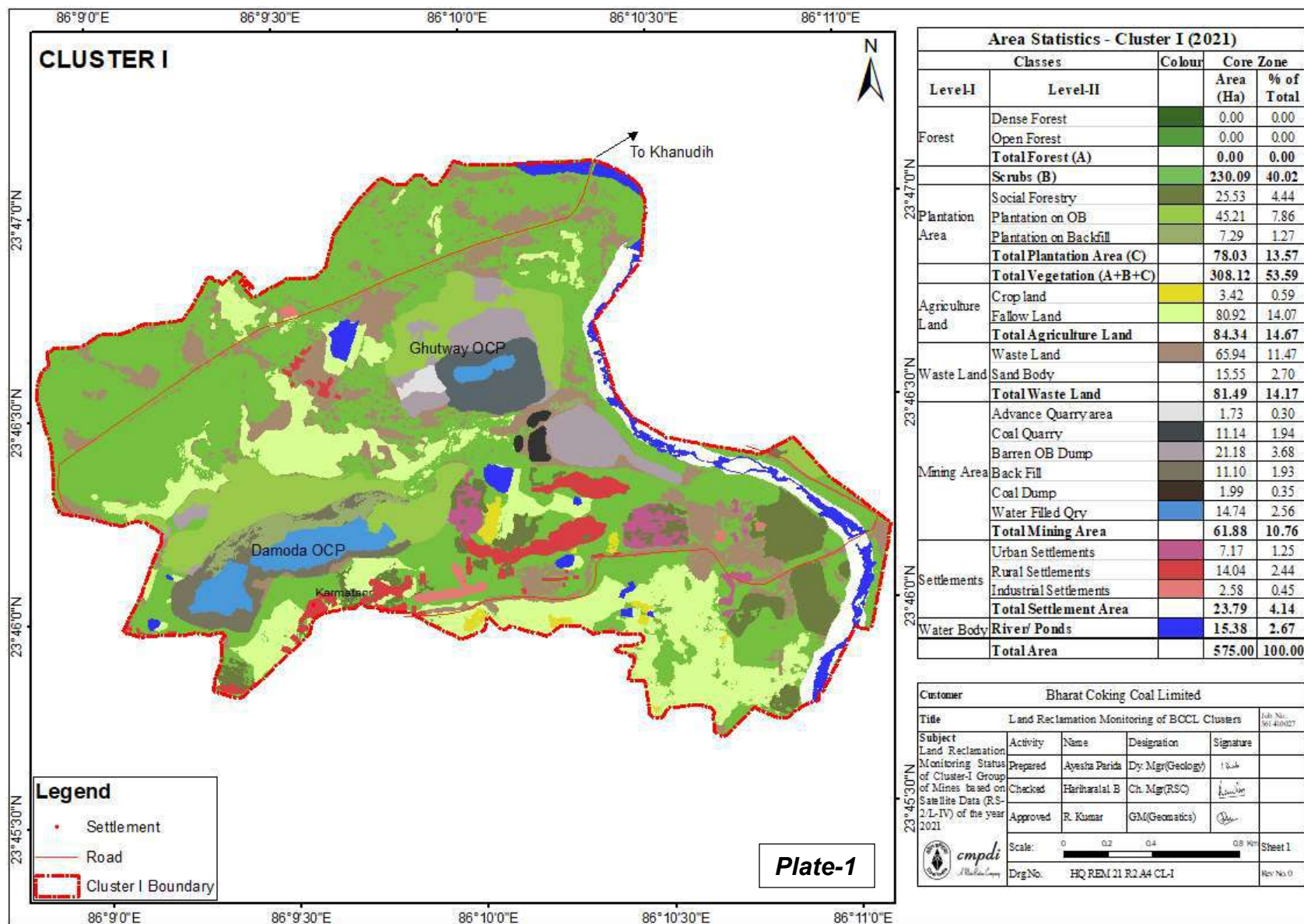
4.10 The area under total plantation (Green Cover) is maximum in Cluster IV (17.10%) followed by Cluster I with (13.57%), Cluster VII with (12.95%), Cluster X with (11.47%) and Cluster XI with (5.31%).

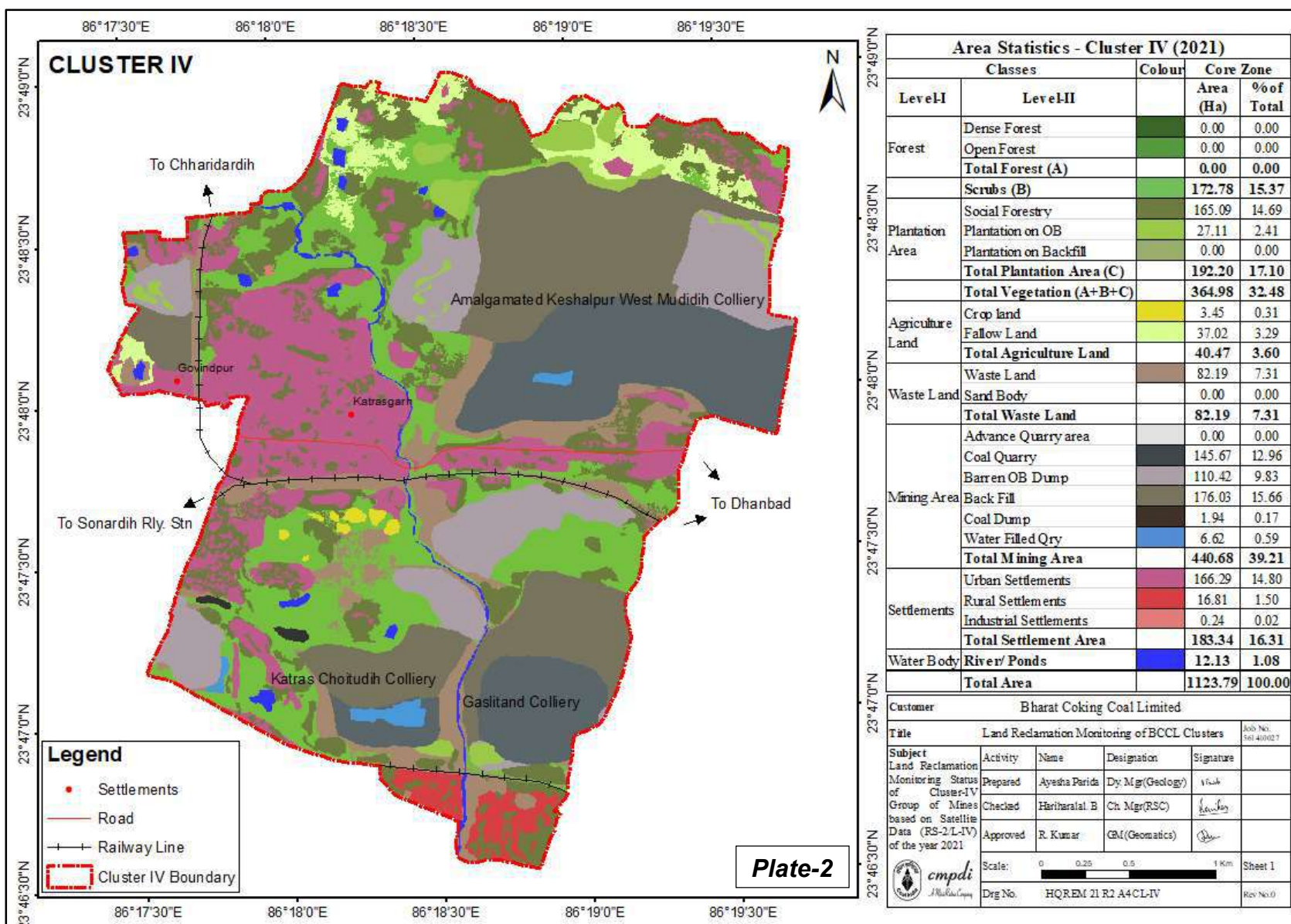
4.11 This study will again will be carried out after an interval of three years to assess the land reclamation status in the above projects.

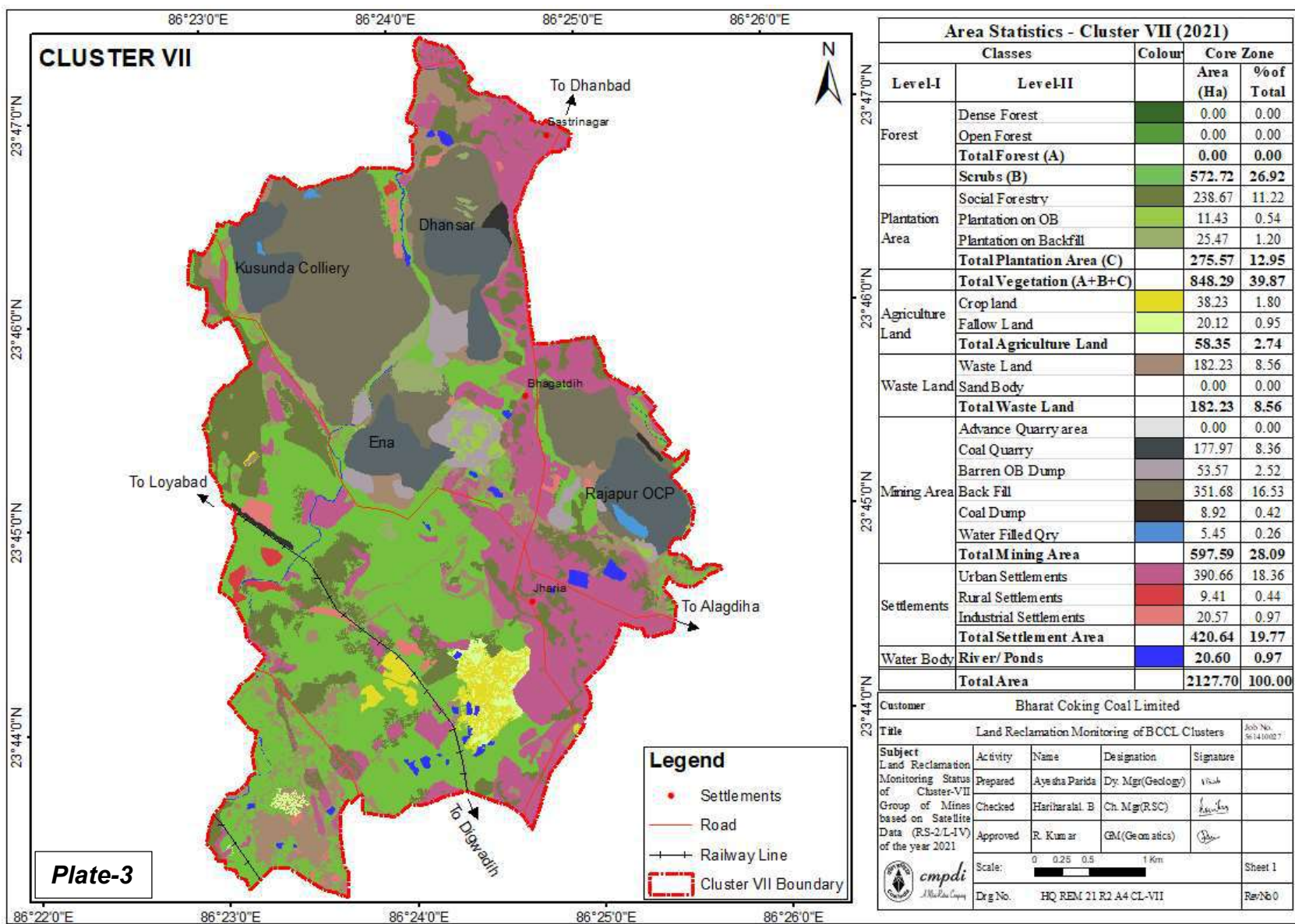
Table 2

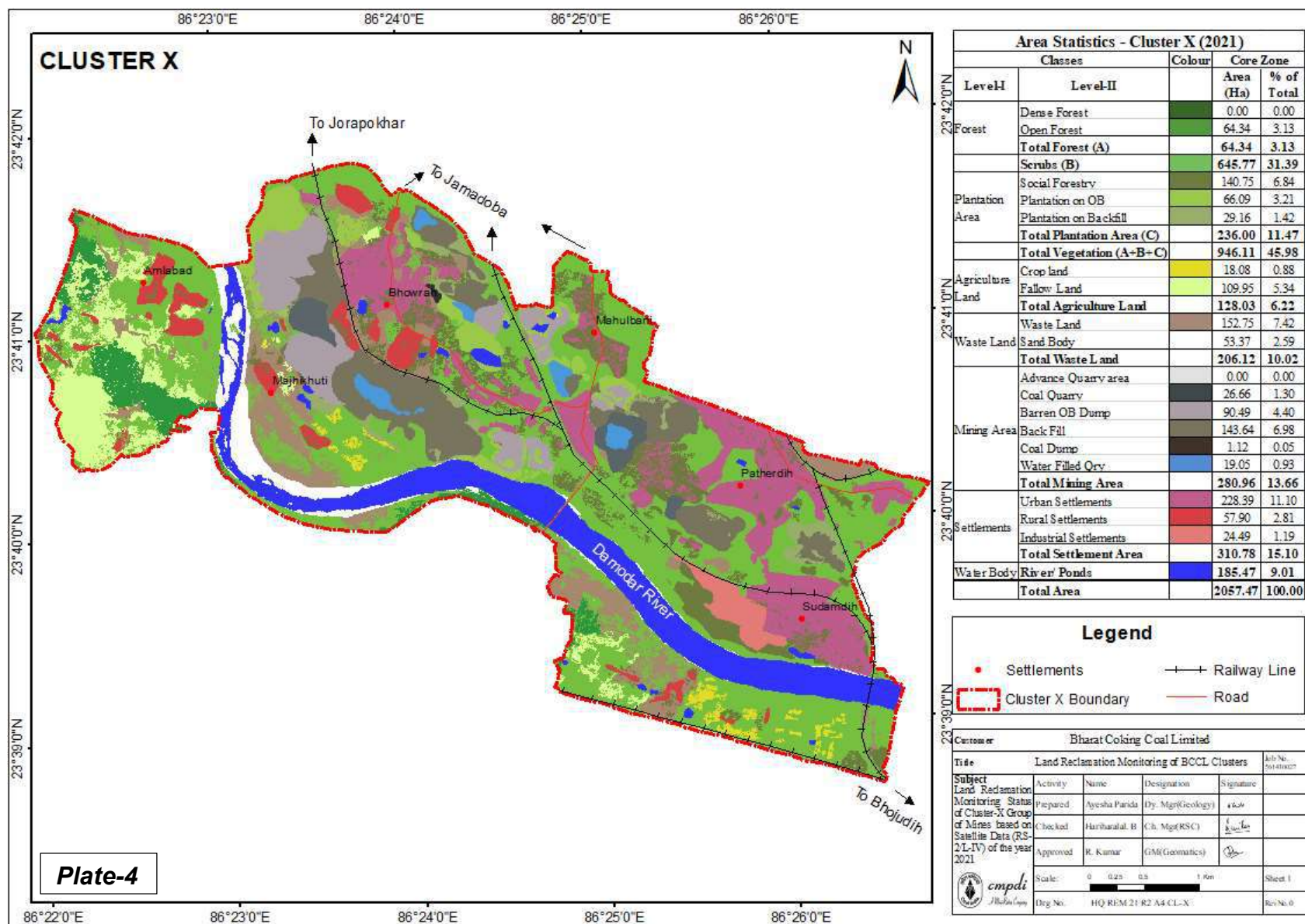
Cluster wise Area Statistics of Land Use/ Cover classes in five Clusters of (OC+UG) mines of BCCL based on Satellite Data of the year 2021

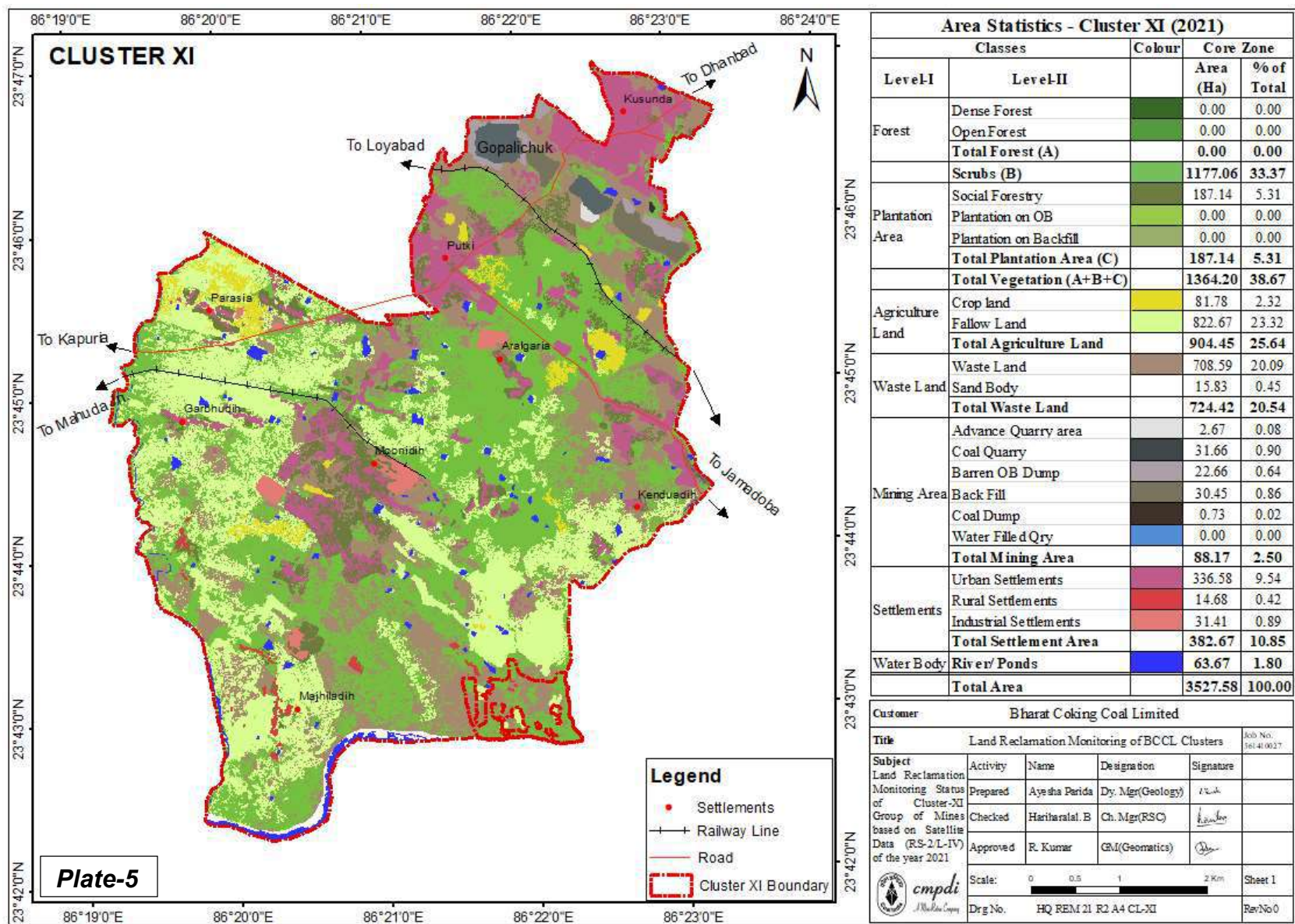
Status of Land Reclamation in 5 Clusters of (UG+OC) mines of Bharat Coking Coal Ltd. based on Satellite data of the Year 2021														
(Area in Hectare)														
			CLUSTER I		CLUSTER IV		CLUSTER VII		CLUSTER X		CLUSTER XI		TOTAL	
FORESTS			Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
	Dense Forest		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Open Forest		0.00	0.00	0.00	0.00	0.00	0.00	64.34	3.13	0.00	0.00	64.34	0.68
	Total Forest (A)		0.00	0.00	0.00	0.00	0.00	0.00	64.34	3.13	0.00	0.00	64.34	0.68
SCRUBS	Scrubs (B)		230.09	40.02	172.78	15.37	572.72	26.92	645.77	31.39	1177.06	33.37	2798.42	29.73
PLANTATION	Social Forestry/Avenue Plantation		25.53	4.44	165.09	14.69	238.67	11.22	140.75	6.84	187.14	5.31	757.18	8.05
	Plantation on OB Dump		45.21	7.86	27.11	2.41	11.43	0.54	66.09	3.21	0.00	0.00	149.84	1.59
	Plantation on Backfill (Biological Reclamation)		7.29	1.27	0.00	0.00	25.47	1.20	29.16	1.42	0.00	0.00	61.92	0.66
	Total Plantation (C)		78.03	13.57	192.20	17.10	275.57	12.95	236.00	11.47	187.14	5.31	968.94	10.30
Total Vegetation (A+B+C)			308.12	53.59	364.98	32.48	848.29	39.87	946.11	45.98	1364.20	38.67	3831.70	40.71
ACTIVE MINING	Coal Dump		1.99	0.35	1.94	0.17	8.92	0.42	1.12	0.05	0.73	0.02	14.70	0.16
	Coal Quarry		11.14	1.94	145.67	12.96	177.97	8.36	26.66	1.30	31.66	0.90	393.10	4.18
	Advance Quarry Site		1.73	0.30	0.00	0.00	0.00	0.00	0.00	0.00	2.67	0.08	4.40	0.05
	Quarry Filled With Water		14.74	2.56	6.62	0.59	5.45	0.26	19.05	0.93	0.00	0.00	45.86	0.49
	Total Area under Active Mining		27.61	4.80	152.29	13.55	183.42	8.62	45.71	2.22	34.33	0.97	443.36	4.71
	Barren OB Dump			21.18	3.68	110.42	9.83	53.57	2.52	90.49	4.40	22.66	0.64	298.32
RECLAIMED	Area Under Backfilling (Technical Reclamation)		11.10	1.93	176.03	15.66	351.68	16.53	143.64	6.98	30.45	0.86	712.90	7.57
	Total Area under Mine Operation		61.88	10.76	440.68	39.21	597.59	28.09	280.96	13.66	88.17	2.50	1469.28	15.61
WASTELAND	Waste Lands		65.94	11.47	82.19	7.31	182.23	8.56	152.75	7.42	708.59	20.09	1191.70	12.66
	Fly Ash Pond / Sand Body		15.55	2.70	0.00	0.00	0.00	0.00	53.37	2.59	15.83	0.45	84.75	0.90
Total Wasteland			81.49	14.17	82.19	7.31	182.23	8.56	206.12	10.02	724.42	20.54	1276.45	13.56
WATERBODIES	Reservoir, Nallah, Ponds		15.38	2.67	12.13	1.08	20.60	0.97	185.47	9.01	63.67	1.80	297.25	3.16
	Total Waterbodies		15.38	2.67	12.13	1.08	20.60	0.97	185.47	9.01	63.67	1.80	297.25	3.16
AGRICULTURE	Crop Lands		3.42	0.59	3.45	0.31	38.23	1.80	18.08	0.88	81.78	2.32	144.96	1.54
	Fallow Lands		80.92	14.07	37.02	3.29	20.12	0.95	109.95	5.34	822.67	23.32	1070.68	11.38
	Total Agriculture		84.34	14.67	40.47	3.60	58.35	2.74	128.03	6.22	904.45	25.64	1215.64	12.92
SETTLEMENTS	Urban Settlement		7.17	1.25	166.29	14.80	390.66	18.36	228.39	11.10	336.58	9.54	1129.09	12.00
	Rural Settlement		14.04	2.44	16.81	1.50	9.41	0.44	57.90	2.81	14.68	0.42	112.84	1.20
	Industrial Settlement		2.58	0.45	0.24	0.02	20.57	0.97	24.49	1.19	31.41	0.89	79.29	0.84
	Total Settlements		23.79	4.14	183.34	16.31	420.64	19.77	310.78	15.10	382.67	10.85	1321.22	14.04
Grand Total			575.00	100.00	1123.79	100.00	2127.70	100.00	2057.47	100.00	3527.58	100.00	9411.54	100.00











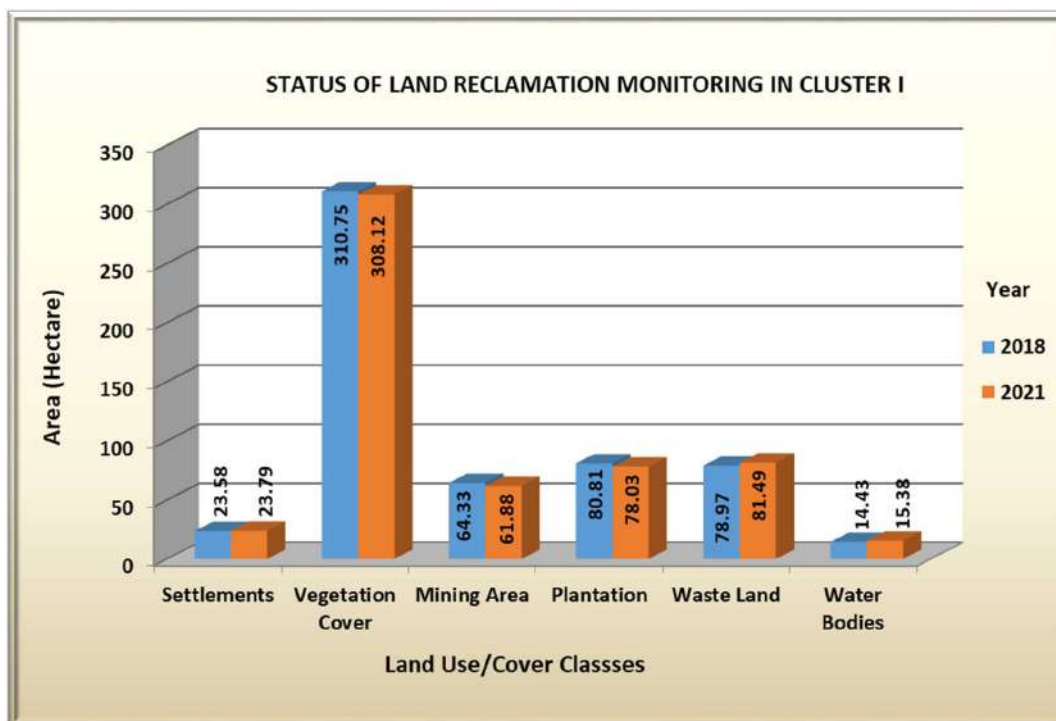


Fig. 3: Land Reclamation Status of Cluster I

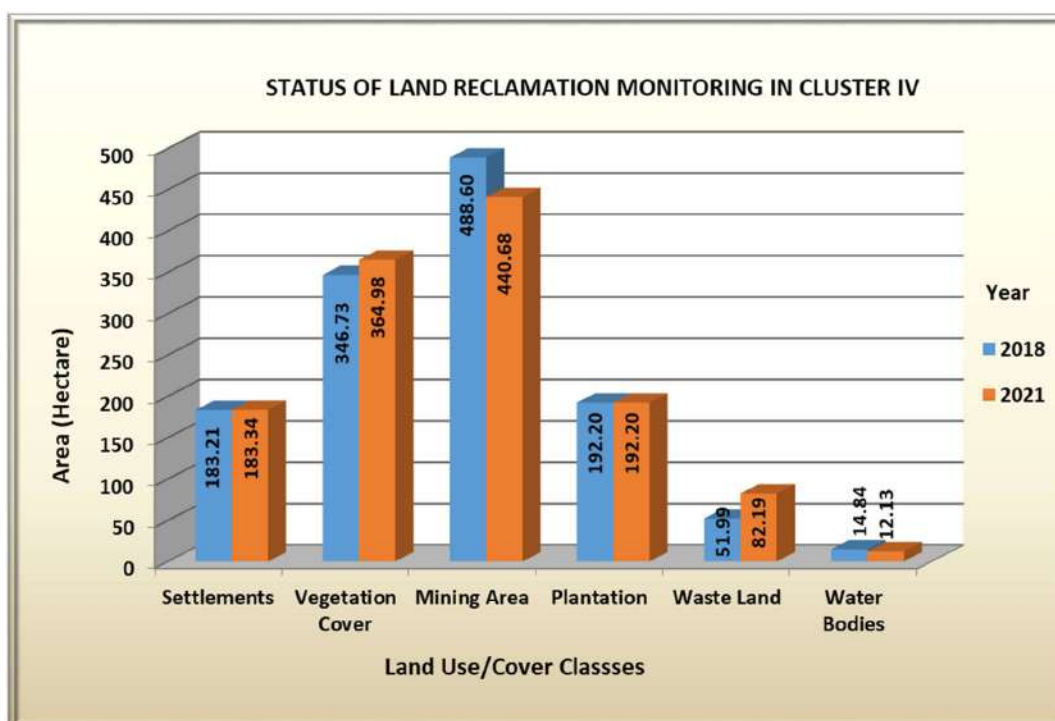


Fig. 4: Land Reclamation Status of Cluster IV

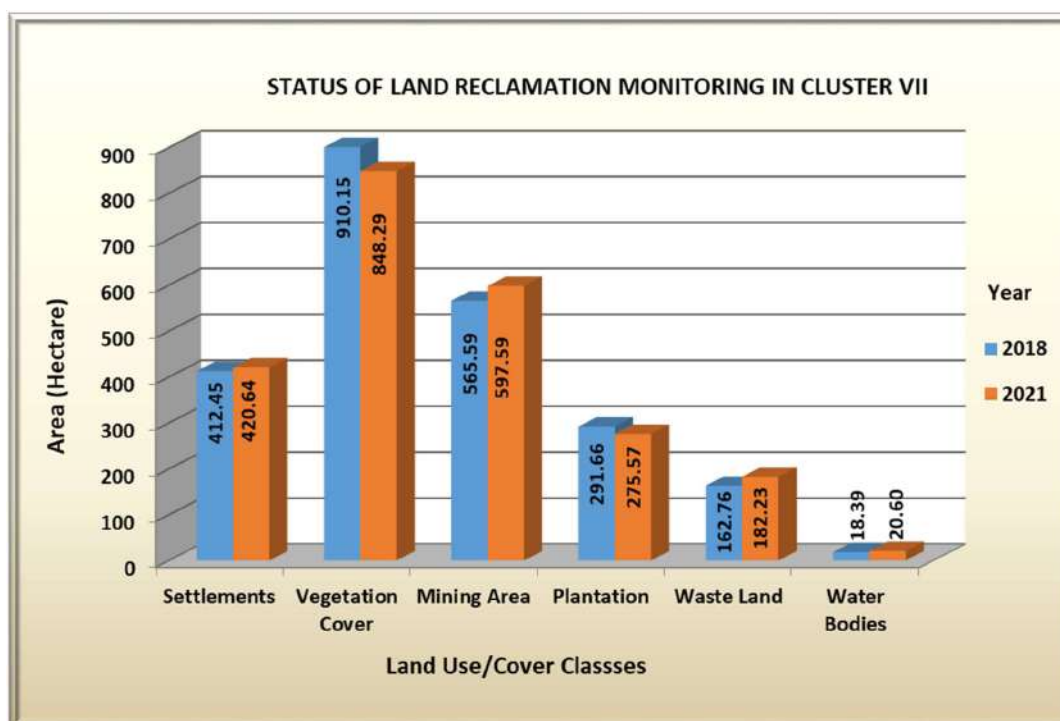


Fig. 5: Land Reclamation Status of Cluster VII

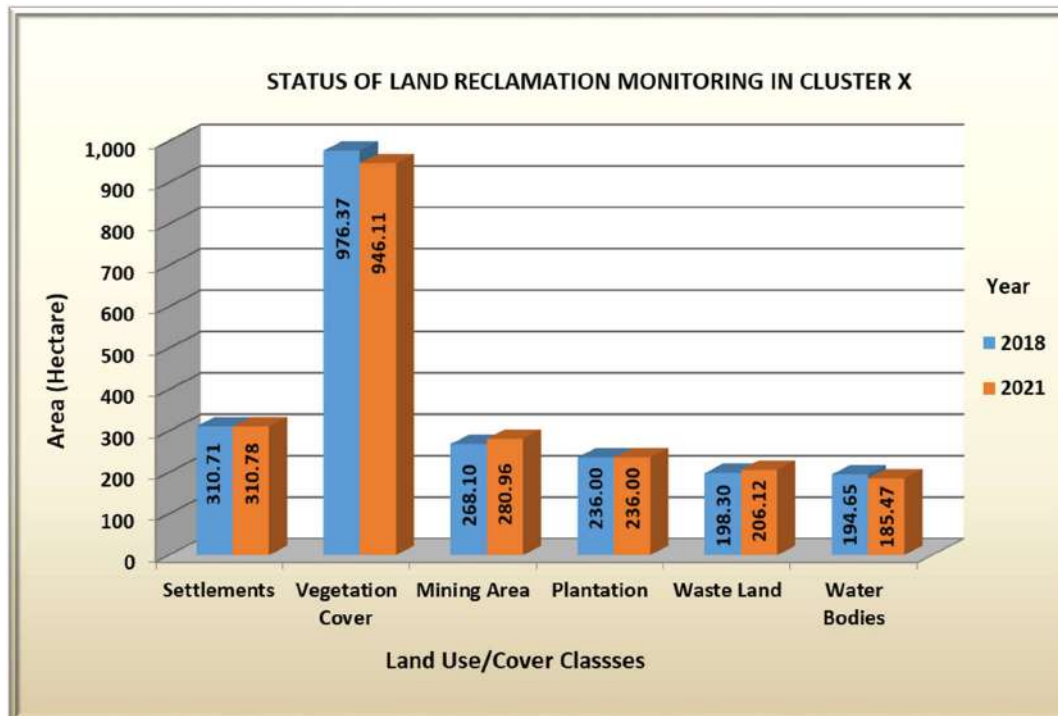


Fig. 6: Land Reclamation Status of Cluster X

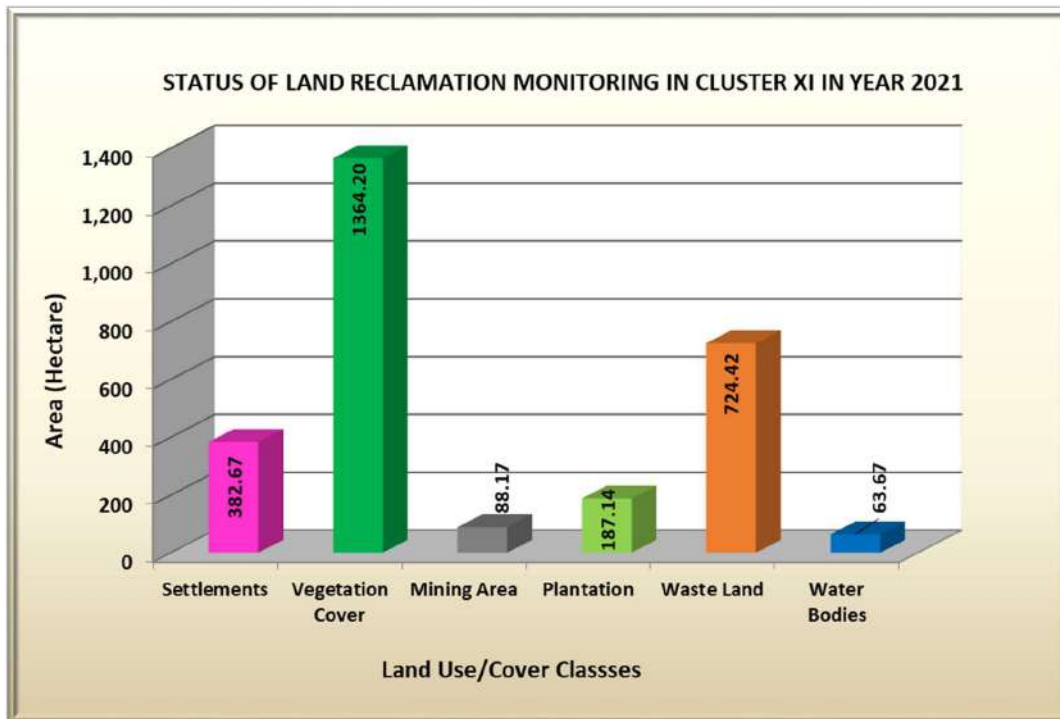


Fig. 7: Land Reclamation Status of Cluster XI



Photo 1: Social Forestry Plantation in Cluster XI



Photo 2: Ecological Restoration Site in Cluster I



Photo 3: Plantation on OB Dump in Cluster I



Photo 4: Plantation on OB Dump in Cluster IV

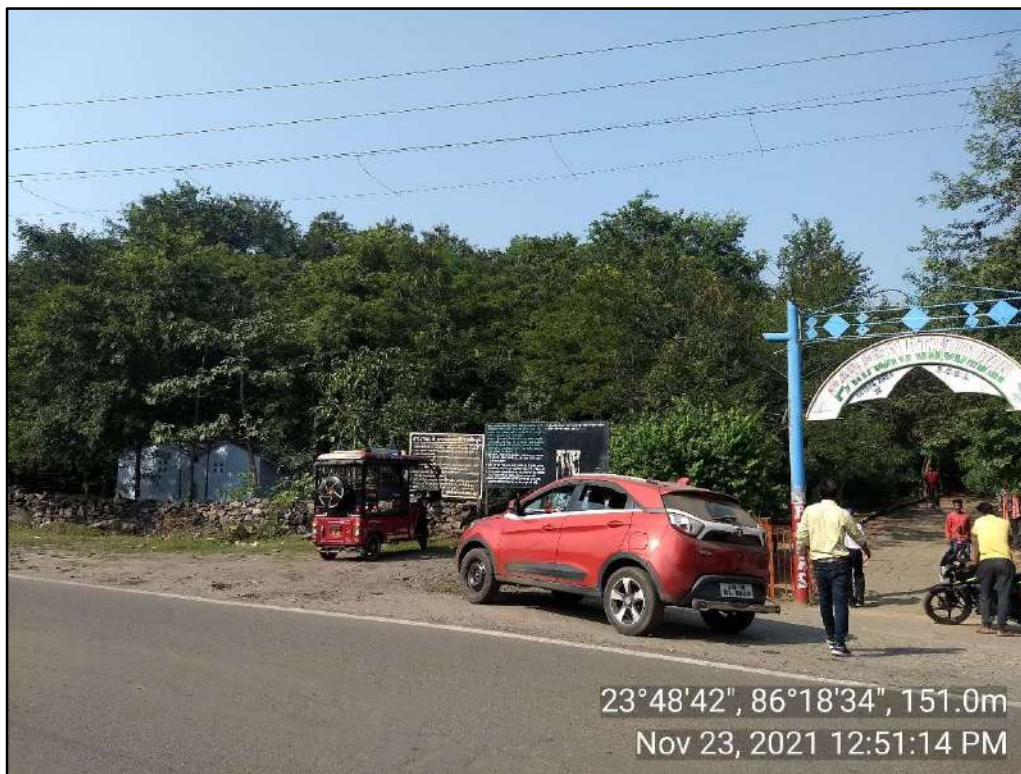


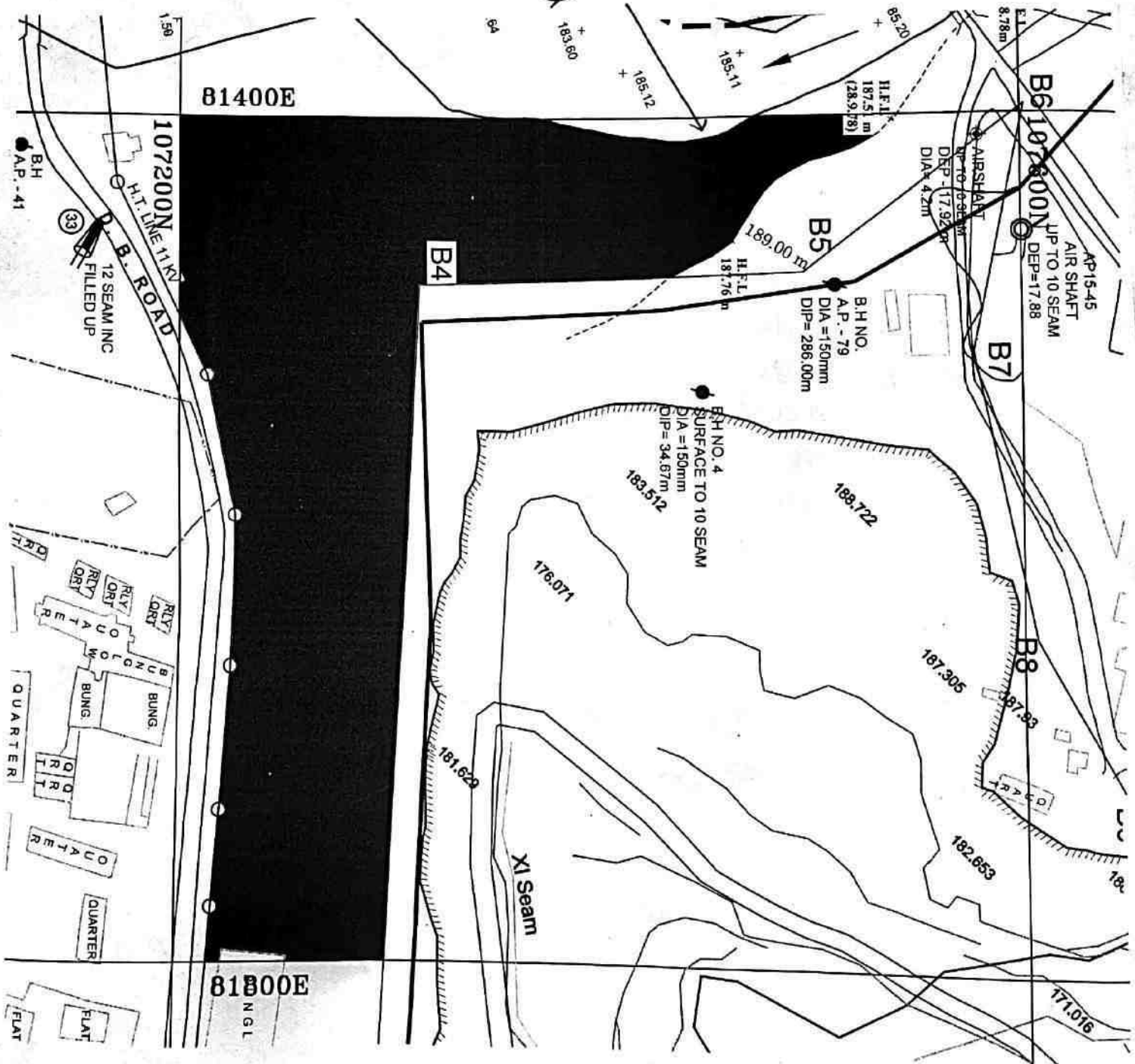
Photo 5: Parasnath Udyaan in Cluster IV



Photo 6: Road side Plantation in Cluster VII



Photo 7: Plantation on OB Dump in Cluster X



**Bharat Coking Coal Ltd.***(A Subsidiary of Coal India Limited)*Office of the General Manager, Katras Area
P.O. KATRAS, P.S.- Jogta, Dhanbad-828121**CIN: U1010JH1972GOI000918****Phone/Fax No.:** 0326-2371213**Email ID:** cgmkatras@bccl.gov.in**Yearwise (2014-15 to 2021-22) Plantation details of Cluster IV**

Year	Biological reclamation (in Ha)/Afforestation	Location	Mode	Remarks
2014-15	3.4	West mudidih, AKWMC	Departmentally	
2015-16	3.02	Keshalpur, AKWMC	Departmentally	
2016-17	5.7	AKWMC (near suryamandir, Katras)	Departmentally	
2016-17			1160+525 = 1685 Nos of Gabion plantation done by DFO, Dhanbad	
2018-19	3.47	AKWMC	Departmentally	
2019-20			600 Nos of Gabion plantation, done by DFO, Dhanbad	
2019-20	0.6	Shahid mrityu Upwan, Gaslitand	Departmentally	
2020-21	1	Keshalpur, Sneh Smriti Upwan site, AKWMC	Departmentally	
2020-21	0.5	Parasnath udyan		Plantation done over extended portion of Parasnath Udhyan
2020-2021	11	AKWMC	By DFO, Dhanbad	
2021-2022	13	KCC	By DFO, Dhanbad	

Afforestation over an area of 41.69 Ha done from the period from 2014-15 to 2020-21 . Apart of that total 2285 nos of gabion plantation has also been done in the said period.

CHAPTER - XII

PROGRESSIVE AND FINAL MINE CLOSURE PLAN

12.0 MINE CLOSURE PLANNING

12.1 OBJECTIVES OF CLOSURE PLANNING

Mine closure planning has to be carried out at the starting of the mine and needs periodic reviewing and revision during its life cycle to cope with the geo-technical constraints, safety and economic risks, social and environmental challenges. Various other objectives are as follows:

- ❖ To allow a productive and sustainable after-use of the site which is acceptable to the mine owner and the regulatory authority;
- ❖ To protect public health and safety;
- ❖ To alleviate or eliminate environmental damage and thereby encourage environmental sustainability;
- ❖ To minimize adverse socio-economic impacts.

12.2 DIFFERENT ASPECTS OF MINE CLOSURE PLANNING

The mine closure planning broadly involves the following aspects:

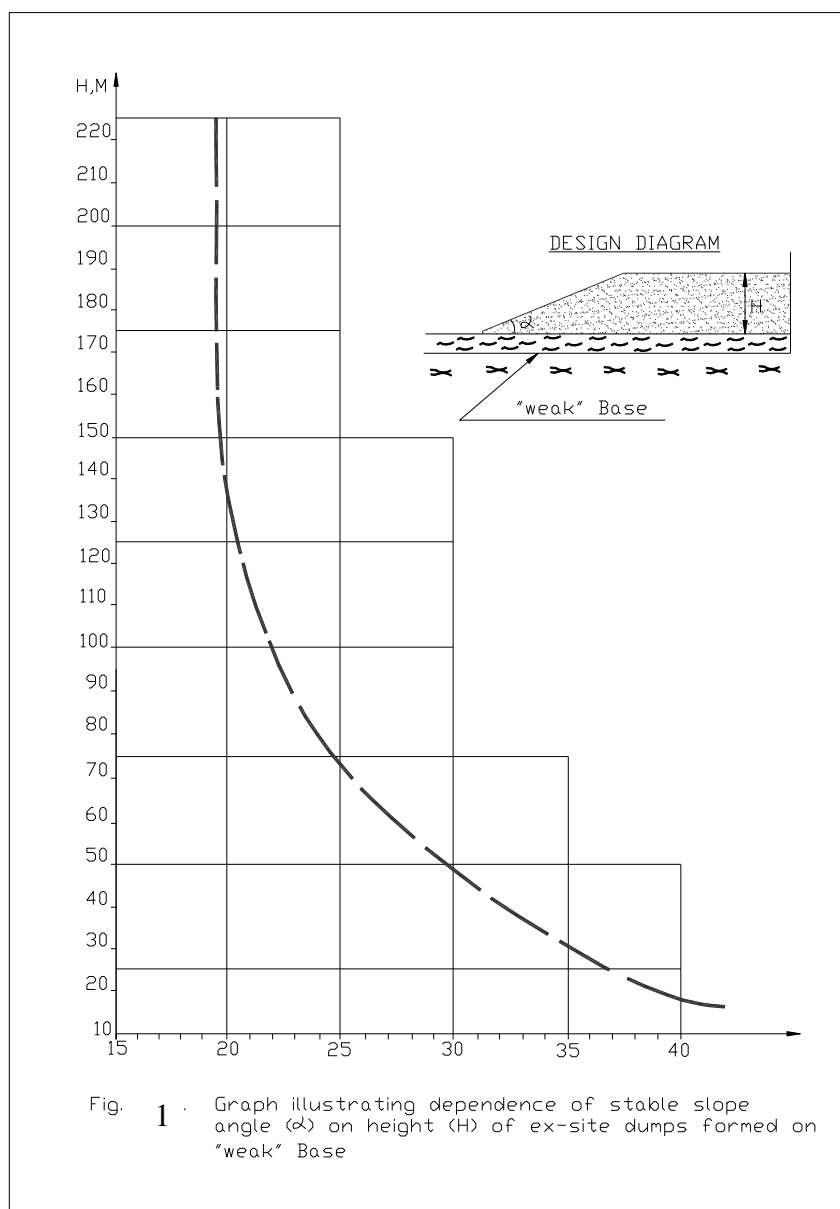
(a) **Technical aspects:**

The following technical aspects would be reviewed in the final mine closure planning. Details can be worked in closure plans envisaged to be prepared.

- ❖ **Safety hazards including management of fire and subsidence:** In the mine closure plan, action will be taken to cover all the safety aspects including management of fire & subsidence and mine inundation.
- ❖ **Management of Pit Slopes:** During operation of the mine, overall slope will be maintained at an angle not exceeding 22⁰-28⁰. Vegetation cover will also be provided along the slopes to arrest any failure.

As regards stability of back-filled dumps, the final level of reclaimed backfill will be matched with the levels of surrounding areas leaving a final residual void which will serve as a lagoon which may be utilised as water reservoir for the locality.

During operation, the external and internal OB dump will be developed with 40m berm width and maximum height of 60m in case of external OB dump and the overall dump slope shall not exceed 22 to 28 degrees. The waste dumps will be provided with toe wall and garland drains. The dump will be technically reclaimed and vegetation will be grown after spreading the top soil. The above measures will prevent slope failure and improve the aesthetic value.



Backfilling has already started in the OCP and the final level of reclaimed backfill will be matched with the levels of surrounding areas leaving a final residual void which will also serve as a lagoon which may be utilised as water reservoir for the locality. Most of the back filled area shall be afforested by selecting proper plant species in consultation with State Forest Department. A part of the back filled area would also be developed for agricultural purpose with the help of the concerned State Authority.

- ❖ **Management of hydrology and hydro-geology:** In the mine closure plan, the surface flow pattern of precipitation and mine water would be clearly developed and water channel suitably laid down so that it does not disturb the general hydrology of the area.

Mining operation may reduce the water table of the area. To recharge the water table, it is proposed that the mine water during operation will be discharged into surface water settling tank over flow of settled water from the tank will be used for water sprinkling, plantation, domestic purpose, etc. Therefore, the excess over flow water will be discharged into the nearby river. After closure of the mine vegetation will be grown on the entire vacant area.

- ❖ **Details of decommissioning of the infrastructures:** The decommissioning of the various infrastructures developed for the mine like office complex, roads, pipelines and transmission line etc. shall be planned in details so that the land occupied by these infrastructures are released. However, before such decommissioning, the possibility of re-use of these infrastructures for the neighbouring mines shall be explored.
- ❖ **Closure of entry to the open-cast mine:** At the end of the mine life, end pit slope within the seam and every exposed mouths of development gallery along the length of the bench / box-cut should be closed with non-combustible material (OB rock & mutti), compacted properly and sprayed with Thermoseal (a mica based sealant).

(b) Environmental aspects

This would include the following:

- ❖ **Management of final voids:** In the mine closure plan, voids due to mining are to be dealt and the final land use plan will include filling of the voids for land reclamation where possible and for hydro reclamation where feasible.
- ❖ **Reclamation of forests/vegetation:** It is to be ensured that in the final land use plan, all vacant land acquired for the project is afforested.
- ❖ **Channelisation of available water:** If the mine is having sufficient water and if on closure, the mine water flows into the surface water courses, channelising this water for surrounding community for their irrigational/domestic uses may be taken up. This can be planned by providing structures involving one time costing.
- ❖ **Management of Recharge Areas:** The pre-mining and post mining scenario on the hydrogeological recharge system would be included in the closure plan.
- ❖ **Acceptable Surface and Ground Water Flows:** In the final closure plan of the mine, wherever the mine water is likely to flow out to surface and meet the surface water sources; the quality of water from such mines would be assessed and flow pattern designed in the final plan.

(c) Social aspects

The social aspects of land use planning relating to mine closure would include the following:

- ❖ **Re-deployment of Workforce:** The company employees will be gainfully engaged in the neighbouring projects after cessation of mining activities.
- ❖ **Management of Community Facilities:** In view of the short life of the project no new community facility will be created. However, the existing facilities of adjoining areas will be strengthened.

(d) Financial aspects:

There are two types of Closure, namely, Progressive Mine Closure (Concurrent) and Final Mine Closure. The cost of Progressive Closure activities is realized by levying a cost of 2.50/Te of coal for UG Mines.

The Final Mine closure cost has to deal with the following:

- Cost of closure activities.
- Cost towards organization for executing the closure activities.
- Cost of the post project monitoring.
- Creation of a corpus fund for the final mine closure.

12.3 MINE CLOSURE OBLIGATIONS

There is need to define the liabilities, responsibilities and authorities of the mine management, other regulatory bodies, Central and State Governments after mine closure. Some obligations relating to the Mine Management Companies are as follows:

- (a) **Health & Safety :** Regulation Nos. 6, 61, 106, 112 of Coal Mines Regulations, 1957 and its related DGMS Circulars;
- (b) **Environment :** Water (Prevention & Control of Pollution) Act, 1974; Air (Prevention & Control of Pollution) Act, 1981; Environmental (Protection) Act, 1986 and Environmental Protection (Amendment) Rule, 2000; DGMS Directives on Noise & Ground Vibration;
- (c) **Forest :** Forest (Conservation) Act, 1980.
- (d) **Rehabilitation :** CIL's policy, however, applicable for land oustees only.
- (e) **Decommissioning/asset disposal, etc.**

12.4 IMPACT ASSESSMENT REMEDIAL MEASURES

Post-Mining Land Use Plan has been shown in Chapter IX. Environmental Impact on Landscape, Water Source, air and noise pollution during mine life has been discussed earlier. It is imperative that the environmental monitoring may be continued for 3 years after closure of UG in order to assess corrective measures to be implemented to sustain pre-mining ecosystem and environment in the core and buffer zone (to the extent possible).

12.5 STAKEHOLDERS INVOLVEMENT

Various stakeholders effected due to mine closure need to be identified and they may be as follows :

The Company	:	Employees, Management & Stakeholders
The Community	:	Local business and service providers, landholders, neighbours and nearby residents, local Government and NGOs and Community Groups.
The State	:	The State Government. The Central Government and concerned Government Agencies.

There is need of regular consultations between the stakeholders to evolve the needs of the stakeholders and their involvement in the process.

12.6 CLOSURE ACTION PLAN

Closure planning is a whole-of-life exercise that begins at the start of a mine and continues till post-closure. The dynamic nature of closure planning requires regular and critical review to reflect changing circumstances as a result of any operational change, new regulation, and new technology and remain flexible enough to cope with unexpected events.

The following steps have to be undertaken in relation to Mine Closure Planning:

- Prior to the surface demolition/restoration a surface audit should be undertaken on all surface structures, spoil heaps, lagoons, etc. to assess whether there are any hazardous materials that could cause problems; viz. explosives, chemicals, etc. A list of surface assets should be prepared and made available to potential purchasers, prospective purchasers could be invited and asked to submit sealed bids, this could ensure that the sale of assets give better financial gain.
- In order to identify potential impact, necessary hydro-geological studies into post-mining ground water recharge have to be done.
- Work force on roll of BCCL may be re-deployed for gainful utilization in the same or other mines of BCCL.
- As a detailed component of the Closure Plan, a Decommissioning Plan is to be developed towards the final stages preferably 5 years prior to tentative closure of the mine. Once established, it may be updated annually.

12.7 PROTECTIVE MEASURES TO BE TAKEN

Protective measures must include the following :

- The protection of mine Entries , building and other structure on the project site against access by unauthorized persons;
- The maintenance of all mechanical, hydraulic and waste management system;
- The continuation of all monitoring programmes;
- The control of all contaminated effluents;
- The securing of all petroleum products, chemicals and waste;
- The rendering of all tailings, dams and piles of earth, rock and waste resulting from work done on the project site in a stable and safe condition.

12.8 CLOSURE COSTS

As per MOC guidelines, a corpus escrow account @ ₹ 1.0 lakhs (August, 2009 Price Level) per Ha (for UG) and @ ₹ 6.0 lakhs (for OC) of the project area shall be opened with the coal controller organization to meet the expenses of mine closure. The current Guidelines read as:

“It has been estimated that typically closure cost for an opencast mine will come around Rs. 6.00 lakh per Hectare of the project area and it would be Rs. 1.00 lakh per Hectare for underground mine project area at current price levels (August, 2009) and these rates will stand modified based on Wholesale Price Index as notified by Government of India from time to time”.

There is already a mine closure plan approved by the 305th BCCL Board, Dated 12.03.2014. According to the approved mine closure plan the total life of the mine was considered to be 7 years and total mine closure cost up to the considered life of the mine was calculated to be ₹ 1484.114 Lakhs. As per the directives ₹ 814.801 (Principal amount) Lakhs were deposited in to the Escrow Account Number 150100009051 by 31st March 2017. Further, the same escrow account shall be continued for AKWM Colliery and the amount already accrued shall be adjusted against the new closure cost calculated.

A revised mine closure plan is prepared incorporating all the major current and proposed changes in the mining activities. As per the data furnished by the mine/area, the project area and leasehold area in respect AKWM Colliery is the same and the closure cost is calculated accordingly. The mine closure cost for the revised mine closure plan is calculated in following way:

In AKWM colliery, the existing leasehold area and project area is 325.10 Ha. An area of 207.50 Ha is required for opencast operations in the leasehold of AKWMC. Also, 4.27 Ha of the Project Area is now abandoned quarry. Thus, out of the project area of 325.10 Ha, 211.77 Ha (207.50+4.27) area has been considered for the calculation of closure cost as per Open cast norms and the remaining 113.33 Ha has been considered for the calculation of closure cost of the area as per Underground norms.

The overlapping area (where UG & OC operations have been done in different vertical levels) has been considered for calculation of closure cost as per opencast norms.

12.8.1 The total amount that shall be further deposited for final mine closure activities of **AKWM Colliery** in case of underground workings during the considered period of 28 years stands out to be ₹ **276.798 lakhs** and in case of opencast workings during the considered period of 8 years stands out to be ₹ **1228.382 lakhs** as per the present status of the mine.

Table No. 12.1 Break-Up cost of Mine Closure of AKWM Colliery

Year	UG Section	OC Section	Total
1	4.739	128.638	133.378
2	4.976	135.07	140.047
3	5.225	141.824	147.049
4	5.487	148.915	154.402
5	5.761	156.361	162.122
6	6.049	164.179	170.228
7	6.351	172.388	178.739
8	6.669	181.007	187.676
9	7.002		7.002
10	7.352		7.352
11	7.720		7.72
12	8.106		8.106
13	8.511		8.511
14	8.937		8.937
15	9.384		9.384
16	9.853		9.853
17	10.346		10.346
18	10.863		10.863
19	11.406		11.406
20	11.976		11.976
21	12.575		12.575
22	13.204		13.204
23	13.864		13.864
24	14.557		14.557
25	15.285		15.285
26	16.050		16.050
27	16.852		16.852
28	17.695		17.695
Total	276.798	1228.382	1505.18

The amount already deposited in the escrow account will also be available for mine closure activities and should be included to arrive at the total funds available for Mine Closure Activities.

Table No. 12.2 Total Amount available for Mine Closure Activities of AKWMC Colliery

	Amount (in ₹ lakhs)	
	UG Section	OC Section
Amount Already Deposited in Escrow Account	29.157	785.644
Amount to be Deposited in the Escrow Account in the Future	276.798	1228.382
Total Amount available for Mine Closure Activities	305.955	2014.026

12.11.2 Based on the existing mine closure planning norms, the above calculated cost at Final WPI of January 2017 on mine closure may be tentatively grouped under different heads as given in Table No. 12.3 A and 12.3 B for underground and opencast respectively, as per guidelines of CMPDI(HQ).

**Table 12.3 A Break up costs of Mine Closure Activities for AKWM Colliery
(Underground)**

Sl. No.	Activity	Mine Closure Cost (₹ in Lakhs)
A	Dismantling of Structures	
	Service Buildings	10.708
	Residential Buildings	32.370
	Industrial Structures like CHP, Workshop, field sub-station, cap lamp room, haulage, fan installation etc.	19.367
B	Permanent Sealing of mine entries(incline mouth and air shaft)	
	Sealing of incline mouths and air shafts	16.277
C	*Subsidence Management	14.533
D	LANDSCAPING	
	Landscaping of the cleared land for improving its esthetic	26.924
E	*Plantation	
	Plantation over the cleared area obtained after dismantling and on other barren spaces	39.774
F	Monitoring/Testing of parameters for three years	
	Air Quality	20.897
	Water Quality	19.398
G	*Enterpreneurship Development(Vocational/skill development training for sustainable income of affected people	23.406
H	*Miscellaneous and other mitigative measures	44.669
I	Manpower Cost for Supervision	37.632
	TOTAL	305.955

Note: * : To be covered under Progressive Mine Closure activities also

Table 12.3 B Break up costs of Mine Closure Activities for AKWM Colliery (Opencast including Abandoned Quarry)

Sl. No.	Activity	Mine Closure Cost (₹ in Lakhs)
A	Dismantling of Structures	
	Service Buildings	4.028
	Residential Buildings	53.774
	Industrial Structures like CHP, Workshop, field sub-station, etc.	6.042
B	Permanent Fencing of Mine Void and other dangerous area	
	Random Rubble masonry of height 1.2 metre including levelling up in cement concrete 1:6:12 in mud mortar	30.210
C	Grading of Highwall slopes	
	Levelling and grading of highwall slopes	35.648
D	*OB Dump Reclamation	
	Handling/Dozing of external OB Dump into mine void	1785.635
	Bio-Reclamation including soil spreading, plantation and maintenance	8.056
E	LANDSCAPING	
	Landscaping of the cleared land for improving its esthetic	6.042
F	*Plantation	
	Plantation over area obtained after dismantling	10.070
	Plantation around fencing	4.028
	Plantation over the cleared external OB Dump	0.403
G	Monitoring/Testing of parameters for three years	
	Air Quality	4.431
	Water Quality	4.028
H	*Enterpreneuship Development(Vocational/skill development training for sustainable income of affected people	5.236
I	*Miscellaneous and other mitigative measures	40.281
J	Manpower Cost for Supervision	16.112
	TOTAL	2014.026

Note: * : To be covered under Progressive Mine Closure activities also

12.8.3 Progressive Closure Costs

The break up costs of Progressive Closure Activities undertaken by BCCL in AKWM Colliery as per earlier approved Mine Closure Plan is given in the following table:

Table 12.4 Break up costs of Mine Closure Activities for AKWM Colliery (earlier approved) and Expenditure incurred during Progressive Closure Activities

Sl. No.	Activity	Mine Closure Cost (₹ in Lakhs)			Amount Claimed (Lakhs) (2014-15)	Amount Claimed (Lakhs) (2015-16)
		OC	UG	Total		
A	Dismantling of Structures					
	Service Buildings	2.968	15.730	18.698		
	Residential Buildings	39.626	47.549	87.175		
	Industrial Structures like CHP, Workshop, field sub-station, etc.	4.452	28.449	32.901		
B	Permanent Fencing of Mine Void and other dangerous area					
	Random Ruble masonry of height 1.2 metre including levelling up in cement concrete 1:6:12 in mud mortar	22.262		22.262		
C	Permanent Sealing of mine entries(incline mouth and air shaft)					
	Sealing of incline mouths and air shafts		23.909	23.909		
D	Subsidence Management		21.348	21.348		
E	Grading of Highwall slopes					
	Levelling and grading of highwall slopes	26.269		26.269		
F	OB Dump Reclamation			0.000		
	Handling/Dozing of external OB Dump into mine void	1315.815		1315.815		1524.638
	Bio-Reclamation including soil spreading, plantation and maintenance	5.936		5.936		
G	LANDSCAPING					
	Landscaping of the cleared land for improving its esthetic	4.452	39.550	44.002		2.071
H	Plantation					
	Plantation over area obtained after dismantling	7.421	58.425	65.846		
	Plantation around fencing and around quarry area	2.968		2.968	67.94789	
	Plantation over the cleared external OB Dump	0.297		0.297		82.844
I	Monitoring/Testing of parameters for three years					
	Air Quality	3.265	30.696	33.961		
	Water Quality	2.968	28.494	31.462		
J	Enterpreneurship Development(Vocational/skill development training for sustainable income of affected people	3.859	34.381	38.240	16.62778	8.285
K	Miscellaneous and other mitigative measures	29.682	65.616	95.298		
L	Manpower Cost for Supervision	11.873	55.279	67.152		
	TOTAL(%)	1484.113	449.426	1933.539	84.57567	1617.838

**The estimate of total expenditure incurred upon the progressive closure activities are provided by BCCL.*

CHAPTER - XII

PROGRESSIVE AND FINAL MINE CLOSURE PLAN

12.0 MINE CLOSURE PLANNING

12.1 OBJECTIVES OF CLOSURE PLANNING

Mine closure planning has to be carried out at the starting of the mine and needs periodic reviewing and revision during its life cycle to cope with the geo-technical constraints, safety and economic risks, social and environmental challenges. Various other objectives are as follows:

- ❖ To allow a productive and sustainable after-use of the site which is acceptable to the mine owner and the regulatory authority;
- ❖ To protect public health and safety;
- ❖ To alleviate or eliminate environmental damage and thereby encourage environmental sustainability;
- ❖ To minimize adverse socio-economic impacts.

12.2 DIFFERENT ASPECTS OF MINE CLOSURE PLANNING

The mine closure planning broadly involves the following aspects:

(a) Technical aspects;

The following technical aspects would be reviewed in the final mine closure planning. Details can be worked in closure plans envisaged to be prepared.

- ❖ **Safety hazards including management of fire and subsidence:** In the mine closure plan, action for control of likely fire areas of the mines will be discussed.

Action will also be suggested to cover all the safety aspects.

Following steps will be taken as precaution against fire and subsidence while mining:-

- i. Panel size will be so designed so that depillaring with caving will be completed within the incubation period of the coal seam.
- ii. Panel will be isolated in proper fashion before depillaring takes place.
- iii. Surface will be properly dozed and leveled wherever there are cracks and fissures so that air does not breathe in through surface.

- ❖ **Management of Pit Slopes:** As per the available records, there are 8 nos. of small quarries in the area which are proposed to be filled upto the required depth. Hence after the closure of the mine, there is little likelihood of any slope failure.
- ❖ **Management of hydrology and hydro-geology:** In the mine closure plan, the surface flow pattern of precipitation and mine water would be clearly developed and water channel suitably laid down so that it does not disturb the general hydrology of the area.

Mining operation may reduce the water table of the area. To recharge the water table, it is proposed that the mine water during operation will be discharged into surface water settling tank over flow of settled water from the tank will be used for water sprinkling, plantation, domestic purpose, etc. Therefore, the excess over flow water will be discharged into the nearby river. After closure of the mine vegetation will be grown on the entire vacant area.

- ❖ **Details of decommissioning of the infrastructures:** The decommissioning of the various infrastructures developed for the mine like office complex, roads, pipelines and transmission line etc. shall be planned in details so that the land occupied by these infrastructures are released. However, before such decommissioning, the possibility of re-use of these infrastructures for the neighbouring mines shall be explored.
- ❖ **Closure of entry to the open-cast mine:** Not applicable.

(b) Environmental aspects

This would include the following:

- ❖ **Management of final voids:** In the mine closure plan, voids due to mining are to be dealt and the final land use plan will include filling of the voids for land reclamation where possible and for hydro reclamation where feasible.
- ❖ **Reclamation of forests/vegetation:** It is to be ensured that in the final land use plan, all vacant land acquired for the project is afforested.

- ❖ **Channelisation of available water:** If the mine is having sufficient water and if on closure, the mine water flows into the surface water courses, channelising this water for surrounding community for their irrigational/domestic uses may be taken up. This can be planned by providing structures involving one time costing
- ❖ **Management of Recharge Areas:** The pre-mining and post mining scenario on the hydrogeological recharge system would be included in the closure plan.
- ❖ **Acceptable Surface and Ground Water Flows:** In the final closure plan of the mine, wherever the mine water is likely to flow out to surface and meet the surface water sources; the quality of water from such mines would be assessed and flow pattern designed in the final plan.

(c) Social aspects;

The social aspects of land use planning relating to mine closure would include the following:

- ❖ **Re-deployment of Workforce:** The company employees will be gainfully engaged in the neighbouring projects after cessation of mining activities.
- ❖ **Management of Community Facilities:** In view of the short life of the project no new community facility will be created. However, the existing facilities of adjoining areas will be strengthened.

(d) Financial aspects.

There are two types of Closure, namely, Progressive Mine Closure (Concurrent) and Final Mine Closure.

The Final Mine closure cost has to deal with the following:

- Cost of closure activities.
- Cost towards organization for executing the closure activities.
- Cost of the post project monitoring.
- Creation of a corpus fund for the final mine closure.

12.3 MINE CLOSURE OBLIGATIONS

There is need to define the liabilities, responsibilities and authorities of the mine management, other regulatory bodies, Central and State Governments after mine closure. Some obligations relating to the Mine Management Companies are as follows:

- (a) **Health & Safety:** Regulation Nos. 6, 61, 106, 112 of Coal Mines Regulations, 1957 and its related DGMS Circulars;
- (b) **Environment :** Water (Prevention & Control of Pollution) Act, 1974; Air (Prevention & Control of Pollution) Act, 1981; Environmental (Protection) Act, 1986 and Environmental Protection (Amendment) Rule, 2000; DGMS Directives on Noise & Ground Vibration;
- (c) **Forest:** Forest (Conservation) Act, 1980.
- (d) **Rehabilitation:** CIL's policy, however, applicable for land oustees only.
- (e) Decommissioning/asset disposal, etc.

12.4 IMPACT ASSESSMENT REMEDIAL MEASURES

Environmental Impact on Landscape, Water Source, air and noise pollution during mine life has been discussed earlier. It is imperative that the environmental monitoring may be continued for 3 years after closure of UG in order to assess corrective measures to be implemented to sustain pre-mining ecosystem and environment in the core and buffer zone (to the extent possible).

12.5 STAKEHOLDERS INVOLVEMENT

Various stakeholders effected due to mine closure need to be identified and they may be as follows:

- The Company :** Employees, Management & Stakeholders
- The Community :** Local business and service providers, landholders, neighbours and nearby residents, local Government and NGOs and Community Groups.

The State : The State Government. The Central Government and concerned Government Agencies.

There is need of regular consultations between the stakeholders to evolve the needs of the stakeholders and their involvement in the process.

12.6 CLOSURE ACTION PLAN

Closure planning is a whole-of-life exercise that begins at the start of a mine and continues till post-closure. The dynamic nature of closure planning requires regular and critical review to reflect changing circumstances as a result of any operational change, new regulation, and new technology and remain flexible enough to cope with unexpected events.

The following steps have to be undertaken in relation to Mine Closure Planning:

- Prior to the surface demolition/restoration a surface audit should be undertaken on all surface structures, spoil heaps, lagoons, etc. to assess whether there are any hazardous materials that could cause problems; viz. explosives, chemicals, etc. A list of surface assets should be prepared and made available to potential purchasers, prospective purchasers could be invited and asked to submit sealed bids, this could ensure that the sale of assets give better financial gain.
- In order to identify potential impact, necessary hydro-geological studies into post-mining ground water recharge have to be done.
- Work force on roll of BCCL may be re-deployed for gainful utilization in the same or other mines of BCCL.
- As a detailed component of the Closure Plan, a Decommissioning Plan is to be developed towards the final stages preferably 5 years prior to tentative closure of the mine. Once established, it may be updated annually.

12.7 PROTECTIVE MEASURES TO BE TAKEN

Protective measures must include the following:

- The protection of mine Entries , building and other structure on the project site against access by unauthorized persons;
- The maintenance of all mechanical, hydraulic and waste management system;
- The continuation of all monitoring programmes;
- The control of all contaminated effluents;
- The securing of all petroleum products, chemicals and waste
- The rendering of all tailings, dams and piles of earth, rock and waste resulting from work done on the project site in a stable and safe condition.

12.8 CLOSURE COSTS

As per MOC guidelines, a corpus escrow account @ ₹ 1.0 lakhs (August, 2009 Price Level) per Ha (for UG) and @ ₹ 6.0 lakhs (for OC) of the project area shall be opened with the coal controller organization to meet the expenses of mine closure. The current Guidelines read as:

“It has been estimated that typically closure cost for an opencast mine will come around Rs. 6.00 lakh per Hectare of the project area and it would be Rs. 1.00 lakh per Hectare for underground mine project area at current price levels (August, 2009) and these rates will stand modified based on Wholesale Price Index as notified by Government of India from time to time”.

There is already a mine closure plan approved by the 305th BCCL Board, Dated 12.03.2014. According to the approved mine closure plan the total life of the mine was considered to be 13 years and total mine closure cost up to the considered life of the mine was calculated to be Rs 361.094 Lakhs. As per the directives Rs.112.46 Lakhs (Principal amount) were deposited in to the Escrow Account Number 150100009053 by 31st March 2017. Further, the same escrow account shall be continued for AAR Colliery.

A revised mine closure plan is prepared incorporating all the major current and proposed changes in the mining activities. As per the data furnished by the mine/area, the project area and leasehold area in respect of AAR Colliery differs and is given below and the closure cost is calculated accordingly. The mine closure cost for the revised mine closure plan is calculated in following way:

In AAR colliery, the existing leasehold area is 254.64 Ha. As per data furnished by the mine, the present Project area is 175.57 Ha excluding the area falling under DC Railway line, DB road and River and Barrier (79.07 Ha). An area of 91.34 Ha is required for opencast operations in the leasehold of AARC. Based on the land use of TOR, 64 Ha is abandoned, not backfilled quarry. However, as per the data furnished by the mine/area, only 1.56 Ha of the Project Area is now abandoned quarry which is not backfilled at present. Thus, out of the project area of 175.57 Ha, 92.90 (91.34+1.56) Ha area has been considered for the calculation of closure cost as per Open cast norms and the remaining 82.67 Ha has been considered for the calculation of closure cost of the area as per Underground norms.

The overlapping area (where UG & OC operations have been done in different vertical levels) has been considered for calculation of closure cost as per opencast norms.

The money deposited in the Escrow Account has to deal with the following:

- Cost of closure activities.
- Cost towards organization for executing the closure activities.
- Cost of the post project monitoring.
- Creation of a corpus fund for the final mine closure

12.11.1 Thus, total amount that shall be further deposited for mine closure activities of **AAR Colliery** in case of underground workings during the considered period of 21 years stands out to be ₹ **64.83 lakhs** and in case of opencast workings during the considered period of 8 years stands out to be ₹ **903.250 lakhs** as per the present status of the mine.

Table No. 12.1 Break-Up cost of Mine Closure of AAR Colliery

Year	UG Section	OC Section	Total
1	1.815	95.45	97.265
2	1.906	100.223	102.129
3	2.001	105.234	107.235
4	2.101	110.496	112.597
5	2.206	116.02	118.226
6	2.316	121.821	124.137
7	2.432	127.912	130.344
8	2.554	134.308	136.862
9	2.682		2.682
10	2.816		2.816
11	2.956		2.956
12	3.104		3.104
13	3.259		3.259
14	3.422		3.422
15	3.594		3.594
16	3.773		3.773
17	3.962		3.962
18	4.160		4.16
19	4.368		4.368
20	4.586		4.586
21	4.816		4.816
	64.830	911.464	976.294

The amount already deposited in the escrow account will also be available for mine closure activities and should be included to arrive at the total funds available for Mine Closure Activities.

Table No. 12.2 Total Amount available for Mine Closure Activities of AAR Colliery

	Amount (in ₹ lakhs)	
	UG Section	OC Section
Amount Already Deposited in Escrow Account	79.958	32.500
Amount to be Deposited in the Escrow Account in the Future	64.830	911.464
Total Amount available for Mine Closure Activities	144.788	943.964

12.11.2 Based on the existing mine closure planning norms, the above calculated cost at Final WPI of January 2017 on mine closure may be tentatively grouped under different heads as given in Table No. 12.3 A and 12.3 B for underground and opencast respectively, as per guidelines of CMPDI(HQ).

**Table 12.3 A Break up costs of Mine Closure Activities for AAR Colliery
(Underground)**

Sl. No.	Activity	Mine Closure Cost (₹ in Lakhs)
A	Dismantling of Structures	
	Service Buildings	5.068
	Residential Buildings	15.319
	Industrial Structures like CHP, Workshop, field sub-station, cap lamp room, haulage, fan installation etc.	9.165
B	Permanent Sealing of mine entries(incline mouth and air shaft)	
	Sealing of incline mouths and air shafts	7.703
C	*Subsidence Management	6.877
D	LANDSCAPING	
	Landscaping of the cleared land for improving its esthetic	12.741
E	*Plantation	
	Plantation over the cleared area obtained after dismantling and on other barren spaces	18.822
F	Monitoring/Testing of parameters for three years	
	Air Quality	9.889
	Water Quality	9.180
G	*Entrepreneurship Development(Vocational/skill development training for sustainable income of affected people	11.076
H	*Miscellaneous and other mitigative measures	21.139
I	Manpower Cost for Supervision	17.809
	TOTAL	144.788

Note: * : To be covered under Progressive Mine Closure activities also

**Table 12.3 B Break up costs of Mine Closure Activities for AAR Colliery
(Opencast)**

Sl. No.	Activity	Mine Closure Cost (₹ in Lakhs)
A	Dismantling of Structures	
	Service Buildings	1.888
	Residential Buildings	25.204
	Industrial Structures like CHP, Workshop, field sub-station, etc.	2.832
B	Permanent Fencing of Mine Void and other dangerous area	
	Random Rubble masonry of height 1.2 metre including levelling up in cement concrete 1:6:12 in mud mortar	14.159
C	Grading of Highwall slopes	
	Levelling and grading of highwall slopes	16.708
D	*OB Dump Reclamation	
	Handling/Dozing of external OB Dump into mine void	836.918
	Bio-Reclamation including soil spreading, plantation and maintenance	3.776
E	LANDSCAPING	
	Landscaping of the cleared land for improving its esthetic	2.832
F	*Plantation	
	Plantation over area obtained after dismantling	4.720
	Plantation around fencing	1.888
	Plantation over the cleared external OB Dump	0.189
G	Monitoring/Testing of parameters for three years	
	Air Quality	2.077
	Water Quality	1.888
H	*Entrepreneurship Development(Vocational/skill development training for sustainable income of affected people	2.454
I	*Miscellaneous and other mitigative measures	18.879
J	Manpower Cost for Supervision	7.552
	TOTAL	943.964

Note: * : To be covered under Progressive Mine Closure activities also

12.8.3 Progressive Closure Costs

The break up costs of Progressive Closure Activities undertaken by BCCL in AAR Colliery as per earlier approved Mine Closure Plan is given in the following table:

Table 12.4 Break up costs of Mine Closure Activities for AAR Colliery (earlier approved) and Expenditure incurred during Progressive Closure Activities

Sl. No.	Activity	Mine Closure Cost (₹ in Lakhs)	Amount Claimed (Lakhs) (2014-15)	Amount Claimed (Lakhs) (2015-16)
A	Dismantling of Structures			
	Service Buildings	11.501		4.2
	Residential Buildings	34.765		
	Industrial Structures like CHP, Workshop, field sub-station, cap lamp room, haulage, fan installation etc.	20.8		
B	Permanent Sealing of mine entries(incline mouth and air shaft)			
	Sealing of incline mouths and air shafts	17.481		
C	Subsidence Management	15.608	2.69877	2.55357
D	LANDSCAPING			
	Landscaping of the cleared land for improving its esthetic	28.916		66.08629
E	Plantation			
	Plantation over the cleared area obtained after dismantling and on other barren spaces	42.717		
F	Monitoring/Testing of parameters for three years			
	Air Quality	22.443		
	Water Quality	20.833		
G	Entrepreneurship Development(Vocational/skill development training for sustainable income of affected people	25.137	74.94412	8.69345
H	Miscellaneous and other mitigative measures	47.975		
I	Manpower Cost for Supervision	40.417		
J	Reclamation of Abandoned Quarry	32.5		
	TOTAL	361.094	77.64289	81.53331

**The estimate of total expenditure incurred upon the progressive closure activities are provided by BCCL.*

CHAPTER - XII

PROGRESSIVE AND FINAL MINE CLOSURE PLAN

12.0 MINE CLOSURE PLANNING

12.1 OBJECTIVES OF CLOSURE PLANNING

Mine closure planning has to be carried out at the starting of the mine and needs periodic reviewing and revision during its life cycle to cope with the geo-technical constraints, safety and economic risks, social and environmental challenges. Various other objectives are as follows:

- ❖ To allow a productive and sustainable after-use of the site which is acceptable to the mine owner and the regulatory authority;
- ❖ To protect public health and safety;
- ❖ To alleviate or eliminate environmental damage and thereby encourage environmental sustainability;
- ❖ To minimize adverse socio-economic impacts.

12.2 DIFFERENT ASPECTS OF MINE CLOSURE PLANNING

The mine closure planning broadly involves the following aspects :

(a) Technical aspects;

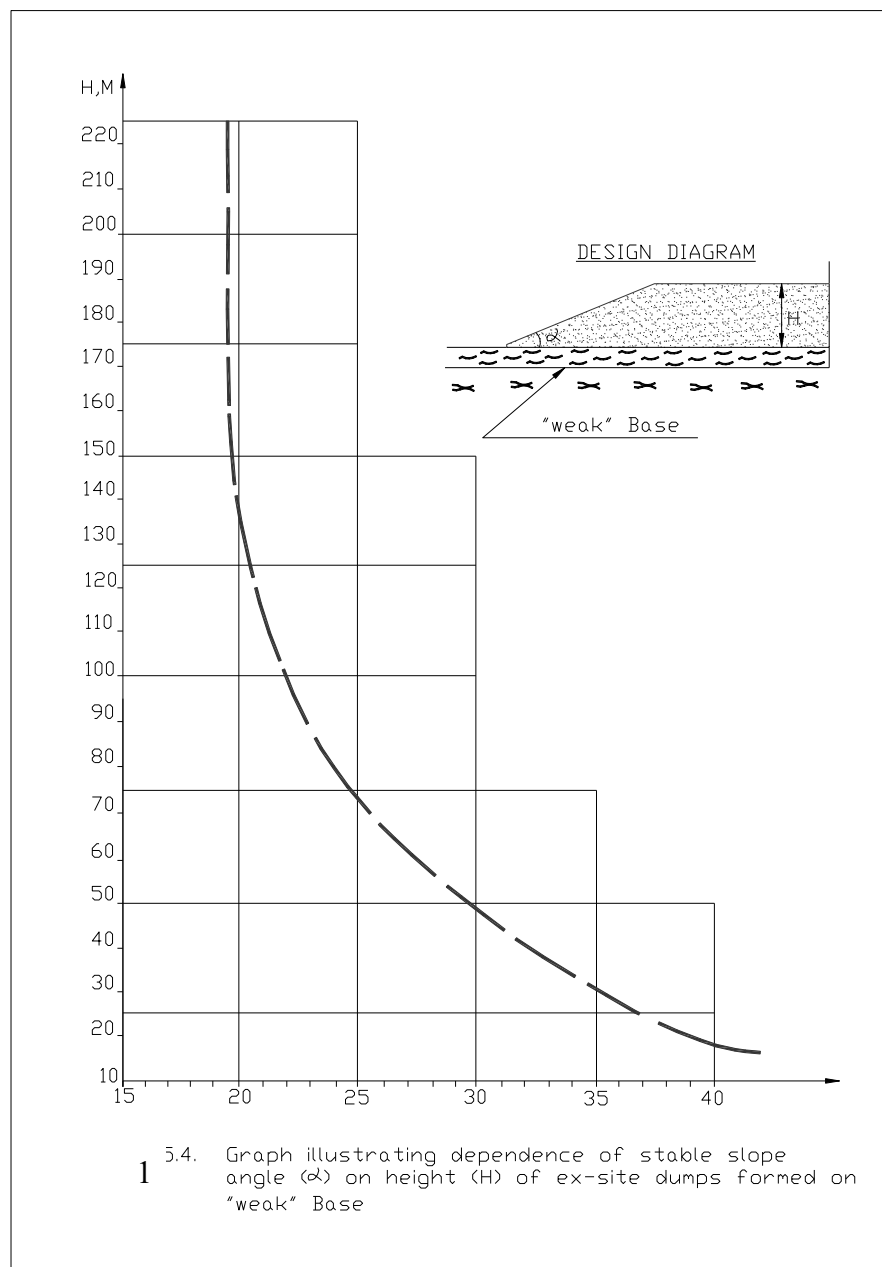
The following technical aspects would be reviewed in the final mine closure planning. Details can be worked in closure plans envisaged to be prepared.

Safety hazards including management of fire and subsidence: In the mine closure plan, action will be taken to cover all the safety aspects including management of fire & subsidence and mine inundation.

Management of Pit Slopes: During operation of the mine, overall slope will be maintained at an angle not exceeding 22⁰-28⁰. Vegetation cover will also be provided along the slopes to arrest any failure.

As regards stability of back-filled dumps, the final level of reclaimed backfill will be matched with the levels of surrounding areas leaving a final residual void which will serve as a lagoon which may be utilised as water reservoir for the locality.

During operation, the external and internal OB dump will be developed with 40 m berm width and maximum height of 60m in case of external OB dump and the overall dump slope shall not exceed 22 to 28 degrees. The waste dumps will be provided with toe wall and garland drains. The dump will be technically reclaimed and vegetation will be grown after spreading the top soil. The above measures will prevent slope failure and improve the aesthetic value.



Backfilling has already started in the OCP and the final level of reclaimed backfill will be matched with the levels of surrounding areas leaving a final residual void which will also serve as a lagoon which may be utilised as water reservoir for the locality. Most of the back filled area shall be afforested by selecting proper plant species in consultation with State Forest Department. A part of the back filled area would also be developed for agricultural purpose with the help of the concerned State Authority.

- ❖ **Management of hydrology and hydro-geology:** In the mine closure plan, the surface flow pattern of precipitation and mine water would be clearly developed and water channel suitably laid down so that it does not disturb the general hydrology of the area.

Mining operation may reduce the water table of the area. To recharge the water table, it is proposed that the mine water during operation will be discharged into surface water settling tank over flow of settled water from the tank will be used for water sprinkling, plantation, domestic purpose, etc. Therefore, the excess over flow water will be discharged into the nearby river. After closure of the mine vegetation will be grown on the entire vacant area..

- ❖ **Details of decommissioning of the infrastructures:** The decommissioning of the various infrastructures developed for the mine like office complex, roads, pipelines and transmission line etc. shall be planned in details so that the land occupied by these infrastructures are released. However, before such decommissioning, the possibility of re-use of these infrastructures for the neighboring mines shall be explored.

- i) **Closure of entry to the open-cast mine :** After closure of the mining activities, all the entries to the mine will be effectively sealed off to avoid any accident and to prevent access to any unauthorized person. The area that is not reclaimed shall be properly fenced/ sealed to prevent any unauthorized entry into the area. However, the guidelines / instructions from DGMS, if any, will be followed.

(b) Environmental aspects

This would include the following:

- ❖ **Management of final voids:** In the mine closure plan, voids due to mining are to be dealt and the final land use plan will include filling of the voids for land reclamation where possible and for hydro reclamation where feasible.
- ❖ **Reclamation of forests/vegetation:** It is to be ensured that in the final land use plan, all vacant land acquired for the project is afforested
- ❖ **Channelisation of available water:** If the mine is having sufficient water and if on closure, the mine water flows into the surface water courses, channelising this water for surrounding community for their irrigational/domestic uses may be taken up. This can be planned by providing structures involving one time costing
- ❖ **Management of Recharge Areas:** The pre-mining and post mining scenario on the hydrogeological recharge system would be included in the closure plan.
- ❖ **Acceptable Surface and Ground Water Flows:** In the final closure plan of the mine, wherever the mine water is likely to flow out to surface and meet the surface water sources; the quality of water from such mines would be assessed and flow pattern designed in the final plan.

(c) Social aspects;

The social aspects of land use planning relating to mine closure would include the following:

- ❖ **Re-deployment of Workforce:** The company employees will be gainfully engaged in the neighboring projects after cessation of mining activities.
- ❖ **Management of Community Facilities:** In view of the short life of the project no new community facility will be created. However, the existing facilities of adjoining areas will be strengthened.

(d) Financial aspects.

Mine Closure activities would be a constant exercise for the mine which would begin with the commencement of mining operations and continue till post closure. The mine closure activities would naturally entail certain expenditures, which will have to be borne by the mine operator. There are two types of Closure, namely, Progressive Mine Closure (Concurrent) and Final Mine Closure. This would cover the activities which are being executed along with normal mining operation and would continue to be executed in course of execution of the project.

The Final Mine closure cost has to deal with the following:

- Cost of closure activities.
- Cost towards organization for executing the closure activities.
- Cost of the post project monitoring.
- Creation of a corpus fund for the final mine closure.

12.3 MINE CLOSURE OBLIGATIONS

There is need to define the liabilities, responsibilities and authorities of the mine management, other regulatory bodies, Central and State Governments after mine closure. Some obligations relating to the Mine Management Companies are as follows :

- (a) **Health & Safety :** Regulation Nos. 6, 61, 106, 112 of Coal Mines Regulations, 1957 and its related DGMS Circulars;
- (b) **Environment :** Water (Prevention & Control of Pollution) Act, 1974; Air (Prevention & Control of Pollution) Act, 1981; Environmental (Protection) Act, 1986 and Environmental Protection (Amendment) Rule, 2000; DGMS Directives on Noise & Ground Vibration;
- (c) **Forest :**
Forest (Conservation) Act, 1980.
- (d) **Rehabilitation :**
CIL's policy, however, applicable for land oustees only.
- (e) Decommissioning/asset disposal, etc.

12.4 IMPACT ASSESSMENT REMEDIAL MEASURES

Post-Mining Land Use Plan has been shown in Chapter IX. Environmental Impact on Landscape, Water Source, air and noise pollution during mine life has been discussed earlier. It is imperative that the environmental monitoring may be continued for 3 years after closure of mines in order to assess corrective measures to be implemented to sustain pre-mining ecosystem and environment in the core and buffer zone (to the extent possible).

12.5 STAKEHOLDERS INVOLVEMENT

Various stakeholders effected due to mine closure need to be identified and they may be as follows :

The Company	:	Employees, Management & Stakeholders
The Community	:	Local business and service providers, landholders, neighbours and nearby residents, local Government and NGOs and Community Groups.
The State	:	The State Government. The Central Government and concerned Government Agencies.

There is need of regular consultations between the stakeholders to evolve the needs of the stakeholders and their involvement in the process.

12.6 CLOSURE ACTION PLAN

Closure planning is a whole-of-life exercise that begins at the start of a mine and continues till post-closure. The dynamic nature of closure planning requires regular and critical review to reflect changing circumstances as a result of any operational change, new regulation, and new technology and remain flexible enough to cope with unexpected events.

The following steps have to be undertaken in relation to Mine Closure Planning:

Prior to the surface demolition/restoration a surface audit should be undertaken on all surface structures, spoil heaps, lagoons, etc. to assess whether there are any hazardous materials that could cause problems; viz. explosives, chemicals, etc. A list of surface assets should be prepared and made available to potential purchasers, prospective purchasers could be

invited and asked to submit sealed bids, this could ensure that the sale of assets give better financial gain.

In order to identify potential impact, necessary hydro-geological studies into post-mining ground water recharge have to be done.

Work force on roll of BCCL may be re-deployed for gainful utilization in the same or other mines of BCCL.

As a detailed component of the Closure Plan, a Decommissioning Plan is to be developed towards the final stages preferably 5 years prior to tentative closure of the mine. Once established, it may be updated annually.

12.7 PROTECTIVE MEASURES TO BE TAKEN

Protective measures must include the following :

- The protection of mine Entries , building and other structure on the project site against access by unauthorized persons;
- The maintenance of all mechanical, hydraulic and waste management system;
- The continuation of all monitoring programmes;
- The control of all contaminated effluents;
- The securing of all petroleum products, chemicals and waste;
- The rendering of all tailings, dams and piles of earth, rock and waste resulting from work done on the project site in a stable and safe condition.

12.8 CLOSURE COSTS

As per MOC guidelines, a corpus escrow account @ 6.0 lakhs (August, 2009 Price Level) per Ha of the property leasehold shall be opened with the coal controller organization to meet the expenses of final mine closure. In 7th June 2011, MOC issued a revised guideline to replace the Para 6.2 of the original guidelines issued on 27.08.2009 by the following Para:

“It has been estimated that typically closure cost for an opencast mine will come around Rs. 6.00 lakh per Hectare of the property leasehold and it would be Rs. 1.00 lakh per Hectare for underground mine leasehold at current price levels (August, 2009) and these rates will stand modified based on Wholesale Price Index as notified by Government of India from time to time. The mine closure cost for overlapping area of the mine would be deposited in the Escrow Account as applicable for opencast area and no separate cost for underground portion of the overlapping area is payable”.

It is difficult to conclusively predict the mining parameters on a long term basis owing to rapidly changing mining technology, developments in the field of clean coal technologies and R&D activities in development of alternative energy sources.

As per the latest Guidelines issued by the MoC, Gol(dt. 07.01.2013) the *“annual closure cost is to be computed considering the total project area at the above mentioned rates and dividing the same by the entire life of the mine in years for new projects and balance life of mine in years for operating/existing mines.”*

In this Mining plan only opencast operation is taken into consideration and therefore Mine closure cost is computed based on opencast operation. At present u/g operation is closed due to fire and water, the life based on u/g working is not considered for determination of Mine Closure cost. The mine has adequate reserve to be mined in future. The underlying seams cannot be worked by underground method until the fire has been taken care off and only after that the underground mine will be restarted again. If so happens, a fresh new Mine Closure Plan will be submitted incorporating all the changes.

In Gaslitand Colliery, the existing leasehold area is 138.66 Ha, out of which 70.00 Ha is for opencast project. There is an abandoned quarry (Backfilled) of 6.50 Ha in the northern side of the leasehold area. The remaining 62.16 Ha of leasehold area (excluding Opencast Project and the abandoned backfilled quarry) has not been considered for the calculation of closure cost as the underground section is not operational, hence not considered as the existing project area. The cost of closure of 70.00 Ha (Opencast Project Area) is calculated as per the Open cast norms.

The Closure cost is estimated to be approximately **Rs. 674.523 lakhs**. The amount has been escalated based on WPI of October, 2016 (183.6) vis-à-vis WPI of August '09 (129.6).

The tentative break up cost of activities as per the current guideline is given below in Table No. 12.1:

Table 12.1: Break up costs of the Mine Closure Activities of Gaslitand Colliery

Sl. No.	Activity	Mine Closure Cost (Rupees in Lakhs)
A	Dismantling of Structures	
	Service Buildings	1.349
	Residential Buildings	18.010
	Industrial Structures like CHP, Workshop, field sub-station, etc.	2.024
B	Permanent Fencing of Mine Void and other dangerous area	
	Random Rubble masonry of height 1.2 metre including levelling up in cement concrete 1:6:12 in mud mortar	10.118
C	Grading of Highwall slopes	
	Levelling and grading of highwall slopes	11.939
D	*OB Dump Reclamation	
	Handling/Dozing of external OB Dump into mine void	598.032
	Bio-Reclamation including soil spreading, plantation and maintenance	2.698
E	*LANDSCAPING	
	Landscaping of the cleared land for improving its esthetic	2.024
F	*Plantation	
	Plantation over area obtained after dismantling	3.373
	Plantation around fencing	1.349
	Plantation over the cleared external OB Dump	0.135
G	Monitoring/Testing of parameters for three years	
	Air Quality	1.484
	Water Quality	1.349
H	*Entrepreneurship Development (Vocational/skill development training for sustainable income of affected people	1.754
I	*Miscellaneous and other mitigative measures	13.490
J	Manpower Cost for Supervision	5.396
	TOTAL	674.523

Note: *: To be covered under Progressive Mine Closure activities also.

CHAPTER - XII

PROGRESSIVE AND FINAL MINE CLOSURE PLAN

12.0 MINE CLOSURE PLANNING

12.1 OBJECTIVES OF CLOSURE PLANNING

As discussed at the outset, this Mining Plan deals with the working of OC Patch-A only. The project area for OC Patch-A is 83.72 Ha. which covers 49.60 Ha of excavation area and other area of about 34.12 Ha for OB Dump, coal Dump etc. After exhaustion of extractable reserve of OC Patch-A, the mine will be left with enough extractable reserve to carry out mining operation in future as per the production requirement of the Mine. As such, the mine will not finally be closed after exhaustion of OC Patch-A. The final Closure Plan of Katras Choitodih Colliery will be prepared when Mining Plan for all the seams is prepared. However, essential activities required to make area safe during extraction and after exhaustion of OC Patch-A has been discussed in this chapter.

Mine closure planning has to be carried out at the starting of the mine and needs periodic reviewing and revision during its life cycle to cope with the geo-technical constraints, safety and economic risks, social and environmental challenges. Various other objectives are as follows:

- ❖ To allow a productive and sustainable after-use of the site which is acceptable to the mine owner and the regulatory authority;
- ❖ To protect public health and safety;
- ❖ To alleviate or eliminate environmental damage and thereby encourage environmental sustainability;
- ❖ To minimize adverse socio-economic impacts.

12.2 DIFFERENT ASPECTS OF MINE CLOSURE PLANNING

The mine closure planning broadly involves the following aspects:

(a) Technical aspects;

The following technical aspects would be reviewed in the final mine closure planning. Details can be worked in closure plans envisaged to be prepared.

- ❖ **Safety hazards including management of fire and subsidence:**

In the mine closure plan, action for control of likely fire areas of the mines will be discussed.

Action will also be suggested to cover all the safety aspects.

❖ **Management of Pit Slopes:**

As per the available records, there are 8 nos. of small quarries in the area. Some of the abandoned quarries are already filled/ partly filled. The partly filled quarries are proposed to be filled upto the required depth. Hence after the closure of the OC Patch-A, there is little likelihood of any slope failure.

❖ **Management of hydrology and hydro-geology:**

In the mine closure plan, the surface flow pattern of precipitation and mine water would be clearly developed and water channel suitably laid down so that it does not disturb the general hydrology of the area.

Mining operation may reduce the water table of the area. To recharge the water table, it is proposed that the mine water during operation will be discharged into surface water settling tank over flow of settled water from the tank will be used for water sprinkling, plantation, domestic purpose, etc. Therefore, the excess over flow water will be discharged into the nearby river. After closure of the mine, vegetation will be grown on the entire vacant area.

❖ **Details of decommissioning of the infrastructures:**

The decommissioning of the various infrastructures developed for the mine like office complex, roads, pipelines and transmission line etc. shall be planned in details so that the land occupied by these infrastructures are released. However, before such decommissioning, the possibility of re-use of these infrastructures for the neighbouring mines shall be explored.

❖ **Closure of entry to the open-cast mine:**

The exposed/excavated area of the proposed open cast shall be back filled as far as possible. The area at the final stage that remains unfilled will be converted into water pond with regulated entry to this pond. The edge of the water pond shall be properly fenced to guard against inadvertent entry of stray animals. The pond water may be used for domestic requirement or for fishery.

(b) Environmental aspects

This would include the following:

❖ **Management of final voids:**

In the mine closure plan, voids due to mining are to be dealt with and the final land use plan will include filling of the voids for land reclamation where ever possible and for hydro reclamation where ever feasible.

❖ **Reclamation of forests/vegetation:**

It is to be ensured that in the final land use plan, all vacant land acquired for the project is afforested.

❖ **Channelisation of available water:**

If the mine is having sufficient water and if on closure, the mine water flows into the surface water courses, channelising this water for surrounding community for their irrigational/domestic uses may be taken up. This can be planned by providing structures involving one time costing

❖ **Management of Recharge Areas:**

The pre-mining and post mining scenario on the hydrogeological recharge system would be included in the closure plan.

❖ **Acceptable Surface and Ground Water Flows:**

In the final closure plan of the mine, wherever the mine water is likely to flow out to surface and meet the surface water sources; the quality of water from such mines would be assessed and flow pattern designed in the final plan.

(c) Social aspects;

The social aspects of land use planning relating to mine closure would include the following:

❖ **Re-deployment of Workforce:**

The company employees will be gainfully engaged in the neighbouring projects after cessation of mining activities at Katras Choitodih Colliery.

❖ **Management of Community Facilities:**

In view of the short life of the project no new community facility will be created. However, the existing facilities of adjoining areas will be strengthened.

(d) Financial aspects.

There are two types of Closure, namely, Progressive Mine Closure (Concurrent) and Final Mine Closure. The cost of Progressive Closure activities is realized by levying a cost of 2.50/Te of coal for Mines.

The Final Mine closure cost has to deal with the following:

- Cost of closure activities.
- Cost towards organization for executing the closure activities.
- Cost of the post project monitoring.
- Creation of a corpus fund for the final mine closure.

12.3 MINE CLOSURE OBLIGATIONS

There is a need to define the liabilities, responsibilities and authorities of the mine management, other regulatory bodies, Central and State Governments after mine closure. Some obligations relating to the Mine Management Companies are as follows:

- (a) **Health & Safety :** Regulation Nos. 6, 61, 106, 112 of Coal Mines Regulations, 1957 and its related DGMS Circulars;
- (b) **Environment :** Water (Prevention & Control of Pollution) Act, 1974; Air (Prevention & Control of Pollution) Act, 1981; Environmental (Protection) Act, 1986 and Environmental Protection (Amendment) Rule, 2000; DGMS Directives on Noise & Ground Vibration;
- (c) **Forest:**
Forest (Conservation) Act, 1980.
- (d) **Rehabilitation:**
CIL's R&R Policy, however, applicable for land oustees only.
- (e) Decommissioning/asset disposal, etc.

12.4 IMPACT ASSESSMENT REMEDIAL MEASURES

Post-Mining Land Use Plan has been shown in Chapter IX. Environmental Impact on Landscape, Water Source, air and noise pollution during mine life has been discussed earlier. It is imperative that the environmental monitoring may be continued for 3 years after closure of the mine in order to assess corrective measures to be implemented to sustain pre-mining

ecosystem and environment in the core and buffer zone (to the extent possible).

12.5 STAKEHOLDERS INVOLVEMENT

Various stakeholders effected due to mine closure need to be identified and they may be as follows:

The Company	:	Employees, Management & Stakeholders
The Community	:	Local business and service providers, landholders, neighbours and nearby residents, local Government and NGOs and Community Groups.
The State	:	The State Government. The Central Government and concerned Government Agencies.

There is need of regular consultations between the stakeholders to evolve the needs of the stakeholders and their involvement in the process.

12.6 CLOSURE ACTION PLAN

Closure planning is a whole-of-life exercise that begins at the start of a mine and continues from beginning of the project till post-closure. The dynamic nature of closure planning requires regular and critical review to reflect changing circumstances as a result of any operational change, new regulation, and new technology and remain flexible enough to cope with changing requirement of mine.

The following steps have to be undertaken in relation to Mine Closure Planning:

Prior to the surface demolition/restoration a surface audit should be undertaken on all surface structures, spoil heaps, lagoons, etc. to assess whether there are any hazardous materials that could cause problems; viz. explosives, chemicals, etc. A list of surface assets should be prepared and made available to potential/prospective purchasers so that they could be invited and asked to submit sealed bids in this regard. This could ensure sale of assets yielding better financial gain.

In order to identify potential impact, necessary hydro-geological studies into post-mining ground water recharge have to be done.

Work force on roll of BCCL may be re-deployed for gainful utilization in the same or other mines of BCCL.

As a detailed component of the Closure Plan, a Decommissioning Plan is to be developed towards the final stages preferably 5 years prior to tentative closure of the mine. Once established, it may be updated annually.

12.7 PROTECTIVE MEASURES TO BE TAKEN

Protective measures must include the following:

- The protection of mine Entries , building and other structures on the project site/mine premises against access by unauthorized persons;
- The maintenance of all mechanical, hydraulic and waste management system;
- The continuation of all monitoring programmes;
- The control of all contaminated effluents;
- The securing of all petroleum products, chemicals and waste;
- Rendering of all tailings, dams and piles of earth, rock and waste resulting from work done on the project site in a stable and safe condition.

12.8 CLOSURE COSTS

12.8.1 As per MOC guidelines, a corpus escrow account @ ` 1.0 lakhs (August, 2009 Price Level) per Ha (for UG) and @ ` 6.0 lakhs (for OC) of the project area shall be opened with the coal controller organization to meet the expenses of final mine closure. The current Guidelines read as:

"It has been estimated that typically closure cost for an opencast mine will come around Rs. 6.00 lakh per Hectare of the property leasehold and it would be Rs. 1.00 lakh per Hectare for underground mine leasehold at current price levels (August, 2009) and these rates will stand modified based on Wholesale Price Index as notified by Government of India from time to time.

There is already a mine closure plan for Katras Choitodih Colliery approved by the 312th BCCL Board, Dated 13.12.2014. As per the approved Mine Closure Plan, the total life of the mine was considered to be 23 years and total mine closure cost up to the considered life of the mine was calculated to be Rs 3402.219 Lakhs. As per the directives, Rs 168.34 Lakhs has been deposited in to the Escrow Account Number 150100010086 by the year 2016.

Further, the same escrow account shall be continued for Katras Choitodih Colliery and the amount already accrued shall be adjusted against the new closure cost calculated.

A modified Mine Closure Plan for Katras Choitodih Colliery (Recast) is being prepared incorporating all the major changes in the mining activities of the mine. The mine closure cost for Katras Choitodih Colliery (Recast) is calculated in following way:

The existing leasehold area of Katras Choitodih Colliery is 228 Ha. Out of total area of 228 Ha, only 83.72 Ha pertaining to mining of OC Patch-A has been considered as project area for the calculation of mine closure cost as per Open cast norms.

As the underground section of Katras Choitodih Colliery is currently not in operation, therefore, it is not considered in the project area.

The money deposited in the Escrow Account has to deal with the following:

- Cost of closure activities.
- Cost towards organization for executing the closure activities.
- Cost of the post project monitoring.
- Creation of a corpus fund for the final mine closure

12.8.2 As per the guidelines for calculation of closure cost, the rates will stand modified based on Whole Sale Price Index (WPI) as notified by Government of India from time to time. Thus the total expenditure on this front has been calculated in following manner:

- The total amount for mine closure activities in respect of Katras Choitodih Colliery = 83.72 Ha X `6 Lakh X 1.41667 = ` 711.62 lakhs

*** The amount has been escalated based on WPI (Final/actual) of October 2016 (183.6) vis-à-vis WPI of August '09 (129.6).**

12.8.3 It is difficult to conclusively predict the mining parameters on a long term basis owing to rapidly changing mining technology, developments in the field of clean coal technologies and R&D activities in development of alternative energy sources.

As per the latest Guidelines issued by the MoC, GoI (dt. 07.01.2013) the “annual closure cost is to be computed, considering the total project area at the above mentioned rates and dividing the same by the entire life of the mine in years for new projects and balance life of mine in years for operating/existing mines.”

Jharia Coalfield is characterized by occurrence of a number of working coal horizons, giving a leverage of extended working life of the mines. Some more seams can come in the lap of workable horizons due to improvement in mining technology in times to come. The underground mines in leasehold of

JCF are generally small capacity mines, giving a false impression of very long lives due to small level of current production level. There may be a strategy in future to amalgamate the mines for higher production level to attain the economics of scale. The existing OC Mines working at shallow depth may be worked upto a greater depth in future. In such a situation, the life of the mine arrived at with current level of production for the balance reserve may not be correct in the long run. **In such a situation, it is envisaged that a Revised Mine Closure Plan should be prepared as per relevant guidelines and submitted for approval of the competent authority as per the requirement.**

At present UG production from Katras Choitodih Colliery is kept under suspension (since 15.06.2012) on account of safety concerns (waterlogged overlying seams within 60 m). The mine was being worked in VIIIA seam through 5 Pit @ 200 TPD with 2 SDLs at the time of production suspension. The production from OC Patch-A has been started since Feb. 2015. The normative production capacity of OC Patch-A was 0.5 MTY and the life was for 6 years. In 2014-15, there was no coal production from the patch and only OB removal was done. However, the coal production during 2015-16 and 2016-17 (upto dec. 2016) was 0.581 and 0.375 MT respectively. Thus, the balance life of the mine is 4 years.

- 12.8.4** As per the data available from the mine, ₹ 168.34 lakhs has already been accrued in the escrow account. This amount has been considered to arrive at the balance amount to be deposited in the Escrow Account of Katras Choitodih Colliery. Thus, the balance amount required to be deposited will be ₹ 711.62 lakhs - ₹ 168.34 lakhs = ₹ 543.28 lakhs.

To arrive at the annual cost to be deposited in each year in an escrow account, **the mine closure cost for OC Patch-A** has been divided by 4. The annual closure cost for subsequent years are as given follows:

- Amount to deposited in 1st year will be the--- ₹ 135.82 lakhs
- Amount to be deposited in 2nd year will be— ₹ 135.82 (1 + 5%)¹ lakhs
- Amount to be deposited in nth year will be---- ₹ 135.82 (1 + 5%)⁽ⁿ⁻¹⁾ lakhs

- 12.8.5** Thus, total Mine closure cost has been arrived at by adding existing amount available (₹ 168.34 lakhs) in Escrow Account and additional amount (₹ 585.40 lakhs) to be deposited in phased manner. The total amount for final mine closure activities of **Katras Choitodih OC Patch-A** thus estimated is ₹ 753.74 lakhs.

The year-wise phasing of closure cost of Katras Choitodih Colliery is as below:

Year	Amount (₹ in lakhs)
Amount deposited for the year 2014-15 and 2015-16.	168.34
1 st Year	135.82

2 ND Year	142.61
3 RD Year	149.74
4 TH Year	157.23
Total	753.74

12.8.6 Based on the existing mine closure planning norms, the above calculated cost at WPI of Oct. 2016 on mine closure may be tentatively grouped under different heads as given in Table No. 12.1 as per the guidelines of CMPDI(HQ), Ranchi.

Table No. 12.1

Break up of Cost of Mine Closure of Katras Choitodih Colliery (Recast)
(OC Patch-A)

Sl. No.	Activity	Mine Closure Cost (` in Lakhs)
A	Dismantling of Structures	
	Service Buildings	1.51
	Residential Buildings	20.12
	Industrial Structures like CHP, Workshop, field sub-station, etc.	2.26
B	Permanent Fencing of Mine Void and other dangerous area	
	Random Rubble masonry of height 1.2 metre including levelling up in cement concrete 1:6:12 in mud mortar	11.31
C	Grading of Highwall slopes	
	Levelling and grading of highwall slopes	13.34
D	*OB Dump Reclamation	
	Handling/Dozing of external OB Dump into mine void	668.27
	Bio-Reclamation including soil spreading, plantation and maintenance	3.01
E	*LANDSCAPING	
	Landscaping of the cleared land for improving its esthetic	2.26
F	*Plantation	
	Plantation over area obtained after dismantling	3.77
	Plantation around fencing	1.51
	Plantation over the cleared external OB Dump	0.15
G	Monitoring/Testing of parameters for three years	

Sl. No.	Activity	Mine Closure Cost (` in Lakhs)
	Air Quality	1.66
	Water Quality	1.51
H	*Entrepreneurship Development(Vocational/skill development training for sustainable income of affected people	1.96
I	*Miscellaneous and other mitigative measures	15.07
J	Manpower Cost for Supervision	6.03
	TOTAL	753.74

Note: *: To be covered under Progressive Mine Closure activities also

12.8.7 Thus, total amount that shall be deposited for final mine closure activities **Katras Choitodih Mine (Recast)** during the period of 4 years has been estimated as ` 585.40 lakhs.

12.8.8 The break up costs of Progressive Closure Activities undertaken by BCCL in Katras Choitodih Colliery is shown the following table:

Table 12.2

Break up costs of Mine Closure Activities for Katras Choitodih Colliery
and Expenditure incurred during Progressive Closure Activities
(As per data furnished from BCCL)

Sl. No.	Activity	Total Expenditure (Lakhs) (2014-15)	Total Expenditure (Lakhs) (2015-16)
A	Dismantling of infrastructure	0	0
	service building	8.70603	0
	Residential building	0	0
	Industrial structure CHP,W/S, substation	0	0
B	Permanent fencing	0	0
C	levelling & grading of highwall slopes		
D	OB dump reclamation	0	0
	Handling/dozing of OB dump & Backfilling	0	0
	Handling/dozing of OB dump & Backfilling	0	0
	Technical and bio reclamation including plantation and post care		
E	Landscaping	0	0
	Landscaping of open space in LH area for improving aesthetics and eco values		
F	Plantation	0	0
	Plantation over cleared area obtained after dismantling	0	0

Sl. No.	Activity	Total Expenditure (Lakhs) (2014-15)	Total Expenditure (Lakhs) (2015-16)
	Plantation around quarry area and in safety zone	0	0
	Plantation over external OB dump		
G	Post closure Environment monitoring	0	0
	Air Quality	0	0
	Water Quality	0	5.745
H	Entrepreneurship development for sustainable income of affected people	0	0
	Sub-Total(OC Part)	0	0
	GRAND TOTAL	8.70603	5.745

****The estimate of total expenditure incurred upon the progressive closure activities are provided by BCCL.***

CHAPTER—XII**PROGRESSIVE AND FINAL MINE CLOSURE PLAN****12.0 Need of Mine Closure Planning -**

Mining is a hazardous operation as it offsets the equilibrium of natural depositional environment viz. in-situ stress field, ground water, surface drainage system as well as the socio-economic condition. Although mining activities are usually short term phenomena, they are liable to leave long lasting impacts on landscape, ecology and on the mine set of local inhabitants. Thus, it is imperative that any mining venture should have adequate closure plan addressing issues viz. Reclamation and environmental protection, rehabilitation of disturbed area. Community implementation of mine closure plan will incur some extra cost, neglecting this aspect will lead to future problems of attending compensation or expensive socio-economic problems.

Mine closure encompasses restoration process designed to restore physical, chemical and biological quality, disturbed by the mining activities. Mine closure is not just something that happens at the end of a mine's life rather mine closure is an ongoing series of decisions and activities beginning in the pre-mining stage of mine and ending with a creation of self-sustainable site that can be returned to the community.

Thus, a mine closure plan needs to define the liabilities, responsibilities and authorities of the different agencies like the mine management, other regulatory bodies, Central and State Governments after mine closure.

Hence, efforts have been made to identify the likely impacts on geo-environmental and socio-political set-up due to closure of the proposed mine during the planning stage itself, so that it will offer an opportunity to generate resources for mitigative measures during closure of the mine.

12.1 Reasons for closure-

Major part of the leasehold area of Salanpur Colliery falls beneath important surface features like Katras Township, DC Railway Line and Nichitpur link line of EC Railway, Railway Colony (Katrasgarh RS), IOW (Katrasgarh), RK siding line (abandoned in Aug. 2003), Salanpur Village, Guhi Bandh Village, Rampujan Village, MADA Water Tank, State Govt. Offices, DB Road etc (Refer Surface cum Topographical Plan).

The Railways are not permitting development beneath its property. Permission for depillaring in the area is not being granted by DGMS resulting in closure of underground mining operation. It is being considered to shift DC Railway line from the existing alignment on account of fire in some mines and a study by RITES is underway to firm up an alternate alignment on non-coal bearing area. This may result in vacation of the major surface area in future and pave the way for future mining. However, no approved plan exists in place as of now and the scenario of future mining in the leasehold area appears very bleak at present.

At present, Seam III and II(Top) is being developed. In this mining plan, II(Top) is not proposed for development due to thinness of the seam. The total development reserves has been estimated as 1.362 Mt considering Seam-III, II(Bot) & Seam-I. The life of the Mine life would be 11 years with normative production of 0.13 Mty Depillaring is not possible due to major surface constraint within the lease hold area.

The mine may be closed in future on account of exhaustion of economically recoverable coal reserves in the lease hold area. The mine may also be closed on account of other unforeseen reasons i.e. Force Majeure or directives from statutory organizations or court etc. for which information and notices shall be served to concerned Government authorities and departments. As per guidelines of Ministry of Coal, Govt. of India, Mine Closure Plan has to be submitted along with the mine plan for getting competent approval within one or two years of date of approval of mine plan.

12.2 Life Cycle Concepts-

Mining projects have a definite life cycle. All the mines have to eventually close their operation. The reasons for the closure may be many including economic conditions, depletion of mine-able resource or any other unforeseen safety reasons.

In the present project proposal the mine life cycle planning is governed by the extractable reserves of the proposed mining area. In general, the total extractable reserve is estimated considering both development as well as depillaring reserves of identified workable seams. In this mine, depillaring has not been done in past due to surface constrain and unless overlying seams are depillared, lower seams can not be depillared. This is mainly due to major surface constrain like Katras Town, Private basti, Rly land etc, Considering the development reserves Seam-III, II(Bottom) & Seam-I and its production

schedule, the life is estimated as 11 years from the date of obtaining Environmental Clearance from MoEFCC. The life of the mine will extent further and may be more if surface constrain is removed in future. It is suggested that the activities for closure will be initiated at an early stage of project life in a gradual/ planned manner.

12.3 Objectives of Closure Planning-

The mine closure phase is supposed to be closed when the mine is decommissioned, facilities at site are removed, the mine entries are sealed/ fenced off, the management of waste dump/ tailing is completed and the site is released in ecologically sustainable state suitable for proposed land use.

Mine closure planning has to be carried out at the starting of the mine and needs periodic reviewing and revision during its life cycle to cope with the geo-technical constraints, safety and economic risks, social and environmental challenges. Various other objectives are as follows:

- ❖ To allow a productive and sustainable after-use of the site which is acceptable to the mine owner and the regulatory authority;
- ❖ To protect public health and safety;
- ❖ To alleviate or eliminate environmental damage and thereby encourage environmental sustainability;
- ❖ To minimize adverse socio-economic impacts.

12.4 Different aspects of Mine Closure Planning-

The mine closure planning broadly involves the following aspects :

(a) Technical aspects;

The following technical aspects would be reviewed in the final mine closure planning. Details can be worked in closure plans envisaged to be prepared.

❖ Safety hazards including management of subsidence:-

Action will also be suggested to cover all the safety aspects.

Following steps will be taken as precaution subsidence while mining:-

- i. Panel size will be so designed so that depillaring with caving (if done in future) will be completed within the incubation period of the coal seam. Depillaring is possible only when surface constrain is removed and land is acquired.
- ii. Panel will be isolated in proper fashion before depillaring takes place.
- iii. Surface will be properly dozed and leveled wherever there are cracks and fissures so that air does not breathe in through surface.

❖ **Management of Pit Slopes (for existing as well as proposed quarry):**

The final quarry slopes shall be so designed and then subsequently developed that after the closure of the mine, there is no likelihood of any slope failure. The final slope of the quarry has been designed with above consideration. However, strict compliance with the proposed final slope of quarry and subsequent slope stability studies would be made.

❖ **Management of hydrology and hydro-geology:**

In the mine closure plan, the surface flow pattern of precipitation and mine water would be clearly developed and water channel suitably laid down so that it does not disturb the general hydrology of the area.

Mining operation may reduce the water table of the area. To recharge the water table, it is proposed that the mine water during operation will be discharged into surface water settling tank. Over flow of settled water from the tank will be used for water sprinkling, plantation, domestic purpose, etc. Therefore, the excess over flow water will be discharged into the nearby Katri River flowing southerly on west side of the property. After closure of this mine (if depillaring in underground working is done in future or quarry is made), the entire surface area will be back filled, dozed and vegetation will be grown.

❖ **Details of decommissioning of the infrastructures:**

The decommissioning of the various infrastructures developed for the mine like office complex, roads, pipelines and transmission line etc. shall be planned in details so that the land occupied by these infrastructures are released. However, before such decommissioning, the possibility of re-use of these infrastructures for the neighbouring mines shall be explored.

❖ **Closure of entry to the open-cast mine and underground mine:**

All entries to the mine (UG or OC/ Quarry) must be planned to be effectively closed so that illegal mining from these openings and safety hazards by way of entry of fire and water etc, will be prevented in the abandoned mines.

(b) Environmental aspects:

This would include the following-

❖ **Management of final voids in case of quarry: -**

In the mine closure plan, voids due to mining are to be dealt and the final land use plan will include filling of the voids for land reclamation where possible and for hydro reclamation where feasible. The study on slope study will be made by some scientific agency and in final closure plan their suggestions will be incorporated.

❖ **Reclamation of forests/vegetation: -**

It is to be ensured that in the final land use plan, all vacant land acquired for the project is afforested

❖ **Channelisation of available water: -**

If the mine (UG/OC/Quarry) is having sufficient water and if on closure, the mine water flows into the surface water courses, channelising this water for surrounding community for their irrigational/domestic uses may be taken up. This can be planned by providing structures involving one time costing

❖ **Management of recharge areas: -**

The pre-mining and post mining scenario on the hydro-geological recharge system would be included in the closure plan.

❖ **Acceptable Surface and Ground Water Flows:**

In the final closure plan of the mine, wherever the mine water is likely to flow out to surface and meet the surface water sources; the quality of water from such mines would be assessed and flow pattern designed in the final plan.

(c) Social aspects:-

The social aspects of land use planning relating to mine closure would include the following:

❖ **Re-deployment of Workforce:**

The company employees will be gainfully engaged in the neighbouring projects after cessation of mining activities.

❖ **Management of Community Facilities:**

In view of the short life of the project, no new community facility will be created. However, the existing facilities of adjoining areas will be strengthened.

(d) Financial aspects.

There are two types of Closure, namely, Progressive Mine Closure and Final Mine Closure. The cost of Progressive Closure activities is realized by levying a cost of Rs. 2.50/Te of coal for UG Mines. The Final Mine closure cost has been dealt with at the end of this Chapter. It has to deal with the following:

- Cost of closure activities.
- Cost towards organization for executing the closure activities.
- Cost of the post project monitoring.
- Creation of a corpus fund for the final mine closure.

12.4 Mine Closure Obligations:-

There is need to define the liabilities, responsibilities and authorities of the mine management, other regulatory bodies, Central and State Governments after mine closure. Some obligations relating to the Mine Management Companies are as follows :

- | | |
|---------------------------------|---|
| (a) Health & Safety: | i) Regulation Nos. 6, 61, 106, 112 of Coal Mines
ii) Regulations, 1957 and its related DGMS Circulars; |
| (b) Environment : | i) Water (Prevention & Control of Pollution) Act, 1974;
ii) Air (Prevention & Control of Pollution) Act, 1981;
iii) Environmental (Protection) Act, 1986
iv) Environmental Protection (Amendment) Rule , 2000; |

v) DGMS Directives on Noise & Ground Vibration;

(c) **Forest** : Forest (Conservation) Act, 1980.

(d) **Rehabilitation** : CIL's policy, however, applicable for land oustees only.

(e) **Decommissioning/asset disposal**, etc.

12.5 Impact assessment remedial measures:

Post-Mining Land Use Plan has been given in Chapter IX. Environmental Impact on Landscape, Water Source, air and noise pollution during mine life has been discussed earlier. It is imperative that the environmental monitoring may be continued for 1-2 years after closure of UG in order to assess corrective measures to be implemented to sustain pre-mining ecosystem and environment in the core and buffer zone (to the extent possible).

12.6 Practice after the closure of the mine-

As the sources of dust and fume generation would no longer be present, the present practice of arresting the air pollution, as enumerated in Chapter-XI. However, water sprinkling would be done on the roads, which remain in use after the mine closure.

Quality of air would be monitored for a period of 3 years after cessation of mining activity. Three samples at fortnight frequency for 3 years, one sample in core zone and one sample each in upwind and downwind direction will be collected and analysed.

12.6.1 Dump Reclamation -

Most of the back filled area shall be afforested by selecting proper plant species in consultation with State Forest Department. A part of the back filled area would also be developed for agricultural purpose with the help of the concerned State Authority. The existing void will serve as a lagoon and may be utilised as water reservoir for the locality. The entire area shall be suitably fenced.

The present mine is an underground unit and generally no solid waste will be generated during the mining operation except stone generates during drift drive .

12.6.2 Details of Surface Structures proposed for dismantling-

12.6.2.1 Infrastructure details -

As far as possible, industrial structures shall be utilised by the adjacent mine. However, if these structures are not found fit at the end of mine life, the same will be dismantled and salvaged. The equipments will be removed and used somewhere else. Every effort will be made to restore the area to economic utilization value in line with mine closure plan.

A. Service Buildings: The service buildings/ structures, viz. workshop, stores, office building, cap-lamp room, Pit Top office, winding rooms, etc. are to be demolished after collecting all re-useable items, or be used for some other projects and the land covered by them restored for productive use. However, it has to be ensured that as and when a service building is vacated/ abandoned, the same should be demolished to prevent any unauthorized occupation.

B. Other Infrastructures: All other infrastructures like sub-stations, transformers, community services, pump-houses, water-treatment/ filtration plants, waterlines, power lines, roads etc. will be utilized for the neighbouring projects.

However, possibility shall be explored for handing over the buildings and other infrastructures including the reclaimed land to the State Government for the benefit of local villagers and strengthening the area infrastructures. The end use of these facilities shall be decided by the State Government with the help of District Authorities and Village Panchayat. The peripheral village community facilities developed by the Mine Authorities will be left to the Local Body/ State Government for their management and public use.

Prior to surface demolition/ restoration, a surface audit will be undertaken on all surface structures, spoil heaps etc. to assess whether there is any hazardous material that could cause problem, i.e. explosive, asbestos, chemical, oil, etc.

A list of surface and UG assets (Plant & Machinery) will be prepared and made available to potential purchasers or transferred to other new/ working mines of the company. This will ensure that the assets perform during their economic life.

12.6.2.2 Post closure disposal / Re-use of the Buildings, Plants & Machineries-

a. Disposal or reuse of existing HEMM, CHP, workshop and railway siding for OC-
No quarry is in operation in Salanpur Mine.

b. Disposal or reuse of haulage, ventilation, workshop and railway siding for UG-

At the time of closure of the mine, it is expected that most of the equipments would complete its rated life and would be surveyed off as per the Company's guidelines. The surveyed off equipments would be auctioned as per prevalent norms.

However, if some of the equipments would not have covered their rated life, they would be diverted to the neighbouring projects for gainful utilisation.

There is a abandoned R K Railway siding in the leasehold area which is under dismantling with due care.

c. Disposal or reuse of transmission lines and sub-station-

As per the electricity demand of the existing neighbouring projects, an analysis would be made as to whether the existing sub-station and transmission lines could be gainfully used or not. If the scope of gainful utilization is not found, they will be dismantled and the usable items/spares/conductors etc. would be dispatched to needy Areas/Projects.

d. Disposal or reuse of residential and non-residential buildings-

At the time of final closure, a list of surface buildings would be prepared in detail. Thereafter following steps would be taken in chronological order in respect of the available buildings:-

- An assessment would be made to find that whether the available buildings can be used by the existing neighboring projects or any new project that might have come up in the vicinity.

- In case, the listed assets cannot be utilized by the nearby project, efforts would be made to sale these assets after making the list available to potential purchasers and asking the interested purchasers to submit sealed bids.
- Thereafter, the state agencies/local agencies may be asked to take possession of the buildings, if they required few of them.
- When there would be no takers, the buildings would be demolished and usable items would be recovered for future use.

12.7 Safety and Security Arrangement

12.7.1 Mine entry-

After closure of the mining activities, all the entries to the mine will be effectively sealed off to avoid any accident and to prevent access to any unauthorized person. The area that is not reclaimed shall be properly fenced/ sealed to prevent any unauthorized entry into the area. Flags/Boards with warning signals shall be posted at vulnerable places to avoid chances of accidents. However, the guidelines / instructions from DGMS, if any, will be followed.

Sealing details and dimensions shall also be prepared for the purpose. The minimum thickness of mine sealing will be 100cm RCC (M20) with nominal reinforcement. For incline entry, the mine entry path of 5 m will be filled with debris and clay before sealing the mine.

12.7.2 Details of fencing around abandoned quarry, indicating the length of the fencing-

At present, no quarry exist in Mine area. If re-opened in future then the void of the existing quarry would be properly fenced to avoid any inadvertent entry of animals or human beings. Sufficient Boards and danger signs shall be placed all around.

Later on, the responsibility of keeping the fencing secured would be entrusted on the State Authorities.

12.7.3 Slope stability arrangement for high wall and back filled dumps

As regards stability of existing back-filled dumps, the final level of reclaimed backfill will be matched with the levels of surrounding hill ranges leaving a final residual void which will serve as a lagoon which may be utilised as water reservoir for the locality. For the stability of the back-filled dump, the slope of the dump will be maintained at a stable angle. Vegetation cover will also be provided along the slopes to arrest any failure.

12.7.4 Providing one time lighting arrangement-

Sufficient lighting as per standard is provided at all the required places, i.e., Mine office, haulage room, fan house, cap lamp room, mine entry, workshop, sub-station, haul road in quarry etc.

After closure of the mine, the lighting arrangements will be kept maintained at all locations which are not required to be demolished or dismantled like sub-stations, transformers, community services, pump-houses, water-treatment/ filtration plants, waterlines, power lines, roads etc. to be utilised for the neighbouring projects and local communities.

12.7.5 Survey records of workings-

All the mine workings including subsidence areas, roads, ponds, tanks etc. shall be resurveyed and records shall be updated. Copy of such records shall also be submitted to the appropriate competent authorities, such as DGMS and State Authorities.

12.7.6 Disposal management of hazardous material-

At the time of closure, assessment would be made as to find whether there is any hazardous material that could cause problem. Such hazardous material e.g. explosives, chemicals, oil etc. shall be appropriately disposed off.

12.8 Stakeholders Involvement -

Various stakeholders effected due to mine closure need to be identified and they may be as follows:

The Company	:	Employees, Management & Stakeholders
The Community	:	Local business and service providers, land holders, neighbours and nearby residents, local Government and NGOs and Community Groups.
The State	:	The State Government, the Central Government and its concerned Government Agencies.

There is need of regular consultations between the stakeholders to evolve the needs of the stakeholders and their involvement in the process.

12.9 Closure Action Plan-

Closure planning is an exercise that begins at the start of a mine opening and continues till post-closure. The dynamic nature of closure planning requires regular and critical review to reflect changing circumstances as a result of any operational change, new regulation, and new technology and remain flexible enough to cope with unexpected events.

The following proposal / steps have to be undertaken in relation to Mine Closure Planning:

Prior to the surface (including infra-structure) demolition/restoration, a surface audit should be undertaken on all surface structures, spoil heaps, lagoons, etc. to assess whether there are any hazardous materials that could cause problems; viz. explosives, chemicals, waste material, etc. A list of surface assets should be prepared and made available to potential purchasers, prospective purchasers could be invited and asked to submit sealed bids, this could ensure that the sale of assets give better financial gain.

In order to identify potential impact, necessary hydro-geological studies into post-mining ground water recharge have to be done.

Work force on roll of BCCL may be re-deployed for gainful utilization of employees of BCCL.

As a detailed component of the Closure Plan, a Decommissioning Plan is to be developed towards the final stages preferably 5 years prior to tentative closure of the mine. Once established, it may be updated annually.

12.10 Protective Measures to be taken-

Protective measures must include the following:

- ❖ Protection of mine Entries , building and other structure on the project site against access by unauthorized persons;
- ❖ Maintenance of all mechanical, hydraulic and waste management system;
- ❖ Continuation of all monitoring programmes;
- ❖ Control of all contaminated effluents;
- ❖ Securing of all petroleum products, chemicals and waste;

12.11 Mine Closure Cost:

Mine Closure activities would be a constant exercise for the mine which would begin with the commencement of mining operations and continue till post closure. The mine closure activities would naturally entail certain expenditures, which will have to be borne by the mine operator.

There would be two types of expenditures on account of mine closure activities in respect of Salanpur Colliery.

A) Revenue expenditures

This would cover the activities which are being executed along with normal mining operation and would continue to be executed in course of execution of the project. The cost of progressive mine closure activities is already part of the project cost.

B) Expenditures to be incurred just prior to actual mine closure and in the post closure period

As per MOC guidelines, a corpus escrow account @Rs.1.0 lakhs (August, 2009 Price Level) per Ha (for UG) and @ Rs.6.0 lakhs (for OC) of the project area shall be opened with the coal controller organization to meet the expenses of final mine closure. The current Guidelines read as:

“It has been estimated that typically closure cost for an opencast mine will come around Rs. 6.00 lakh per Hectare of the project area and it would be Rs. 1.00 lakh per Hectare for underground mine project area at current price levels (August, 2009) and these rates will stand modified based on Wholesale Price Index as notified by Government of India from time to time”.

There is already a mine closure plan approved by the 305th BCCL Board, Dated 12.03.2014. According to the approved mine closure plan the total life of the mine was considered to be 12 years and total mine closure cost up to the considered life of the mine was calculated to be Rs 369.439 Lakhs. As per the directives Rs 142.90049 Lakhs (Principal Rs 125.296 lakhs and Interest Rs 17.604 lakhs) were deposited in to the Escrow Account Number 150100009050 by the year 2016. Further, the same escrow account shall be continued for Salanpur Colliery.

As per the data furnished by the mine/area, leasehold area and project area in respect of Salanpur UG mine is the same and the closure cost is calculated accordingly.

In Salanpur Colliery, the existing leasehold and project area is 177.49 Ha. Out of this, 5.46 Ha is abandoned and not backfilled quarry, 21.00 Ha is considered for suspended opencast patch and the remaining 151.03 Ha is considered for underground operations. Thus, out of the project area of 177.49 Ha, 26.46 (5.46 + 21.00) Ha area has been considered for the calculation of closure cost as per Open cast norms and the remaining 151.03 Ha has been considered for the calculation of closure cost of the area as per Underground norms.

The overlapping area (where UG & OC operations have been done in different vertical levels) has been considered for calculation of closure cost as per opencast norms.

The money deposited in the Escrow Account has to deal with the following:-

- Cost of closure activities.
- Cost towards organization for executing the closure activities.
- Cost of the post project monitoring.
- Creation of a corpus fund for the final mine closure

12.11.1 The total amount that shall be further deposited for final mine closure activities of **Salanpur Colliery** in case of underground workings during the considered period of 11 years stands out to be ₹ **198.309 lakhs** and in case of opencast workings during the considered period of 5 years stands out to be ₹ **176.585 lakhs** as per the present status of the mine. The year-wise break-Up cost of Mine Closure of Salanpur Colliery is given in Table No. 12.1.

Table No. 12.1
Break-Up cost of Mine Closure of Salanpur Colliery

Year	Amount to be Deposited (in ₹ lakhs)		
	UG Section	OC Section	Total
1	13.959	31.958	45.916
2	14.657	33.555	48.212
3	15.390	35.233	50.623
4	16.159	36.995	53.154
5	16.967	38.845	55.812
6	17.815		17.815
7	18.706		18.706
8	19.641		19.641
9	20.623		20.623
10	21.655		21.655
11	22.737		22.737
	198.309	176.585	374.895

The amount already deposited in the escrow account will also be available for mine closure activities and should be included to arrive at the total funds available for Mine Closure Activities.

Table No. 12.2
Total Amount available for Mine Closure Activities of Salanpur Colliery

	Amount (in ₹ lakhs)	
	UG Section	OC Section
Amount Already Deposited in Escrow Account	60.296	65.000
Amount to be Deposited in the Escrow Account in the Future	198.309	176.585
Total Amount available for Mine Closure Activities	258.605	241.585

12.11.2 Based on the existing mine closure planning norms, the above calculated cost at Final WPI of November 2016 on mine closure may be tentatively grouped under different heads as given in Table No. 12.3 A and 12.3 B for underground and opencast respectively, as per guidelines of CMPDI(HQ).

Table 12.3 A**Break up costs of Mine Closure Activities for Salanpur Colliery (Underground)**

Sl. No.	Activity	Mine Closure Cost (₹ in Lakhs)
A	Dismantling of Structures	
	Service Buildings	9.051
	Residential Buildings	27.360
	Industrial Structures like CHP, Workshop, field sub-station, cap lamp room, haulage, fan installation etc.	16.370
B	Permanent Sealing of mine entries(incline mouth and air shaft)	
	Sealing of incline mouths and air shafts	13.758
C	*Subsidence Management	12.284
D	LANDSCAPING	
	Landscaping of the cleared land for improving its esthetic	22.757
E	*Plantation	
	Plantation over the cleared area obtained after dismantling and on other barren spaces	33.619
F	Monitoring/Testing of parameters for three years	
	Air Quality	17.663
	Water Quality	16.396
G	*Enterpreneuship Development(Vocational/skill development training for sustainable income of affected people	19.783
H	*Miscellaneous and other mitigative measures	37.756
I	Manpower Cost for Supervision	31.808
	TOTAL	258.605

Note: * : To be covered under Progressive Mine Closure activities also

Table 12.3 B

Break up costs of Mine Closure Activities for Salanpur Colliery (Opencast)

Sl. No.	Activity	Mine Closure Cost (₹ in Lakhs)
A	Dismantling of Structures	
	Service Buildings	0.483
	Residential Buildings	6.450
	Industrial Structures like CHP, Workshop, field sub-station, etc.	0.725
B	Permanent Fencing of Mine Void and other dangerous area	
	Random Rubble masonry of height 1.2 metre including levelling up in cement concrete 1:6:12 in mud mortar	3.624
C	Grading of Highwall slopes	
	Levelling and grading of highwall slopes	4.276
D	*OB Dump Reclamation	
	Handling/Dozing of external OB Dump into mine void	214.189
	Bio-Reclamation including soil spreading, plantation and maintenance	0.966
E	LANDSCAPING	
	Landscaping of the cleared land for improving its esthetic	0.725
F	*Plantation	
	Plantation over area obtained after dismantling	1.208
	Plantation around fencing	0.483
	Plantation over the cleared external OB Dump	0.048
G	Monitoring/Testing of parameters for three years	
	Air Quality	0.531
	Water Quality	0.483
H	*Entrepreneurship Development(Vocational/skill development training for sustainable income of affected people	0.628
I	*Miscellaneous and other mitigative measures	4.832
J	Manpower Cost for Supervision	1.933
	TOTAL	241.585

Note: * : To be covered under Progressive Mine Closure activities also

12.11.3 The break up costs of Progressive Closure Activities undertaken by BCCL in Salanpur Colliery as per earlier approved Mine Closure Plan is given in the following table:

Table 12.4

Break up costs of Mine Closure Activities for Salanpur Colliery (earlier approved) and Expenditure incurred during Progressive Closure Activities

Sl. No.	Activity	Mine Closure Cost (₹ in Lakhs)	Amount Claimed (Lakhs) (2014-15)	Amount Claimed (Lakhs) (2015-16)
A	Dismantling of Structures			
	Service Buildings	10.655		
	Residential Buildings	32.21		
	Industrial Structures like CHP, Workshop, field sub-station, etc.	19.271		
B	Permanent Sealing of mine entries(incline mouth and air shaft)			
	Sealing of incline mouths and air shafts	16.196		
C	Subsidence Management	14.461		2.56609
D	LANDSCAPING			
	Landscaping of the cleared land for improving its esthetic	26.791		
E	Plantation			
	Plantation over area obtained after dismantling	39.577		1.81038
F	Monitoring/Testing of parameters for three years			
	Air Quality	20.793		
	Water Quality	19.301		
G	Enterpreneurship Development(Vocational/skill development training for sustainable income of affected people	23.29	41.80181	
H	Miscellaneous and other mitigative measures	44.448		173.29465
I	Manpower Cost for Supervision	37.446		
	Sub-Total(UG Part)	304.439		
	Abandoned Quarry Reclamation			
J	Reclamation of the abandoned quarry	65.000		
	Sub-Total(OC Part)	65.000		
	GRAND TOTAL	369.439	41.802	177.671

**The estimate of total expenditure incurred upon the progressive closure activities are provided by BCCL.*

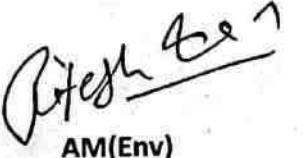


Bharat Coking Coal Ltd.
(A Subsidiary of Coal India Limited)
Office of the General Manager, Katras Area
P.O. KATRAS, P.S.- Jogta, Dhanbad-828121
CIN: U1010JH1972GOI000918
Phone/Fax No.: 0326-2371213
Email ID: cgmkatras@bccl.gov.in

Annexure-12

To whom it may concern

This is to certify herethat there is no mining induced subsidence movement over and around the working area of cluster-IV group of mines namely Amalgamated Keshalpur west mudidih colliery, Amalgamated Angarpathra Ramkanali colliery, Gaslitand colliery, Katras Choitudih colliery & Salanpur colliery have been observed after obtaining Environmental clearance.


AM(Env)
Cluster IV

RC STATUS

JH02AE6241
Goods Carrier(HGV)
DIESEL
LPK 2518
TATA MOTORS LTD
HAZARIBAG, Jharkhand

Status: ACTIVE
Not Available

Owner Name:	*I*A*J*N *U*A*	Registration Date:	25-Nov-2014
Validity			
Fitness/REGN:	23-Dec-2021	MV Tax:	28-12-2021
Insurance:	12-Nov-2022	PUCC:	12-May-2022
*If Insurance/PUCC validity are not available, same may be verified from physical document.			
Financed: YES			

TERMS OF USES

- The content on this portal is meant for sharing information regarding vehicles on the basis of information available on centralized VAHAN and vehicle National Register. Using content of this portal for any commercial purpose or any derivative work or misuse of any kind is strictly prohibited and may invite legal consequences.
- The content can be removed from the portal without notice and at any time as per Ministry of Road Transport and Highways/NIC direction.
- Ministry of Road Transport and Highways/NIC shall not be held responsible for any interactions/passing of information(s) etc. between any user via e-mail, chat and any other mediation with another user. Ministry of Road Transport and Highways/NIC has no obligation to monitor any such disputes arising between the users and shall not be party to such dispute/litigation etc.
- These terms and conditions shall be governed by and construed in accordance with the Indian Laws. Any dispute arising under these terms and conditions shall be subject to the jurisdiction of the courts of Indian territory only.

RC STATUS

JH10AJ0359
Goods Carrier(HGV)
DIESEL
LPK2518
TATA MOTORS LTD
DHANBAD, Jharkhand

Status: ACTIVE
Not Available

Owner Name:	*O*A* *U*A* *H*U*H*R*	Registration Date:	07-Mar-2013
Validity			
Fitness/REGN:	11-Apr-2022	MV Tax:	06-12-2021
Insurance:	25-Feb-2022	PUCC:	NA
*If Insurance/PUCC validity are not available, same may be verified from physical document.			
Financed: YES			

TERMS OF USES

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- These terms and conditions shall be governed by and construed in accordance with the Indian Laws. Any dispute arising under these terms and conditions shall be subject to the jurisdiction of the courts of Indian territory only.

RC STATUS

JH10AN9675
Goods Carrier(HGV)
DIESEL
LPK2518
TATA MOTORS LTD
DHANBAD, Jharkhand

Status: ACTIVE
Not Available

Owner Name:	*M*S* *U*A*	Registration Date:	20-Mar-2014
Validity			
Fitness/REGN:	07-Oct-2023	MV Tax:	19-12-2021
Insurance:	11-Mar-2022	PUCC:	16-Sep-2022
*If Insurance/PUCC validity are not available, same may be verified from physical document.			

TERMS OF USES

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- These terms and conditions shall be governed by and construed in accordance with the Indian Laws. Any dispute arising under these terms and conditions shall be subject to the jurisdiction of the courts of Indian territory only.

RC STATUS

JH10BB2322
Goods Carrier(HGV)
DIESEL
LPK2518
TATA MOTORS LTD
DHANBAD, Jharkhand

Status: ACTIVE

Not Available

Owner Name:	*A*E*H *U*A* *A*A*O	Registration Date:	27-Sep-2016
Validity			
Fitness/REGN:	01-Sep-2023	MV Tax:	26-03-2022
Insurance:	16-Sep-2022	PUCC:	20-Feb-2022
*If Insurance/PUCC validity are not available, same may be verified from physical document.			

Permit Details

Goods Permit [TIPPER]			
Permit No:	PPUC/1789/2016/HZB	Valid upto:	08-Nov-2026
NP Auth No:		NP Auth upto:	

TERMS OF USES

- The content on this portal is meant for sharing information regarding vehicles on the basis of information available on centralized VAHAN and vehicle National Register. Using content of this portal for any commercial purpose or any derivative work or misuse of any kind is strictly prohibited and may invite legal consequences.
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- These terms and conditions shall be governed by and construed in accordance with the Indian Laws. Any dispute arising under these terms and conditions shall be subject to the jurisdiction of the courts of Indian territory only.

भारत कोकिंग कोल लिमिटेड

एक मिनी रत्न कम्पनी

(कोल इंडिया लिमिटेड का एक अंग)

विभागाध्यक्ष (पर्यावरण) का कार्यालय

कोयला भवन, कोयला नगर, धनबाद

पत्रसंख्या: भाकोकोलि/ विभागाध्यक्ष (पर्या)/फाईल-Plantation/B-3/2021/271-278 (H) दिनांक: 18.02.2021

सेवा में,

वन प्रमंडल पदाधिकारी,

धनबाद

**Bharat Coking Coal Limited**

A Mini Ratna Company

(A Subsidiary of Coal India Limited)

Office of the HoD (Environment)

Koyla Bhawan, Koyla Nagar, Dhanbad

विषय : Work Order for carrying afforestation over 13 ha of OB dump of BCCL.

संदर्भ: (i) Our letter no. भाकोकोलि/उपमहाप्रबंधक(पर्या)/फाईल-B-3/2020/1529-1534(H) dt 10.12.2020
(iii) Your letter no.88 dated 12.01.2021

माननीय महोदय,

This has reference to above mentioned letters, competent authority has approved for carrying afforestation over 13 ha of OB dump of BCCL through DFO, Dhanbad for a total estimated value of ₹ 37,96,039.00 (Rupees thirty seven lakhs ninety six thousand thirty nine only) for four years with the following terms and conditions in respect of above mentioned work:-

1. The Period of work will be 04 years as per the estimate provided by Forest Department.
2. The aforesaid work is to be carried out at below mentioned sites:

S No	Name of the site	Type	Ha
1	AGKCC, Katras Area	OB Dump	13

3. The Forest department shall conduct all its afforestation activities subject to all laws, rules, statutory orders and regulations applicable to the site and the nature of the work.
4. The Forest department shall take up afforestation works on company's land with due expertise and supervision as per the scheme & estimates duly sanctioned as per the estimate submitted by forest department (The estimate has been submitted by Forest Department considering 15% enhancement every year in labour wages of preceding year).
5. The estimate has been submitted by Forest Department considering 15% enhancement every year in labour wages of preceding year. However, the payment of Completion work, first year maintenance work and second year maintenance work will be made as per the actual labour wages prevailing in the corresponding year.
6. The Forest department shall exercise precautions on the aid and advice of the mine management for the safety of all lives and properties involved in the afforestation activities.

7. SCOPE OF WORK

This work shall be done with the following attributes:

- (i) Self-sustaining / healthy plantation at the end of project period/ at the handover of the site.
- (ii) The plants planted shall be of native species, high root density, soil binding species, thick canopy and/or fruit bearing. The following suggested native species shall preferably but not limited to be planted at the sites:

S.No.	Botanical Name	Common name	S.No.	Botanical Name	Common name
1.	<i>Ailanthus excelsa</i>	Mahanim	2.	<i>Ficus hispida</i>	Kath gular
3.	<i>Albizzia lebbeck</i>	Siris	4.	<i>Ficus religiosa</i>	Pipal
5.	<i>Alstonia scholaris</i>	Chatni	6.	<i>Albizia Procera</i>	Safed Siris
7.	<i>Azadirachta indica</i>	Neem	8.	<i>Madhuca indica</i>	Mahua
9.	<i>Bombax ceiba</i>	Semal	10.	<i>Melia composita</i>	Bakain
11.	<i>Butea monosperma</i>	Palas	12.	<i>Tamarindus indica</i>	Imli
13.	<i>Cassia fistula</i>	Amaltas	14.	<i>Terminalia arjuna</i>	Arjun
15.	<i>A. Odoratissima</i>	Kala Siris	16.	<i>Aegle marmelos</i>	Bel
17.	<i>Dalbergia sissoo</i>	Shisham	18.	<i>Mangifera indica,</i>	Aam
19.	<i>Ehretia laevis</i>	Chamror	20.	<i>Zizyphus nummularia</i>	Ber
21.	<i>Ficus glomerata</i>	Gular	22.	<i>Embilica officianlis</i>	Awala
23.	<i>Syzygium cumini</i>	Jamun	24.	<i>Anthocephalus indicus</i>	Kadamb
25.	<i>Acacia Catechu</i>	Desi Kher	26.	<i>Gmelina arbora</i>	Gamhar
27.	And other fruit bearing native species or the species deemed suitable by the Forest deptt.				

- (iii) Survival of the plantation shall not be less than 80 per cent at the end of the project period.
- Annual Joint Inspection report of the inspection carried out by joint team of Forest Department and BCCL personnel after the completion of each year work should indicate name of the site, year of plantation, number of plants, name of the species present, date of inspection and survival rate.
 - The display boards shall be installed at all the plantation sites indicating, the name of the company, the no. of plantation, species planted, name of site of plantation and plantation year.
 - All the materials & manpower required with regard to the aforesaid work shall be arranged by you at your own cost.
 - The Forest department shall pay wages not less than the minimum wages fixed by the Govt of Jharkhand to the labourers engaged in the execution of the aforesaid work and it will be the responsibility of the Forest department to ensure the compliance of the payment of wages to its workmen/labourers as per law and company shall not be held responsible for the same.
 - In case of revision of minimum wages by the Govt of Jharkhand during the work, a revised estimate of the corresponding year of the scheme as per the work order shall be submitted to the company by Forest Department and claim the amount of difference in wages payable due to increase in labour wages on the basis of man days works on revised wage for which the forest department shall certify.
 - As the afforestation work has been directly monitored by Ministry of Coal, every year on monthly basis; therefore, you will provide the plantation data from June 2021 to October 2021 on monthly basis during the completion year (2021-22).
 - The afforestation sites as mentioned in the work order shall be handed over to mine management after the Joint inspection at the end of the Maintenance year-2 and having survival rate not less than 80%.

15. TERMS OF PAYMENT

Total project cost is ₹ 37,96,039.00 (Rupees thirty seven lakhs ninety six thousand thirty nine only as per the estimate submitted by Forest Department. The payment schedule will be as follows: -

S. No	Financial Year	Details of the work	Amount (Rs.)	Remarks
1.	2020-21	Advance Work	13,28,797.00	Wages @ ₹ 295.80 per MD
2.	2021-22	Completion work	14,70,510.00	Wages @ ₹ 340.17 per MD
3.	2022-23	Maintenance work-1	5,79,193.00	Wages @ ₹ 391.19 per MD
4.	2023-24	Maintenance work-2	4,17,539.00	Wages @ ₹ 449.87 per MD
Total			37,96,039.00	

16. The estimate for the Completion work, Maintenance work-1 and Maintenance work-2 is based on the tentative increase in the labour wages @ 15% of preceding year's wages as submitted in the estimate by the Forest Department. Therefore, the forest department shall certify the rate of labour wages for the corresponding year and demand letter/ bill based on the actual rates of labour wages to that corresponding year.

17. **Paying Authority:** HOD (Pay), Pay Office, BCCL HQ, Koyla Bhawan, Dhanbad.

18. All the payment will be made by ELECTRONIC MODE through bank in the account of DFO, Dhanbad. You are required to fill the format of Electronic Fund Transfer (EFT) in triplicate which is enclosed as annexure-A.

19. For release of the payment, you have to submit

- The letter of acceptance of the work order along with the Demand letter/Bill for the Advance work.

And for further payments regarding this work order

- Utilization certificate of the preceding payment made to you in respect of this work order
- Joint inspection report of preceding year's work.
- Demand letter/Bill based on the actual rates of labour wages to that corresponding year for payment.

The utilization certificates along with joint inspection report shall be accepted by the accepting authority i.e. HOD (Env), BCCL.

20. BCCL shall not have any liability in case of any accident etc. towards Forest Department's personnel/ staffs /workers during the execution of the work.

21. All other conditions stipulated in aforementioned reference letters shall be complied.

22. Matter relating to any dispute or difference arising out of this work order shall be subject to the jurisdiction of Dhanbad court only.

23. Child labour is prohibited under Mines Act, therefore, child labour shall not be deployed in the aforesaid work.


विभागाध्यक्ष (पर्यावरण)

PROFORMA FOR COLLECTING PAYMENT THROUGH ELECTRONIC MODE INCLUDING ELECTRONIC FUND TRANSFER (ETF) & ELECTRONIC CLEARING SYSTEM (ECS)

1	VENDOR/SUPPLIER/CONTRACTOR/CUSTOMER'S NAME & ADDRESS (With Telephone No. and Fax No.)	
2	PARTICULARS OF BANK ACCOUNT	
	A) BANK NAME	
	B) BRANCH NAME (Including RTGS Code)	
	ADDRESS	
	TELEPHONE No. & FAX No.	
	C) 9 – DIGIT CODE NUMBER OF THE BANK & BRANCH (Appearing on the MICR cheque issued on the bank) OR 5 – digit code No. OF SBI	
	D) ACCOUNT TYPE (S.B. Account/Current Account OR Cash Credit with code 10/11/13)	
	E) LEDGER No./LEDGER FOLIO No.	
	F) ACCOUNT NUMBER (CORE BANKING) & STYLE OF ACCOUNT (As appearing on the cheque Book)	
3	DATE OF EFFECT	

I hereby declare that the particulars given above are correct and complete. If the transaction is delayed or not effected at all for reasons of incomplete or incorrect information, I would not hold the user institution responsible. I have read the option invitation letter and agree to discharge responsibility expected of me as a participant under the scheme. Any Bank charges levied by the Bank of such e-transfer shall be borne by us.

Date :

Signature of the Contractor

Certified that the particulars furnished above are correct as per our records.

Signature of the Authorized Officials
from the Bank



भारत कोकिंग कोल लिमिटेड
एक मिनी रत्न कंपनी
(कोल इंडिया लिमिटेड का एक अंग)
उप महाप्रबंधक (पर्यावरण) का कार्यालय
कोयलाभवन, कोयलानगर, धनबाद-826005
CIN : U10101JH1972GOI000918



Bharat Coking Coal Limited
A Mini Ratna Company
(A Subsidiary of Coal India Limited)
Office of the Dy. GM (Environment)
Koyla Bhawan, Koyla Nagar, Dhanbad -826005
CIN : U10101JH1972GOI000918

पत्रसंख्या: भाकोकोलि/ विभागाध्यक्ष (पर्या)/फाईल-Plantation /2020/210-214(H) दिनांक: 26.02.2020
सेवा में,
वन प्रमंडल पदाधिकारी,
धनबाद

विषय : Work Order for carrying afforestation over 54.5 ha of OB dumps of BCCL.

संदर्भ: (i) Our offer letter no. भाकोकोलि/उपमहाप्रबंधक(पर्या)/फाईल-Plantation/2019/2959-2963/ (H)
dt 13/14.12.2019.
(ii) Your letter no.130, dated 16.01.2020

Dear Sir,

This has reference to above mentioned letters, Competent Authority has approved for carrying afforestation over 54.5 ha of OB dumps through DFO, Dhanbad, for a total value of Rs. 14608770.00 (Rupees One crore forty six lakhs eight thousand seven hundred seventy only) for four years with the following terms and conditions in respect of above mentioned work:-

1. The Period of work from the date of acceptance of work order will be 04 years.
2. The aforesaid work is to be carried out at below mentioned sites:

S No	Name of the site	Type	Ha
1	ABOCP, Block-II	OBD	12.4
2	ABOCP, Block-II	OBD	5.6
3	AKWMC, Katras	OBD	11
4	ABG, Govindpur	OBD	4.5
5	NAKC, Govindpur	OBD	5
6	NT-ST-JG, Lodna	OBD	16
	TOTAL		54.5

3. The Forest department shall conduct all its afforestation activities subject to all laws, rules, statutory orders and regulations applicable to the site and the nature of the work.
4. The Forest department shall take up afforestation works on company's land with due expertise and supervision as per the scheme & estimates duly sanctioned as per the estimate submitted by forest department (The estimate has been submitted by Forest Department considering 15% enhancement every year in labour wages of preceding year).

AM(Envt.)

P. d. v. s.

2/3/2020

5. The payment of Completion work, first year maintenance work and second year maintenance work will be made as per the actual labour wages prevailing in the corresponding year.
6. The Forest department shall exercise precautions on the aid and advice of the company for the safety of all lives and properties involved in the afforestation activities.

7. SCOPE OF WORK:

This work shall be done with the following attributes:

- (i) Self-sustaining / healthy plantation at the end of project period/ at the handover of the site.
- (ii) The plants planted shall be of native species, high root density, soil binding species, thick canopy and/or fruit bearing. The following suggested native species shall preferably but not limited to be planted at the sites:

S.No.	Botanical Name	Common name	S.No.	Botanical Name	Common name
1.	<i>Ailanthus excelsa</i>	Mahanim	2.	<i>Ficus hispida</i>	Kath gular
3.	<i>Albizia lebbek</i>	Siris	4.	<i>Ficus religiosa</i>	Pipal
5.	<i>Alstonia scholaris</i>	Chatni	6.	<i>Albizia Procera</i>	Safed Siris
7.	<i>Azadirachta indica</i>	Neem	8.	<i>Madhuca indica</i>	Mahua
9.	<i>Bombax ceiba</i>	Semal	10.	<i>Melia composita</i>	Bakain
11.	<i>Butea monosperma</i>	Palas	12.	<i>Tamarindus indica</i>	Imli
13.	<i>Cassia fistula</i>	Amaltas	14.	<i>Terminalia arjuna</i>	Arjun
15.	<i>A. Odoratissima</i>	Kala Siris	16.	<i>Aegle marmelos</i>	Bel
17.	<i>Dalbergia sissoo</i>	Shisham	18.	<i>Mangifera indica</i>	Aam
19.	<i>Ehretia laevis</i>	Chamror	20.	<i>Zizyphus nummularia</i>	Ber
21.	<i>Ficus glomerata</i>	Gular	22.	<i>Embilica officianlis</i>	Awala
23.	<i>Syzygium cumini</i>	Jamun	24.	<i>Anthocephalus indicus</i>	Kadlamb
25.	<i>Acacia Catechu</i>	Desi Kher	26.	<i>Gmelina arbora</i>	Gamhar
27.	And other fruit bearing native species or the species deemed suitable by the Forest deptt.				

- (iii) Survival of the plantation shall not be less than 80 per cent at the end of the project period.
8. Annual Joint Inspection report of the inspection carried out by joint team of Forest Department and BCCL personnel after the completion of each year work should indicate name of the site, year of plantation, number of plants, name of the species present, date of inspection and survival rate.
9. The display boards shall be installed at all the plantation sites indicating, the name of the company, the no. of plantation, species planted, name of site of plantation and plantation year.

19. For release of the payment, you have to submit

- a) The letter of acceptance of the work order along with the Demand letter/Bill for the Advance work.

And for further payments regarding this work order

- a) Utilization certificate of the preceding payment made to you in respect of this work order
b) Joint inspection report of preceding year's work.
c) Demand letter/Bill based on the actual rates of labour wages to that corresponding year for payment.

The utilization certificates along with joint inspection report shall be accepted by the accepting authority i.e. HOD (Env), BCCL.

20. BCCL shall not have any liability in case of any accident etc. towards Forest Department's personnel/ staffs /workers during the execution of the work.

21. Child labour is prohibited under Mines Act, therefore, child labour shall not be deployed in the aforesaid work.

 26/2/2020

विभागाध्यक्ष (पर्यावरण)

Copy to:-

1. TS to D (T) OP/ D(T) PP, BCCL..... for kind information please.
2. GM (Vigilance), BCCL.....for kind information please.
3. CGM (Environment), CIL, Kolkata. for kind information please.
4. HOD, (Pay)/ In-charge Pay Office, BCCL HQ, Koyla Bhawan, Dhanbad.
5. Master File/Office Copy

6. GM, Block-II Area

7. GM, Gwindpur Area

8. GM, Katra Area

9. GM, Lodna Area

For kind information please

 26/2/2020
विभागाध्यक्ष (पर्यावरण)



Plantation in FY 2019-20 over 11 Ha Ob dump Area



Preparation of nursery for plantation site 13 Ha Ob dump



Hole digging for plantation site 13 Ha Ob dump



Over Head Dust Suppression Arrangement installed at Haul Road for wetting the coal loaded over trucks



Block Plantation Around CHP



Water Arrangement at CHP Hooper



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FOR COMPANY USE ONLY

RESTRICTED

The information given in this report is not to be communicated either directly or indirectly to the press or to any person not holding an official position in the CIL/ Government.

GROUNDWATER LEVEL & QUALITY REPORT FOR CLUSTER OF MINES, BCCL

(Assessment year – 2021-22)

[CLUSTER – I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XIII, XIV, XV & XVI of Mines, BCCL]

JHARIA COALFIELD AND RANIGANJ COALFIELD (PART)

**For
(BHARAT COKING COAL LIMITED)**

(A Subsidiary of Coal India Limited)

KOYLA BHAWAN (DHANBAD)

**Prepared by
Hydrogeology Department
Exploration Division
CMPDI (HQ), Ranchi**

MARCH – 2022



**GROUNDWATER LEVEL & QUALITY REPORT
FOR CLUSTER OF MINES, BCCL**

(Assessment year – 2021-22)

[CLUSTER – I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XIII, XIV, XV & XVI of Mines, BCCL]

JHARIA COALFIELD AND RANIGANJ COALFIELD (PART)

**For
(BHARAT COKING COAL LIMITED)**

(A Subsidiary of Coal India Limited)

KOYLA BHAWAN (DHANBAD)

**Prepared by
Hydrogeology Department
Exploration Division
CMPDI (HQ), Ranchi**

MARCH – 2022

PERSONS ASSOCIATED

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CMPDI, Dhanbad

Swagata Dutta

Asst. Manager (Geology)
Regional Institute - II
CMPDI, Dhanbad



CMPDIL

CENTRAL MINE PLANING & DESIGN INSTITUTE
HYDROGEOLOGY SECTION, EXPLORATION DEPARTMENT
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(Accredited Groundwater Professional Institutions by CGWA)

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DETAILS OF THE REPORT

SI No.	ITEMS	INFORMATIONS
1	Geographical Area	Jharia Coalfield (JCF): 453 sq. km. Raniganj Coalfield (RCF part): 19.64 sq. km. (Cluster-XVI area only)
2	Major Physiographic Units	Dissected Pediplain with surface Reduced Level (RL) varies from 160 m to 220 m above mean sea level (AMSL) in JCF and 100 m to 140 m AMSL in RCF.
3	Drainage System	Damodar River is the master drainage flowing along western boundary of the JCF. Jamunia River, Khudia River, Katri River, Jarian Nala, Ekra Jore, Kari Jore, Kashi Jore, Chatkari Jore and their tributaries are flowing through the JCF area. Damodar River, Barakar River is the master drainage of the part of RCF area (CV Area).
4	Annual Rainfall (IMD-report)	Jharkhand State: 1264.10 mm Rainfall data given in Annexure-IV .
5	Geological Formations	Gondwana Formation (Talchir Formation, Barakar Formation, Barren Measure Formation & Raniganj Formation)
6	Aquifer System	Unconfined/Phreatic Aquifer – thickness 25 m (Avg.) Semi-confined to confined Aquifer – thickness from 25 m upto 650 m
7	Hydrogeological properties (Aquifer Pump Test)	Unconfined Aquifer (Damoda BJ Section & Block-II): Hydraulic Conductivity – upto 0.50 m/day Transmissivity – 10 - 42 m ² /day Semi-confined to confined Aquifer (Sitanala & Kumari Block): Hydraulic Conductivity – 0.0006-1.44 & 0.05-0.0027 m/day Transmissivity – 0.06 – 0.573 m ² /day
8	Groundwater Level Monitoring Network	Out of total 252 nos. of monitoring stations 64 nos located within core mining area and rest comes within Buffers zone. 60 Nos. of Groundwater monitoring well (Dug Wells) network established by CMPDI to record groundwater level data in and around the Core Zone of JCF and 4 Nos. of Groundwater monitoring well (Dug Wells) in RCF (CV Area).
9	Groundwater Levels Below Ground Level (bgl)	JCF area: Pre-monsoon – 0.62 to 11.26 m (Avg. 5.23 m bgl) in '2021-22 Post-monsoon – 0.05 to 7.62 m (Avg. 2.28 m bgl) in '2021-22 RCF area (part): Pre-monsoon – 2.0 to 6.20 m (Avg. 3.34 m bgl) in '2021-22 Post-monsoon – 1.10 to 5.25 m (Avg. 2.44 m bgl) in '2021-22
10	Groundwater Quality	Potable as per GEC-2015 Norms (Annexure- VIII)
11	Proposed Piezometers	Proposed piezometers (23 nos.) to monitor impact of coal mining on groundwater regime within the coalfield area (JCF & part of RCF) for maximum depth upto 290 m.
12	Stage of Groundwater Development (CGWB)	Dhanbad District-76.30% (GWRE-2017)

GROUNDWATER LEVEL & QUALITY REPORT FOR CLUSTER OF MINES OF BCCL

1.0 INTRODUCTION

1.1 LOCATION DETAILS AND BRIEF ABOUT THE PROJECT

The 15 nos. Cluster of mines (Cluster-I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XIII, XIV, XV and XVI) of BCCL is located in the Jharia coalfield in Bokaro district of and Dhanbad district of Jharkhand and part of Raniganj coalfield of Dhanbad district of Jharkhand.

The area of Jharia Coalfield (JCF) is 453 sq. km. and Raniganj Coalfield (RCF part) is 19.64 sq. km. (Cluster-XVI area only). Located about 3.0 km south-west of Dhanbad town and 10.0 km north-east of Bokaro town. The coalfield bounded by Jamunia River in the west, Damodar river in the south, and metamorphics (hard rock) in the north and east side. **(Plate-I)**.

1.2 OBJECTIVE OF THE STUDY:

The objective of the report is to conducting hydrogeological study by quarterly monitoring of groundwater level and quality of the Jharia coalfield and Raniganj coalfield (part) within BCCL command area for 15 nos. Cluster of mines of BCCL. The data collected shall submitted to the MoEF&CC, CPCB & SPCB within stipulated timeframe. The work being done yearly and require d to be continued as per the specific condition mentioned invariably in Environmental Condition (EC) for all of the Clusters of BCCL.

1.3 SCOPE OF THE STUDY:

The following scope has taken into account for hydro-geological investigation of the study area.

- i) The monitoring of the groundwater levels done four times/year during (May, August, Nov and Jan).
- ii) The monitoring of the groundwater quality done during May including Arsenic and Fluoride.
- iii) To evaluate the status of ground water level condition in the area.
- iv) To study the ground water flow direction in the mining areas.
- v) To study the depth to ground water level condition in the mining areas.
- vi) To study the ground water quality data and interpretation in the mining areas.

File No. 08HBDD/JRRI/BCCL/ENV/0003/2018-BD Divn.-CMPDI (Computer No. 68378)
Receipt No : 188686/2018/O/e HEAD OF BUSINESS DEVELOPMENT, CMPDI HQ
भारत कोकिंग कोल लिमिटेड

एक मिनी रत्न कंपनी
(कोल इंडिया लिमिटेड का एक अंग)
कोयलाभवन, कोयलानगर, धनबाद -826005



Bharat Coking Coal Limited

A Mini Ratna Company
(A Subsidiary of Coal India Limited)
Regd.Off: Koyla Bhawan, Koyla Nagar

CIN: U10101JH1972GOI000918
Environment Department

पत्र संख्या भाकोकोलि/उप महाप्रबंधक(पर्या0)/संचिका-18/1086- दिनांक : 14.06.2018
1088/14)

सेवा में,
महाप्रबंधक
व्यापार विकास

सीएमपीडीआई - कांके रोड रांची ८३४०३१-

Sub: For work of Ground water level and quality monitoring

महोदय,

This is with reference to earlier letter ref no. BCCL/HOD(Env)/F-Env/13/161 dated 11.02.2014 regarding conducting hydrological study by quarterly monitoring of groundwater level and quality of the study to be carried out by establishing a network of existing wells. The monitoring for quantity shall be done four times a year in pre-monsoon (May), monsoon (August), post-monsoon (November) and winter (January) season and for quality including Arsenic and Fluoride during month of May. Data thus collected shall be submitted to the Ministry of Environment & Forest and to Central Pollution Control Board/SPCB quarterly within one month of monitoring.

The above work is being done yearly and required to be continued as per the specific condition mentioned invariably in Environment Clearance order of all clusters of BCCL.

This is for your kind information and further necessary action

भवदीय

14/6/18
उप-महाप्रबंधक (पर्यावरण)

Copy To:

१ महाप्रबंधक (गवेषण), कांके रोड रांची ८३४०३१-

1.4 TOPOGRAPHY AND DRAINAGE

Northern part of the JCF area covered with hills and thin forest. In general, the altitude varies from 220 m AMSL in Barora area (Cluster-I) to 160 m above mean sea level (AMSL) in Sudamdih area (Cluster-X). Pediplains developed over sedimentary rocks or Gondwana formation consisting of Sandstone, Shale, coal, etc. Dissected pediplains developed over Gondwana formations found in Jharia, Baghmara, Katras areas etc. However, in RCF (part) areas the altitude varies from 100 m to 140 m AMSL (Cluster-XVI). The general slope of the topography is towards south, i.e. Damodar River.

The drainage pattern of the area is dendritic in nature. The drainage system of the area is the part of Damodar sub-basin. All the rivers that originate or flow through the coalfield area have an easterly or southeast course and ultimately joins Damodar River, the master drainage. The drainage of the JCF is mainly controlled by Jamuniya River (5th order), Khudia nala (3rd order), Katri River (4th) and Chatkari nala (3rd order) flowing from north to south and joins Damodar River. Whereas, Barakar River and Khudia River are controlling the drainage pattern of RCF (part) and joins Damodar River in the south. Damodar River is the main drainage channel and flows from west to east along the southern boundary of JCF and RCF.

The drainage map of the JCF and part of RCF has been prepared on topographic map of scale 1:50,000 (**Plate-I**). The watershed of all tributary rivers (Jamuniya River to Barakar River) falls within the north-western part of Damodar sub-basin which comes under Lower Ganga Basin.

Besides, a large number of ponds/tanks distributed in and around JCF, out of which one prominent lake is located at Topchanchi in the north-west part. Two reservoirs, Maithon dam in Barakar River and Panchet dam in Damodar River near to Chanch Victoria Area of BCCL (part of RCF) are the main source of water supply to the nearby area. Jharia Water Board, Damodar Water Supply Scheme and Mineral Area Development Authority (MADA) are supplying water.

1.5 DETAILS REGARDING WETLANDS

A **wetland** is a distinct ecosystem that flooded by water, either permanently or seasonally. The primary factor that distinguishes **wetlands** from other landform or water bodies is the characteristic vegetation of aquatic plants. Wetland are protective ecosystem as per new guidelines of CGWA & MoEF&CC. There are no Wetlands in and around the area (Jharia coalfield and Raniganj coalfield) as per the list given on official website of MoEF&CC, Govt. of India. The list enclosed as **Annexure-III**.

1.6 CLIMATE & RAINFALL

The Jharia Coalfield (JCF) and part of Raniganj Coalfield (RCF) area in Dhanbad District belongs to sub-humid tropical climatic region. The maximum temperature during summer shoots upto 45° C and falls between 10° C to 5° C in winter. The maximum rainfall occurs during the period between June and September. Rainfall data of IMD Dhanbad and Mine Rescue Station Dhanbad given in **Annexure-IV**.

In Jharkhand state, Daily Rainfall data from 1989 to 2018 considered for analysis of trend variability and mean rainfall patterns. From the daily rainfall data, monthly rainfall series of each stations computed and then monthly district rainfall series has constructed by considering arithmetic average of all the station rainfall values within the district. The monthly rainfall series of the state has computed by using area weighted rainfall values of all the districts within the state. The objective of the analysis is to:

1. Identify the spatial pattern of the mean rainfall
2. Understand district wise observed rainfall trend and variability in annual and SW monsoon season (June, July, august and September).

Daily station rainfall data utilized for identification of the mean spatial patterns and rainfall intensity trends. From mean and standard deviation (SD), the coefficient of variation (CV) calculated as follows: Coefficient of variation (CV) = [Standard Deviation / Mean] × 100

The analysis has done in two parts. For identification of the spatial pattern mean rainfall and variability and observed trends we have used district rainfall series and results have been brought out for four southwest monsoon months viz. June, July, August, September, for the southwest monsoon season and also for annual.

Table shows the mean rainfall (mm) and coefficient of variation of the state for the monsoon months, southwest monsoon season and annual during the period 1989-2018. It can see that the state gets highest rainfall (31%) of southwest monsoon rainfall in July month while the August month get 28% of the southwest monsoon rainfall. June and September receive 19% and 22% of southwest monsoon rainfall. Also more than 84% of annual rainfall receives during the southwest monsoon season only. The variability of monsoon or annual rainfall is also very less.

Jharkhand State

	June	July	August	September	Sub-total	Annual
Mean	190.3	313.9	289.2	225.7	1019.1	1211.4
CV	44.4	29.0	24.8	37.0	18.7	16.9

Dhanbad District

	June	July	August	September	Sub-total	Annual
Mean	203.9	327.7	302.5	271.5	1105.6	1332.2
CV	41.0	35.0	33.5	48.7	20.8	19.4

Fig. 1 and 2 show the time series of rainfall in mm for the months of June, July, August, September and southwest monsoon season, annual respectively. The trend lines displayed for each of the series. Neither monthly rainfall nor seasonal rainfall shows any significant increasing/decreasing trend while annual rainfall shows significant decreasing trend. In the monthly rainfall June, July, August, September and seasonal rainfall shows decreasing trend. During the last 30 years highest rainfall of 390.3 mm received in June in the year 1994, 492.1 mm received in June in the year 2017, 431.5 mm received in August in the year 1997, while highest rainfall of 395.2 in September received in the year 1995. Highest annual rainfall of 1587.9 mm received in the year 1999 and highest southwest monsoon rainfall of 1364.6 mm received in the year 1994 (Climate Research and Services, IMD, Ministry of Earth Sciences, Pune, Jan'2020).

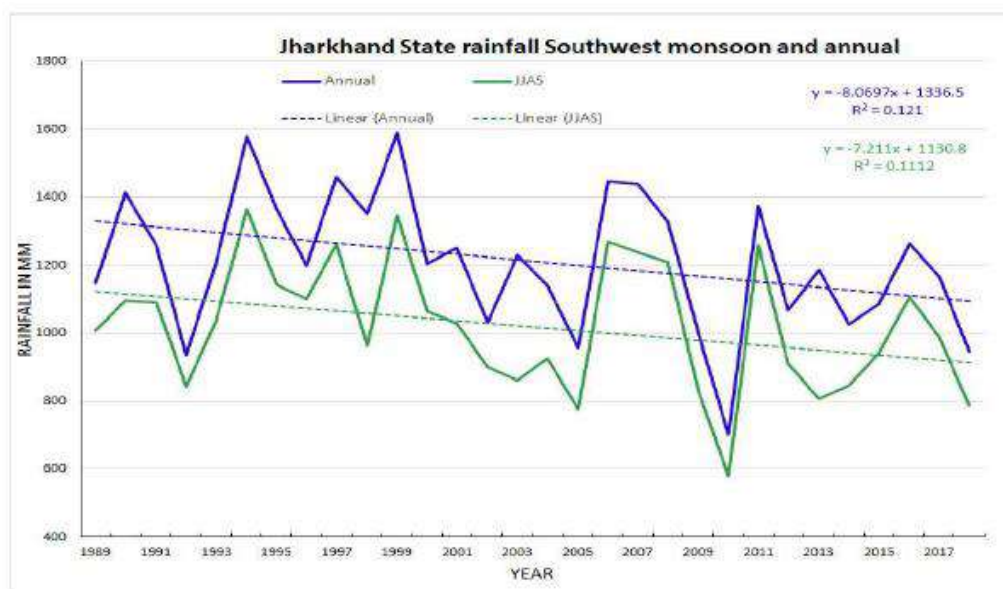


Fig-1.

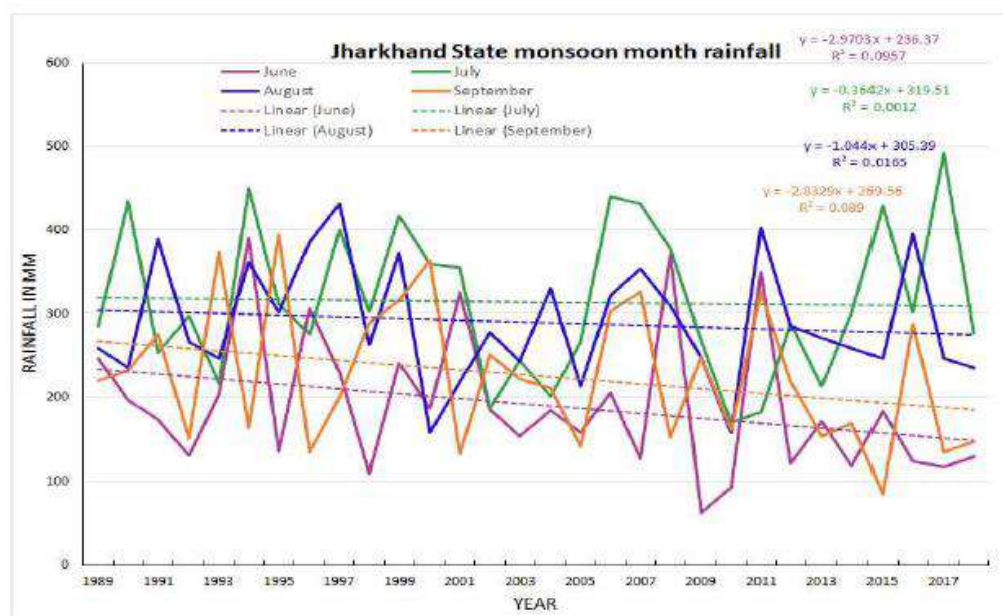


Fig-2.

2.0 GEOLOGY AND HYDROGEOLOGICAL SETUP OF THE AREA

2.1 REGIONAL GEOLOGY

The Jharia Coalfield covers an area of 453 sq. km. located in Dhanbad District, Jharkhand. The non-coal bearing Talchir Formation exposed in patches along the northern fringe of the Coalfield. The Barakar Formation overlies the Talchir is covering the most part of the Jharia Coalfield and having an area of 218 sq. km. This successively overlain by the non-coal bearing Barren Formation mainly exposed in the central part of the Coalfield. This, in turn, overlain by the Raniganj formation (Coal Bearing horizon) in the south-west part of the Coalfield and covers an area of 54 sq. km.

Chanch-Victoria Area is located in the western part of Raniganj Coalfield. The Raniganj coalfield represents the eastern most coal basin in the Damodar Valley Region, located in the border of Dhanbad District of Jharkhand and Bardhaman District of West Bengal. The Coalfield is almost elliptical in shape and covers an area of about 1530 sq. km. out of which only 35 sq. km. comes under leasehold area of BCCL out of which 19.64 sq. km is the study area (Cluster-XVI only). The coal bearing formations of the area belongs to Barakar Formation of the Lower Gondwana in **Table-1**.

Table – 1: Regional Geological Succession of Jharia Coalfield in the area

Geological Formations		Age
Quaternary/Recent	Soil cover/Weathered mantle	Recent
Post-Gondwana	Dolerite	Upper Cretaceous
	Lamprophyres	Jurassic
Damoda Group	Raniganj Formation	Upper Permian
	Barren Measures Formation	Middle Permian
	Barakar Formation	Lower Permian
	Karharbari	
	Talchir Formaton	Upper Carboniferous
-----Unconformity-----		
Metamorphics		Proterozoic

2.2 HYDROGEOLOGICAL SET- UP

The permeable formations mainly composed of sandstone behave as aquifer units. The coal seam and shales developed in the area act as impermeable beds i.e. aquiclude. The aquifer materials of Gondwana Formation constituted of fine to coarse grain sandstone having primary porosity of intergranular void space. The secondary porosity formed due to presence of faults, fracture, joints, etc. Sandstone of Gondwana formations in JCF and RCF are very hard, compact and cemented sandstone and forming less potential aquifer, particularly the deeper aquifer system. The secondary porosity along with primary porosity forms a conduit system making these formations good aquifers for movement and storage of ground water.

2.3 AQUIFERS DESCRIPTION

The aquifer system for shallow and deeper aquifer has established through hydrogeological studies, exploration, surface and subsurface geophysical studies in the JCF and RCF (part) covering all geological formations. The aquifer can be divided into two zones – Un-confined/Phreatic (shallow) and Semi-confined to confined (deeper) aquifer.

PHREATIC/UN-CONFINED AQUIFER

The top aquifer occurred above the top most coal seam/shale bed called un-confined or water table aquifer and it consists of relatively permeable formation such as weathered sandstone and loose soil. The thickness of the un-confined aquifer is varying from few meters to 50 m. This un-confined aquifer is potential than semi-confined to confined aquifer.

SEMI-CONFINED TO CONFINED AQUIFER

The semi-confined to confined aquifer consisting of sandstone bed is sandwiched with coal seams/shale beds and multiple aquifer system developed due to presence of multiple numbers of coal seams/shale beds. With the presence of intercalated shale and carbonaceous shale beds and reduction in permeability with depth, the lower aquifers are poor in potential.

Table –2 Generalized Hydrogeological Units developed in the study Area

Sl. No.	Type of Aquifer	Depth range (m)	Core zone (within 2 km)	Buffer zone (within 10 km)
1.	Unconfined	0 – 50 (Avg. 25)	Alluvium, weathered sandstone	Alluvium, weathered sandstone
2.	Semiconfined/ confined	Beyond 25 upto 650 m	Multiple Sandstone horizons in Barakar formation	Multiple Barakar, sandstone, Barren Measure, Raniganj sandstone and Talchir shale

2.4 GENERAL AQUIFER PARAMETERS

PHREATIC/UN-CONFINED AQUIFER

The wells tested by CMPDI for determination of aquifer parameters in Damuda (BJ Section) and Block-III area of JCF. The hydraulic conductivity of the un-confined aquifer is 0.50 m/day as computed from pumping tests on the wells. The transmissivity of the unconfined aquifer ranges from 10.68 m² /day to 41.48 m² /day.

SEMI-CONFINED TO CONFINED AQUIFER

The un-confined aquifer, the sandstone partings in-between impervious layers of shale and coal seams designated as semi-confined / confined aquifers. The sandstones in these aquifers are fine to coarse grained, hard and compact with very low porosity. Mostly groundwater occurs in the weak zones formed due to weathering, fracture, faults, which create the secondary porosity. The hydrogeological parameter has determined by CMPDI in Sitanala Block by conducting aquifer performance test (APT). The hydraulic conductivity (K) of semi-confined aquifer in Barakar Formation ranges from 0.0006 m/day to 1.44 m/day. The hydrogeological parameter has also been determined at Kumari OCP Block in the central JCF by conducting aquifer performance test. The hydraulic conductivity (K) of semi-confined aquifer in Barakar Formation in this area ranges from 0.0027 m/day to 0.05 m/day.

Table – 3: Aquifer parameters considered for the study Area

Hydraulic Parameter	Unconfined aquifer Site: Damuda (BJ Section) and Block-III area	Semi-confined aquifer Site: (1): Sitanala Block (2): Kumari Block
Transmissivity (m ² /d)	10.68 – 41.48	0.0621 – 0.573
Hydraulic conductivity (m/d)	0.5	0.05 – 0.0027
Specific yield	0.03 to 0.04 (as per GEC recommended values)	

3.0 GROUND WATER LEVEL MONITORING

To collect the representative groundwater levels in the study area, CMPDI has established a monitoring network of total 252 monitoring stations out of which 64 located within core zone and rest comes within Buffer zone. Total 60 nos. dug well within JCF and 04 nos. dug well within RCF (part) area (Details of the Hydrograph stations & water level given in **Annexure-V, VA & VB**) spread over the entire BCCL leasehold area, **Plate-I**. Water level monitoring in all hydrograph stations has been done in pre-monsoon as well as in post monsoon whereas in 64 stations monitoring done in quarterly (May'21, Aug'21, Nov'21 and Jan'22) basis.

Depth to water level of the water table depict the inequalities in the position of water table with respect to ground surface and is useful in delineating recharge / discharge areas, planning of artificial recharge structure and shows the overall status of the groundwater level in the area. Historical groundwater level (GWL) of entire JCF and part of RCF with fluctuation, GWL of Non-mining / Mining areas and GWL of the Cluster of Mines of BCCL are shown in this report to assess the effect of Coal mining activity in the groundwater regime in and around the Coalfield area.

Mining is a dynamic phenomenon. The mining activity creates dis-equilibrium in environmental scenario of the area and disturbs the groundwater conditions/regime in particular. The impact on shallow water regime due to mining activity can broadly viewed as under:

- Historical GWL with annual fluctuation over the years
- GWL scenario in Non-mining and Mining area (OC/UG mines)
- GWL scenario of Cluster of mines of BCCL

3.1 HISTORICAL GROUNDWATER LEVEL (GWL)

Historical GWL of JCF and part of RCF given from 2005 to 2021 of CMPDI monitoring stations (total 64 stations within Coalfield area). Pre-monsoon and Post-monsoon GWL with Fluctuation has been mentioned below in the table.

Table – 4: Historical Groundwater Level

Period		(Water level in metre below ground level)								
		Pre-Monsoon (April/May)			Post-Monsoon (Nov/Dec)			Fluctuation		
		From	To	Average	From	To	Average	From	To	Average
JCF	2005	0.07	19.08	6.29	0.84	12.13	3.20	0.12	12.45	3.21
	2007	0.40	19.27	5.66	0.35	8.21	2.87	0.02	16.15	2.96
	2008	0.45	18.35	5.42	0.35	14.20	3.62	0.03	9.22	2.45
	2010	0.85	14.47	5.24	0.10	15.88	4.48	0.02	5.55	1.54
	2012	1.27	18.68	5.58	0.15	7.80	2.72	0.08	13.45	2.96
	2013	0.70	19.20	5.65	0.45	8.35	2.77	0.29	15.88	3.17
	2014	0.70	16.28	4.92	0.75	14.98	3.27	0.25	10.15	2.17
	2015	1.38	17.20	6.00	0.45	14.58	3.92	0.28	7.62	2.15
	2016	0.78	16.73	5.64	0.30	12.43	3.19	0.23	6.35	2.88
	2017	0.67	16.28	5.61	0.15	6.97	2.41	0.10	12.10	3.25
	2018	1.20	14.58	5.55	0.40	7.17	2.83	0.20	9.45	2.68
	2019	0.95	15.88	5.46	0.45	5.95	2.34	0.20	13.40	3.05
	2020	0.80	16.25	4.95	0.75	10.10	3.26	0.25	11.05	2.15
	2021	0.62	11.26	5.23	0.05	7.62	2.28	0.15	9.03	2.94
RCF (part)	2008	5.02	10.50	7.59	2.85	4.90	3.71	1.82	6.60	3.87
	2010	2.20	8.85	4.74	2.78	9.58	4.63	0.68	1.10	0.89
	2011	3.57	8.02	4.98	2.50	6.21	3.75	0.55	1.90	1.23
	2012	3.10	7.34	4.59	1.55	7.00	3.66	0.05	2.78	0.94
	2013	1.70	9.87	6.54	2.90	8.85	4.71	1.02	5.54	2.84
	2014	3.27	6.48	4.57	2.13	3.03	2.63	0.54	3.45	1.94
	2015	3.38	9.52	5.33	2.68	8.20	5.11	1.06	1.32	1.81
	2016	3.61	10.65	6.24	0.90	6.50	3.18	1.63	4.40	3.06
	2017	1.93	5.80	3.25	1.63	3.78	2.47	1.63	3.78	0.78
	2018	2.34	8.70	4.35	1.75	5.70	2.75	0.41	2.55	1.59
	2019	1.60	9.35	5.29	0.80	3.88	2.10	0.80	5.47	3.20
	2020	2.30	9.70	4.30	1.75	5.50	2.70	0.40	2.75	1.60
	2021	2.00	6.20	3.34	1.10	5.25	2.44	0.80	0.95	0.90

3.2 GROUNDWATER LEVEL SCENARIO IN NON-MINING/MINING AREA

Depth to water level (DTW) range in different formations with respect of mining and non-mining areas summarized in the Table-5.

Table – 5: Depth to water table

Formation	Area		DTW (bgl, m) [Year-2021-22]		Average GWL (m)	
			Pre-monsoon (Apr/May)	Post-monsoon (Nov/Dec)	Pre-monsoon	Post-monsoon
Sedimentary (Gondwana)	Non-mining		1.45-8.20	0.35-3.70	5.10	2.00
	Mining	OC	1.40-10.35	0.84-5.65	4.66	2.15
		UG	1.09-10.13	0.55-7.62	5.75	2.80
Metamorphics (Hard rock)	Peripheral part of the Coalfield		0.62-11.75	0.50-7.45	6.80	3.60

The study revealed that water table is in shallow depth and there is no significant stress in the water table due to coal mining activity. Mining and Non-mining areas shows barely any difference in water table condition in the JCF and RCF (part) area. The average hydraulic gradient of the water table within mining and non-mining areas given in Table-6. There is no significant change in hydraulic gradient observed. Relatively steep gradient near active opencast mining areas w.r.t., Non-Mining, Underground mines and Metamorphics areas observed.

Table – 6: Average hydraulic gradient

Sl. No	Formation	Area		Average hydraulic gradient
1	Sedimentary (Gondwana)	Non-Mining		1.0×10^{-3} to 3.25×10^{-3}
		Mining	OC	1.0×10^{-2} to 4.0×10^{-3}
			UG	1.0×10^{-2} to 3.0×10^{-3}
2	Metamorphics (Hard rock)	Peripheral part of the Coalfield		1.0×10^{-3} to 3.5×10^{-3}

3.3 GROUND WATER LEVEL DATA OF THE CLUSTER OF MINES OF BCCL

A GROUND WATER LEVEL OF CLUSTER-I

Cluster-I (Damuda Group of Mines) consisting of (Cluster-I consisting of Damoda UG, Albion OCP, Proposed BJ Section OCP and Abandoned Gutway OCP) of Barora area, BCCL is located in the western most part of Jharia coalfield in Bokaro district of Jharkhand. The life of the project works out upto 15 years considering annual target production of 1.17 MTPA. It is located in the extreme western part of JCF in Bokaro district of Jharkhand (Toposheet no – 73 I/1).

The present leasehold area of Cluster-I is 575.0 Ha. The Damoda block area marked by more or less flat and gently undulating topography. The RL varies from 179 m to 208 m AMSL and the general slope of topography is towards east. Jamuniya River, Kari Jore, Podo Jore and its tributaries are controlling the drainage system of the area. The area comes under the watershed of Jamuniya River.

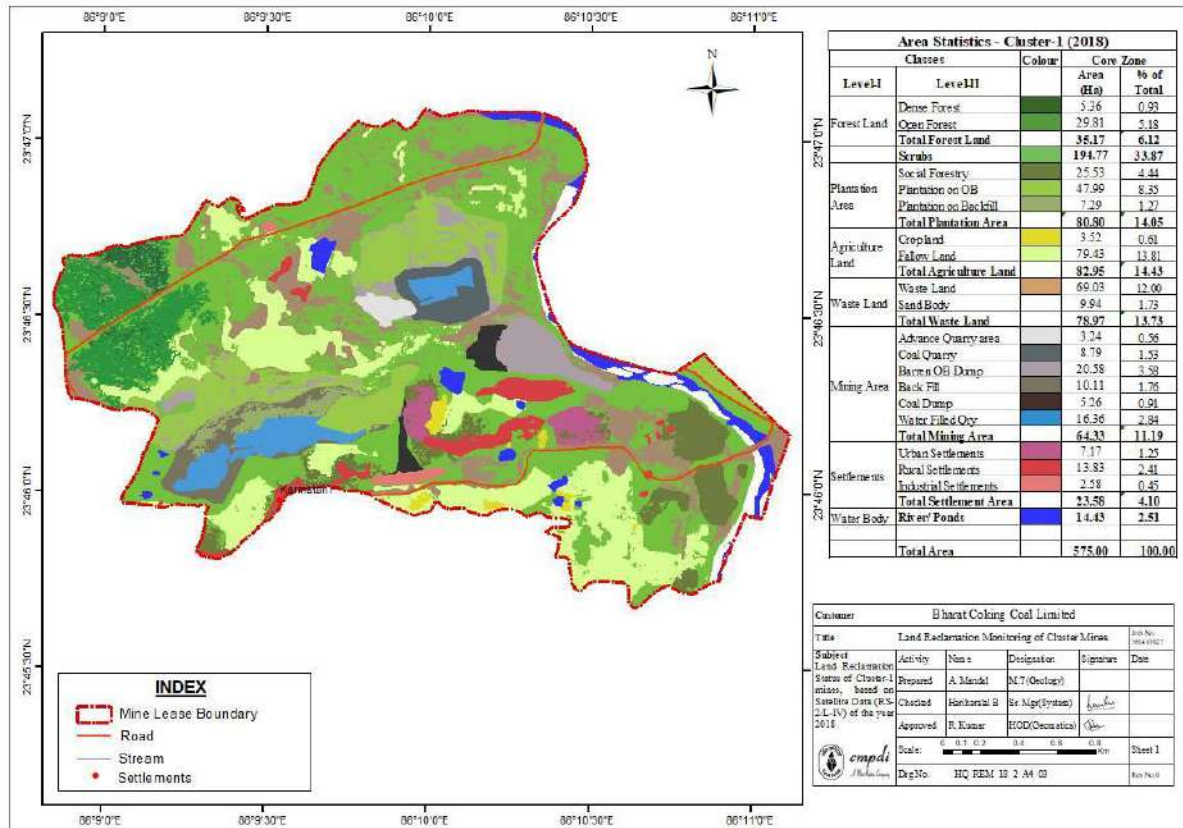
Monitoring stations (**B-15, B-21A, B51 and B-53**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'21, August'21, and Nov'21 and January'21, the Ground water level data enclosed in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2021-22				2020-21				2019-20			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	B-15	Bera Basti	1.46	0.25	0.35	1.01	3.70	0.15	1.47	1.70	1.90	0.45	1.65	2.65
2	B21A	Dugdha	8.38	2.5			10.00	4.15	5.80	6.70	9.45	1.90	-	-
3	B-51	Taranga	5.70	0.90	1.00	4.88	5.00	0.88	2.10	3.00	5.10	1.10	2.70	2.90
4	B-53	Karmatanr	4.85	1.52	1.87	2.87	3.12	1.07	1.40	1.92	3.22	0.97	1.42	2.12
Average WL (bgl)			5.10	1.29	1.07	2.92	3.70	0.15	1.47	1.70	4.92	1.11	1.92	2.56

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 1.46 m Max – 10.00 m
Post-monsoon GW Level (m): Min – 0.35 m Max – 5.80 m

LAND USE / LAND COVER MAP OF THE CLUSTER-I MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	393.69 x 10 ⁴	0.0	393.69 x 10 ⁴
2	Open Land	204.89 x 10 ⁴	0.0	204.89 x 10 ⁴
3	Road/ Paved Area	09.0 x 10 ⁴	0.0	09.0 x 10 ⁴
4	Rooftop area of building/ sheds	14.58 x 10 ⁴	0.0	14.58 x 10 ⁴
5	Total	575.00 x 10 ⁴	0.0	575.00 x 10 ⁴

B. GROUND WATER LEVEL OF CLUSTER-II

Cluster-II consists of seven mines namely; (Block II Mixed mines (OCP & UGP), Jamunia OCP, Shatabdi OCP, Muraidih Mixed mines (OCP & UGP), and Phularitand OCP of BCCL is located in the western most part of Jharia coalfield in Bokaro district and Dhanbad district of Jharkhand. The life of the project works out upto 30 years considering annual target production of 20.215 MTPA. It is located in the extreme western part of Jharia Coalfield in Dhanbad district of Jharkhand (Toposheet no- 73 I/1 and I/5).

The present leasehold area of Cluster-II is 2260.54 Ha. The Damoda block area marked by more or less flat and gently undulating topography. The RL varies from 176 m to 235 m AMSL. Jamuniya River, Khudia River and its tributaries are controlling the drainage system of the area. The area comes under the watershed of Jamuniya River and Khudia River.

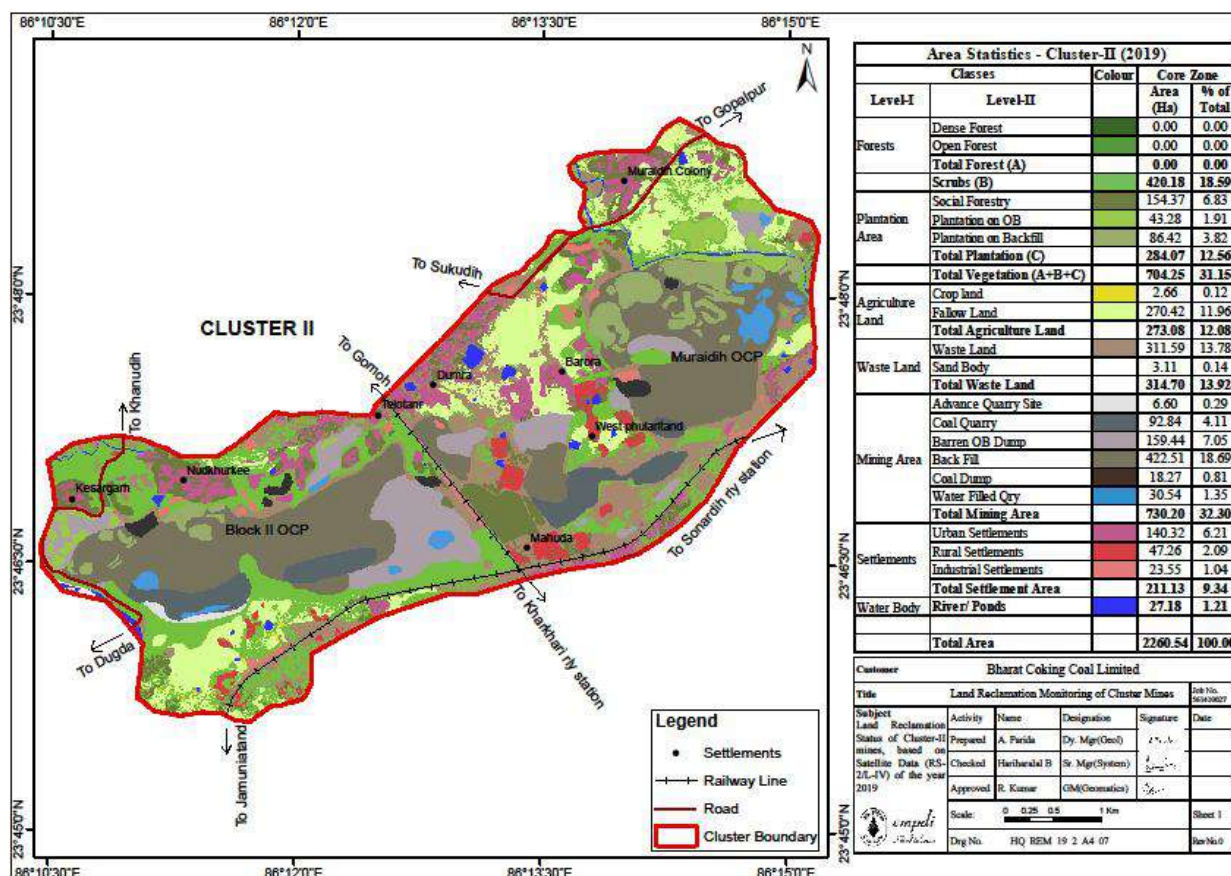
Monitoring stations (**B-1, B-59, B-60, B-61A and B-62A**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'21, August'21, and Nov'21 and January'22, the Ground water level data enclosed in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2021-22				2020-21				2019-20			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	B-1	Muraidih	2.58	0.58	1.91	2.03	3.28	0.73	1.63	1.73	3.18	1.33	1.73	1.98
2	B-59	Khodovaly	5.49	0.30	0.90	0.95	5.25	0.67	1.40	2.10	6.20	0.80	0.90	1.20
3	B-60	Bahiyardi	11.26	1.33	2.23	6.53	10.33	0.91	3.21	6.13	8.13	1.23	3.23	4.93
4	B61A	Kesargora	4.42	0.47	0.97	0.97	3.32	0.85	1.60	2.07	3.32	1.39	0.52	1.12
5	B62A	Sadiyardih	6.87	1.35	4.50	4.60	6.95	2.77	3.00	4.95	7.55	2.80	3.25	4.95
Average WL (bgl)			6.12	0.81	2.10	3.02	5.83	1.19	2.17	3.40	5.68	1.51	1.93	2.84

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 2.57 m Max – 11.26 m
Post-monsoon GW Level (m): Min – 0.52 m Max – 4.50 m

LAND USE / LAND COVER MAP OF THE CLUSTER-II MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	977.33 x 10 ⁴	0.0	977.33 x 10 ⁴
2	Open Land	1072.08 x 10 ⁴	0.0	1072.08 x 10 ⁴
3	Road/ Paved Area	140.32 x 10 ⁴	0.0	140.32 x 10 ⁴
4	Rooftop area of building/ sheds	70.81 x 10 ⁴	0.0	70.81 x 10 ⁴
5	Total	2260.54 x 10 ⁴	0.0	2260.54 x 10 ⁴

C. GROUND WATER LEVEL OF CLUSTER-III

Cluster-III consists of nine mines namely, Jogidih UG, Govindpur UG, Maheshpur UG, Kooridih/Block-IV Mixed Mine, New Akashkinaree Mixed Mine, South Govindpur UG (closed), and Teturiya UG (closed) mines. It is located in the western most part of Jharia coalfield in Dhanbad district of Jharkhand. The life of the project works out upto 60 years considering annual target production of 3.60 MTPA. This Cluster of mines is located in western part of Jharia Coalfield in Dhanbad district of Jharkhand (Toposheet no – 73 I/5).

The present leasehold area of Cluster-III is 1552.53 Ha. The area is plain with gentle undulation with RL varies from 160 m to 208.80 m AMSL. The general slope of the area is towards south. Khudia River, Baghdihi Jore, Katri River and its tributaries are controlling the drainage system of the area. The area comes under the watershed of Khudia River.

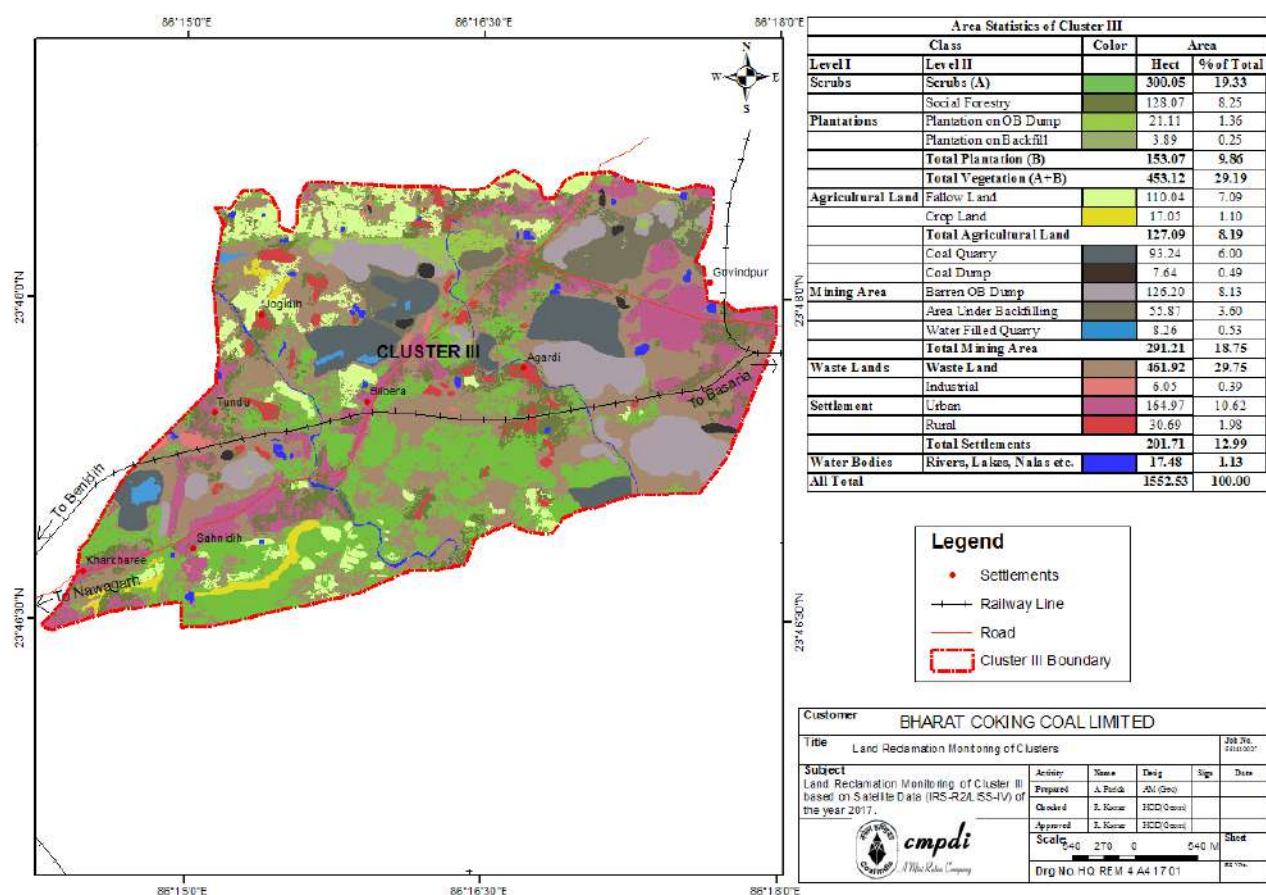
Monitoring stations (**A-12, A-25, A-29, B-14 and B-60**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'21, August'21, and Nov'21 and January'22, the Ground water level data enclosed in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2021-22				2020-21				2019-20			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	A12	Jamua	1.92	0.50	1.10	1.72	2.60	0.32	0.50	1.20	2.10	0.29	0.45	0.75
2	A25	Sinidih	5.78	1.73	2.43	2.53	2.98	1.30	1.83	2.53	6.08	1.43	1.93	2.48
3	A29	Dharmaband	6.49	2.90	5.90	6.65	6.20	1.21	3.20	3.25	4.85	1.20	3.40	3.65
4	B14	Mathadih	2.84	0.24	2.04	2.10	2.44	0.32	1.04	1.69	2.24	0.54	0.94	2.04
5	B60	Sonardih	11.26	1.33	2.23	6.53	10.33	0.91	3.21	6.13	8.13	1.23	3.23	4.93
Average WL (bgl)			5.66	1.34	2.74	3.91	4.91	0.81	1.96	2.96	4.68	0.94	1.99	2.77

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 1.92 m Max – 11.26 m
Post-monsoon GW Level (m): Min – 0.45 m Max – 5.90 m

LAND USE / LAND COVER MAP OF THE CLUSTER-III MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	580.21 x 10 ⁴	0.0	580.21 x 10 ⁴
2	Open Land	770.61 x 10 ⁴	0.0	770.61 x 10 ⁴
3	Road/ Paved Area	164.97 x 10 ⁴	0.0	164.97 x 10 ⁴
4	Rooftop area of building/ sheds	36.74 x 10 ⁴	0.0	36.74 x 10 ⁴
5	Total	1552.53 x 10 ⁴	0.0	1552.53 x 10 ⁴

D. GROUND WATER LEVEL OF CLUSTER-IV

Cluster-IV consists of six mines namely, Amalgamated Keshalpur & West Mudidih colliery, Amalgamated Angarpathra & Ramkanali colliery, Katras-Choitudih Colliery, Salanpur colliery and Gaslitand colliery of Katras area, BCCL. It is located in the north-central part of Jharia Coalfield in Dhanbad district of Jharkhand. The life of the project works out more than 30 years considering annual target production of 9.55 MTPA (Toposheet no – 73 I/5).

The present leasehold area of Cluster-IV is 1123.79 Ha. The area has a general undulating topography, with an overall gentle south-west slope. The RL varies from 182 m to 216 m AMSL. Katri River, Kumari Jore and its tributaries are controlling the drainage pattern of the area. The area comes under the watershed of Katri River.

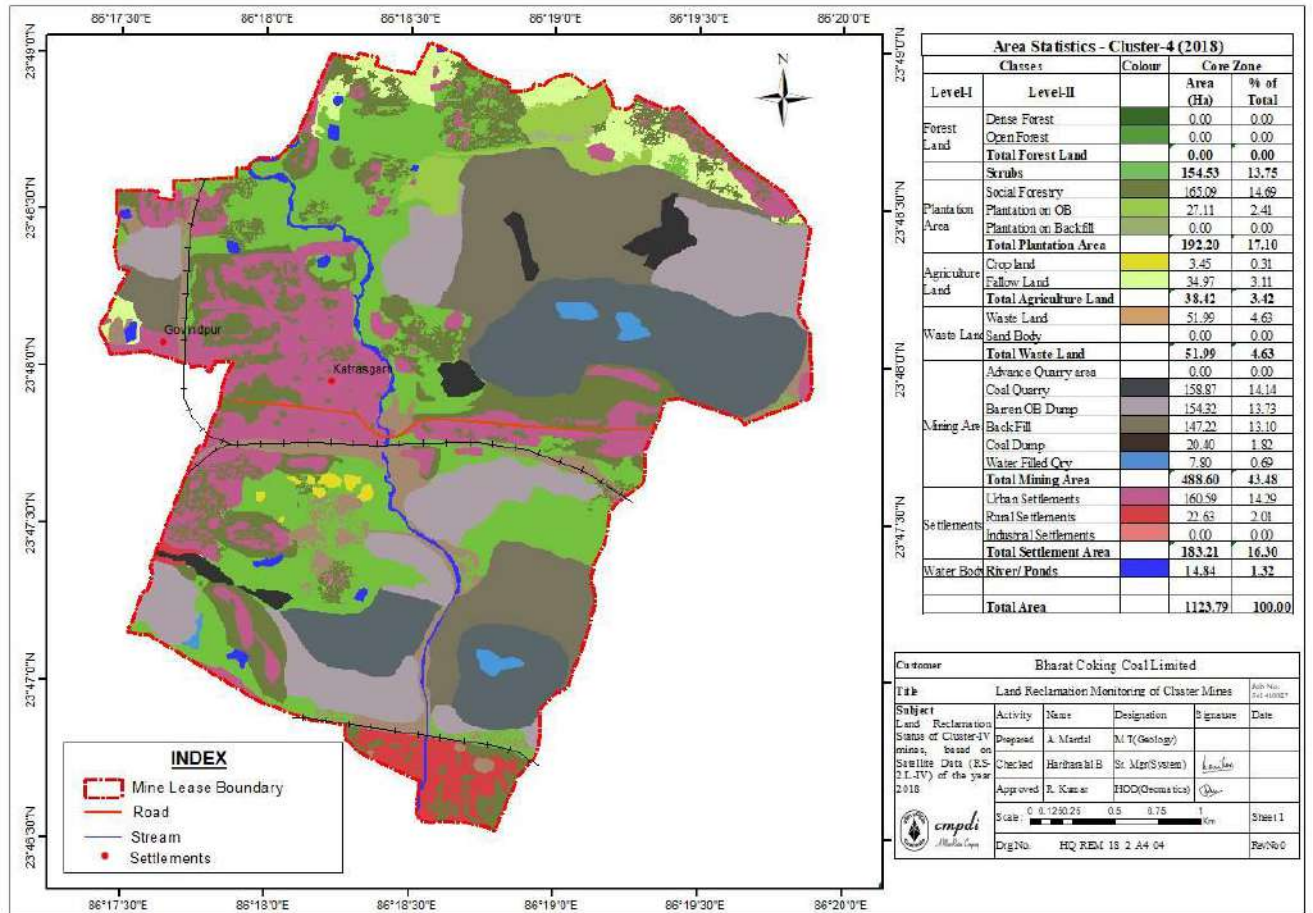
Monitoring stations (**A-26, A28A, B-64 and B-65A**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'21, August'21, and Nov'21 and January'22, the Ground water level data enclosed in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2021-22				2020-21				2019-20			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	A-26	Malkhera	6.70	2.10	2.73	3.63	6.98	2.69	3.18	4.78	6.58	2.23	3.33	3.83
2	A28A	Lakarka	6.23	0.53	3.75	4.47	4.00	1.33	3.03	3.35	2.45	1.25	3.15	3.60
3	B-64	Keshalpur	2.35	0.30	0.95	1.00	1.85	0.93	0.50	1.37	0.95	0.30	0.45	1.20
4	B65A	Jhinjipahari	9.03	0.45	1.42	2.80	9.25	0.03	2.30	4.10	11.05	1.85	0.95	2.95
Average WL (bgl)			6.08	0.85	2.21	2.98	5.52	1.25	2.25	3.40	5.26	1.41	1.97	2.90

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 0.95 m Max – 11.05 m
Post-monsoon GW Level (m): Min – 0.45 m Max – 3.75 m

LAND USE / LAND COVER MAP OF THE CLUSTER-IV MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	385.15 x 10 ⁴	0.0	385.15 x 10 ⁴
2	Open Land	555.43 x 10 ⁴	0.0	555.43 x 10 ⁴
3	Road/ Paved Area	160.59 x 10 ⁴	0.0	160.59 x 10 ⁴
4	Rooftop area of building/ sheds	22.63 x 10 ⁴	0.0	22.63 x 10 ⁴
5	Total	1123.79 x 10 ⁴	0.0	1123.79 x 10 ⁴

E. GROUND WATER LEVEL OF CLUSTER-V

Cluster-V consists of twelve mines namely; Tetulmari OC & UG mines, Mudidih OC & UG mines, Nichitpur OC mine, Sendra Bansjore OC & UG mines, Bansdeopur OCP (proposed) & UG Mines, Kankanee OC & UG mines and Loyabad UG mine (closed) of Sijua area, BCCL. This Cluster of mines is located in northern part of Jharia Coalfield in Dhanbad district of Jharkhand. The life of the project works out more than 30 years considering annual target production of 6.311 MTPA (Toposheet no – 73 I/6).

The present leasehold area of Cluster-V is 1724.52 Ha. The area has a general undulating topography, with an overall gentle south-west slope. The RL varies from 210 m to 170 m AMSL. Jarian Nala, Nagri Jore, Ekra Jore and its tributaries are controlling the drainage pattern of the area. The area comes under the watershed of Jarian Nala and Ekra Jore.

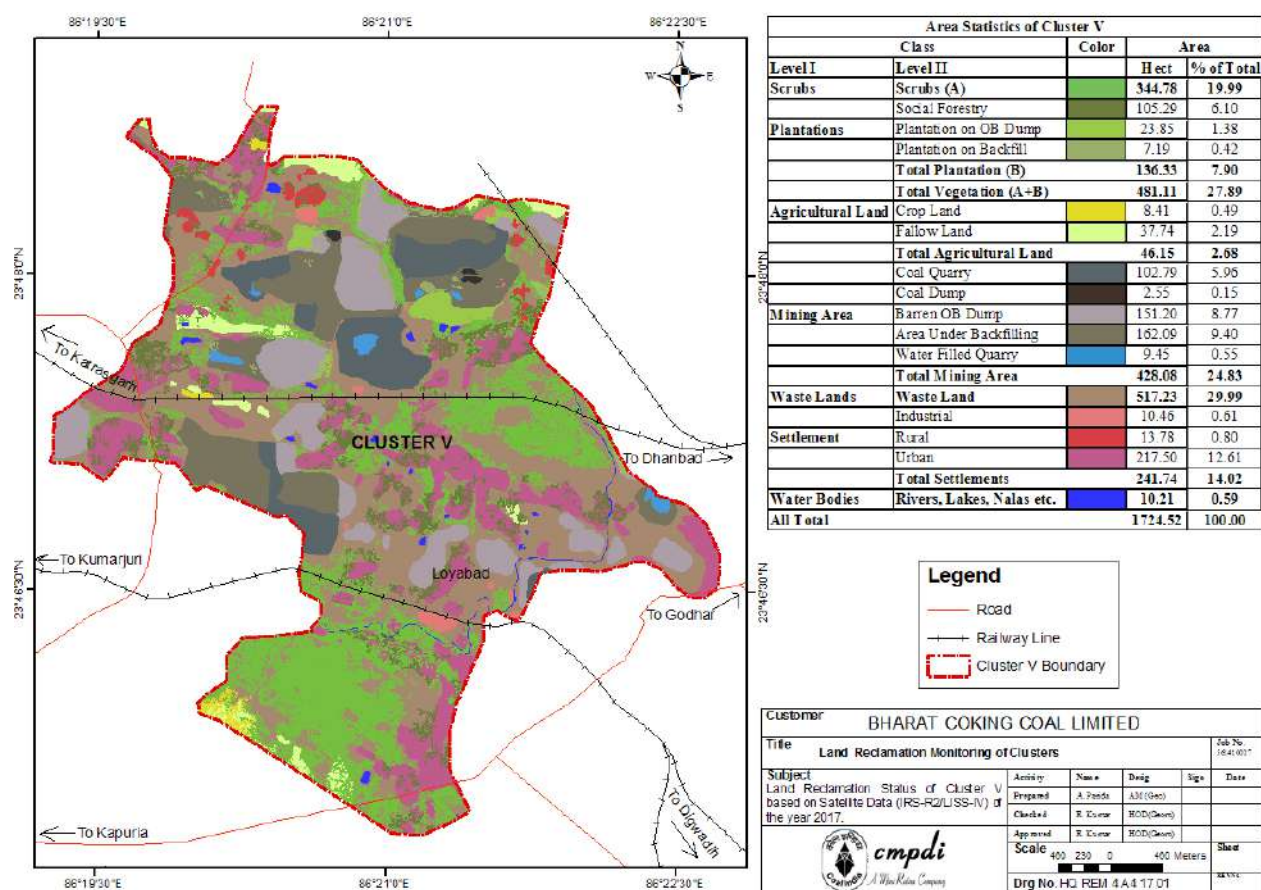
Monitoring stations (**A-3, A-16, A-27 and D-23**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'21, August'21, and Nov'21 and January'22, the Ground water level data enclosed in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2021-22				2020-21				2019-20			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	A-3	Sijua	0.62	0.07	0.05	0.07	1.57	0.02	0.47	0.77	3.47	0.32	0.47	0.62
2	A-16	Ekra	3.45	1.90	2.00	3.00	7.15	1.34	1.75	3.20	5.45	1.65	1.95	4.55
3	A-27	Tetulmari	1.67	0.80	0.90	1.13	2.40	0.03	1.10	1.90	2.40	0.15	0.92	1.30
4	D-23	Jogta	5.43	1.87	1.60	1.65	5.60	1.69	3.35	3.70	4.70	1.65	1.40	1.50
Average WL (bgl)			2.79	1.16	1.14	1.46	4.18	0.77	1.67	2.39	4.01	0.94	1.19	1.99

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 0.62 m Max – 5.60 m
Post-monsoon GW Level (m): Min – 0.05 m Max – 3.35 m

LAND USE / LAND COVER MAP OF THE CLUSTER-V MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	527.26 x 10 ⁴	0.0	527.26 x 10 ⁴
2	Open Land	973.52 x 10 ⁴	0.0	973.52 x 10 ⁴
3	Road/ Paved Area	217.50 x 10 ⁴	0.0	217.50 x 10 ⁴
4	Rooftop area of building/ sheds	24.24 x 10 ⁴	0.0	24.24 x 10 ⁴
5	Total	1724.52 x 10 ⁴	0.0	1724.52 x 10 ⁴

F. GROUND WATER LEVEL OF CLUSTER-VI

Cluster-VI consists of four coalmines; East Bassuriya opencast (OC), Bassuriya underground (UG), Gondudih Khas-Kusunda OC and Godhur Mixed Mines (OC and UG) of BCCL. This Cluster of mines is located in central part of Jharia Coalfield in Dhanbad district of Jharkhand. The life of the project works out more than 30 years considering annual target production of 7.631 MTPA (Toposheet no – 73 I/6).

The present leasehold area of Cluster-VI is 831.83 Ha. The area has a general undulating topography with general slope towards south. The RL varies from 180 m to 240 m AMSL. Ekra Jore, Kari Jore and their tributaries are controlling the drainage pattern of the area. The area comes under the watershed of Ekra Jore and Kari Jore.

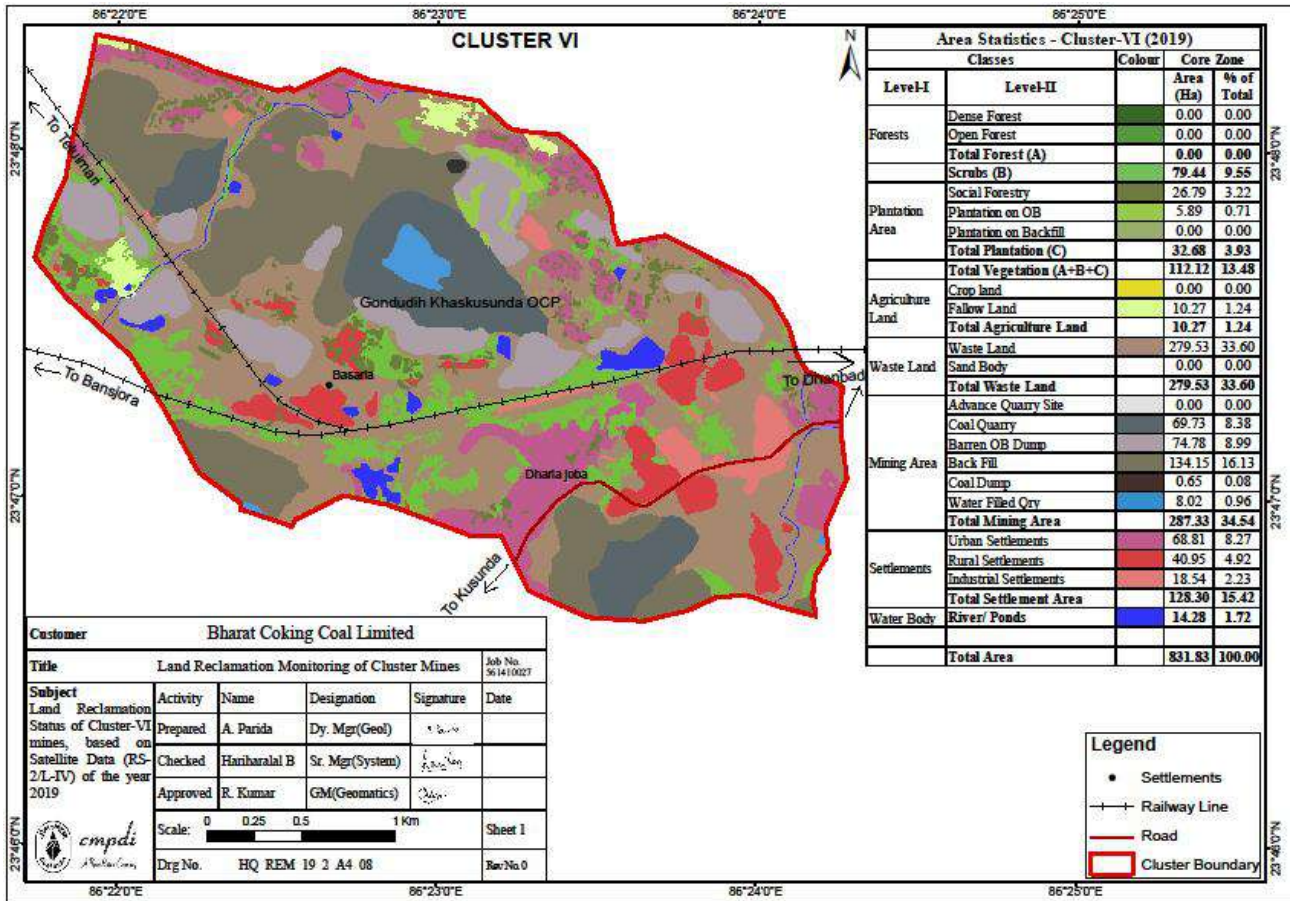
Monitoring stations (**D-25 and D-30**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'21, August'21, and Nov'21 and January'22, the Ground water level data enclosed in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2021-22				2020-21				2019-20			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	D25	Godhur	10.50	2.90	3.80	4.40	10.50	2.28	5.62	6.40	9.90	4.35	5.38	5.50
2	D30	Borkiboa	4.23	0.60	0.84	1.80	4.50	1.65	1.35	2.40	4.60	0.38	0.75	1.95
Average WL (bgl)			7.37	1.75	2.32	3.10	7.50	1.97	3.49	4.40	7.25	2.37	3.07	3.73

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 4.23 m Max – 10.50 m
Post-monsoon GW Level (m): Min – 0.75 m Max – 5.62 m

LAND USE / LAND COVER MAP OF THE CLUSTER-VI MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	122.39 X 10 ⁴	0.0	122.39 X 10 ⁴
2	Open Land	581.14 X 10 ⁴	0.0	581.14 X 10 ⁴
3	Road/ Paved Area	68.81 X 10 ⁴	0.0	68.81 X 10 ⁴
4	Rooftop area of building/ sheds	59.49 X 10 ⁴	0.0	59.49 X 10 ⁴
5	Total	831.83 X 10 ⁴	0.0	831.83 X 10 ⁴

G. GROUND WATER LEVEL OF CLUSTER-VII

Cluster-VII consists of fourteen mines namely; Kusunda Area, Bastacolla Area and PB Area B.C.C.L (Jharia Coalfield) is located in Dhanbad district of Jharkhand. Cluster-VII consists of coal mines; Dhansar UG, Dhansar OCP, Kusunda OCP and Viswakarma OCP (proposed) are under the administrative control of Kusunda Area and Industry UG (closed), Alkusa UG, Ena OCP, S.Jharia/Rajapur OCP, Burragarh UG, Simlabahal UG, Huriladih UG, Bhutgoria UG (Re-opening), Kustore UG (closed) and E.Bhuggatdih UG (closed) are under Bastacolla and PB Area of BCCL. This Cluster of mines is located in east central part of Jharia Coalfield in Dhanbad district of Jharkhand. The life of the project works out more than 30 years considering annual target production of 8.226 MTPA (Toposheet no – 73 I/6).

The present leasehold area of Cluster-VII is 2127.70 Ha. The area has a general undulating topography with general slope towards south. The RL varies from 172 m to 221 m above M.S.L. Kari Jore, Chatkari Jore and its tributaries are controlling the drainage pattern of the area. The area comes under the watershed of Kari Jore and Chatkari Jore.

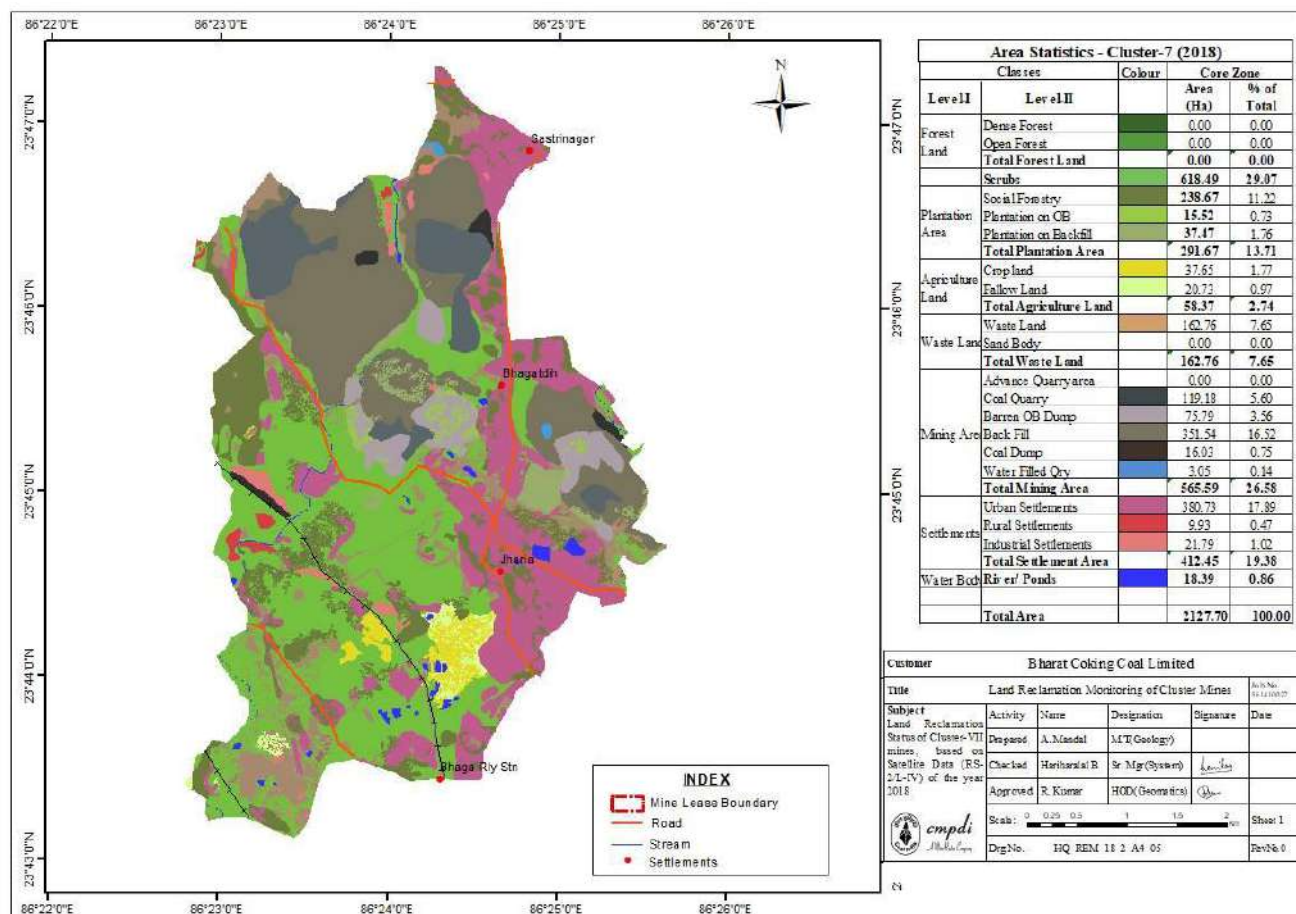
Monitoring stations (**D-3, D-4, D-33, D-34, D-47, D-55 and D-80**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'21, August'21, and Nov'21 and January'22, the Ground water level data enclosed in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2021-22				2020-21				2019-20			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	D-3	Dhansar	3.41	0.80	0.85	1.30	5.40	0.56	1.38	1.90	1.75	1.05	1.30	1.45
2	D-4	Jharia	3.01	1.41	1.16	1.61	3.41	0.51	1.41	2.26	2.81	1.16	1.71	2.16
3	D33	Kustore	1.75	0.62	0.85	1.60	3.65	0.48	1.45	1.80	2.35	0.25	1.65	2.35
4	D34	Kusunda	3.78	2.05	2.90	2.95	3.30	2.00	2.80	2.95	4.75	2.10	2.40	2.55
5	D47	Parastanr	4.05	3.22	2.45	4.88	9.45	3.41	5.45	5.83	4.55	1.90	4.35	4.20
6	D55	Hariladih	9.52	5.62	7.62	9.02	9.42	3.88	8.60	8.62	8.42	2.97	5.47	8.62
7	D80	Bastacolla	7.10	2.17	2.55	3.10	4.30	2.08	4.90	5.00	5.00	2.30	3.05	3.80
Average WL (bgl)			4.66	2.27	2.63	3.49	5.56	1.85	3.71	4.05	4.23	1.68	2.85	3.59

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 1.75 m Max – 9.52 m
Post-monsoon GW Level (m): Min – 0.85 m Max – 8.60 m

LAND USE / LAND COVER MAP OF THE CLUSTER-VII MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	968.53 x 10 ⁴	0.0	968.53 x 10 ⁴
2	Open Land	746.72 x 10 ⁴	0.0	746.72 x 10 ⁴
3	Road/ Paved Area	380.73 x 10 ⁴	0.0	380.73 x 10 ⁴
4	Rooftop area of building/ sheds	31.71 x 10 ⁴	0.0	31.71 x 10 ⁴
5	Total	2127.70 x 10 ⁴	0.0	2127.70 x 10 ⁴

H. GROUND WATER LEVEL OF CLUSTER-VIII

Cluster - VIII of B.C.C.L mines under administrative control of Bastacolla Area of B.C.C.L (Jharia Coalfield) is located in Dhanbad district of Jharkhand. Cluster-VIII consists of ten mines namely; Bastacolla mixed mines (OC & UG), Bera mixed mines (OC&UG), Dobari UG, Kuya mixed mines (OC&UG), Proposed Goluckdih (NC) OC mine, Ghanoodih OC mine and Kujama OC mine are under Bastacolla Area of BCCL is located in the west part of Jharia Coalfield. All above the mines are contiguous in nature and the environmental impact is overlapping in ambient environment due to cumulative effect of the mining activities. The life of the project works out upto 25 years considering annual target production of 6.383 MTPA (toposheet no. 73 I/5 and I/6).

The present leasehold area of Cluster-VIII is 1331.95 Ha. The area has a general undulating topography with general slope towards south and south-west. The ground elevation in the area ranges from 175 m to 221 m AMSL. Chatkari Jore, Tisra Jore and its tributaries controlling the drainage pattern of the area. The area comes under the watershed of Chatkari Jore.

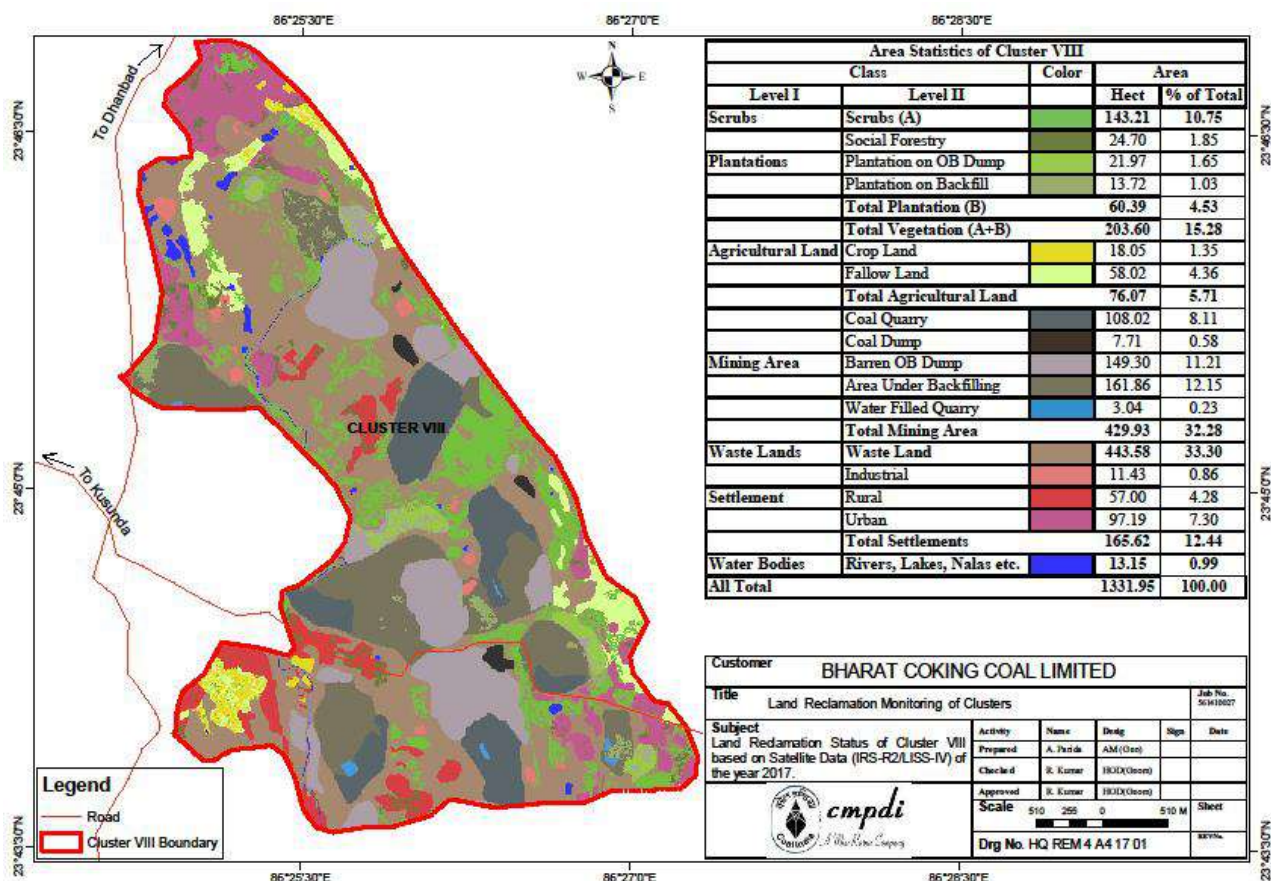
Monitoring stations (**D-8, D-43, D-49 and D-51**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'21, August'21, and Nov'21 and January'22, the Ground water level data enclosed in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2021-22				2020-21				2019-20			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	D-8	Alokdiha	4.55	1.85	2.27	3.20	5.83	1.70	2.75	3.20	4.80	1.95	2.85	4.25
2	D43	Alagdih	4.65	2.40	2.60	3.35	6.60	2.31	2.55	3.05	7.35	3.55	2.70	4.25
3	D49	Galucdih	1.40	0.73	0.85	1.00	3.25	1.41	1.65	1.98	1.75	0.60	1.50	1.25
4	D51	Chankuiya	9.43	5.65	5.65	7.50	8.45	6.03	5.70	7.35	9.95	8.05	5.75	7.75
Average WL (bgl)			5.01	2.66	2.84	3.76	6.03	2.86	3.16	3.90	5.96	3.54	3.20	4.38

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 1.40 m Max – 9.95 m
Post-monsoon GW Level (m): Min – 0.85 m Max – 5.75 m

LAND USE / LAND COVER MAP OF THE CLUSTER-VIII MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	279.69 x 10 ⁴	0.0	279.69 x 10 ⁴
2	Open Land	886.66 x 10 ⁴	0.0	886.66 x 10 ⁴
3	Road/ Paved Area	97.19 x 10 ⁴	0.0	97.19 x 10 ⁴
4	Rooftop area of building/ sheds	68.43 x 10 ⁴	0.0	68.43 x 10 ⁴
5	Total	1331.95 x 10 ⁴	0.0	1331.95 x 10 ⁴

I. GROUND WATER LEVEL OF CLUSTER-IX

Cluster - IX of B.C.C.L mines under administrative control of Lodna Area of B.C.C.L (Jharia Coalfield) is located in Dhanbad district of Jharkhand. Cluster- IX consists of eight mines namely; North Tisra/South Tisra OCP, Jeenagora OCP, North Tisra UG, Lodna UG, Bagdigi UG, Bararee UG, Joyrampur UG and Jealgora UG (closed) are under the administrative control of Lodna Area of Bharat Coking Coal Limited (B.C.C.L - A Subsidiary of Coal India Limited). Among them N. Tisra/S. Tisra OCP, Jeenagora OCP and N. Tisra UG mine will be amalgamated and will form North Tisra/South Tisra Expansion OCP. North Tisra/South Tisra Expansion OCP, Lodna UG, Bagdigi UG, Bararee UG and Joyrampur UG are under Lodna Area of BCCL is located in the west part of Jharia Coalfield. All above the mines are contiguous in nature and the environmental impact is overlapping in ambient environment due to cumulative effect of the mining activities. The life of the project works out upto 30 years considering annual target production of 8.513 MTPA (toposheet no. 73 I/6).

The present leasehold area of Cluster-IX is 1967.22 Ha. The topography of the area is undulating with gentle slope towards south. The RL varies from 221 m to 188.44 m AMSL. Chatkari Jore, Tisra Jore, Sulunga Jore and its tributaries controlling the drainage pattern of the area. The area comes under the watershed of Chatkari Jore.

Monitoring stations (**D-5, D-7, D-39, D-40A, D-41 and D-74**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'21, August'21, and Nov'21 and January'22, the Ground water level data enclosed in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2021-22				2020-21				2019-20			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	D-5	Jiyalgora	7.28	3.35	4.00	6.40	8.60	3.20	7.70	7.90	8.25	2.90	4.85	8.20
2	D-7	Golden Pahari	6.08	2.38	2.63	3.88	7.33	2.56	5.13	5.35	8.23	1.88	3.28	4.86
3	D-39	Tilaboni	10.70	4.60	5.10	8.15	9.40	3.35	6.05	6.78	12.60	4.00	5.95	12.45
4	D40A	Khapa Dhawra	1.95	1.35	1.80	2.35	1.95	0.30	1.43	6.78	1.85	1.50	1.45	1.95
5	D-41	Joyrampur	1.95	1.34	1.38	1.45	3.30	1.43	1.45	1.60	2.30	0.70	1.25	1.40
6	D-74	BhulanBararee	6.93	3.20	2.90	3.70	4.30	2.58	3.93	4.00	5.80	2.35	3.57	4.95
Average WL (bgl)			5.82	2.70	2.97	4.32	5.81	2.24	4.28	4.54	6.51	2.22	3.39	5.64

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 1.85 m Max – 12.60 m
Post-monsoon GW Level (m): Min – 1.25 m Max – 7.70 m

Area Statistics of Cluster IX

Level I	Class	Color	Hect	% of Total
Scrubs	Scrubs (A)		339.86	17.28
	Social Forestry		168.58	8.57
Plantations	Plantation on OB Dump		41.79	2.12
	Plantation on Backfill		6.80	0.35
	Total Plantation (B)		217.17	11.04
	Total Vegetation (A+B)		557.03	28.32
Agricultural Land	Fallow Land		44.49	2.26
	Total Agricultural Land		44.49	2.26
	Coal Quarry		178.55	9.08
Mining Area	Barren OB Dump		172.19	8.75
	Area Under Backfilling		77.53	3.94
	Coal Dump		9.67	0.49
	Water Filled Quarry		3.30	0.17
	Total Mining Area		441.24	22.43
Waste Lands	Waste Land		614.64	31.24
	Industrial		9.13	0.46
Settlement	Rural		47.79	2.43
	Urban		232.31	11.81
	Total Settlements		289.23	14.70
Water Bodies	Rivers, Lakes, Nalas etc.		20.59	1.05
All Total			1967.22	100.00

Legend

- Railway Line
- Cluster IX Boundary

Customer BHARAT COKING COAL LIMITED

Title Land Reclamation Monitoring of Clusters

Subject Land Reclamation Status of Cluster IX based on Satellite Data (IRS-R2/LISS-IV) of the year 2017.

Scale 1:40,000

Map No. 10/14/10/17

Sheet 10/14/10/17

Org No HQ REM A 44 17 01

Rev.

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Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	601.52 x 10 ⁴	0.0	601.52 x 10 ⁴
2	Open Land	1076.47 x 10 ⁴	0.0	1076.47 x 10 ⁴
3	Road/ Paved Area	232.31 x 10 ⁴	0.0	232.31 x 10 ⁴
4	Rooftop area of building/ sheds	56.92 x 10 ⁴	0.0	56.92 x 10 ⁴
5	Total	1967.22 x 10 ⁴	0.0	1967.22 x 10 ⁴

J. GROUND WATER LEVEL OF CLUSTER-X

Cluster-X consists of Bhowrah North OC & UG, Bhowrah South OC & UG, Amalgamated Sudamdih Patherdih, Sudamdih Shaft, Amlabad UG (Closed) and Sudamdih Coal Washery comes under the administrative control of Eastern Jharia Area of Bharat Coking Coal Limited (B.C.C.L - A Subsidiary of Coal India Limited). This cluster of mines is located in eastern part of Jharia Coalfield in Dhanbad district of Jharkhand. The life of the project works out is more than 30 years considering annual target production of 2.289 MTY.

Cluster-X mine involves leasehold area of about 2057.47 Ha of land. It covered in Survey of India toposheet no. 73 I/6. The area of Bhowrah North OC & UG, Bhowrah South OC & UG, Amalgamated Sudamdih Patherdih, Sudamdih Shaft, Amlabad UG (Closed) are 280.83 Ha, 571.58 Ha, 498.61 Ha, 391.50 Ha and 386.95 Ha respectively.

The present leasehold area of Cluster-X is 2057.47 Ha. The area has an undulating topography with gentle slope towards south and south-east. The RL varies from 185 m to 150.0 m AMSL. Gaurkuthi Nala and few seasonal streams are controlling the drainage pattern of the area. The area comes under the watershed of Damodar River.

Monitoring stations (**A-19, D-35, D-36 and D-77**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'21, August'21, and Nov'21 and January'22, the Ground water level data enclosed in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2021-22				2020-21				2019-20			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	A-19	Bhowrah	3.30	1.95	1.90	2.20	6.05	2.30	3.25	3.70	4.85	0.95	3.43	4.95
2	D-35	Patherdih	6.60	2.70	2.90	4.30	8.20	2.98	5.40	5.62	8.00	3.15	3.80	5.90
3	D-36	Sudamdih	2.02	0.45	0.55	0.55	2.10	0.06	1.00	1.15	1.20	0.10	0.55	0.65
4	D-77	Amlabad	5.98	2.60	4.69	5.60	6.40	5.90	3.50	4.25	6.40	2.80	3.20	4.50
Average WL (bgl)			4.48	1.93	2.51	3.16	5.69	2.81	3.29	3.68	5.11	1.75	2.75	4.00

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 1.20 m Max – 8.20 m
Post-monsoon GW Level (m): Min – 0.55 m Max – 4.69 m

LAND USE / LAND COVER MAP OF THE CLUSTER-X MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	1085.72 x 10 ⁴	0.0	1085.72 x 10 ⁴
2	Open Land	661.04 x 10 ⁴	0.0	661.04 x 10 ⁴
3	Road/ Paved Area	228.39 x 10 ⁴	0.0	228.39 x 10 ⁴
4	Roof top area of building/ sheds	82.32 x 10 ⁴	0.0	82.32 x 10 ⁴
5	Total	2057.47 x 10 ⁴	0.0	2057.47 x 10 ⁴

K. GROUND WATER LEVEL OF CLUSTER-XI

Cluster–XI consists of eight coal mines; Moonidih UG, Gopalichak UG Project, Kachi Balihari 10/12 Pit UG, Pootkee Balihari Project UG, Bhagaband UG, Kendwadih UG (closed), Pootkee UG (closed), Kachi Balihari 5/6 Pit UG (closed) are under the administrative control of Western Jharia Area of Bharat Coking Coal Limited (B.C.C.L - A Subsidiary of Coal India Limited). The Cluster- XI is located in central part of Jharia Coalfield in Dhanbad district of Jharkhand. The life of the project works out about upto 50 years considering annual target production of 6.604 MTPA (toposheet no. no. 73 I/5 7 73 I/6).

The present leasehold area of Cluster-XI is 3527.58 Ha. The area has an undulating topography with gentle slope towards south. The RL varies from 201 m to 166 m AMSL. Katri River, Jarian Nala, Ekra Jore and Kari Jore are controlling the drainage of the area. The area comes under the watershed of Katri River and Kari Jore.

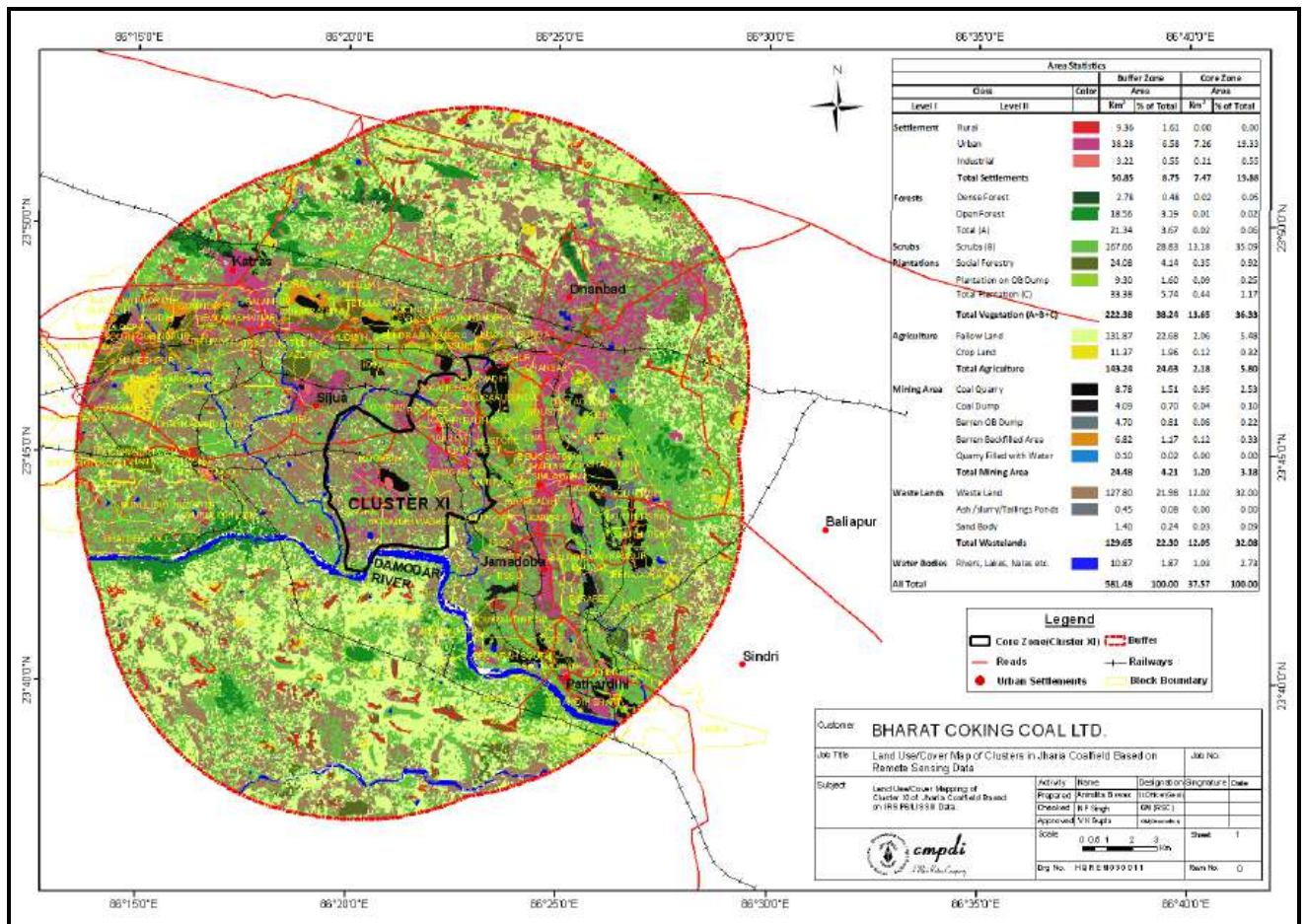
Monitoring stations (**A-17, A-18, A-20 and A-32**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'21, August'21, and Nov'21 and January'22, the Ground water level data enclosed in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2021-22				2020-21				2019-20			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	A-17	Kachi Balihari	3.36	1.62	2.37	2.54	2.14	0.64	1.69	1.79	2.94	0.34	2.24	2.42
2	A-18	Baghaband	1.09	0.54	0.57	0.74	1.09	0.39	0.34	0.89	2.29	1.09	0.69	1.09
3	A-20	Gorbudih	5.47	1.47	2.02	3.07	8.47	1.44	3.87	4.42	4.57	3.32	1.82	4.02
4	A-32	Baludih	2.35	0.73	0.96	1.50	1.90	0.36	1.75	1.80	2.75	0.62	0.95	1.65
Average WL (bgl)			3.07	1.09	1.48	1.96	3.40	0.71	1.91	2.23	3.14	1.34	1.43	2.30

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 1.09 m Max – 8.47 m
Post-monsoon GW Level (m): Min – 0.34 m Max – 3.87 m

LAND USE / LAND COVER MAP OF THE CLUSTER-XI MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	1060.61 x 10 ⁴	0.0	1293.46 x 10 ⁴
2	Open Land	1518.33 x 10 ⁴	0.0	1509.06 x 10 ⁴
3	Road/ Paved Area	171.08 x 10 ⁴	0.0	171.08 x 10 ⁴
4	Rooftop area of building/ sheds	777.56 x 10 ⁴	0.0	563.06 x 10 ⁴
5	Total	3527.58 x 10 ⁴	0.0	3527.58 x 10 ⁴

L. GROUND WATER LEVEL OF CLUSTER-XIII

Cluster-XIII, consists of one running mine (Murulidih 20/21 pit UG mine) and six abandoned mines i.e. Bhurungiya colliery, Muchraidih colliery, Hantoodih colliery, Padugora colliery, Murulidih colliery and Bhatdee colliery of Western Jharia area, BCCL is located in the south-western part of Jharia coal field in Dhanbad district of Jharkhand. The area is covered by Survey of India toposheet no. 73 I/6. The life of the project works out about 15 years considering annual target production of 0.234 MTPA.

The present leasehold area of Cluster-XIII is 1898.62 Ha. The area has an undulating topography with gentle slope towards south-east. The maximum RL is 224 m AMSL in the north-western part of the area whereas the minimum RL is 179 m AMSL at southern part. The area comes under the watershed area of Jamunia River and Katri River.

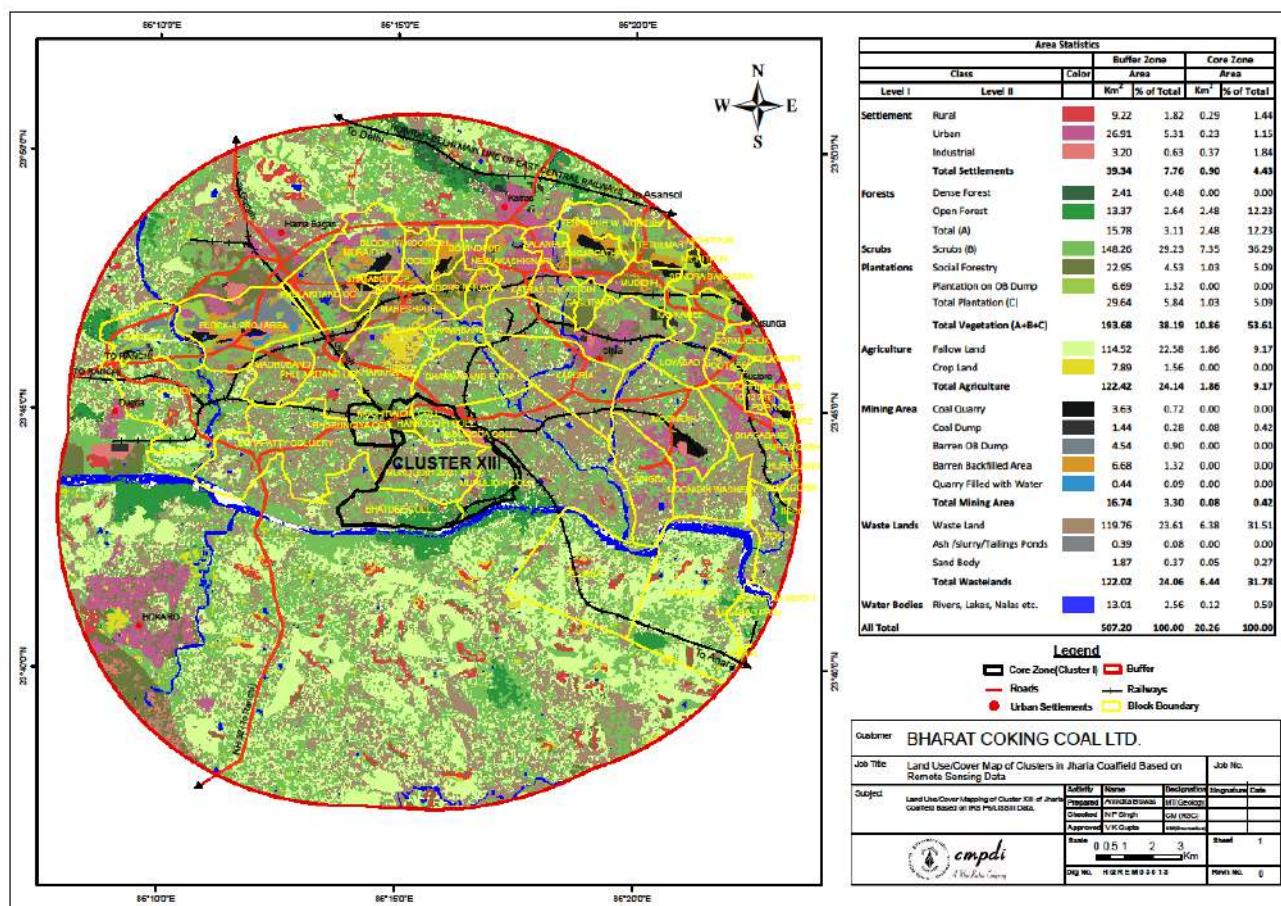
Monitoring stations (**A-22, A-23, A-33, A-34, B-25 and B-48**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'21, August'21, Nov'21 and January'22, the Ground water level data enclosed in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2021-22				2020-21				2019-20			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	A22A	Nagdah	2.90	0.40	1.10	1.50	2.90	0.20	1.98	2.00	2.60	1.75	2.00	2.85
2	A-23	Machhayara	9.52	1.87	2.82	4.82	8.92	1.12	5.62	7.12	11.97	5.37	3.77	6.57
3	A-33	Mahuda Wa	2.85	0.80	0.85	1.33	4.55	0.38	1.85	2.85	3.65	0.55	1.25	1.55
4	A-34	Mahuda vil.	5.20	1.83	3.55		8.35	3.43	3.45	5.35	6.35	3.45	3.95	5.45
5	B-25	Mahuda more	5.10	1.98	2.58	3.30	7.90	3.02	2.55	3.45	4.80	1.38	1.40	3.50
6	B-48	Mahuda	7.23	2.28	6.05	6.60	8.20	3.37	3.85	4.51	7.05	2.85	4.35	5.45
Average WL (bgl)			5.47	1.53	2.83	3.51	6.80	1.92	3.22	4.21	6.07	2.56	2.79	4.23

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 2.85 m Max – 11.97 m
Post-monsoon GW Level (m): Min – 0.85 m Max – 6.05 m

LAND USE / LAND COVER MAP OF THE CLUSTER-XIII MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	1484.41 x 10 ⁴	0.0	1570.48 x 10 ⁴
2	Open Land	183.28 x 10 ⁴	0.0	97.22 x 10 ⁴
3	Road/ Paved Area	71.84 x 10 ⁴	0.0	71.83 x 10 ⁴
4	Rooftop area of building/ sheds	159.09 x 10 ⁴	0.0	159.09 x 10 ⁴
5	Total	1898.62 x 10 ⁴	0.0	1898.62 x 10 ⁴

M. GROUND WATER LEVEL OF CLUSTER-XIV

Cluster-XIV of B.C.C.L mines under administrative control of Western Jharia Area of B.C.C.L (Jharia Coalfield) is located in Dhanbad district of Jharkhand. Lohapatty UG and Lohapatty OC patch (proposed) are under the administrative control of Western Jharia Area of Bharat Coking Coal Limited (B.C.C.L - A Subsidiary of Coal India Limited). The Cluster- XIV is located in western part of Jharia Coalfield in Dhanbad district of Jharkhand. The life of the project works out upto 08 years considering annual target production of 0.526 MTPA. Cluster-XIV mine involves leasehold area of about 1418.25 Ha of land. It covered in Survey of India toposheet no. 73 I/2.

The present leasehold area of Cluster-XIV is 1418.25 Ha. The topography of the area is undulating with slope towards south west. The maximum RL is 224 m in the north-eastern part whereas the minimum RL is 170 m above mean sea level on the south-western part of the area. Jamunia River and its tributaries are controlling the drainage of the area. The area comes under the watershed area of Jamunia River.

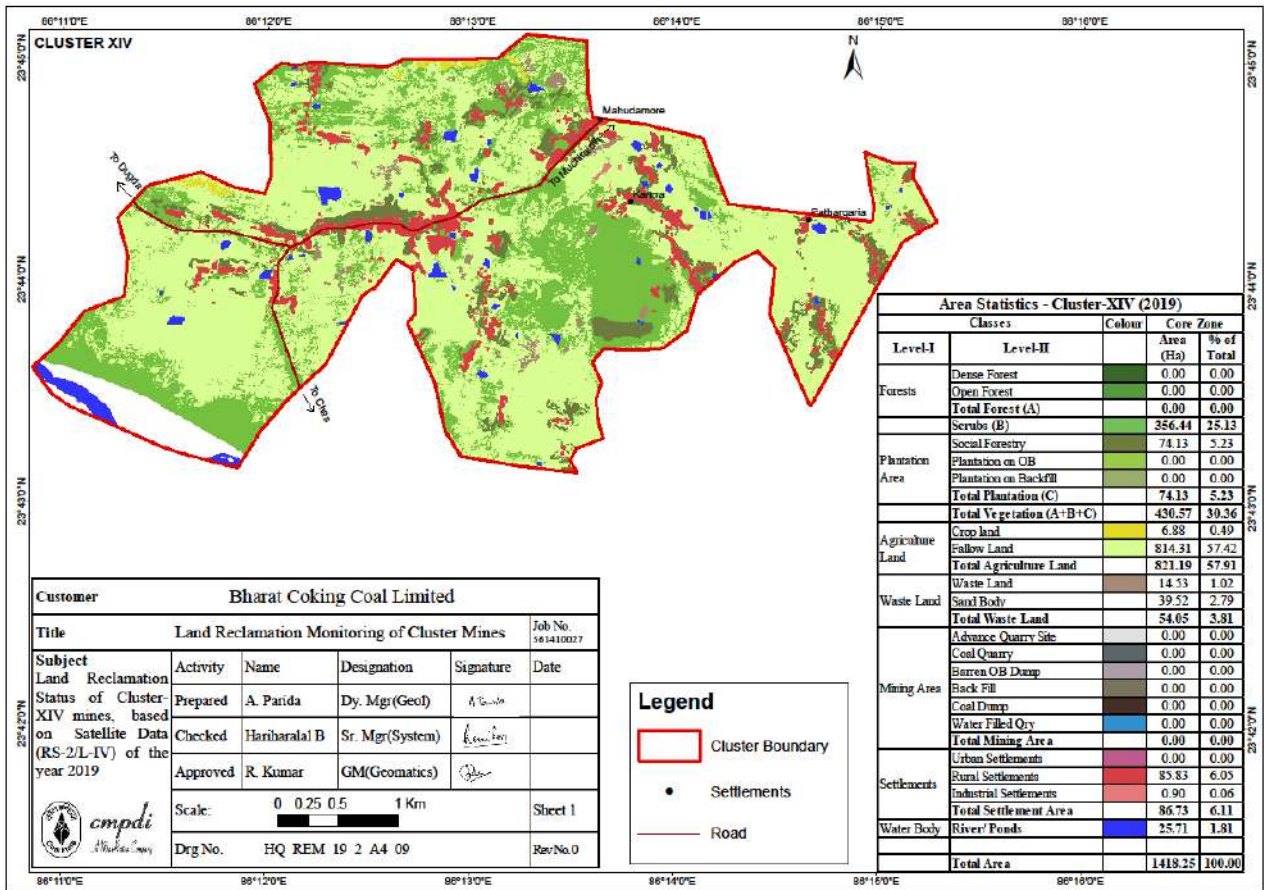
Monitoring stations (**B-23, B-24 and B-67**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'21, August'21, and Nov'21 and January'22, the Ground water level data enclosed in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2021-22				2020-21				2019-20			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	B-23	Lohapatti	4.12	1.24	1.44	1.81	3.24	0.77	1.76	2.69	2.84	1.12	1.34	2.24
2	B-24	Telmuchu	5.68	1.55	2.08	3.07	5.48	1.13	3.53	4.38	4.58	1.23	2.33	3.63
3	B-67	Simatanr	8.95	2.45	2.95	3.65	7.55	1.83	3.95	5.90	8.57	3.37	4.35	4.65
Average WL (bgl)			6.25	1.75	2.16	2.84	5.42	1.24	3.08	4.32	5.33	1.91	2.67	3.51

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 2.84 m Max – 8.95 m
Post-monsoon GW Level (m): Min – 1.34 m Max – 4.35 m

LAND USE / LAND COVER MAP OF THE CLUSTER-XIV MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	1251.76 x 10 ⁴	0.0	1251.76 x 10 ⁴
2	Open Land	79.76 x 10 ⁴	0.0	79.76 x 10 ⁴
3	Road/ Paved Area	85.83 x 10 ⁴	0.0	85.83 x 10 ⁴
4	Rooftop area of building/ sheds	0.90 x 10 ⁴	0.0	0.90 x 10 ⁴
5	Total	1418.25 x 10 ⁴	0.0	1418.25 x 10 ⁴

N. GROUND WATER LEVEL OF CLUSTER-XV

Cluster - XV of B.C.C.L mines under administrative control of Govindpur Area and barora Area of B.C.C.L (Jharia Coalfield) is located in Dhanbad district of Jharkhand. Cluster-XV consists of four coal mines; Kharkharee UG (underground mine) and Dharmaband UG are under the administrative control of Govindpur Area and Madhuband UG & Phularitand UG are under the administrative control of Barora Area of Bharat Coking Coal Limited (B.C.C.L - A Subsidiary of Coal India Limited). The Cluster-XV is located in western part of Jharia Coalfield in Dhanbad district of Jharkhand. The life of the project works out upto 30 years considering annual target production of 0.423 MTPA. Cluster-XV mine involves leasehold area of about 1696.55 Ha of land. It covered in Survey of India toposheet no. 73 I/1 and 73 I/5.

The present leasehold area of Cluster-XV is 1696.55 Ha. The topography of the area is undulating with slope towards south-west. The maximum RL is 235 m in the Kharkharee mine area whereas the minimum RL is 165 m AMSL on the eastern & western part of the Cluster. Jamunia River and Khudia River are controlling the drainage of the area. The area comes under the watershed area of both Jamunia River and Khudia River.

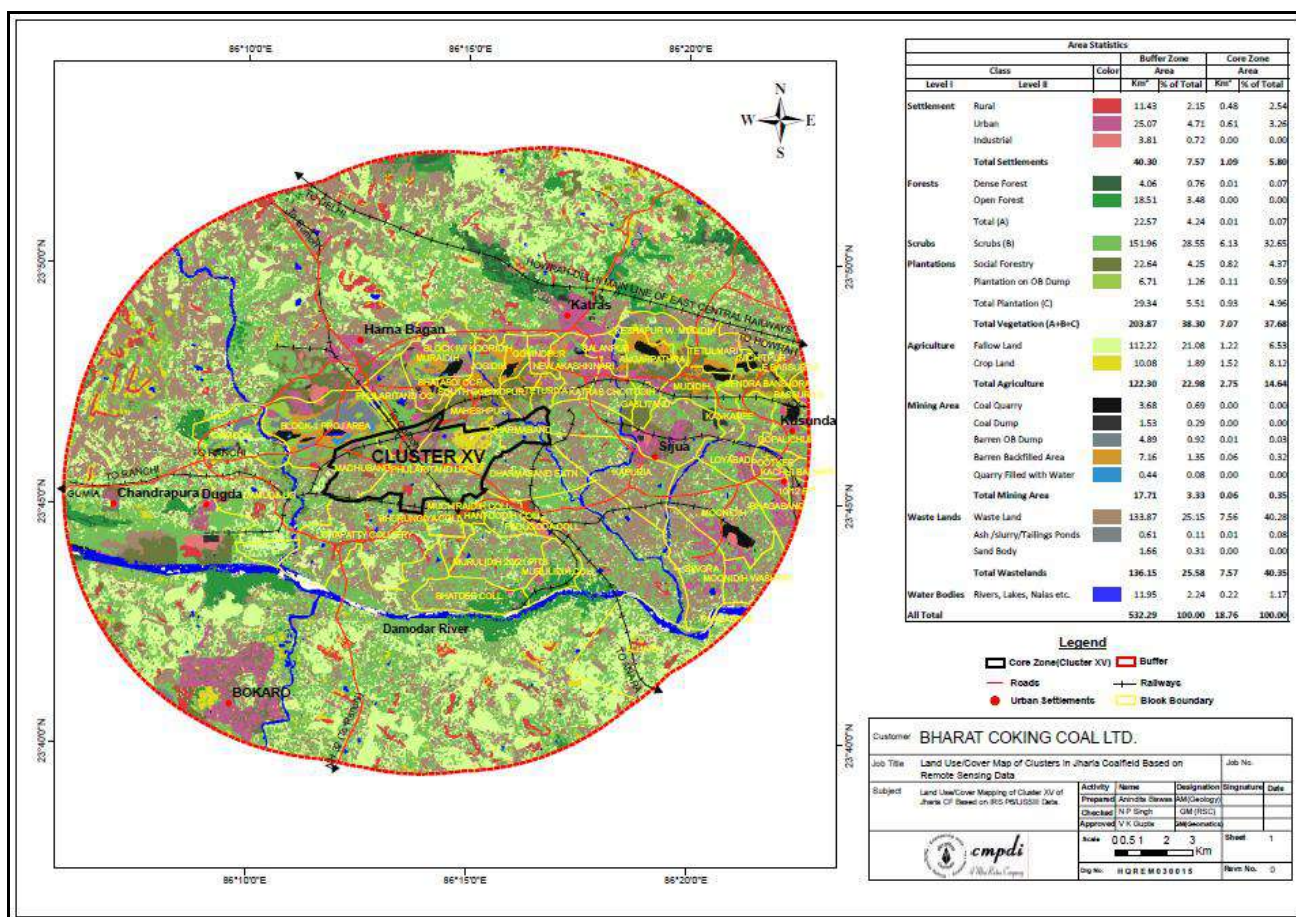
Monitoring stations (**A-24, B-32A and B-61A**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'21, August'21, and Nov'21 and January'22, the Ground water level data enclosed in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2021-22				2020-21				2019-20			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	A24	Pipratn	10.13		2.78	4.55	4.88	-	4.28	4.68	15.88	1.73	2.48	4.08
2	B32A	Madhuband	5.60	1.34	1.70	2.30	3.30	1.18	2.00	2.21	5.55	1.25	1.70	2.35
3	B61A	Kesargora	4.42	0.47	0.97	0.97	3.32	0.85	1.60	2.07	3.35	1.39	0.52	1.12
Average WL (bgl)			6.72	0.91	1.82	2.61	3.83	1.02	2.63	2.99	5.39	7.97	3.63	4.27

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 3.32 m Max – 15.88 m
Post-monsoon GW Level (m): Min – 0.52 m Max – 4.28 m

LAND USE / LAND COVER MAP OF THE CLUSTER-XV MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	365.18 x 10 ⁴	0.0	957.34 x 10 ⁴
2	Open Land	1130.53 x 10 ⁴	0.0	538.37 x 10 ⁴
3	Road/ Paved Area	101.67 x 10 ⁴	0.0	101.67 x 10 ⁴
4	Rooftop area of building/ sheds	99.17 x 10 ⁴	0.0	99.17 x 10 ⁴
5	Total	1696.55 x 10 ⁴	0.0	1696.55 x 10 ⁴

O. GROUND WATER LEVEL OF CLUSTER-XVI

Cluster - XVI of B.C.C.L mines under administrative control of Chanch Victoria Area of B.C.C.L (Raniganj Coalfield) is located in Dhanbad district of Jharkhand. The Cluster-XVI (Dahibari-Basantimata Group of mines) is located on the western part of the Raniganj Coalfield and falls within Dhanbad district of Jharkhand. There are total five collieries within this Clusture- XVI (Dahibari-Basantimata OC, Basantimata UG, New Laikdih OC, Laikdih Deep UG and Chanch UG Colliery). All above the mines are contiguous in nature and the environmental impact is overlapping in ambient environment due to cumulative effect of the mining activities. The life of the project works out upto 24 years considering annual target production of 1.963 MTPA. Cluster-XVI mine involves leasehold area of about 2008.40 Ha of land. It covered in Survey of India toposheet no. 73 I/14.

The present leasehold area of Cluster-XVI is 2008.40 Ha. The topography of the area is undulating with slope towards south-west. The area is plain with gently undulating with elevation varying from 100 m to 140 m AMSL. The general slope of the area is towards southeast. Barakar River and Khudia River are controlling the drainage of the area. The area comes under the watershed area of Barakar River.

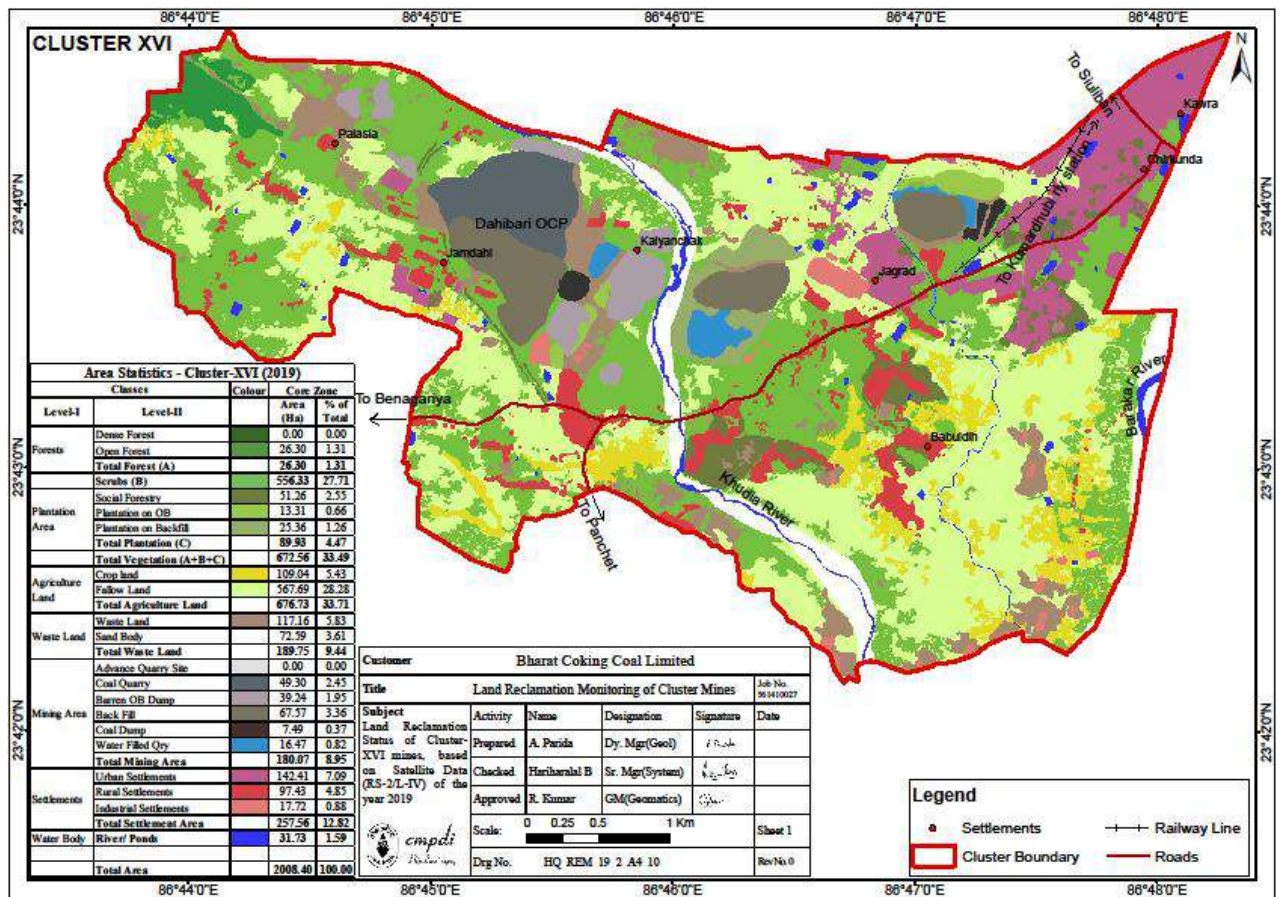
Monitoring stations (**DB-22, DB-23, DB-24 & DB-25**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'21, August'21, and Nov'21 and January'22, the Ground water level data enclosed in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2021-22				2020-21				2019-20			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	DB22	Dahibari, Basti	2.31	1.55	1.38	1.57	2.63	1.30	2.25	2.38	4.93	1.38	1.63	1.73
2	DB23	Dahibari OC	2.00	1.05	1.10	1.70	2.50	0.70	1.95	2.17	1.60	0.88	0.80	1.00
3	DB24	Dahibari	6.20	4.20	5.25	5.80	3.60	1.57	5.70	5.90	9.35	3.20	3.88	4.80
4	DB25	Basantimata UG	2.83	1.01	2.03	2.63	3.98	1.19	2.63	2.68	-	-	-	-
Average WL (bgl)			3.34	1.95	2.44	2.93	3.18	1.19	3.13	3.28	4.53	1.82	2.10	2.51

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 1.60 m Max – 9.35 m
Post-monsoon GW Level (m): Min – 0.80 m Max – 5.70 m

LAND USE / LAND COVER MAP OF THE CLUSTER-XVI MINES, BCCL



SI no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	1349.29 x 10 ⁴	0.0	1349.29 x 10 ⁴
2	Open Land	401.55 x 10 ⁴	0.0	401.55 x 10 ⁴
3	Road/ Paved Area	142.41 x 10 ⁴	0.0	142.41 x 10 ⁴
4	Rooftop area of building/ sheds	115.15 x 10 ⁴	0.0	115.15 x 10 ⁴
5	Total	2008.40 x 10 ⁴	0.0	2008.40 x 10 ⁴

4.0 GROUND WATER LEVEL SCENARIO

The summarized water level data of all clusters given in **Table – 7**.

Table –7: Groundwater level data Cluster-wise

Sl. No.	Cluster of BCCL	No. of Monitoring Wells	Water level fluctuation Below ground level (May, Aug, Nov'21 & Jan'22)	Avg. Fluctuation (in meters) during 2021-22	Geological Formation
1	I	4 nos.	0.25 to 8.38 m	2.93 m	Barakar
2	II	5 nos.	0.30 to 11.26 m	4.02 m	Barakar
3	III	5 nos.	0.24 to 11.26 m	2.92 m	Barakar
4	IV	4 nos.	0.30 to 9.03 m	3.87 m	Barakar
5	V	4 nos.	0.07 to 5.43 m	1.66 m	Barakar
6	VI	2 nos.	0.60 to 10.50 m	5.05 m	Barakar
7	VII	7 nos.	0.62 to 9.52 m	2.03 m	Barakar
8	VIII	4 nos.	0.73 to 9.43 m	2.17 m	Barakar
9	IX	6 nos.	1.34 to 10.70 m	2.85 m	Barakar
10	X	4 nos.	0.45 to 6.60 m	1.97 m	Barakar
11	XI	4 nos.	0.54 to 5.47 m	1.80 m	Barakar & Barren Measure
12	XIII	6 nos.	0.40 to 9.52 m	2.64 m	Raniganj
13	XIV	3 nos.	1.24 to 8.95 m	4.09 m	Raniganj
14	XV	3 nos.	0.47 to 10.13 m	4.90 m	Barakar & Barren Measure
15	XVI	3 nos.	1.01 to 6.20 m	0.90 m	Barakar

Depth to water level (in bgl) values described that water level goes down to maximum 11.26 m during pre-monsoon'2021 and maximum upto 7.62 m during post-monsoon'2021. Un-confined aquifer affected around 20 m to 30 m maximum close to active opencast mining areas, showing steep gradient towards mine void. Other than that, there is no mining effect in the water level within JCF area and RCF area (part). Historical water level data and hydrograph of permanent observation stations from CGWB shown in **Annexure–VI**. Water Table contour map and Depth to water level map shown in **Plate-IV & V**.

Monitoring groundwater (quantity & quality) to assess the present condition and resource has done regularly in the coalfield areas. Well hydrographs (**Annexure–VI**) are prepared and studied to identify long-term trends. Hydrograph trend analysis of CGWB monitoring wells and observation well reveals increasing groundwater level trends in most of the Cluster of mines. However, decline trends in both Pre

and Post-monsoon GW level in Cluster-I, Cluster-V, Cluster-VI and Cluster-VII is recorded but no significant decline trend (>1.0 m/year) of water level is noticed in any particular area for the last 10 years within the coalfield area. Regarding quality monitoring, the water sample location map (**Plate-II**) with collection points details (dug wells) given in **Annexure-V** and Quality is given in **Annexure-VII**.

5.0 GROUND WATER QUALITY

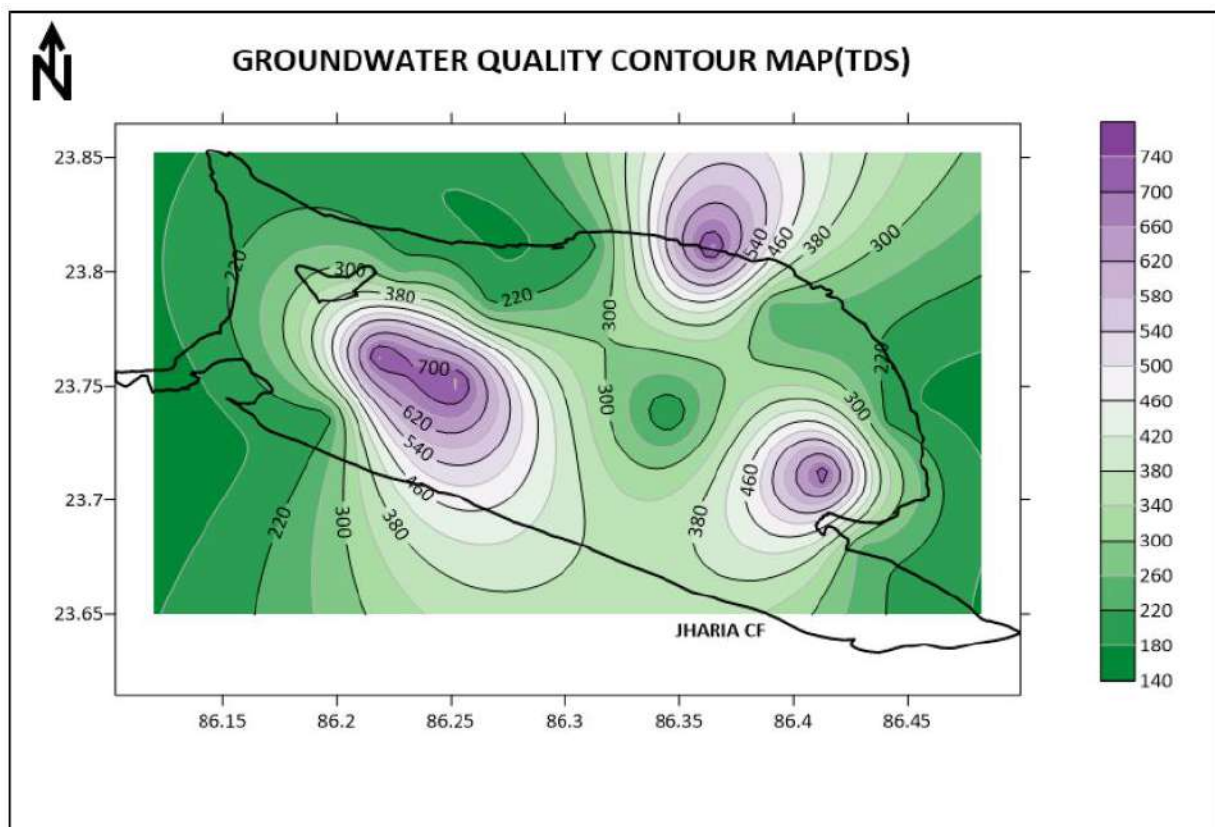
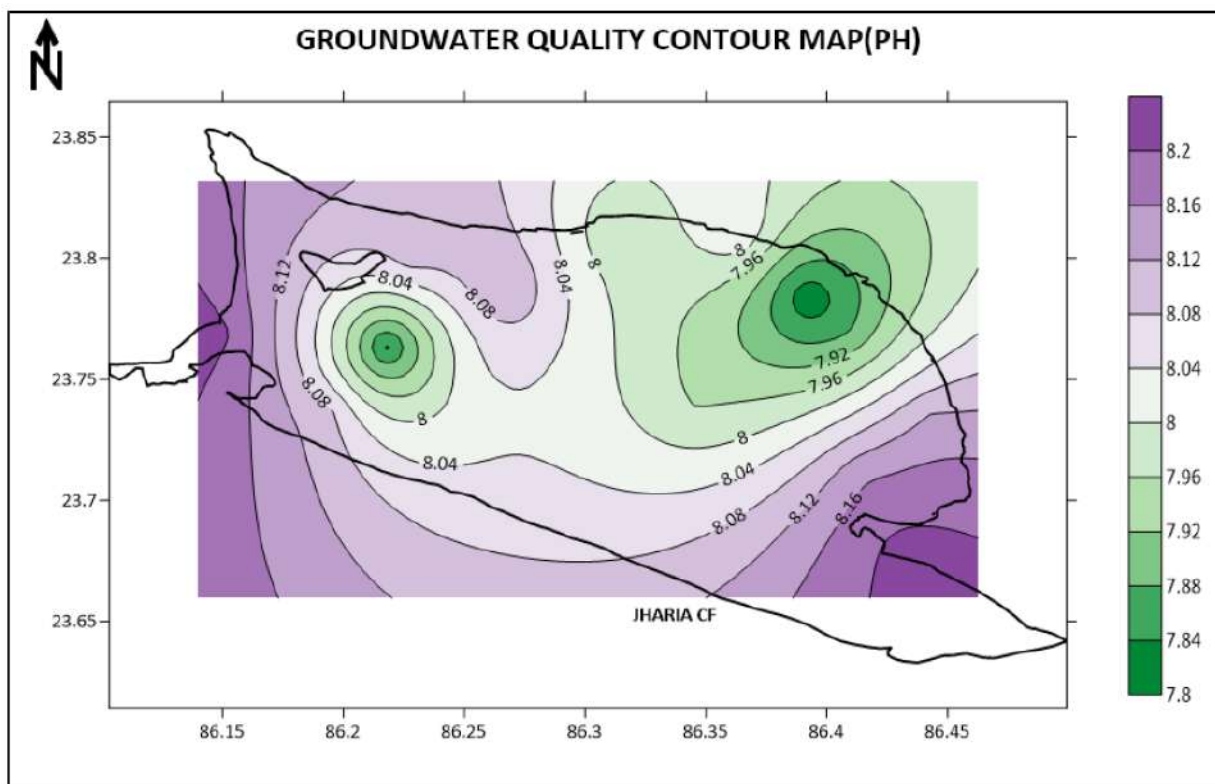
The ground water sample of the study area (15 nos. of Cluster of mines, BCCL) collected from dug wells and analyzed. Fifteen ground water samples (GW-1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15 & 16) analyzed during the month of June'2021 at CMPDI, RI-II, Dhanbad. The water sampling details given in **Annexure-V** and Water sample locations shown in **Plate-II**. The water quality data enclosed in **Annexure-VII**.

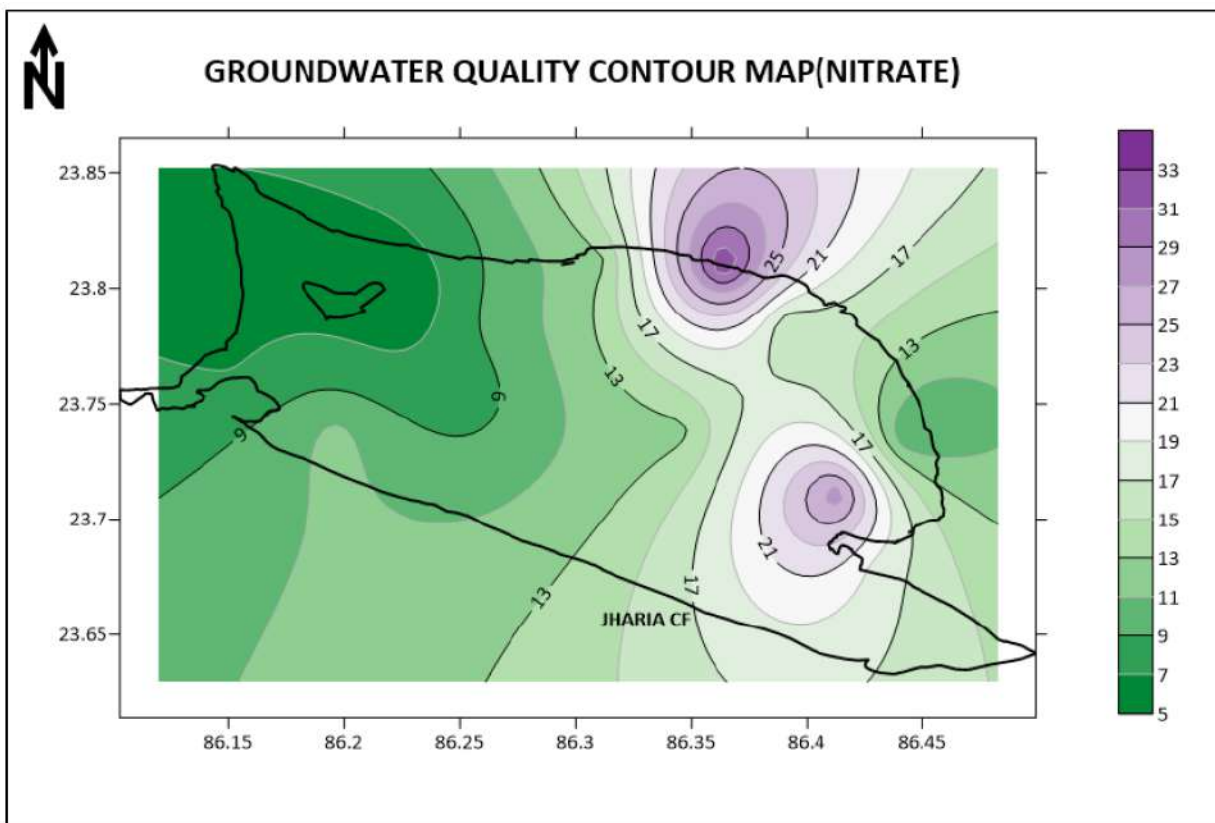
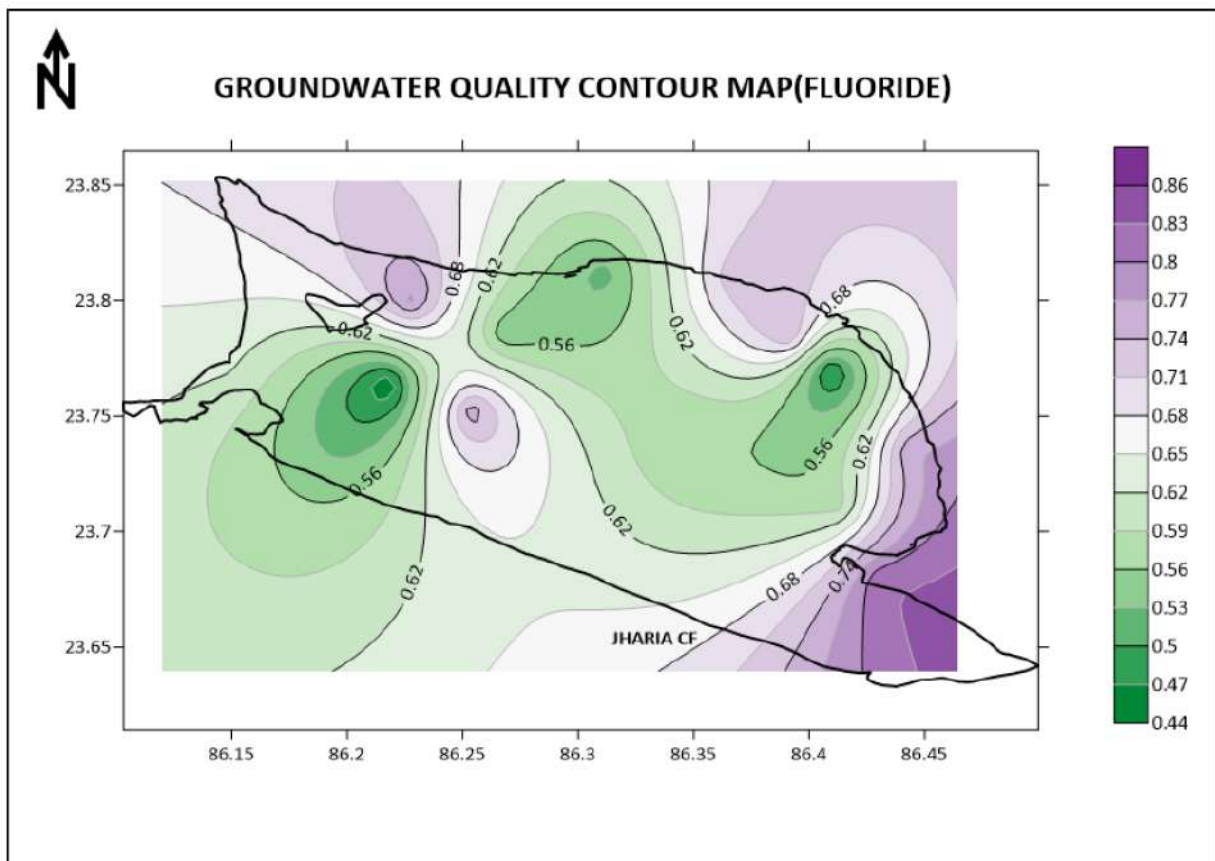
The study of the variations in water quality parameters described below:

The pH of the groundwater samples varies between 7.65 (GW-5) to 8.15 (GW-11), the pH is within the IS 10500 limit of drinking water standard.

The mineral constituents dissolved in water constitute the dissolved solids. The total dissolve solids vary from 425 (GW-1) to 889 mg/l (GW-9), the TDS values ranges slightly above the IS 10500:2012 standards limits of drinking water.

The alkalinity of the water samples varies from 101 (GW-14) to 182 mg/l (GW-7) and are within the stipulated standard of (200 mg/l) drinking water. The concentrations of calcium in the water samples vary from 41 (GW-1) to 158 mg/l (GW-13) and are **slightly above** the permissible limit (75 mg/l) of drinking water standards. The total hardness ranges between 226 (GW-8) to 638 mg/l (GW-5) and the value of total hardness in water samples are **above** the permissible limit (200 mg/l). The sulphate ranges between 31 (GW-1) to 187 mg/l (GW-16) and the value of sulphate in water sample are within the permissible limit (200 mg/l). The Iron, Copper, Manganese, Lead, Zinc and Chromium concentration in the water samples found to be below the upper ISI limits for drinking water.





6.0 STAGE OF GROUNDWATER EXTRACTION

The groundwater mainly utilized for domestic needs and for irrigation purposes. The groundwater abstraction is mainly through dug wells and bore wells. The stage of groundwater development in Dhanbad District is 76.30% (as per 2017 GWRE). The highest stage of development is in Jharia Block (127.0%) & Dhanbad Block (107.50%) and lowest stage of development is in Baliapur Block (78.24%) as per GWRE-2013. The Gondwana sandstones in general, known to constitute good aquifers at many places. However, the yield potential of the area adjoining to active mines in the coal belt is poor. The active mines often act as groundwater “sinks”. In contrast, the water logged abandoned mines and pits act as potential sources of groundwater. As per the assessment by Central Ground Water Board (CGWB), Patna in 2017, Block wise data of Dhanbad District given below:

Table–8A: Block wise Stage of Groundwater development

SI No.	Administrative Unit		Stage of GW Development	Category (GWRE-2013)	Category (GWRE-2017)
	District	Block			
1	Bokaro	Bermo	156.30%	Over- exploited	Over- exploited
2	Dhanbad	Baghmara	91.74%	Critical	Critical
3	Dhanbad	Baliapur	78.24%	Semi- Critical	Semi- Critical
4	Dhanbad	Dhanbad	107.50%	Over- exploited	Over- exploited
5	Dhanbad	Jharia	127.0%	Over- exploited	Over- exploited
6	Dhanbad	Topchachi	98.45%	Critical	Critical

- **Dynamic Groundwater Resource Assessment, CGWB as per 2013 & 2017.**

Table-8B: Cluster wise Groundwater development scenario

Cluster/ Area	Adminis- trative Blocks/Stage Of GW Extraction	Total Water demand (cum/day)				Avg. GW level (bgl in m) 2021-22		GW level declining trend 2005-2021		Remarks
		Mine Discharge + BH pumping	Surface Water Source	Total Use (Domestic + Industrial)	Excess Or other use	Pre- monsoon	Post- monsoon	Pre- monsoon	Post- monsoon	
Cluster-I	Bermo (SOD: Over- exploited)	2173 (2065+108)	NIL	2112 (1698+414)	61	5.10	1.07	YES	YES	Recharge structure needed
Cluster-II	Baghmara (SOD: Critical)	8350	Jamunia river	6737 (2755+3982)	1613	6.12	2.10	NO	NO	Excess mine water needed to be utilized
Cluster-III		12760 (10960+1800)	NIL	8946 (7849+1097)	3814	5.66	2.74	NO	NO	
Cluster-IV		5900	MADA	5100 (3605+1495)	800	6.08	2.21	NO	NO	
Cluster-V		12690 (11025+1665)	MADA	11063 (5710+5353)	1897	2.80	1.15	YES	YES	
Cluster-VI	Dhanbad	4150	MADA	4150 (1664+2486)	0.0	7.37	2.32	YES	NO	--
Cluster-VII	(SOD: Over- exploited)	21565	MADA	20826 (17596+3230)	739	4.66	2.63	YES	YES	Excess mine water needed to be utilized water
Cluster-VIII	Jharia (SOD: Over- exploited)	9320	MADA	5294 (3730+1564)	4026	5.01	2.84	NO	NO	
Cluster-IX		12980	MADA	9358 (4549+4809)	3622	5.82	2.97	NO	NO	
Cluster-X		11825	Damodar river	6201 (4255+1946)	5624	4.48	2.51	YES	NO	
Cluster-XI	Dhanbad (SOD: Over- exploited)	24960	MADA & DVC	19425 (14015+5410)	5535	2.82	1.48	NO	NO	
Cluster-XIII	Baghmara	750	Damodar river	692	58.0	5.47	2.83	NO	NO	--
Cluster-XIV	(SOD: Critical)	943	NA	668	275	6.25	2.16	NO	NO	--
Cluster-XV		6200	NA	5941 (4600+1341)	259	6.72	1.82	NO	NO	--
Cluster-XVI	Nirsa (SOD:Safe)	1910	DVC (Barakar river)	1730 (1380+350)	180	3.34	2.44	NO	NO	--

MADA – Mineral Area Development Authority, Jharkhand, Dhanbad (payment basis).

DVC – Damodar Valley Corporation, Maithon/Panchet, Jharkhand (payment basis).

7.0 IMPACT OF MINING ON GROUND WATER REGIME

7.1 GENERAL CONSEQUENCES OF COAL MINES ON AMBIENT HYDROGEOLOGICAL REGIME

Mining of coal either by opencast or underground method is bound to incise one or more water bearing strata (aquifers) which in turn may result in depletion or draw down in water levels and a corresponding inflow of water into the mine workings. The potential effects of coal mining operations on the hydrogeological regime are as under:

- ❖ Creates disruption in formation/aquifer
- ❖ Dewatering of aquifers
- ❖ Change in hydraulic gradient
- ❖ Modification of recharge to aquifers
- ❖ Change in groundwater flow pattern

The general need in mine planning from the hydrogeological point of view is the estimation of make of water (ground water seepage) into the mine, its rate, the mine pumping capacity to meet the storm rainwater accumulation, extent of depression of water surface and management of mine effluent (mine water). It is also desirable that the consequences of mining operation on the groundwater regime be determined in advance. However, the mine pumping in most of the cases are passive dewatering for the safety of the mine pit, active mine dewatering is done in few cases for very high potential aquifers.

7.2 POTENTIAL CONSEQUENCES OF OPENCAST AND UNDERGROUND COAL MINES OF JHARIA COALFIELD ON HYDROGEOLOGICAL REGIME

Generally, in the opencast and underground mines of Jharia Coalfield, alluvium and overlying weathered mantle are the first to excavate followed by upper Barakar Formation / Aquifer. Since these formations vary in thickness, compaction and their constituents over the area, their aquifer properties also vary.

The porosity and the compactness in the sandstone controls the discharge from these aquifers. The alluvium and weathered Formation wherever loose and fragile possess more porosity and this has high groundwater potential. Due to the mine cut, the depression in the water table created. The initial discharges due to this depression is large in amount due to concentration of flow to that region. In the top zones, water table condition prevails and away from the opening in the stratified section, semi-confined conditions exist. With progress of mine operations, there is an increase in the depth of incision as a result; the semi-confined aquifers are also punctured.

During mining the hydraulic gradients generally, steepens down near mine i.e. within the mine influence area. In the up-dip region, only un-confined aquifer punctured through the mining process and thus only it

affected whereas in the down-dip region both un-confined and semi-confined aquifers may be affected. The confined aquifers of lower Barakar Formation in the mining area not punctured as it lies below the working coal seams and hence normally there is no noticeable effect in the aquifer related to this formation.

7.3 ESTIMATION OF RADIUS OF MINE INFLUENCE ZONE

Radius of Influence can be defined as the radial distance from the center of the borehole to the point where there is no lowering of groundwater table/potentiometric surface.

The radius of influence (R) for Opencast and UG Mines within Jharia CF calculated by using Sichardt's formula based on present mining scenario.

$$R_0 = C \cdot (H-h) \cdot \sqrt{K}$$

Where, R_0 - Radius of influence (m), C - Constant = 3000,

(H-h) - Drawdown (m), K - Hydraulic conductivity (m/s).

Here, K has used for Barakar Formations i.e. 0.05 m/d or 5.7×10^{-7} m/sec.

It may be appropriate to mention here that the presence of prominent boundaries/water bodies, faults or interfringing of sandstone and shale beds may restrict propagation of the drawdown cone. With the presence of low permeable beds such as clay/shale and younger coal seams in the formation, laying above the working seams the water level in the phreatic aquifer not directly affected. During the working of board and pillar method, subsidence takes place during the extraction of total coal (depillaring), both the phreatic and semi-confined aquifers get affected. Surface vigilance and filling up subsided zone, if any, has to constantly be in view. The effect on groundwater level for most of the coalmine in Jharia coalfield has been observed in the down-dip side, generally within a distance upto 500 m and becomes milder/negligible thereafter.

8.0 CONSERVATION MEASURES & FUTURE STRATEGY

- BCCL has installed 25 Pressure Filter Plant of total capacity of 4.16 MGD to meet drinking water requirement nearby the area. At present 63 Water Treatment Plants are operational having capacity of 16.16 MGD within Jharia Coalfield area. Further installation of 28 more Pressure Filter Plants with the capacity of 5.84 MGD are in progress.

- BCCL participated in development of low cost technology for drinking water in a CSIR project along with CIMFR, Dhanbad and a pilot plant of 4000 Liters/hour is functional at PB Project site of BCCL. Similar plant has proposed at other sites of BCCL.
- A scheme entitled 'Scheme for multi-purpose utilization of surplus mine water of Barora Area, Block II and Govindpur Area of BCCL' was prepared with a view to harness the excess water discharge to take care of the persistence problem of water scarcity in the nearby villages. In the scheme, two water reservoirs of capacity 27 MG and 17 MG have been proposed in the non-coal bearing area for storage of 3250 GPM and 2000 GPM surplus mine water which will be fed through pipe line by mine discharge at mines of Barora, Block-II and Govindpur Area.
- Rooftop rainwater harvesting (RWH) will took up in the project area using the administrative buildings. 138 no. of quarters having roof-top area of about 14950 sq. m. is already prepared to harvest rainwater and around 13150 cum/annum of water is going to be recharged the nearby groundwater system through RWH structures. Proposal already made to facilitate this kind of RWH structure at suitable locations i.e. Lodna Area, Kusunda Area (Jawahar Nagar, Matkuria, Coal Board Colony), Sijua Area (Nichitpur and Tetulmari Colony) within Jharia Coalfield to augment groundwater recharge.
- After cessation of mining, with plenty rainfall and abundant ground water recharge, the water levels will recoup and attain normalcy. Thus, the impact of mining on groundwater system may considered as a temporary phenomenon. The abandoned mine workings (UG) behave as water pool and improves the resources availability in the coalfield area.
- Utilization of treated mine water discharge by both industry and local people in the mine influence area. The excess mine water can be used to recharge groundwater system through connecting pipeline to abandoned dug wells. Utilization of mine water for irrigation use will also enhance the ground water recharge potential through artificial recharge in the area.
- Increase vegetative cover by plantation in the mine area under land amelioration measures. This will contain the surface run-off and increase the groundwater recharge.
- Creation of awareness among workers and local peoples about Rainwater harvesting and artificial recharge will have priority. This aspect usually covered during the Environmental Week celebrated every year (5 to 12 June).
- 23 nos. of Piezometer proposed to install within JCF and RCF to monitor GW level (**Plate-III**).

Monitoring of water quality of mine water discharge, local River/nala and domestic water source (dug well/hand pump wells) will continued under routine monitoring (May, August, November & Jan).

9.0 EXISTING/PROPOSED RAINWATER HARVESTING STRUCTURES IN BCCL COAL MINES

Fig-3 to 4.



Proposed Rain Water Harvesting Site GVTC, Cluster-I, Barora Area



Proposed Rain Water Harvesting Site Nehru Balika Vidhalaya, Cluster-I, Barora Area

Fig-5 to 6.



Proposed Rain Water Harvesting Site Barora Area Guest House, Cluster-I, Barora Area



Proposed Rain Water Harvesting Site Regional Hospital Baghmara, Cluster-I, Barora Area

Fig-7 to 8.



Proposed Rain Water Harvesting Site – Barora Area Office, Cluster-I, Barora Area

RECHARGE POND / ABANDONDED IN THE JCF MINE AREA

Fig-9 to 10.



RECHARGE POND / ABANDONDED IN THE JCF MINE AREA



RECHARGE POND / ABANDONDED IN THE JCF MINE AREA

Fig-11 to 12.



RECHARGE POND / ABANDONDED IN THE JCF MINE AREA



RECHARGE POND / ABANDONDED IN THE JCF MINE AREA

Fig-13 to 14.



RECHARGE POND / ABANDONDED IN THE JCF MINE AREA



FILTER PLANT IN THE MINE AREA

Fig-15.



Government of India
Ministry of Environment, Forest and Climate Change
Wetlands Division

List of Ramsar Sites in India

S. No	Name of Ramsar site	State	Area in hectares	Date of designation	Coordinates
1.	Ashtamudi Wetland	Kerala	6,140	19/08/2002	08°57'N 076°34'E
2.	Beas Conservation Reserve	Punjab	6,429	26/09/2019	31°23'N 075°11'E
3.	Bhitarkanika Mangroves	Odisha	65,000	19/08/2002	20°39'N 086°54'E
4.	Bhoj Wetland	Madhya Pradesh	3,201	19/08/2002	23°13'N 077°19'E
5.	Chandertal Wetland	Himachal Pradesh	49	08/11/2005	32°28'N 077°36'E
6.	Chilika Lake	Odisha	116,500	01/10/1981	19°42'N 085°21'E
7.	Deepor Beel	Assam	4,000	19/08/2002	26°07'N 091°39'E
8.	East Calcutta Wetlands	West Bengal	12,500	19/08/2002	22°27'N 088°27'E
9.	Harike Lake	Punjab	4,100	23/03/1990	31°13'N 075°12'E
10.	Hokera Wetland	Jammu & Kashmir	1,375	08/11/2005	34°04'N 074°42'E
11.	Kanjli	Punjab	183	22/01/2002	31°25'N 075°22'E
12.	Keoladeo National Park (MR)	Rajasthan	2,873	01/10/1981	27°13'N 077°31'E
13.	Keshopur-Miani Community Reserve	Punjab	344	26/09/2019	32°05'N 075°23'E
14.	Kolleru Lake	Andhra Pradesh	90,100	19/08/2002	16°37'N 081°12'E
15.	Loktak Lake (MR)	Manipur	26,600	23/03/1990	24°25'N 093°49'E
16.	Nalsarovar	Gujarat	12,000	24/09/2012	22°46'N 072°02'E
17.	Nandur Madhameshwar	Maharashtra	1,437	21/06/2019	20°01'N 074°06'E
18.	Nangal Wildlife Sanctuary	Punjab	116	26/09/2019	31°23'N 076°22'E
19.	Nawabganj Bird Sanctuary	Uttar Pradesh	225	19/09/2019	26°36'N 080°39'E
20.	Parvati Arga Bird Sanctuary	Uttar Pradesh	722	02/12/2019	26°56'N 082°09'E
21.	Point Calimere Wildlife and Bird Sanctuary	Tamil Nadu	38,500	19/08/2002	10°19'N 079°37'E
22.	Pong Dam Lake	Himachal Pradesh	15,662	19/08/2002	32°01'N 076°04'E
23.	Renuka Wetland	Himachal Pradesh	20	08/11/2005	31°37'N 077°27'E
24.	Ropar	Punjab	1,365	22/01/2002	31°01'N 076°30'E
25.	Rudrasagar Lake	Tripura	240	08/11/2005	23°28'N 091°16'E
26.	Saman Bird Sanctuary	Uttar Pradesh	526	02/12/2019	27°00'N 079°10'E
27.	Samaspur Bird Sanctuary	Uttar Pradesh	799	03/10/2019	25°59'N 081°23'E
28.	Sambhar Lake	Rajasthan	24,000	23/03/1990	27°00'N 075°00'E
29.	Sandi Bird Sanctuary	Uttar Pradesh	309	26/09/2019	27°18'N 079°58'E
30.	Sarsai Nawar Jheel	Uttar Pradesh	161	19/09/2019	26°58'N 079°15'E

Annexure – IV

Rainfall Data (in mm) At Dhanbad Observatory Station, IMD (Source: WRIS Website data)

Year	January	February	March	April	May	June	July	August	Sep	Oct	Nov	Dec	Annual
1994	26.5	20.0	3.3	23.5	4.5	289.5	245.5	240.0	134.0	40.5	0.0	0.0	1027.3
1995	15.0	18.3	20.0	0.0	34.5	122.0	140.1	257.0	446.0	0.0	34.0	5.5	1092.4
1996	12.5	12.5	5.2	0.0	0.0	210.5	138.5	400.0	214.0	24.0	0.0	0.0	1017.2
1997	10.5	17.5	2.8	63.5	41.5	231.5	599.3	621.1	196.8	16.5	34.0	16.0	1851.0
1998	20.5	21.0	160.0	18.0	40.0	80.0	347.0	409.0	123.0	120.5	11.0	0.0	1350.0
1999	0.0	0.0	0.0	0.0	64.0	150.0	511.0	336.0	510.5	124.0	0.0	0.0	1695.5
2000	2.0	15.0	0.0	20.0	68.0	452.5	270.5	89.0	234.5	-	0.0	0.0	1151.5
2001	0.0	0.0	34.0	13.0	104.0	448.7	552.5	121.0	107.0	126.5	0.0	0.0	1506.7
2002	12.0	10.0	26.0	0.0	32.5	185.0	150.0	125.5	310.0	64.0	0.0	0.0	915.0
2003	6.0	58.5	38.5	40.0	24.0	-	366.1	279.0	145.1	151.6	0.0	2.3	1111.1
2004	18.45	2.13	1.55	53.93	9.53	95.95	408.57	261.07	174.01	63.01	51.10	12.85	1152.15
2005	44.49	23.11	26.16	17.90	28.95	272.26	388.86	158.86	69.03	117.63	0.09	1.67	1149.01
2006	0.00	0.00	3.11	12.64	86.68	113.20	505.72	316.06	339.51	9.80	3.73	0.00	1390.45
2007	0.00	58.69	35.76	21.08	25.33	139.60	666.30	416.85	363.93	43.63	1.57	0.00	1772.74
2008	16.44	1.96	6.27	6.78	37.26	180.58	422.25	275.33	198.31	27.64	0.00	0.00	1172.82
2009	0.00	0.26	5.81	0.19	105.82	78.32	232.20	370.39	429.16	68.56	11.31	0.98	1303.00
2010	0.59	19.64	7.62	38.24	93.72	146.68	157.31	198.97	239.75	78.76	5.26	40.53	1027.07
2011	0.00	1.60	18.25	12.81	102.58	294.61	174.35	445.43	214.88	30.35	0.69	0.00	1295.55
2012	18.45	2.13	1.55	53.93	9.53	95.95	408.57	261.07	174.01	63.01	51.10	12.85	1152.15
2013	0.07	17.62	0.79	15.24	105.51	176.77	170.14	276.70	135.76	304.46	0.00	0.00	1203.06
2014	9.27	35.71	21.21	8.16	62.77	112.58	283.73	223.38	214.48	30.30	0.00	0.00	1001.59
2015	12.06	3.33	26.71	45.73	32.91	162.96	385.21	239.38	71.34	15.62	0.00	0.61	995.86
2016	6.16	17.59	1.73	1.33	73.90	197.34	248.86	395.33	424.81	30.45	0.00	0.00	1397.50
2017	5.12	0.00	34.96	59.89	81.01	141.66	502.58	168.84	111.95	274.18	0.64	4.12	1384.95
2018	0.00	0.06	2.90	159.52	31.22	202.84	344.59	211.91	153.63	16.31	0.04	20.99	1144.01
2019	0.00	25.18	7.24	46.99	109.43	109.11	292.02	234.65	327.95	199.63	0.10	5.13	1357.43
2020	21.14	5.94	74.96	27.94	71.32	218.12	187.01	258.74	196.87	52.23	1.23	0.00	1115.50

Annexure – IV**Rainfall Data (in mm) At Dhansar (Rescue station) Observatory Station
State Sec Deptt of Coord, BCCL**

Year	January	February	March	April	May	June	July	August	Sep	Oct	Nov	Dec	Annual
2005	34.20	22.80	41.80	32.20	33.00	193.00	542.00	107.80	185.60	39.20	0.00	2.00	1233.60
2006	0.00	0.00	34.40	33.80	87.60	214.20	477.70	246.30	172.00	0.00	1.00	0.00	1267.00
2007	0.00	22.00	37.80	0.00	78.70	167.20	545.00	426.40	351.40	52.00	0.00	0.00	1680.50
2008	5.80	4.80	17.80	18.40	18.00	216.10	433.48	183.80	297.80	85.80	0.00	0.00	1281.78
2009	0.00	0.00	1.60	2.20	112.00	72.80	269.20	192.80	333.00	98.20	10.20	0.00	1092.00
2010	0.00	12.20	7.60	9.20	64.30	206.20	199.40	212.60	230.10	45.30	3.4	----	991.90
2011	7.60	0.00	18.0	11.40	121.60	344.20	163.40	452.0	374.0	41.80	0.00	0.00	1534.20
2012	17.6	13.4	1.0	9.0	6.60	52.0	328.20	315.10	367.70	11.60	61.60	18.0	1201.80
2013	0.0	32.0	3.0	33.90	190.40	244.20	192.80	364.40	304.70	233.60	0.0	0.0	1599.0
2014	12.40	36.80	21.80	2.60	79.80	217.60	305.30	315.60	178.0	6.40	0.0	0.0	1176.0
2015	23.80	0.0	6.20	76.20	35.80	122.10	407.60	244.40	145.20	25.60	0.0	6.20	1093.10
2016	3.0	20.60	5.50	0.0	99.40	181.60	248.80	456.70	443.60	50.40	0.0	0.0	1509.60
2017	8.80	0.0	3.80	17.90	33.20	120.0	533.40	284.70	247.40	207.70	3.40	0.0	1460.30
2018	0.0	0.0	0.0	102.90	76.30	270.60	382.30	338.80	159.50	38.90	2.40	37.90	1346.60
2019	0.0	49.60	10.20	54.20	132.0	188.0	319.10	343.60	403.10	156.40	3.20	10.80	1667.00
2020	22.0	7.60	77.80	76.80	86.20	214.10	296.80	351.40	214.0	92.0	0.0	0.0	1438.70

Location of Hydrograph Stations (Dug Wells)

Well No	Latitude	Longitude	Well No	Latitude	Longitude
A-3	23°47'53.35" N	86°19'55.14" E	B-64	23°48'43.14" N	86°18'44.25" E
A-12	23°48'20.31" N	86°16'51.64" E	B-65A	23°48'53.65" N	86°18'11.82" E
A-16	23°46'57.00" N	86°21'38.57" E	B-67	23°43'30.70" N	86°14'01.45" E
A-17	23°45'09.44" N	86°22'16.35" E	D-3	23°46'46.31" N	86°24'49.30" E
A-18	23°44'37.65" N	86°22'58.90" E	D-4	23°44'29.37" N	86°24'42.88" E
A-19	23°41'12.86" N	86°23'55.27" E	D-5	23°42'20.05" N	86°24'86.06" E
A-20	23°44'56.64" N	86°19'55.35" E	D-7	23°43'12.08" N	86°27'11.89" E
A-22	23°43'06.65" N	86°14'48.53" E	D-8	23°44'06.13" N	86°27'20.72" E
A-23	23°45'06.38" N	86°15'12.69" E	D-23	23°47'20.89" N	86°20'09.96" E
A-24	23°45'20.44" N	86°13'45.12" E	D-25	23°47'03.28" N	86°23'29.56" E
A-25	23°47'06.20" N	86°15'27.79" E	D-30	23°48'36.10" N	86°21'50.07" E
A-26	23°46'49.24" N	86°18'12.12" E	D-33	23°45'34.62" N	86°23'18.50" E
A-27	23°48'42.55" N	86°20'21.80" E	D-34	23°45'36.50" N	86°23'02.45" E
A-28A	23°47'34.74" N	86°18'04.18" E	D-35	23°40'46.54" N	86°25'46.33" E
A-29	23°47'08.02" N	86°16'02.72" E	D-36	23°40'19.26" N	86°25'18.98" E
A-32	23°44'15.56" N	86°20'43.80" E	D-39	23°43'28.50" N	86°26'0.10" E
A-33	23°44'32.58" N	86°16'58.28" E	D-40A	23°43'20.18" N	86°25'45.70" E
A-34	23°42'58.63" N	86°15'19.31" E	D-41	23°42'40.00" N	86°26'17.20" E
B-1	23°48'48.06" N	86°14'16.87" E	D-43*	NA	NA
B-14	23°48'00.81" N	86°16'25.88" E	D-47	23°45'20.59" N	86°24'34.86" E
B-15	23°46'06.92" N	86°08'59.30" E	D-49	23°44'08.96" N	86°26'32.71" E
B-21A	23°45'10.50" N	86°09'36.38" E	D-51	23°44'20.86" N	86°27'11.37" E
B-23	23°44'13.05" N	86°11'46.56" E	D-55	23°43'58.37" N	86°24'07.45" E
B-24	23°44'26.80" N	86°13'09.38" E	D-74	23°41'33.66" N	86°25'06.10" E
B-25	23°44'44.98" N	86°13'57.80" E	D-77	23°41'00.74" N	86°22'25.55" E
B-32A	23°45'49.18" N	86°13'03.64" E	D-80	23°46'09.46" N	86°24'33.08" E
B-48	23°44'35.09" N	86°16'38.30" E	DB-22	23°43'38.81" N	86°45'09.00" E
B-51	23°47'40.20" N	86°09'11.90" E	DB-23	23°43'44.24" N	86°45'06.39" E
B-53	23°45'55.25" N	86°09'35.44" E	DB-24	23°43'53.00" N	86°45'03.88" E
B-59	23°47'59.87" N	86°13'37.97" E	DB-25	23°44'10.75" N	86°44'35.84" E
B-60	23°48'7.87" N	86°15'37.12" E			
B-61A	23°45'59.85" N	86°11'40.80" E			
B-62A	23°45'44.15" N	86°11'27.80" E			

Details of Hydrograph Stations (Dug Wells)

Well No	Location	M.P. (agl) in m	Well Dia in m	Well Depth (m bmp)	R.L. (G.L) (m)	Formation	Owner	Utility
A-3	Sijua	0.53	3.00	5.20	203	Barakar	Govt.	Domestic
A-12	Jamua	0.80	1.90	3.30	202	Barakar	Govt.	Domestic
A-16	Ekra, Kalali	0.45	3.10	6.50	205	Barakar	Govt.	Domestic
A-17	Kachi Balihari	0.56	1.60	5.30	182	Barakar	Govt.	Domestic
A-18	Bhagabandh	0.61	1.45	3.37	182	Barakar	Govt.	Domestic
A-19	Bhaura	0.54	3.15	11.65	162	Barakar	Govt.	Domestic
A-20	Gorbhudih	0.43	3.30	8.30	181	BM	Govt.	Domestic
A-22	Nagdah, Niche	0.00	1.40	9.50	171	Raniganj	Govt	Irrigation
A-23	Machhyara	0.43	1.85	12.40	203	Raniganj	Govt	Domestic
A-24	Pipra Tanr	0.22	1.80	19.55	208	Raniganj	Govt	Domestic
A-25	Sinidih	0.22	2.00	11.30	203	Barakar	Govt	Domestic
A-26	Pasitanr	0.32	1.80	9.65	198	Barakar	Govt	Domestic
A-27	Chandor	0.60	2.50	5.50	221	Barakar	Govt	Domestic
A-28A	Lakarka 6 no.	0.65	1.30	5.25	199	Barakar	BCCL	Domestic
A-29	Aambagan	0.10	2.60	9.15	186	Barakar	Govt	Domestic
A-32	Baludih	0.55	2.30	6.85	182	BM	Govt	Domestic
A-33	Mahuda	0.75	2.00	10.80	195	BM	BCCL	Domestic
A-34	Bhatdih	0.55	3.50	24.50	162	Raniganj	BCCL	Domestic
B-1	Muraidih	0.47	1.80	5.35	212	Talchir	Govt	Domestic
B-14	Mathadih	0.76	2.15	3.75	201	Barakar	Govt	Domestic
B-15	Bera Basti	0.55	1.60	2.50	221	Talchir	Dhanu Roy	Domestic
B-21A	Dugdha	0.55	2.10	10.35	220	Metamorphics	Govt	Domestic
B-23	Lohapati	0.26	3.60	10.85	204	Raniganj	Govt	Domestic
B-24	Telmuchu	0.67	4.35	10.83	207	Raniganj	Govt	Domestic
B-25	Mahuda More	0.10	2.45	8.45	205	Raniganj	Govt	Domestic
B-32A	Madhuband	0.80	4.30	8.60	205	Barakar	BCCL	Domestic
B-48	Mahuda	0.65	2.10	11.50	181	Raniganj	Mosque	Domestic
B-51	Taranga	0.00	2.50	5.75	215	Metamorphics	Bisun	Irrigation
B-53	Karmatanr	0.58	2.70	13.25	195	Barakar	Govt	Domestic
B-59	Khodovaly	0.60	2.40	9.30	202	Barakar	BCCL	Domestic
B-60	Bahiyardih	0.77	3.00	15.60	196	Barakar	BCCL	Domestic
B-61A	Kesargora	0.48	2.00	11.20	201	Barakar	BCCL	Domestic
B-62A	Sadariyadih	0.15	3.10	9.50	188	Barakar	Govt	Domestic

Details of Hydrograph Stations (Dug Wells)

Well No	Location	M.P. (agl) in m	Well Dia in m	Well Depth (m bmp)	R.L. (G.L) (m)	Formation	Owner	Utility
B-64	Keshalpur	0.65	1.10	3.40	195	Barakar	BCCL	Domestic
B-65A	Jhinjipahari	0.95	2.20	12.40	196	Barakar	Shiv Temple	Domestic
B-67	Simatanr	0.55	2.20	11.80	198	Raniganj	Govt	Domestic
D-3	Dhansar	0.60	1.70	8.70	217	Barakar	Govt	Domestic
D-4	Jharia	0.59	1.90	5.73	218	Barakar	Govt	Domestic
D-5	Jiyalgora	0.70	2.80	10.55	183	Barakar	Govt	Domestic
D-7	Golden Pahari	0.67	2.85	10.05	201	Barakar	BCCL	Domestic
D-8	Alokdiha	0.35	1.75	7.57	201	Metamorphics	BCCL	Domestic
D-23	Jogta (Sindra)	0.40	3.10	7.25	205	Barakar	BCCL	Domestic
D-25	Godhar More	0.60	2.75	5.60	219	Barakar	Govt	Domestic
D-30	Borkiboa	0.70	2.00	5.60	221	Talchir	H.Kumbhakar	Domestic
D-33	Kustore-4	0.55	1.85	3.45	196	Barakar	BCCL	Domestic
D-34	Kusunda-7	0.60	1.50	3.45	201	Barakar	BCCL	Domestic
D-35	Patherdih	0.40	2.00	11.20	160	Barakar	BCCL	Domestic
D-36	Sudamdih	0.90	2.00	6.20	141	Barakar	BCCL	Domestic
D-39	Tilabani	0.85	2.00	5.90	178	Barakar	BCCL	Domestic
D-40A	Khapra Dhaora	0.55	1.95	3.70	180	Barakar	Panchayat	Domestic
D-41	Joyrampur	0.50	1.80	4.00	180	Barakar	BCCL	Domestic
D-43	Alagdi	0.45	2.20	8.90	200	Metamorphics	Govt	Domestic
D-47	Parastanr	0.45	3.20	23.80	206	Barakar	BCCL	Domestic
D-49	Goluckdih	0.55	1.80	6.15	192	Barakar	BCCL	Domestic
D-51	Chankuiya	0.55	3.70	11.90	197	Barakar	BCCL	Domestic
D-55	Hariladih	0.48	2.80	11.80	184	Barakar	Govt	Domestic
D-74	Bhulan Barari	0.10	1.60	12.80	173	Barakar	Govt	Domestic
D-77	Rohoniatanr	0.40	3.15	6.70	156	Barakar	Govt	Domestic
D-80	Bastacolla	0.70	2.50	24.95	219	Barakar	Govt	Domestic
DB-22	Nichebasti	0.67	2.40	10.65	121	Barakar	Govt	Domestic
DB-23	Dahibari OC	0.70	2.30	8.00	-	Barakar	BCCL	Domestic
DB-24	Dahibari	0.60	3.60	13.70	125	Barakar	BCCL	Domestic
DB-25	Palasya	0.37	1.55	5.25	127	Barakar	Govt	Domestic

MP: Measuring Point
Abn.: Abandoned
G.L.: Ground Level

R.L.: Reduced Level **W.L.: Water Level m: Meter**
b.g.l.: Below Ground Level **a.g.l.: Above Ground Level**
bmp: Below Measuring Point **BM: Barren Measure**

Historical Water Level data of Hydrograph Stations

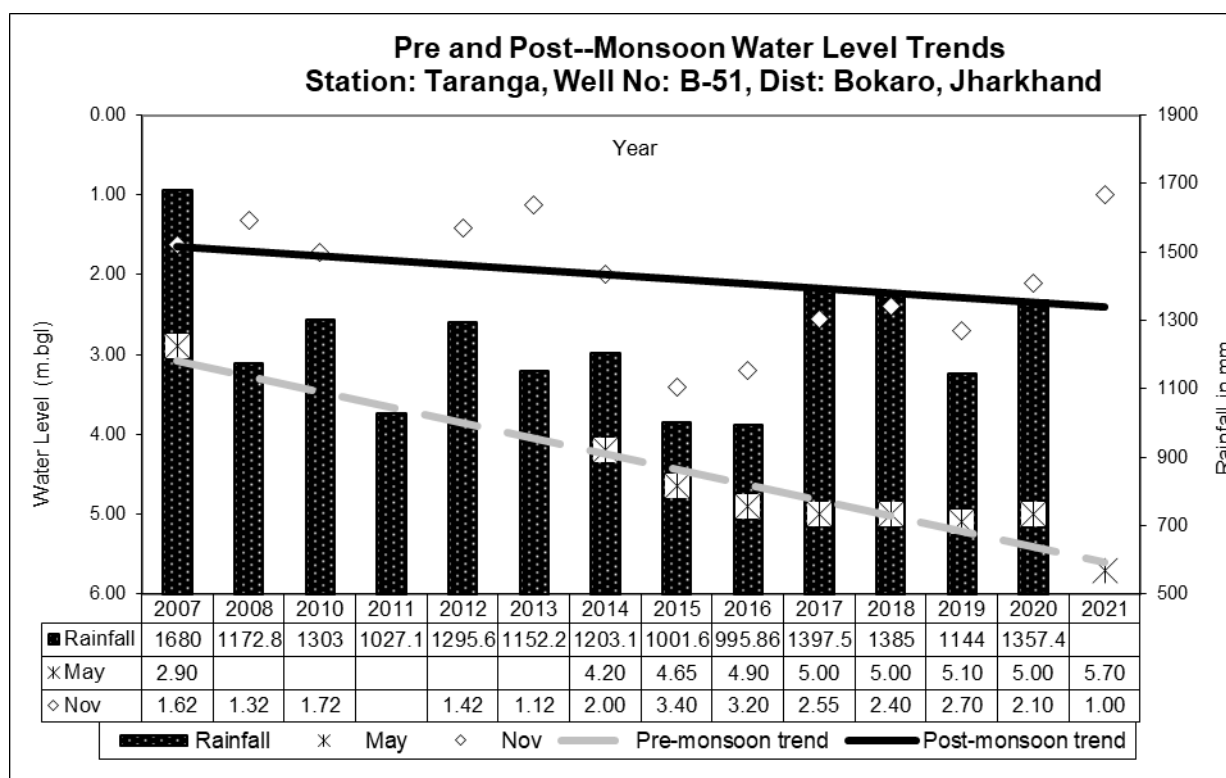
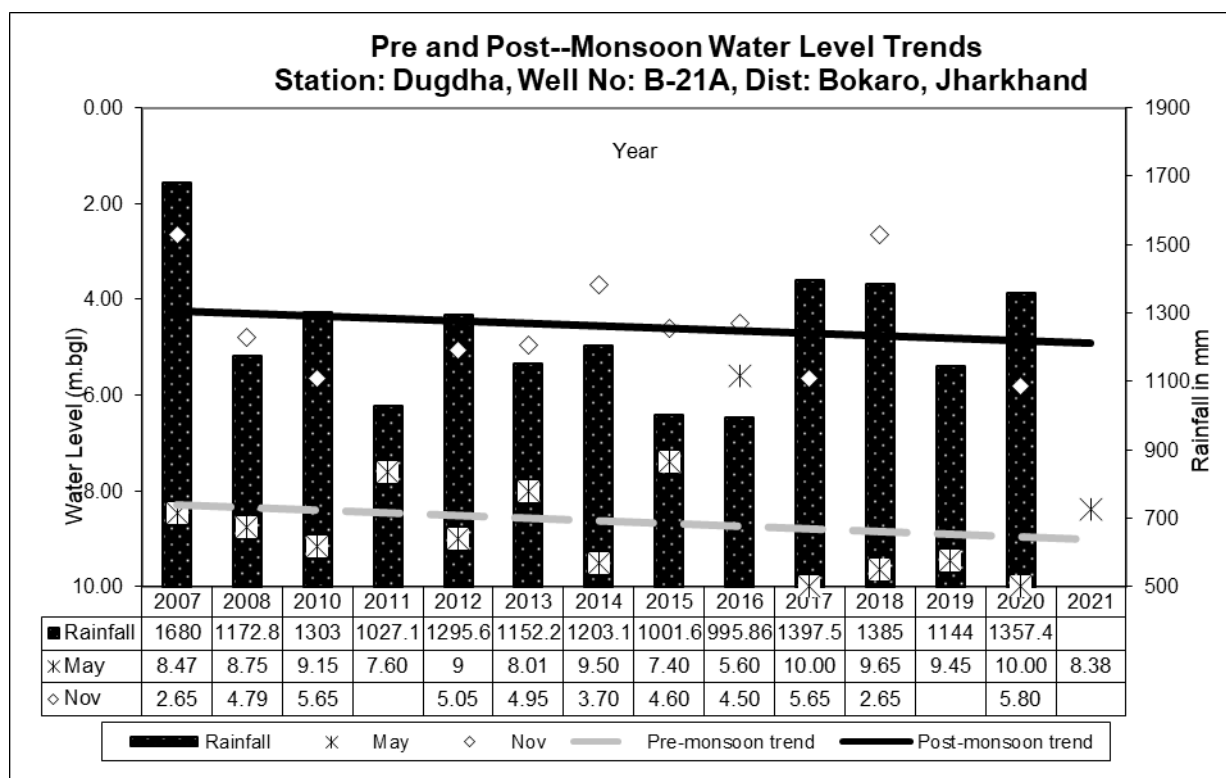
Well No	Water level below ground level (bgl) in meters															
	May 14	Nov 14	May 15	Nov 15	May 16	Nov 16	May 17	Nov 17	May 18	Nov 18	May 19	Nov 19	May 20	Nov 20	May 21	Nov 21
A-3	4.67	2.37	3.70	3.42	4.87	0.47	0.67	0.77	1.27	0.47	3.47	0.47	1.57	0.47	0.62	0.05
A-12	2.45	1.4	3.00	2.68	2.50	0.70	2.55	0.85	2.80	1.0	2.10	0.45	2.60	0.50	1.92	1.10
A-16	5.5	2.9	5.55	4.17	5.85	3.15	3.65	2.20	4.30	3.65	5.45	1.95	7.15	1.75	3.45	2.00
A-17	2.19	1.91	3.79	2.64	2.44	2.69	2.44	2.24	3.34	2.84	2.94	2.24	2.14	1.69	3.36	2.37
A-18	1.76	1.19	2.84	1.29	1.14	0.89	1.29	0.99	1.24	0.99	2.29	0.69	1.09	0.34	1.09	0.57
A-19	3.00	2.75	3.05	2.75	7.81	4.11	6.37	2.45	5.55	2.45	4.85	3.43	6.05	3.25	3.30	1.90
A-20	3.97	2.55	4.59	2.93	7.49	3.50	4.27	1.77	4.57	2.57	4.57	1.82	8.47	3.87	5.47	2.02
A22A	1.50	2.0	3.20	1.96	3.25	1.75	4.27	1.77	3.35	1.30	2.60	2.00	2.90	1.98	2.90	1.10
A-23	8.76	6.82	11.3	9.37	11.87	8.13	6.40	1.50	11.15	7.17	11.97	3.77	8.92	5.62	9.52	2.82
A-24	16.28	14.98	17.2	14.5	16.62	12.43	11.87	6.97	14.58	6.88	15.88	2.48	*4.88	4.28	10.13	2.78
A-25	7.03	5.28	7.78	5.85	7.43	4.58	6.38	2.88	6.63	3.13	6.08	1.93	2.98	1.83	5.78	2.43
A-26	7.71	4.58	7.73	3.18	8.93	4.48	5.28	2.53	6.23	3.88	6.58	3.33	6.98	3.18	6.70	2.73
A-27	1.63	1.55	4.40	3.95	4.85	1.80	2.90	1.25	2.90	1.0	2.40	0.92	2.40	1.10	1.67	0.90
A28A	3.29	1.91	4.35	3.60	3.35	1.47	4.30	1.55	4.15	2.51	2.45	3.15	4.00	3.03	6.23	3.75
A-29	3.3	2.35	4.55	4.60	5.92	6.96	4.40	1.30	6.45	2.10	4.85	3.40	6.20	3.20	6.49	5.90
A-32	3.15	2.45	4.41	2.13	4.75	2.10	3.15	1.55	2.80	0.70	2.75	0.95	1.90	1.75	2.35	0.96
A-33	4.08	1.57	4.91	1.97	5.75	2.60	6.45	1.55	4.07	2.35	3.65	1.25	4.55	1.85	2.85	0.85
A-34	4.45	4.45	8.40	4.81	4.75	4.45	12.45	4.45	5.90	3.70	6.35	3.95	8.35	3.45	5.20	3.55
B-1	2.43	1.81	3.28	2.75	3.58	1.93	2.33	0.85	2.88	2.08	3.18	1.73	3.28	1.63	2.58	1.91
B-14	3.24	4.44	2.94	2.29	2.44	0.47	2.94	1.84	3.64	2.84	2.24	0.94	2.44	1.04	2.84	2.04
B-15	0.95	1.45	1.50	0.45	1.85	0.55	4.85	0.15	1.85	0.85	1.90	1.65	3.70	1.47	1.46	0.35
B21A	9.54	3.7	7.37	4.65	5.55	4.50	8.85	5.65	9.65	2.65	9.45	-	10.00	5.80	8.38	-
B-23	6.57	2.74	7.86	4.29	6.81	2.41	7.74	2.14	6.64	2.14	2.84	1.34	3.24	1.76	4.12	1.44
B-24	9.40	2.21	10.0	5.78	10.63	4.28	10.03	4.03	9.28	4.33	4.58	2.33	5.48	3.53	5.68	2.08
B-25	5.82	5.15	6.88	-	7.05	1.70	6.70	1.40	5.90	3.70	4.80	1.40	7.90	2.55	5.10	2.58
B32A	8.33	2.05	7.55	3.32	6.95	3.07	6.95	2.80	6.75	3.90	5.55	1.70	3.30	2.00	7.23	6.05
B-48	6.38	4.35	7.90	5.42	9.35	4.60	7.70	4.15	7.33	3.97	7.05	4.35	8.20	3.85	7.23	6.05
B-51	2.09	1.98	4.65	3.40	4.90	3.18	4.98	2.55	5.02	2.42	5.10	2.70	5.00	2.10	5.70	1.0
B-53	3.39	-	5.58	2.82	4.70	1.45	4.02	1.92	3.92	1.42	3.22	1.42	3.12	1.40	4.85	1.87
B-59	2.65	1.0	4.12	1.60	4.40	0.50	5.40	0.60	5.47	1.10	6.20	0.90	5.25	1.40	5.49	0.90
B-60	9.82	4.59	9.21	5.28	10.33	5.03	13.23	3.18	13.68	4.23	8.13	3.23	10.33	3.21	11.26	2.23
B61A	6.93	3.57	6.15	4.52	6.58	3.87	2.57	0.82	2.57	2.02	3.32	0.52	3.32	1.60	4.42	0.97
B62A	8.83	5.85	9.10	5.21	9.30	4.95	8.15	4.35	8.27	4.78	7.55	3.25	6.95	3.00	6.87	4.50

Historical Water Level data of Hydrograph Stations

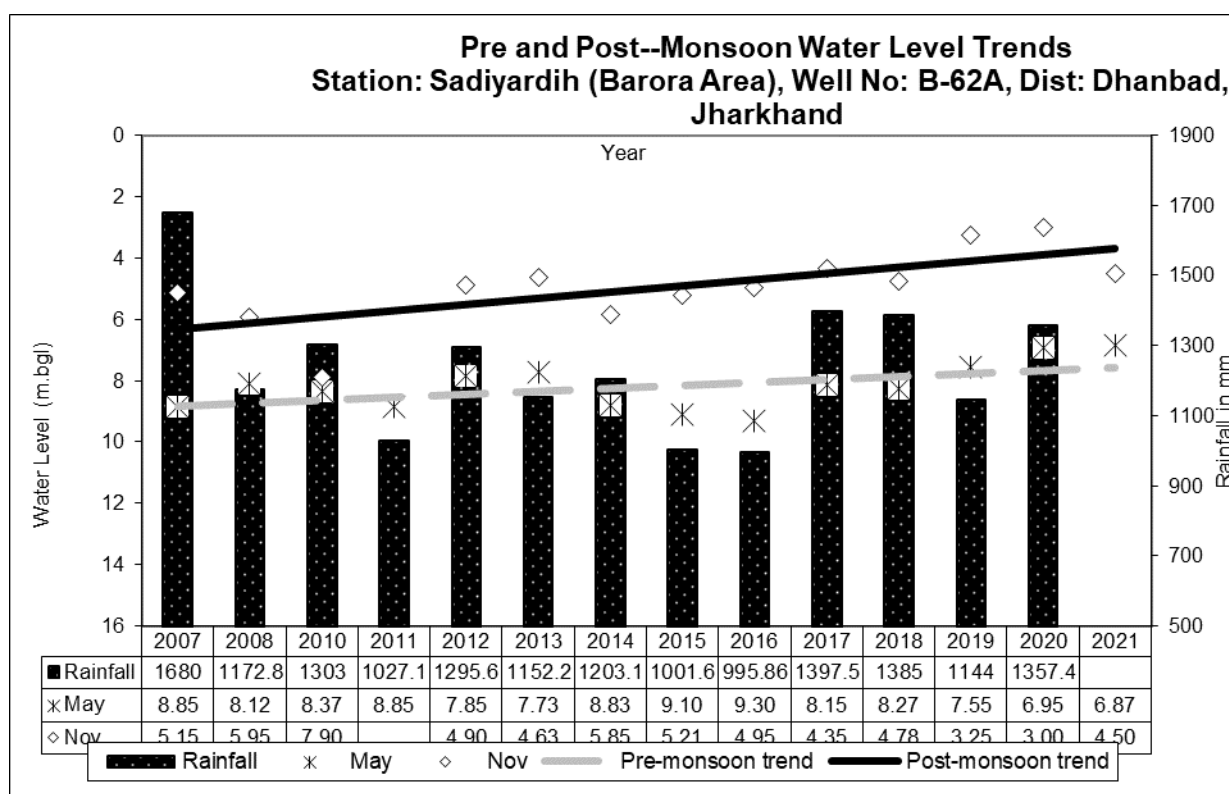
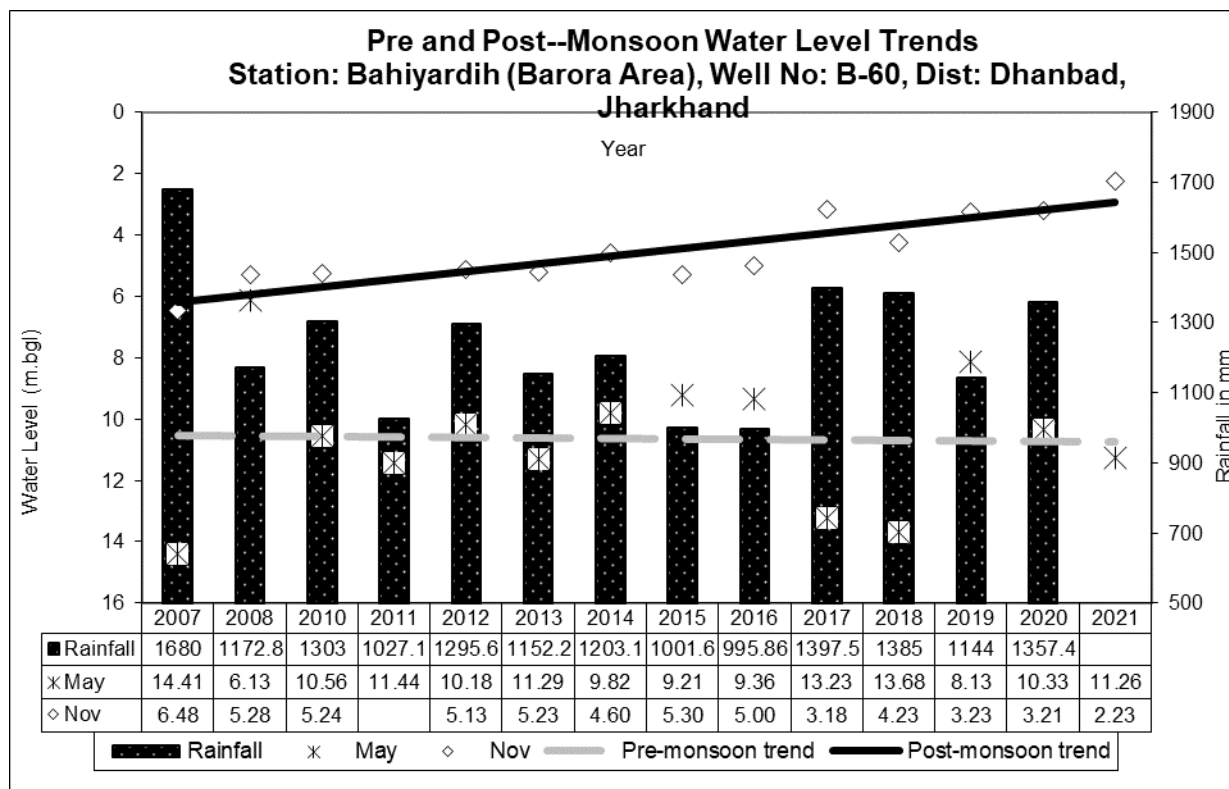
Well No	Water level below ground level (bgl) in meters															
	May 14	Nov 14	May 15	Nov 15	May 16	Nov 16	May 17	Nov 17	May 18	Nov 18	May 19	Nov 19	May 20	Nov 20	May 21	Nov 21
B-64	0.7	1.15	1.38	0.95	2.35	0.55	1.25	0.85	2.15	1.85	0.95	0.45	1.85	0.50	2.35	0.95
B65A	10.45	2.4	7.82	5.87	7.15	2.68	9.05	1.25	10.03	2.40	11.05	0.95	9.25	2.30	9.03	1.42
B-67	9.80	3.72	9.23	5.53	9.53	4.30	10.00	2.15	9.55	4.0	8.57	4.35	7.55	3.95	8.95	2.95
D-3	2.54	2.11	4.25	2.25	2.35	1.90	2.15	2.30	3.43	2.45	1.75	1.30	5.40	1.38	3.41	0.85
D-4	1.23	0.91	2.41	1.27	1.21	1.36	1.21	1.46	1.91	1.56	2.81	1.71	3.41	1.41	3.01	1.16
D-5	9.0	7.8	9.37	8.33	9.40	6.40	7.90	5.20	7.80	5.30	8.25	4.85	8.60	7.70	7.28	4.00
D-7	5.28	5.53	8.25	5.61	7.53	4.03	7.33	2.88	7.53	2.83	8.23	3.28	7.33	5.13	6.08	2.63
D-8	7.73	-	6.24	4.38	8.00	3.43	5.15	1.85	5.65	1.85	4.80	2.85	5.83	2.75	4.55	2.27
D-23	6.38	2.4	6.55	3.48	5.70	1.63	2.80	2.98	4.40	3.40	4.70	1.40	5.60	3.35	5.43	1.60
D-25	4.42	2.9	4.48	2.45	2.40	1.90	2.40	1.20	2.60	2.40	*9.90	*5.38	10.50	5.62	10.50	3.80
D-30	4.17	3.3	4.55	3.15	4.45	3.20	4.40	1.25	4.58	1.10	4.60	0.75	4.50	1.35	4.23	0.84
D-33	1.72	0.35	2.25	1.10	2.50	1.95	0.75	0.75	2.85	0.95	2.35	1.65	3.65	1.45	1.75	0.85
D-34	2.80	0.30	2.55	1.45	2.30	0.30	0.80	0.55	2.80	0.45	4.75	2.40	3.30	2.80	3.78	2.90
D-35	6.94	6.15	9.80	7.90	9.52	6.45	8.80	3.60	8.40	4.45	8.00	3.80	8.20	5.40	6.60	2.90
D-36	1.82	0.75	1.66	1.13	0.78	0.95	1.30	0.70	1.20	0.60	1.20	0.55	2.10	1.00	2.02	0.55
D-39	5.03	2.25	5.00	2.61	2.18	2.65	6.17	4.75	4.95	4.35	*12.60	*5.95	9.40	6.05	10.70	5.10
D40A	2.35	2.45	3.07	2.45	1.40	0.85	1.45	1.35	2.10	1.40	1.85	1.45	1.95	1.43	1.95	1.80
D-41	3.20	1.35	2.65	2.32	1.30	1.52	1.40	1.20	1.59	1.32	2.30	1.25	3.30	1.45	1.95	1.38
D-43	6.0	4.75	6.61	5.05	8.20	3.35	7.50	3.60	7.15	3.45	7.35	2.70	6.60	2.55	4.65	2.60
D-47	8.0	2.37	9.60	3.60	3.18	2.95	3.15	2.85	5.33	2.55	4.55	4.35	9.45	5.45	4.05	2.45
D-49	2.51	1.65	3.55	2.35	2.45	1.72	2.70	2.05	3.45	2.45	1.75	1.50	3.25	1.65	1.40	0.85
D-51	9.60	9.05	10.48	9.15	11.15	6.45	10.45	5.43	10.93	7.10	9.95	5.75	8.45	5.70	9.43	5.65
D-55	1.95	2.07	6.15	1.57	2.52	3.62	6.42	2.37	8.42	1.57	8.42	5.47	9.42	8.60	9.52	7.62
D-74	5.0	4.0	10.05	7.20	7.73	5.00	9.25	3.85	8.60	4.80	5.80	3.57	4.30	3.93	6.93	2.90
D-77	6.23	6.0	6.44	5.60	4.60	2.90	6.50	4.90	6.30	5.20	6.40	3.20	6.40	3.50	5.98	4.69
D-80	13.3	3.15	10.97	3.35	6.55	4.15	8.65	3.70	9.35	4.20	5.00	3.05	4.30	4.90	7.10	2.55
RCF (part)	May 14	Nov 14	May 15	Nov 15	May 16	Nov 16	May 17	Nov 17	May 18	Nov 18	May 19	Nov 19	May 20	Nov 20	May 21	Nov 21
DB22	6.48	3.03	4.59	3.53	5.38	3.33	1.93	1.63	2.34	1.93	4.93	1.63	2.63	2.25	2.31	1.38
DB23	3.95	2.13	3.38	6.04	5.30	0.90	2.05	1.90	2.85	1.75	1.60	0.80	2.50	1.95	2.00	1.10
DB24	-	8.45	9.52	8.20	10.65	6.50	5.80	3.78	8.25	5.70	9.35	3.88	5.70	3.60	6.20	5.25
DB25	3.27	2.73	3.83	2.68	3.61	1.98	3.23	2.58	3.93	1.63	-	-	3.98	2.63	2.83	2.03

*New well

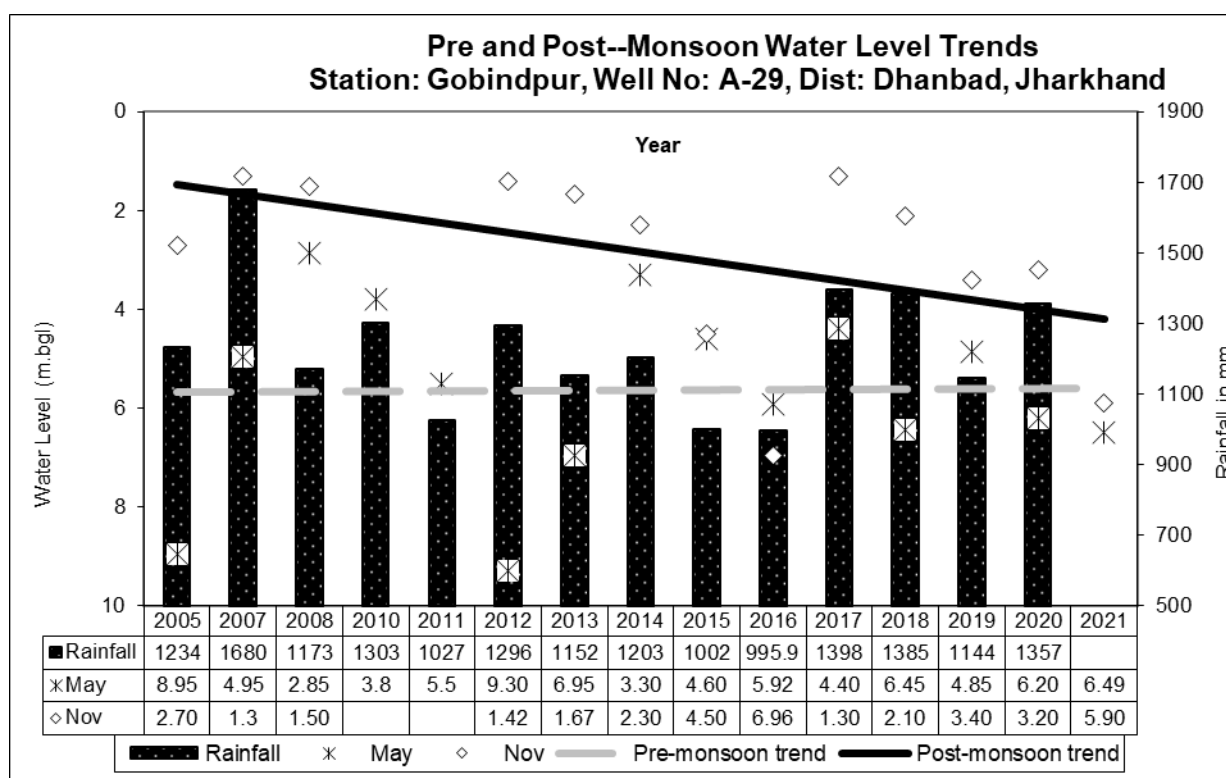
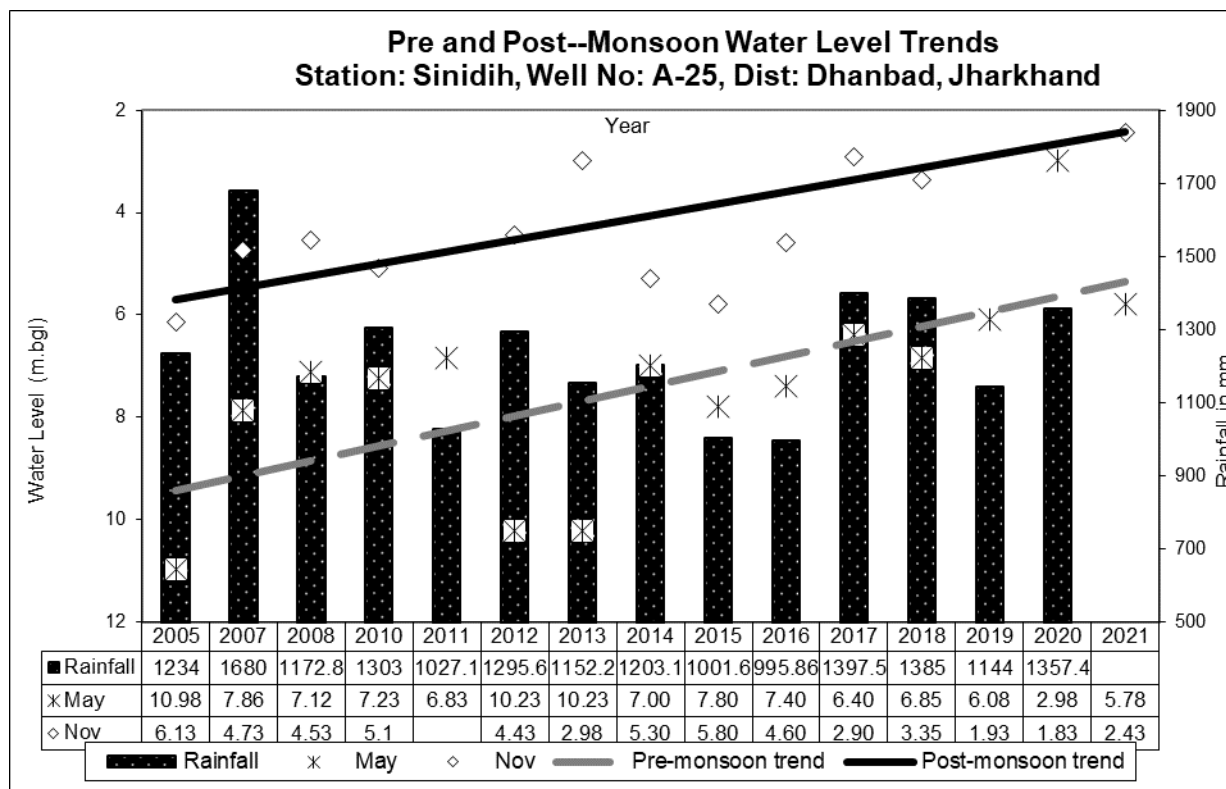
HYDROGRAPHS OF CLUSTER-I



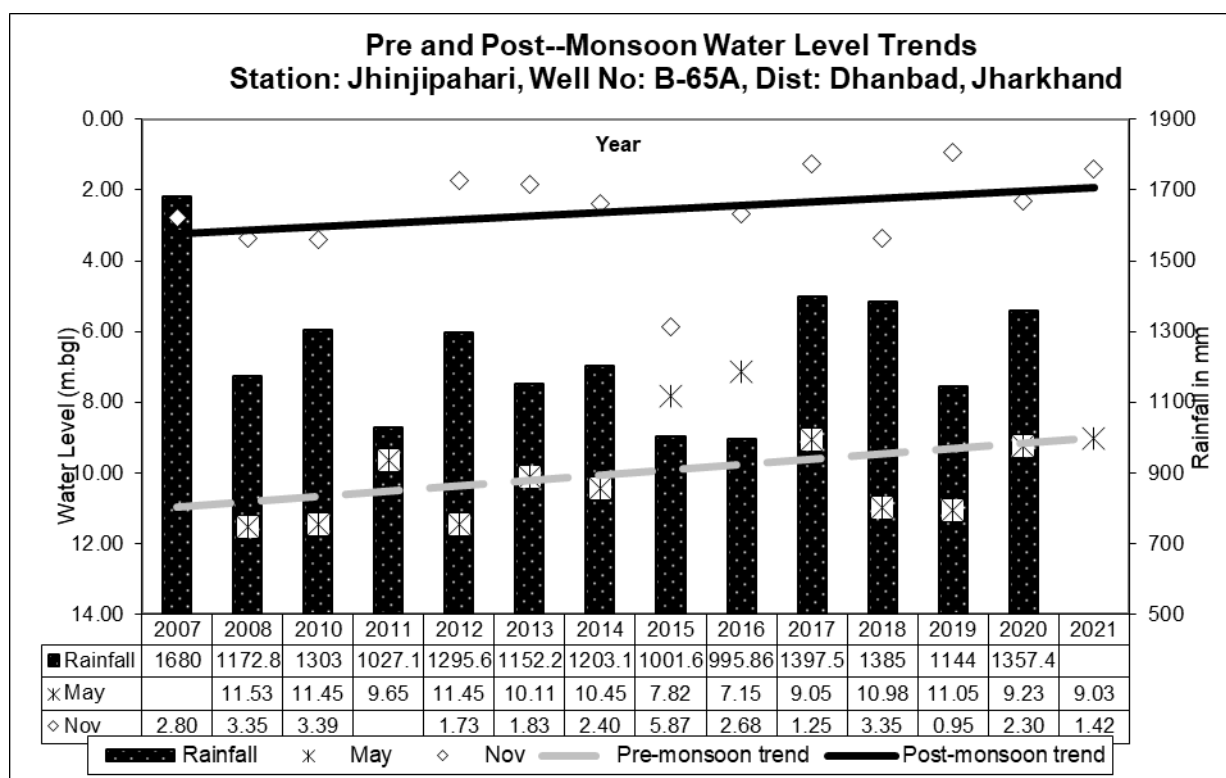
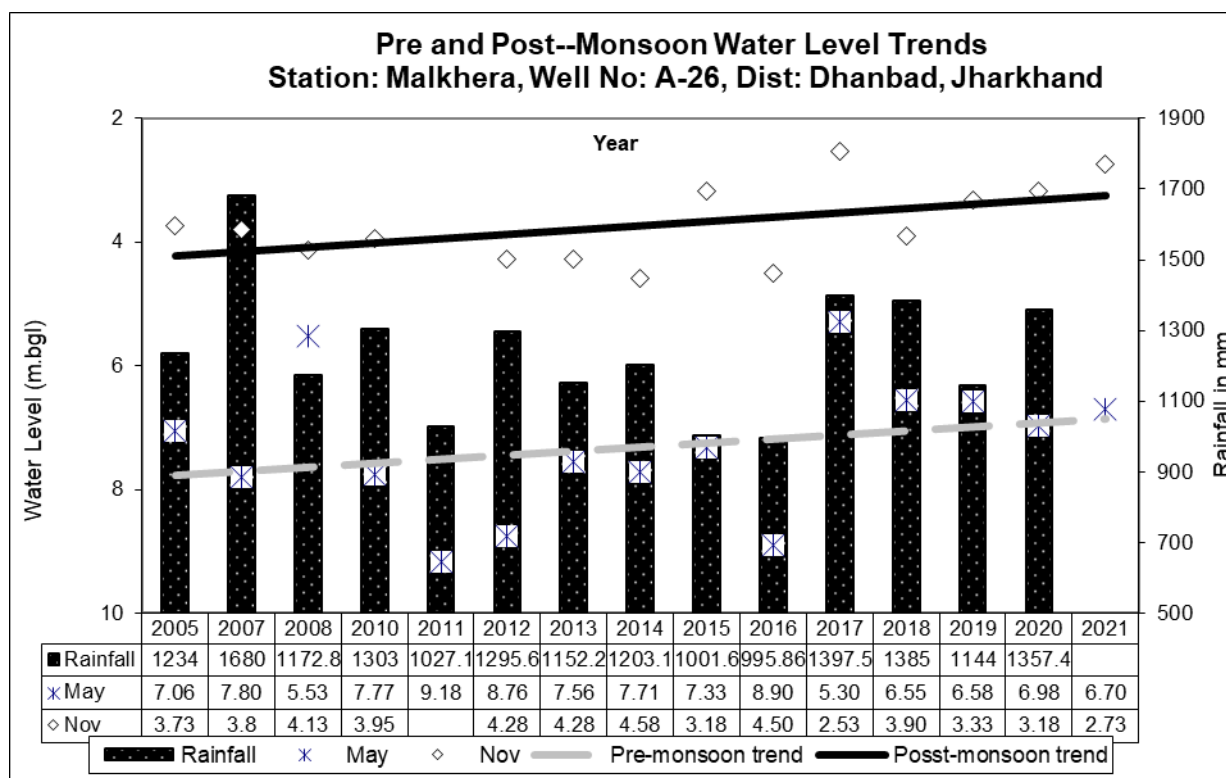
HYDROGRAPHS OF CLUSTER-II



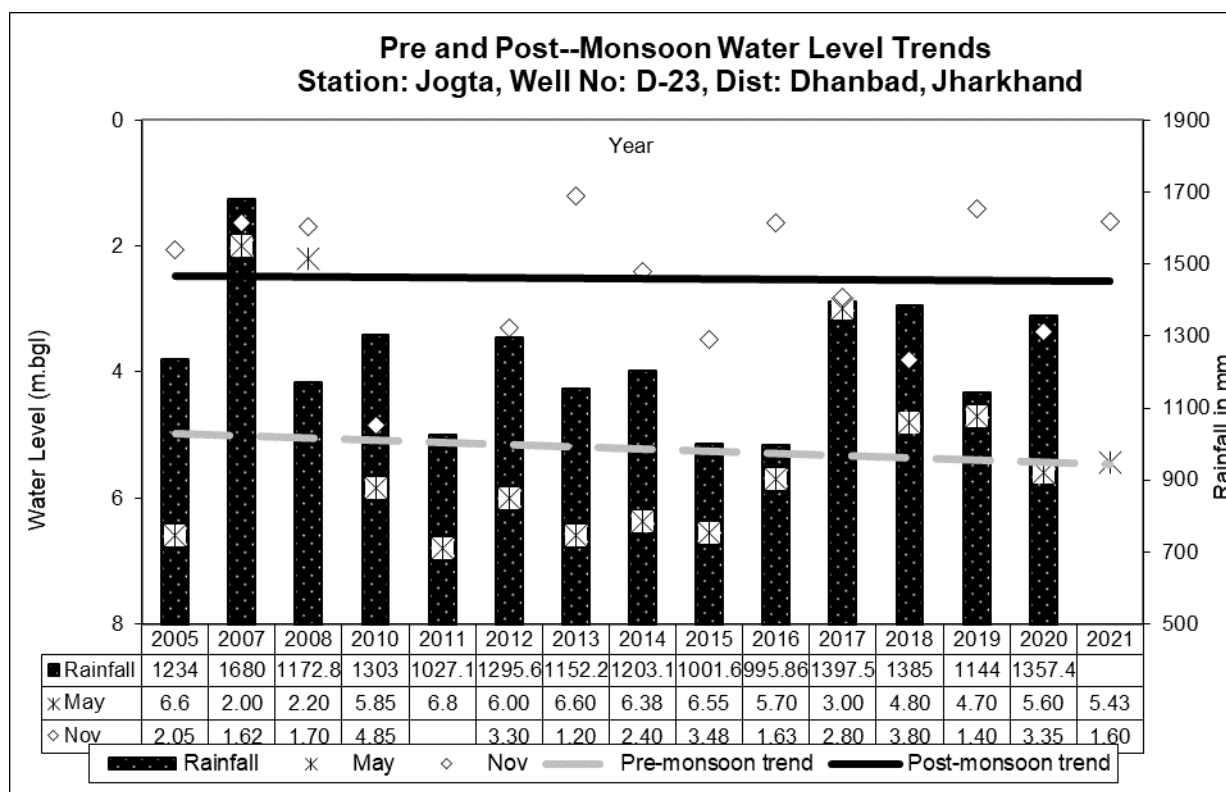
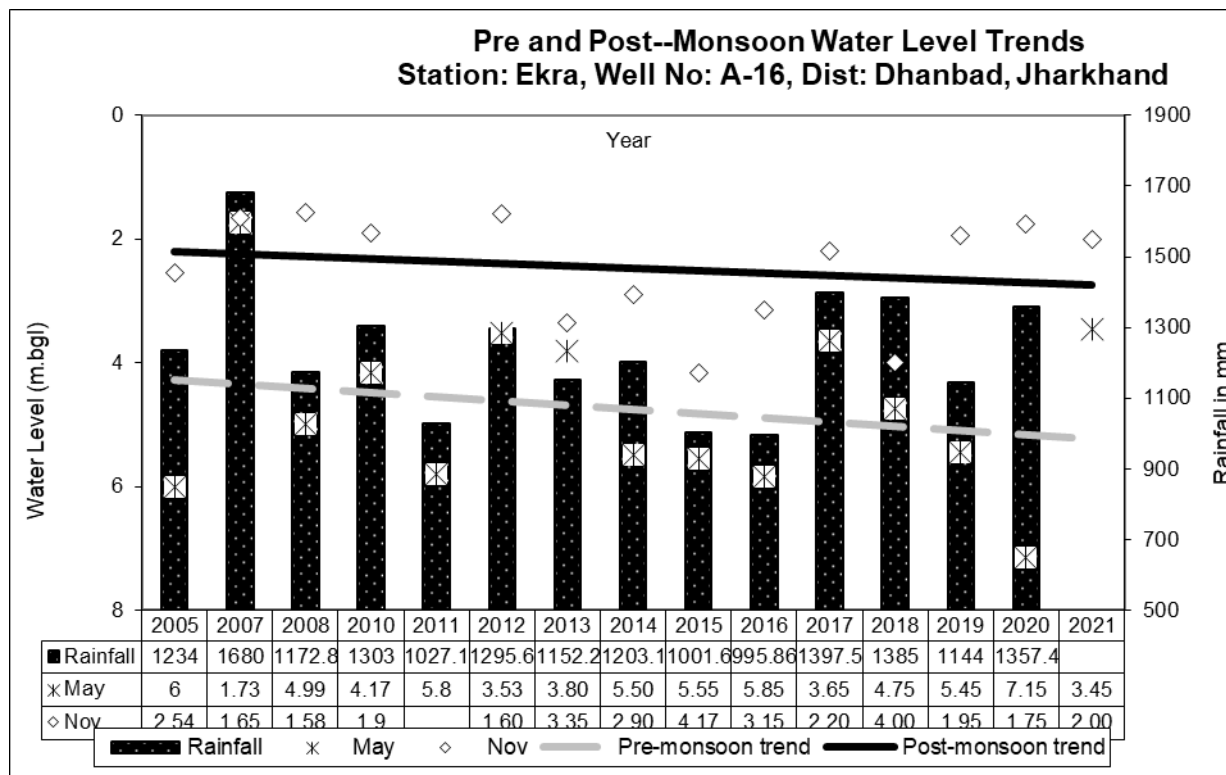
HYDROGRAPHS OF CLUSTER-III



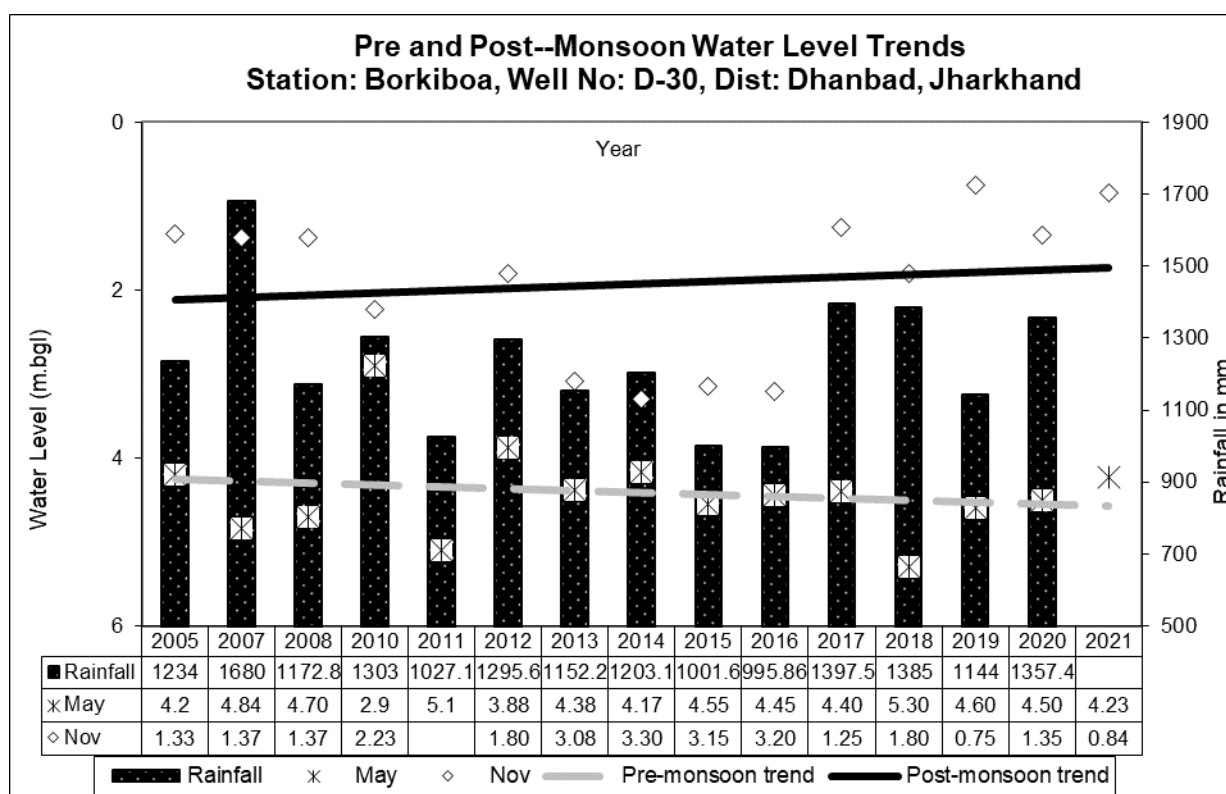
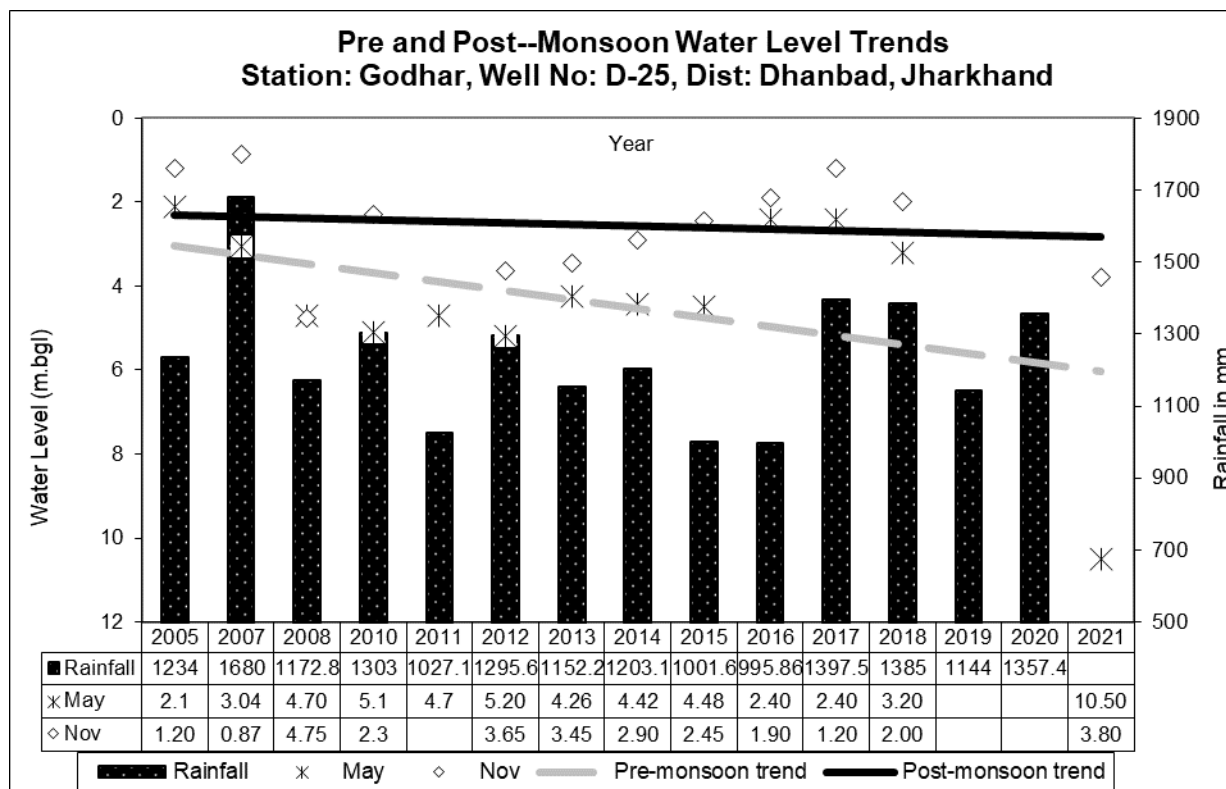
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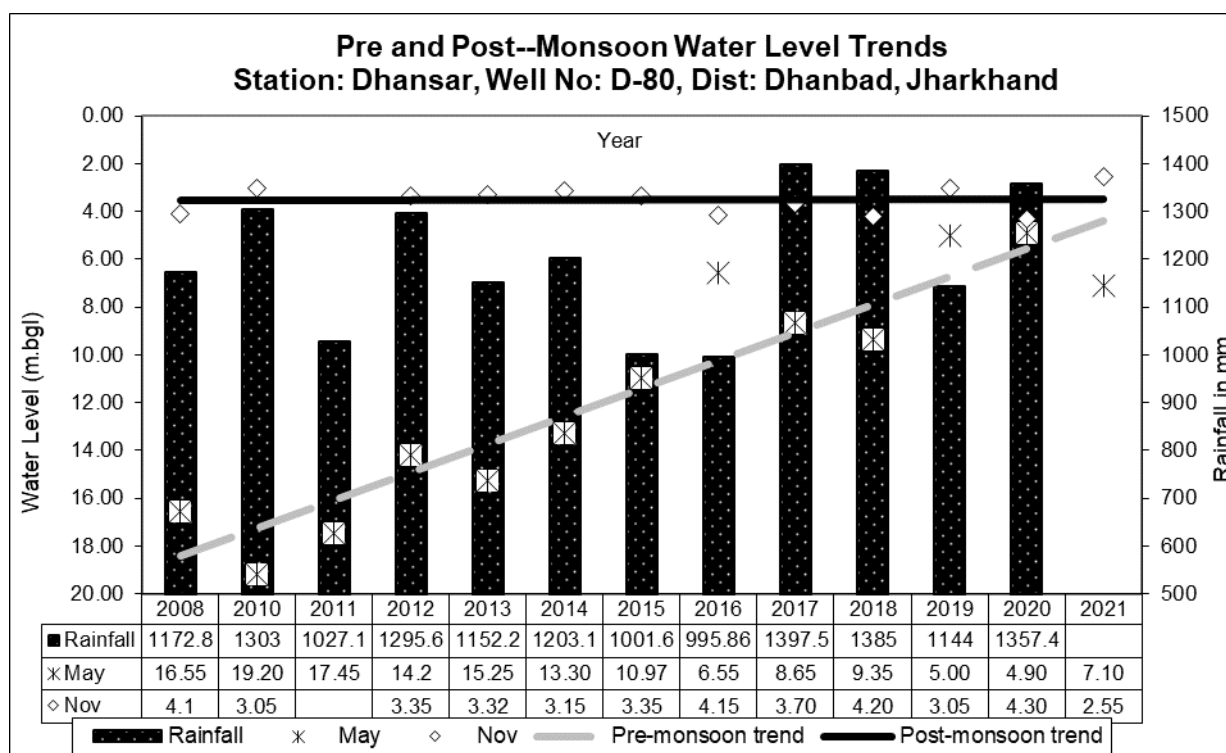
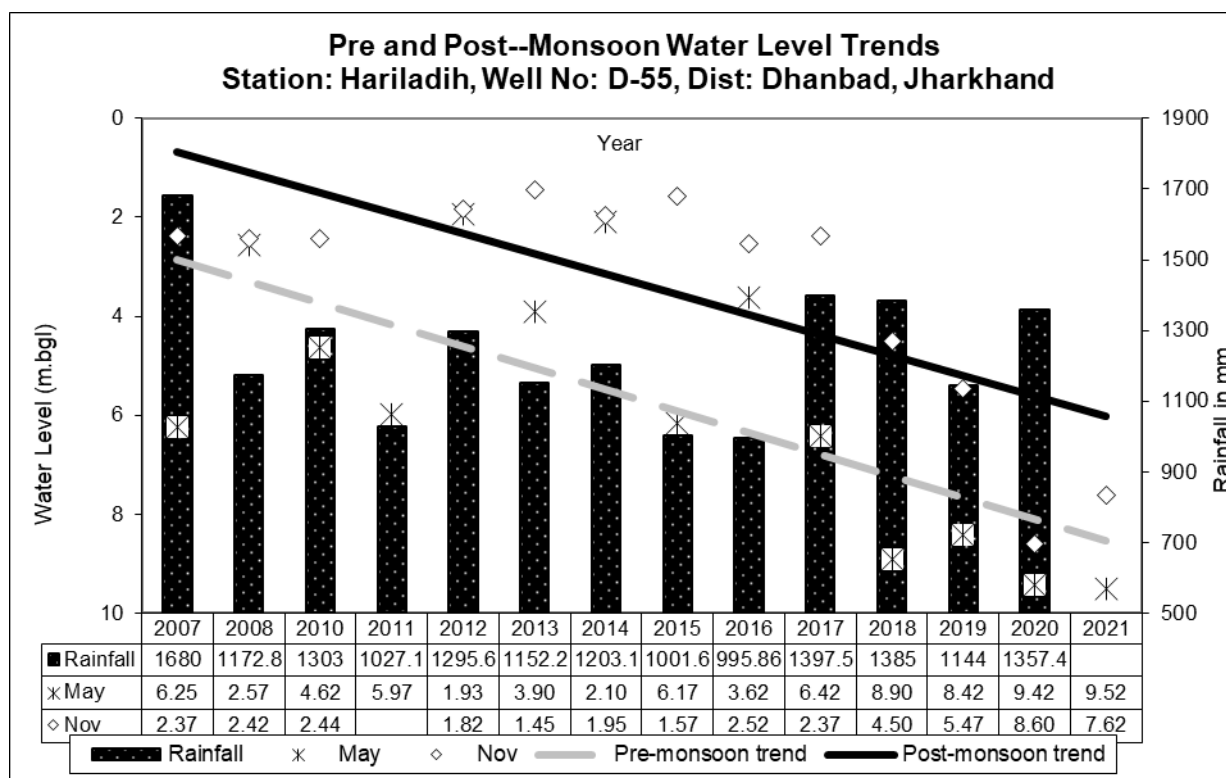
HYDROGRAPHS OF CLUSTER-V



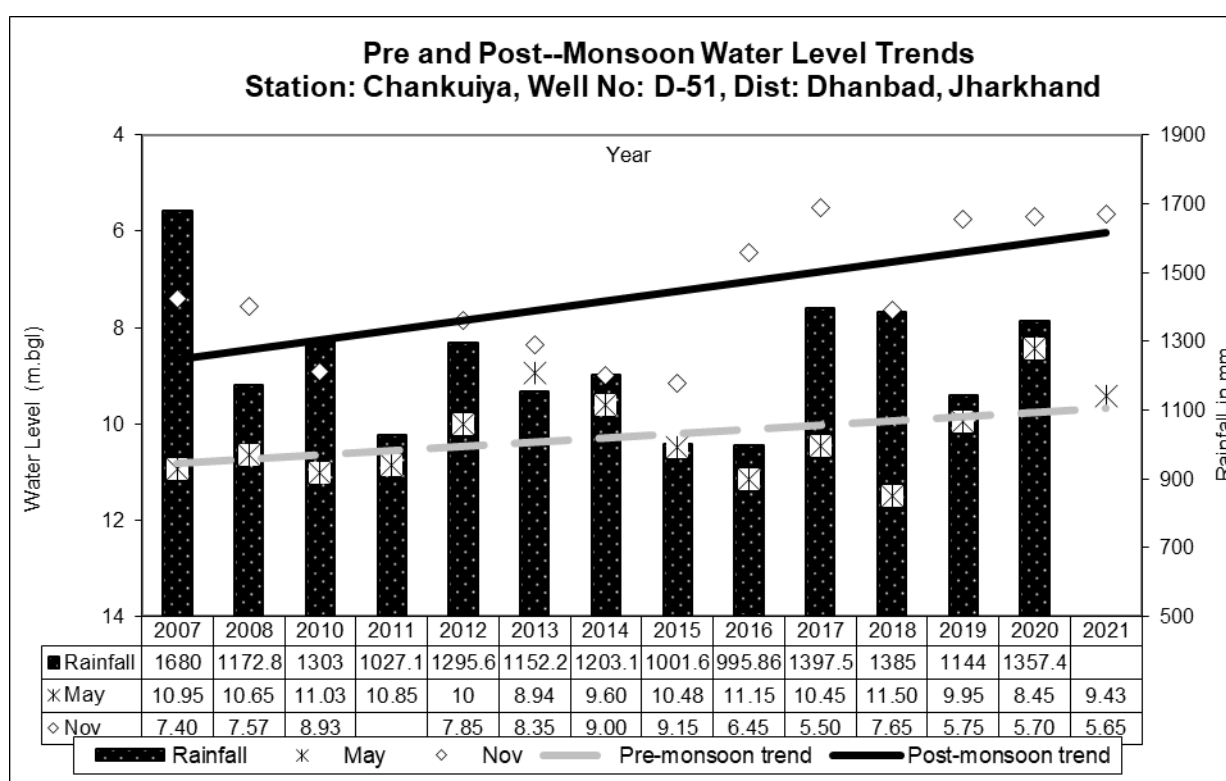
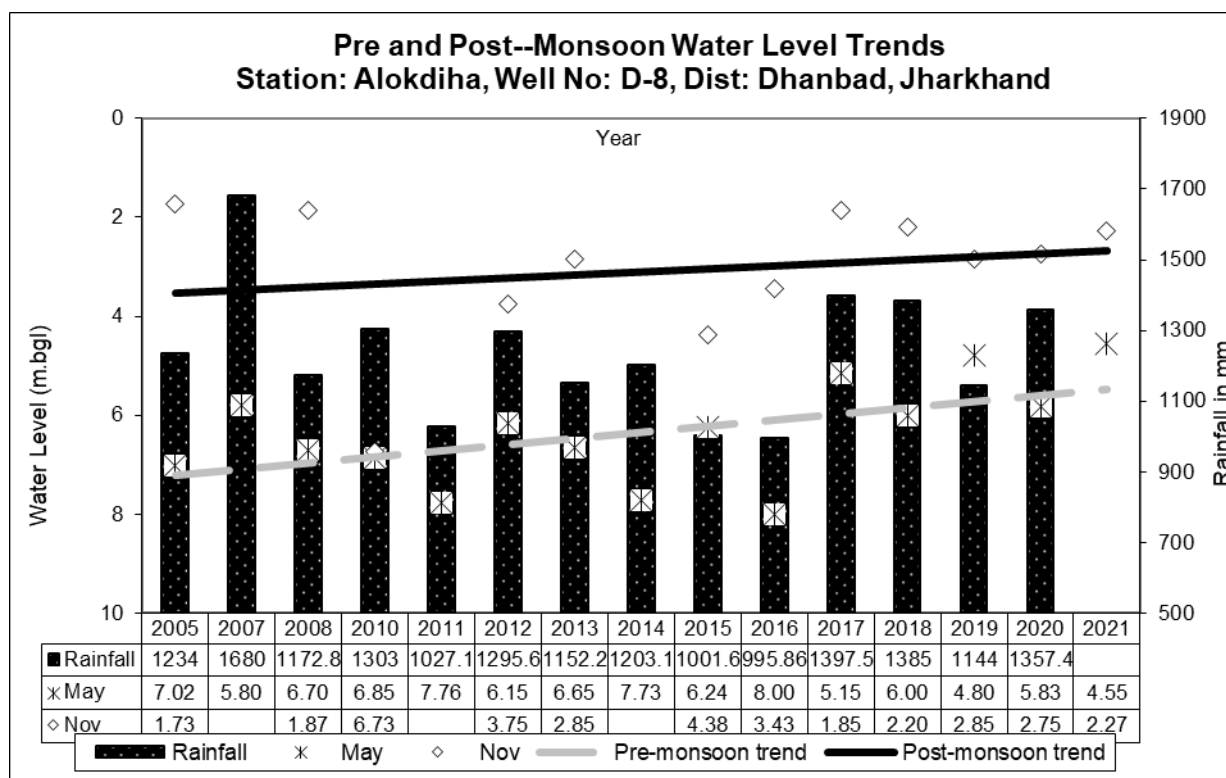
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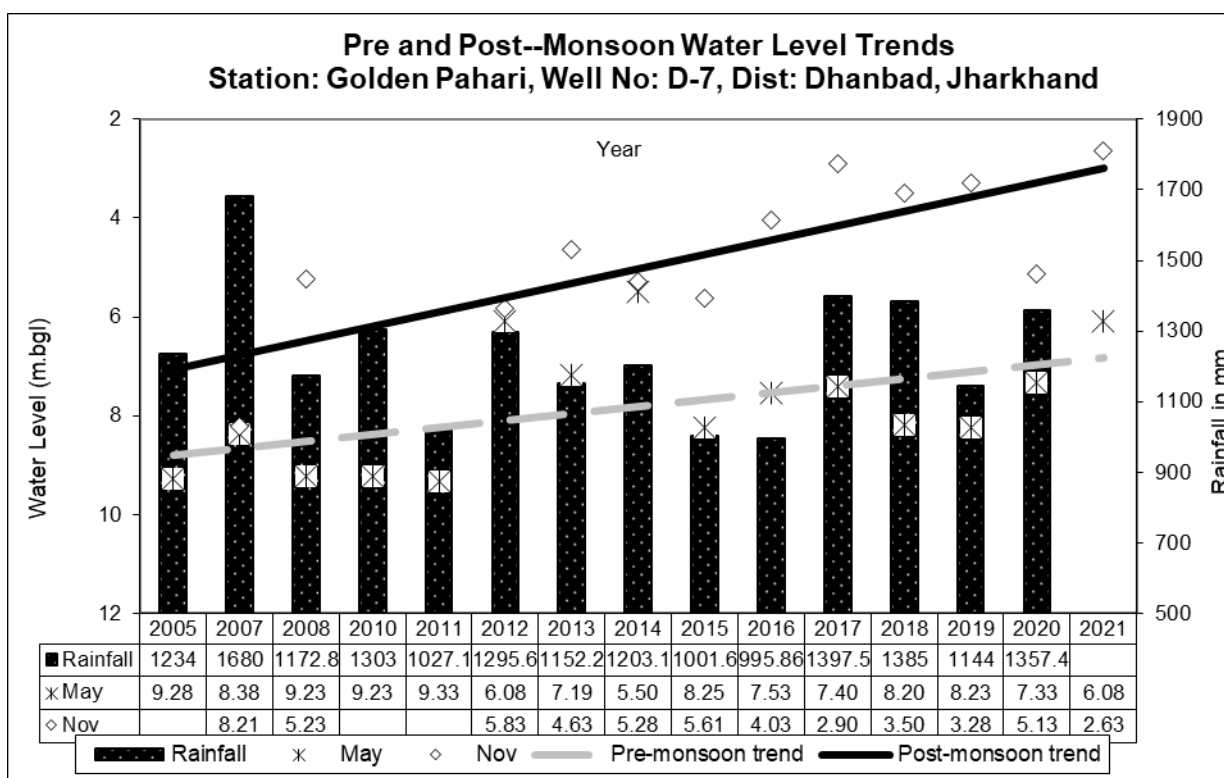
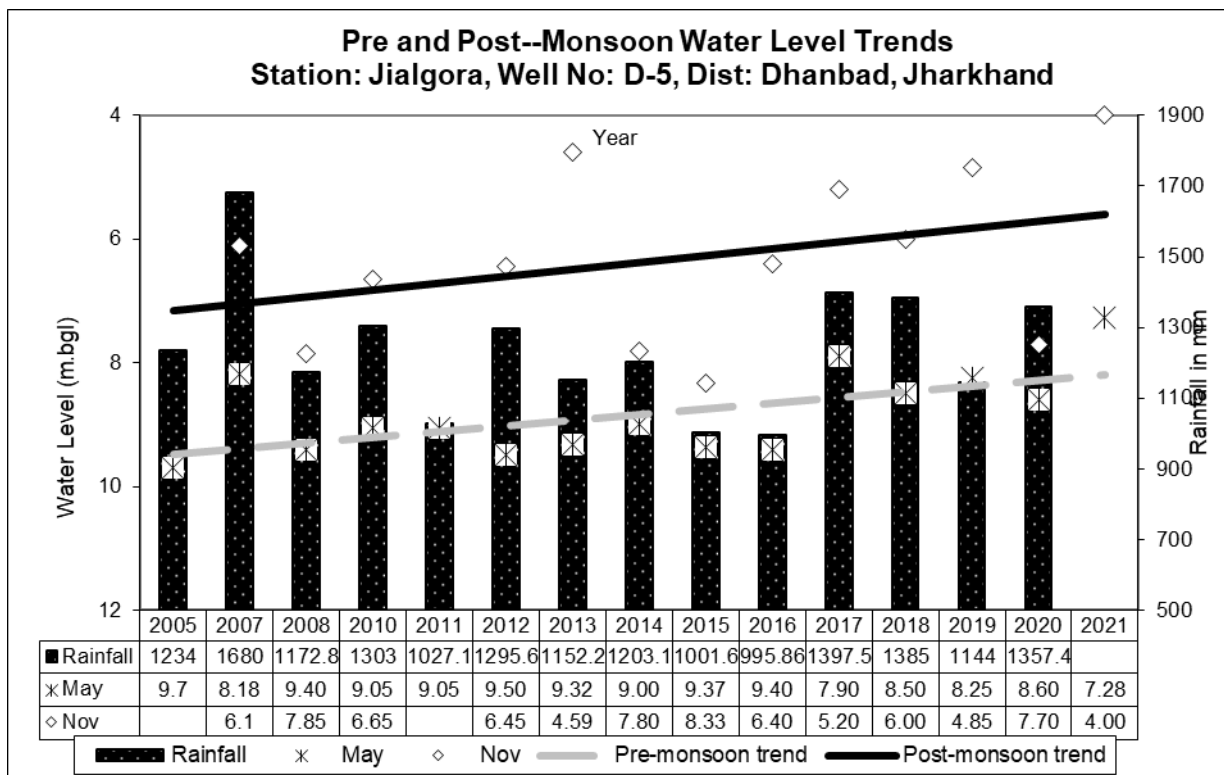
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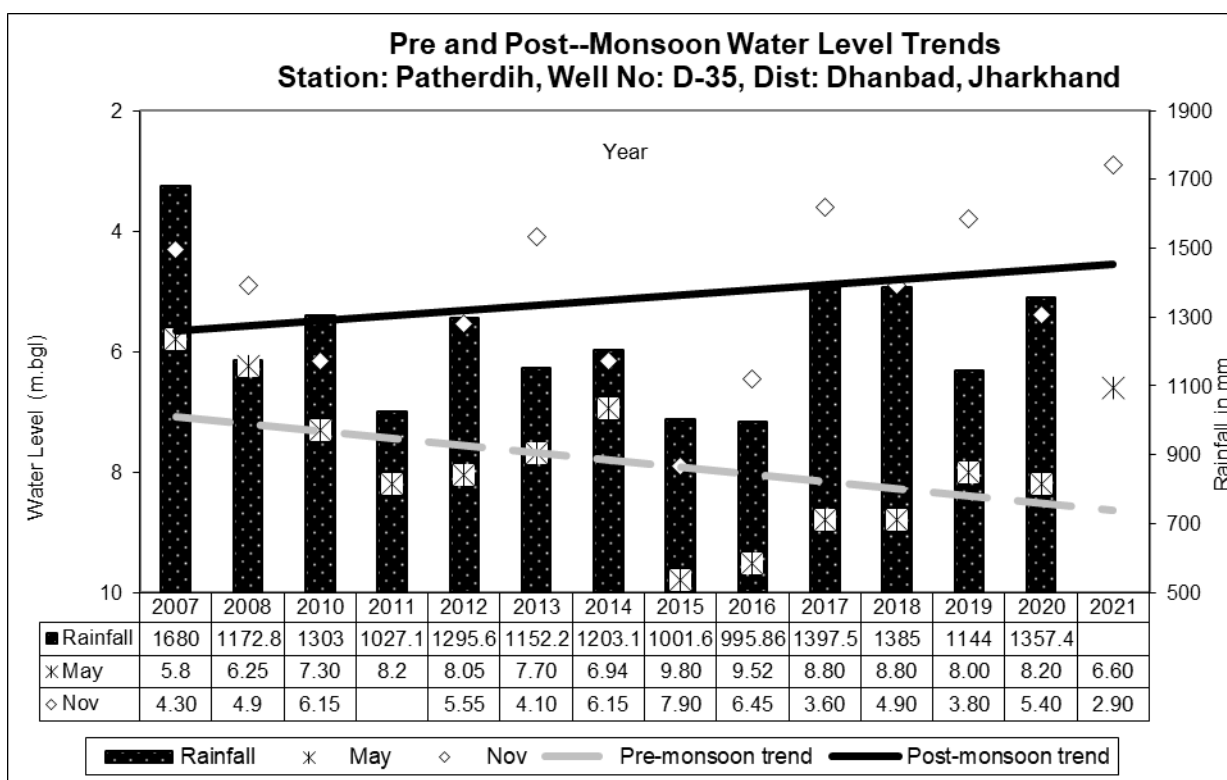
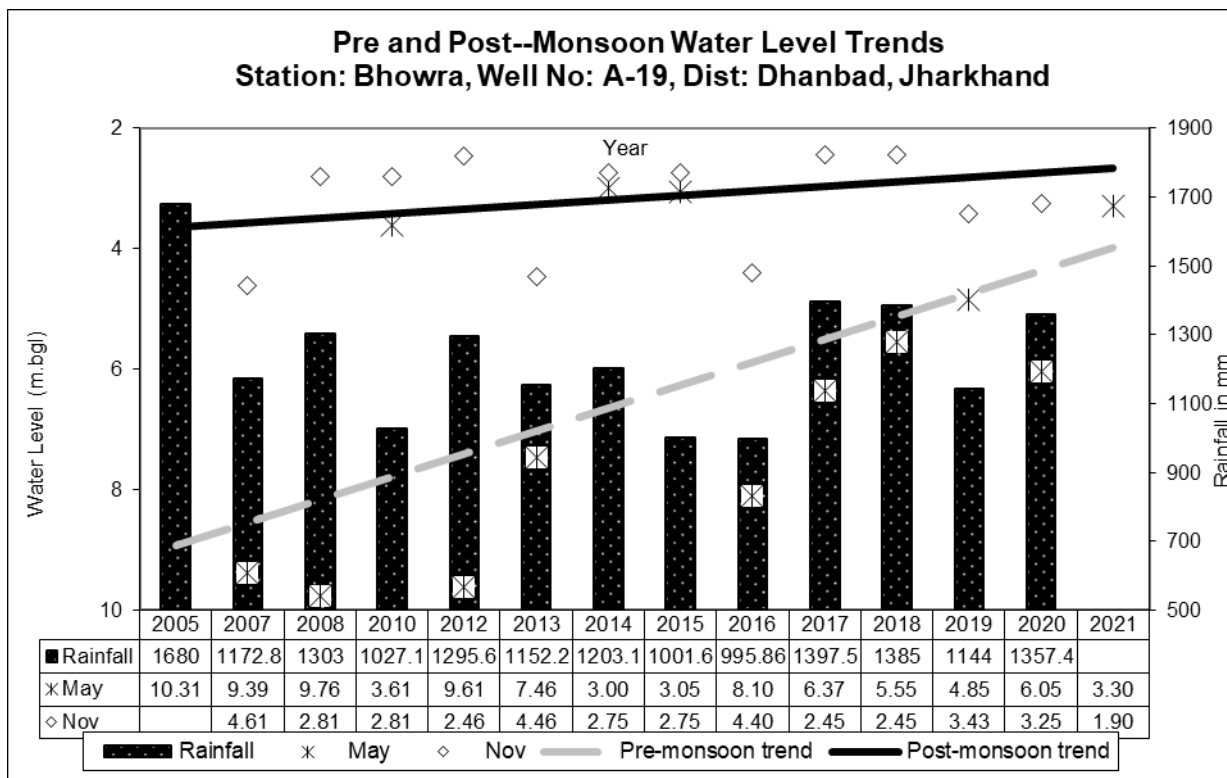
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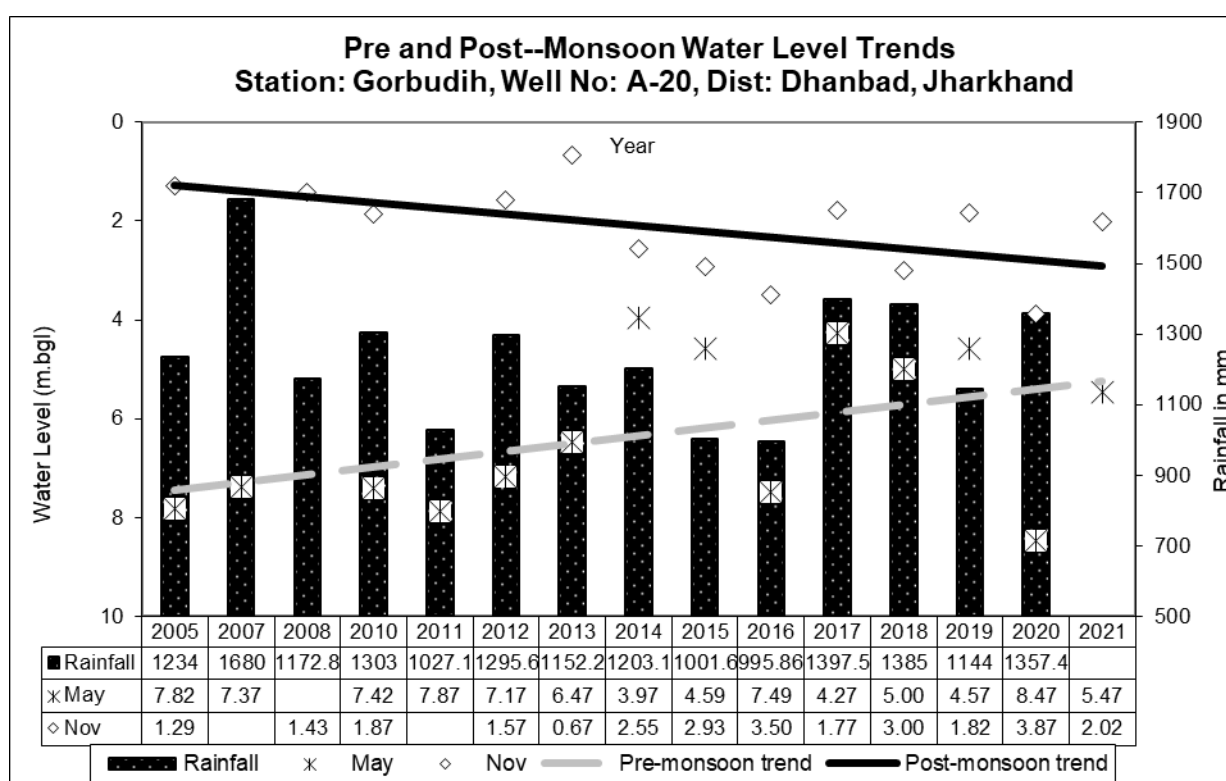
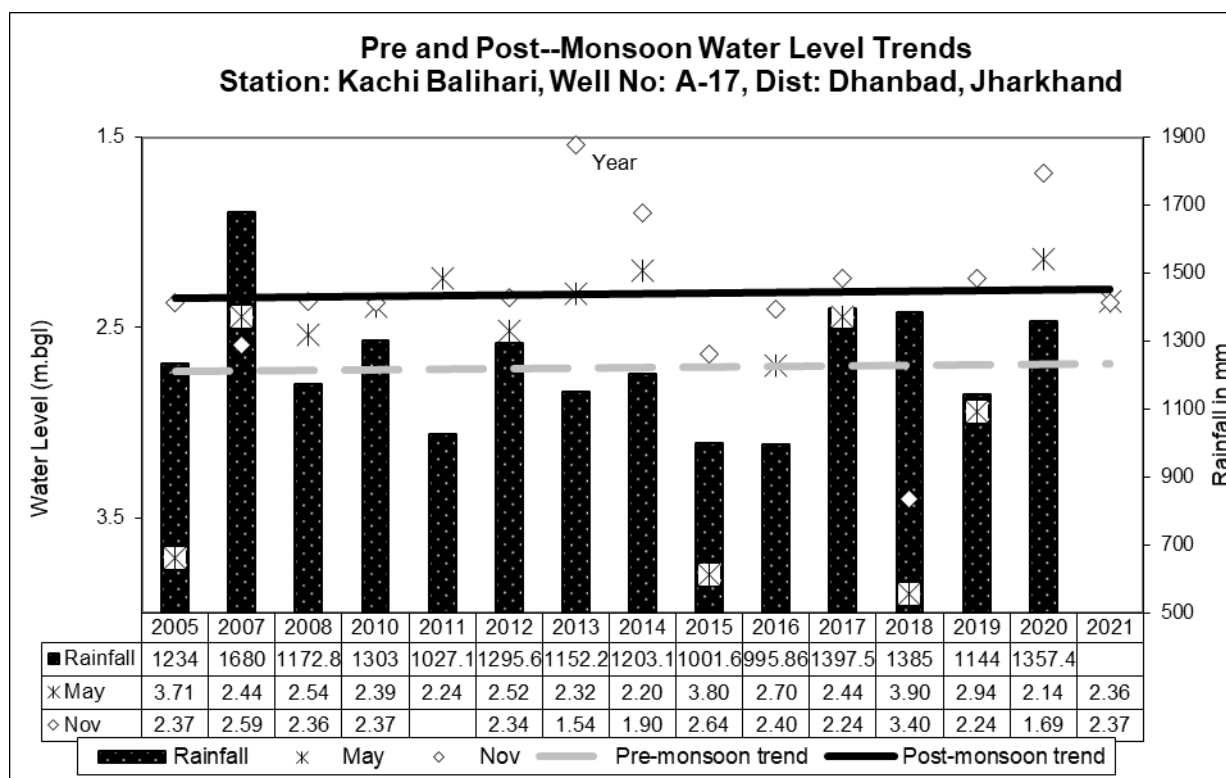
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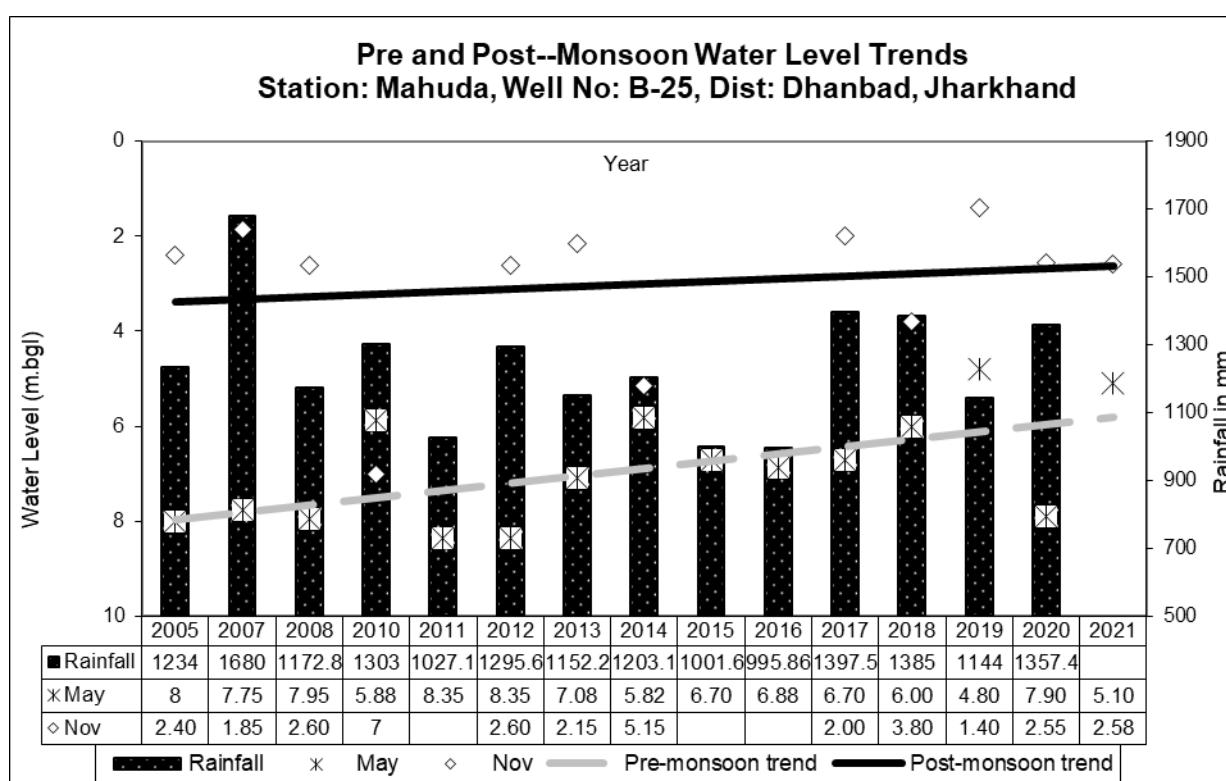
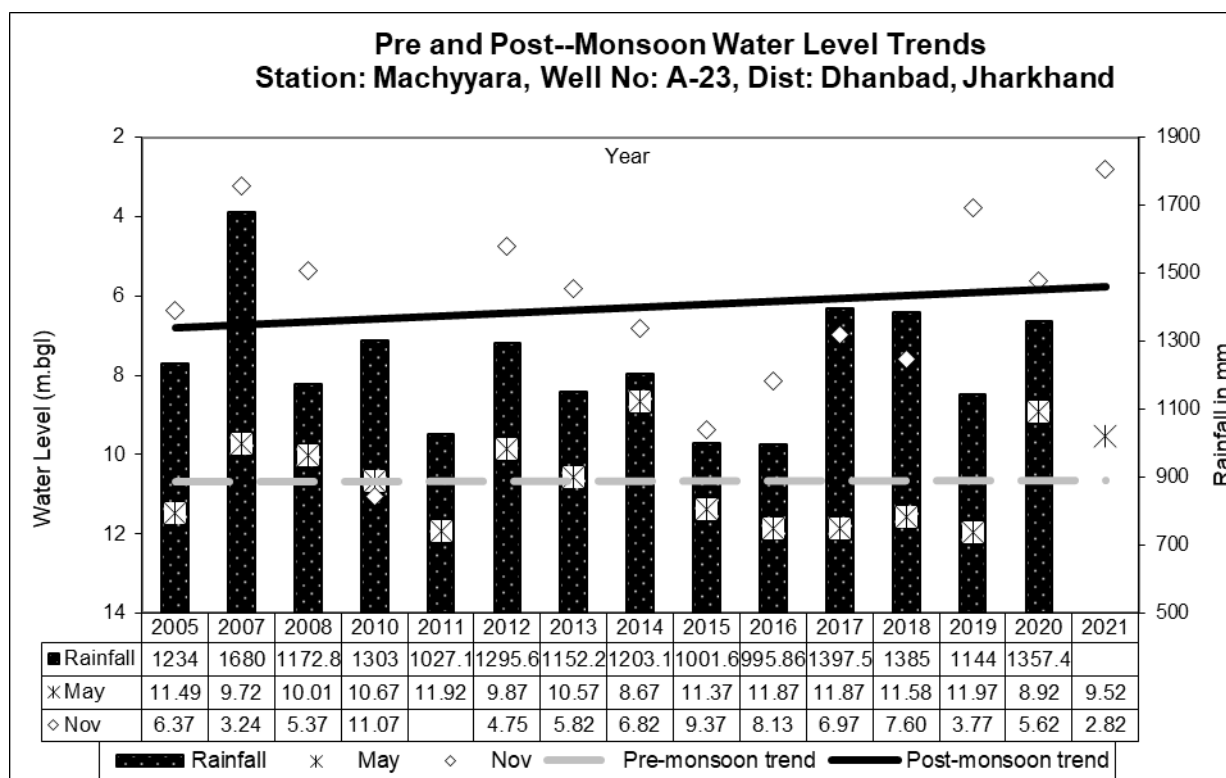
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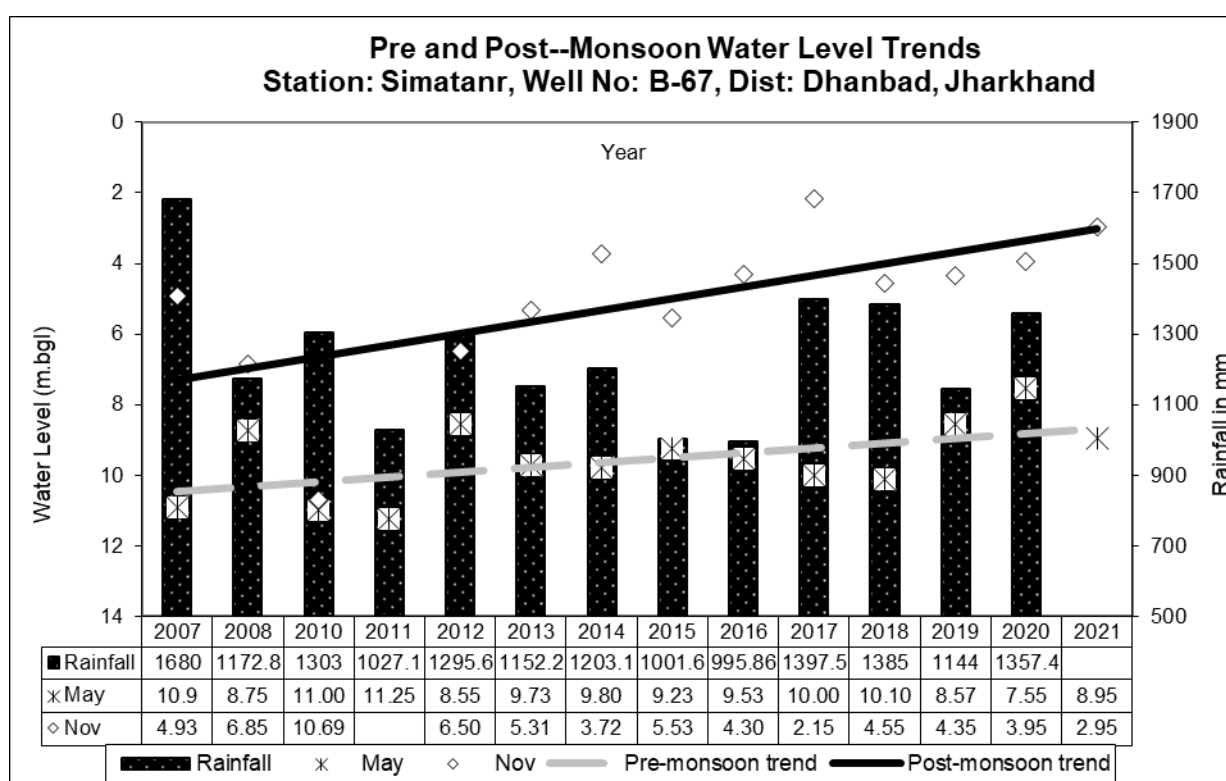
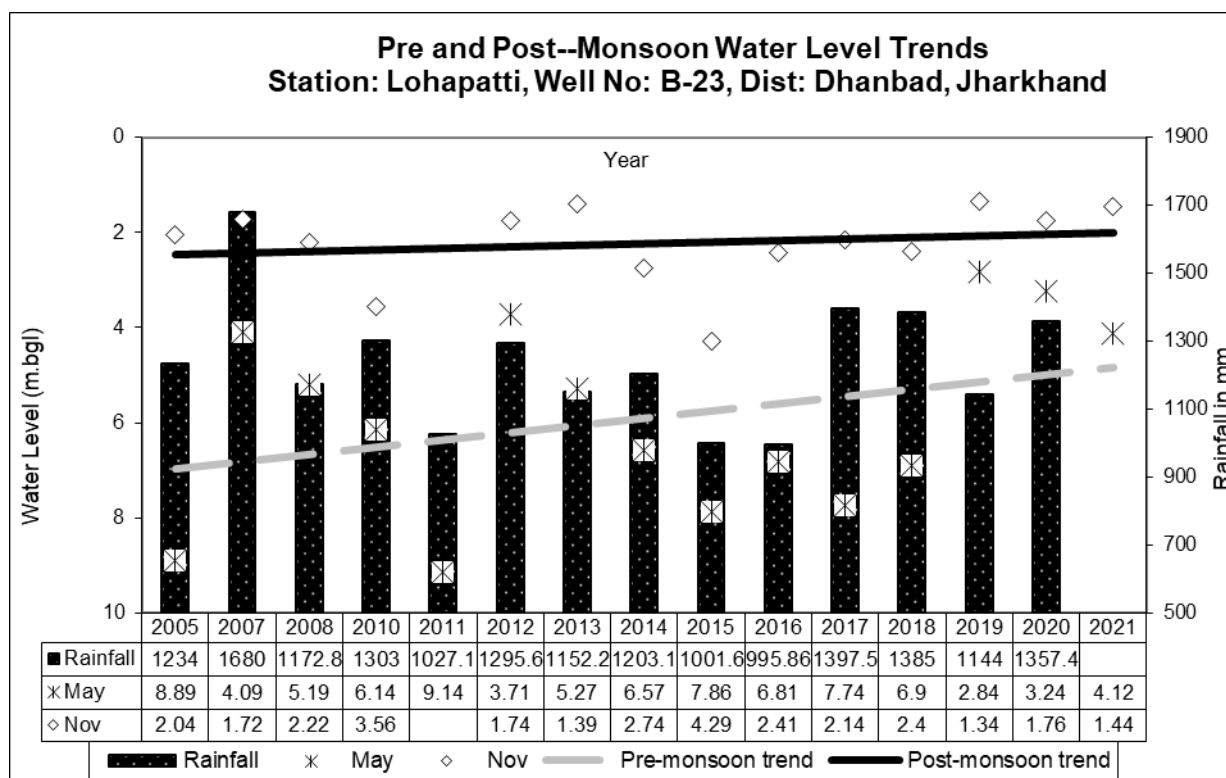
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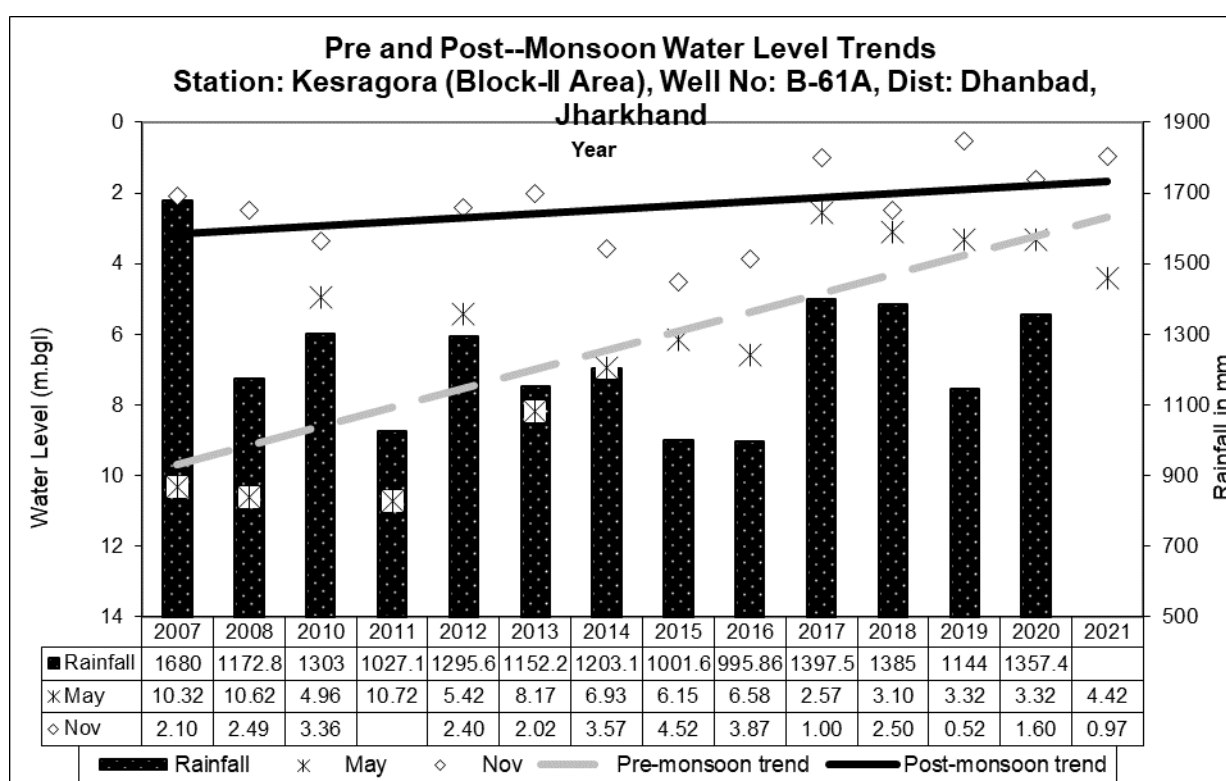
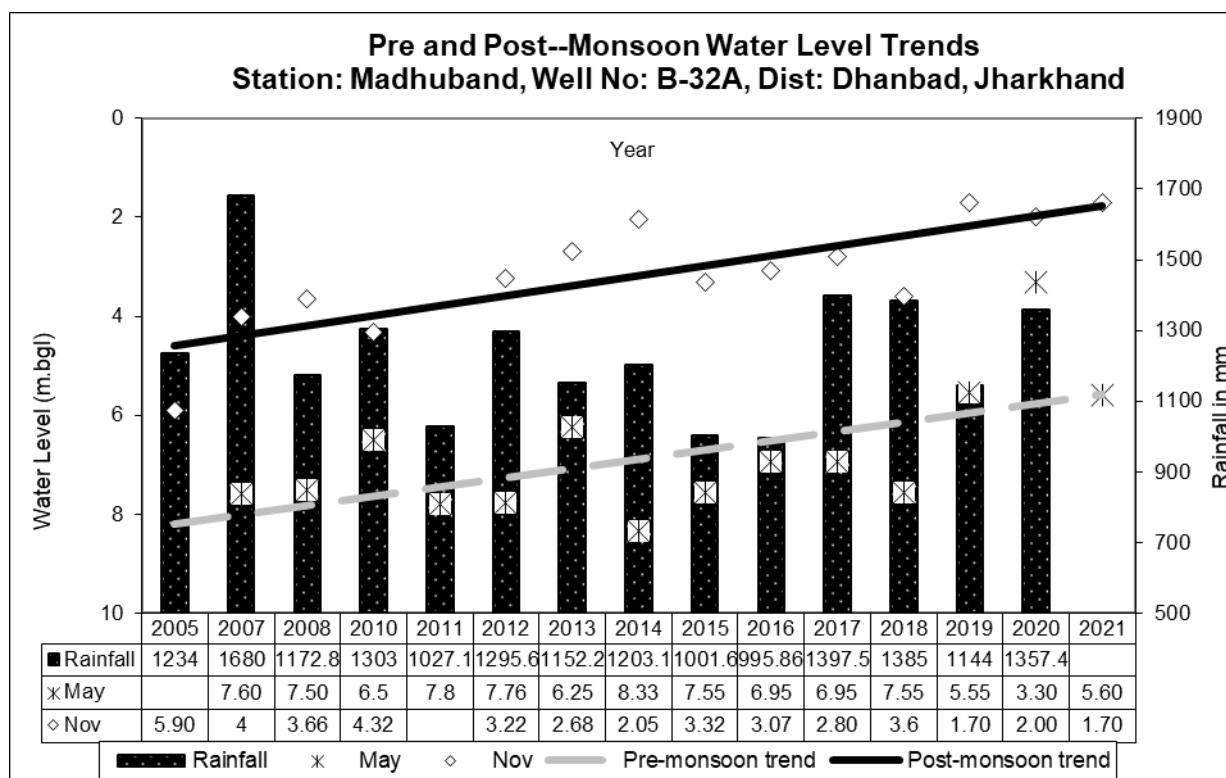
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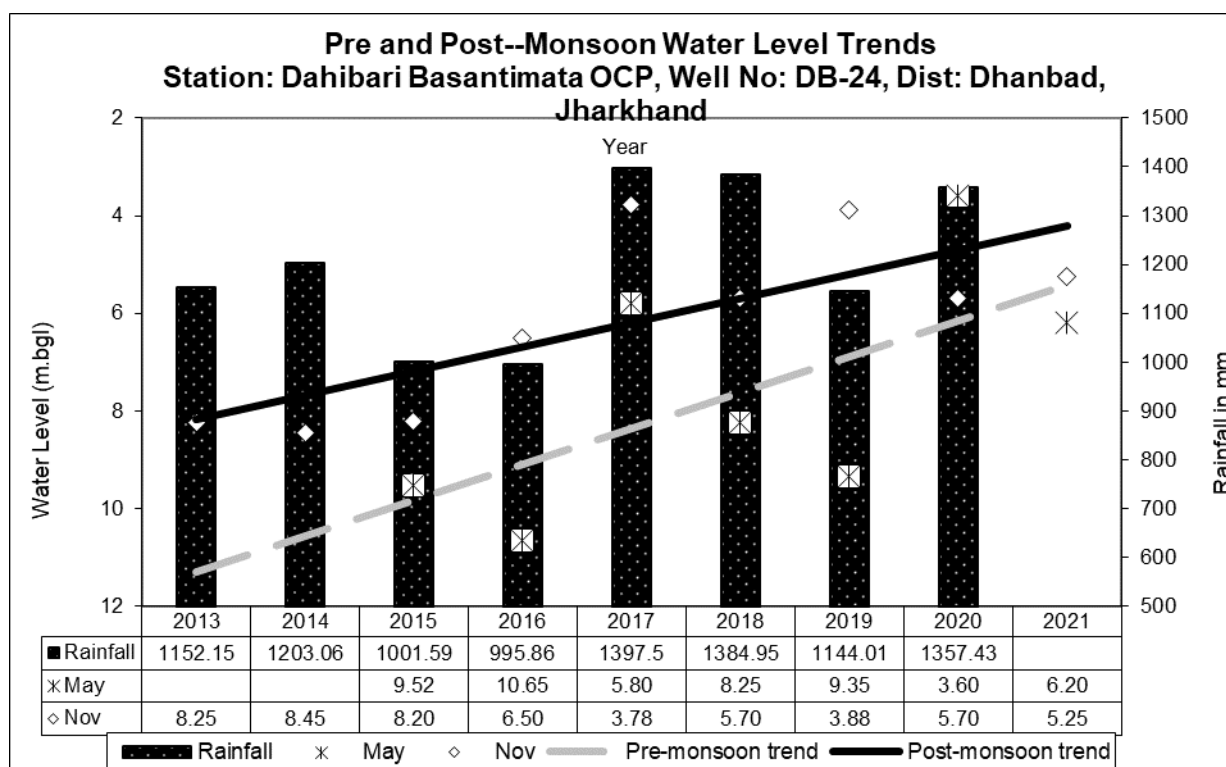
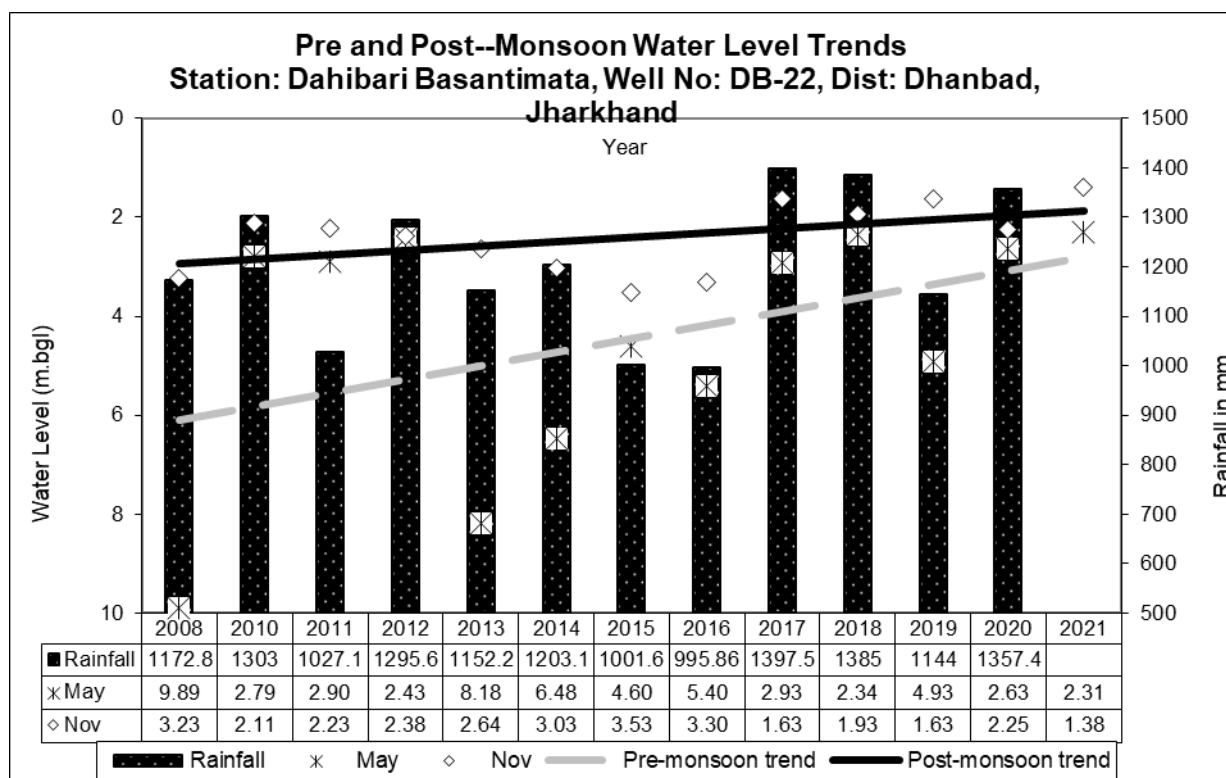
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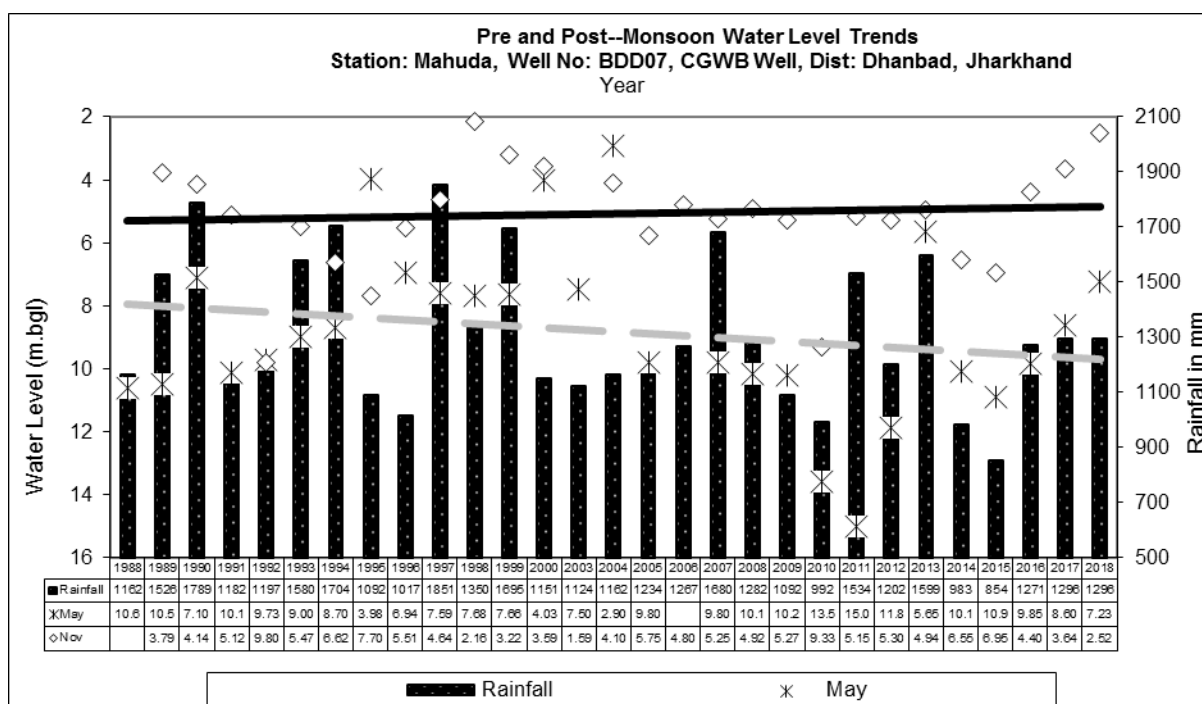
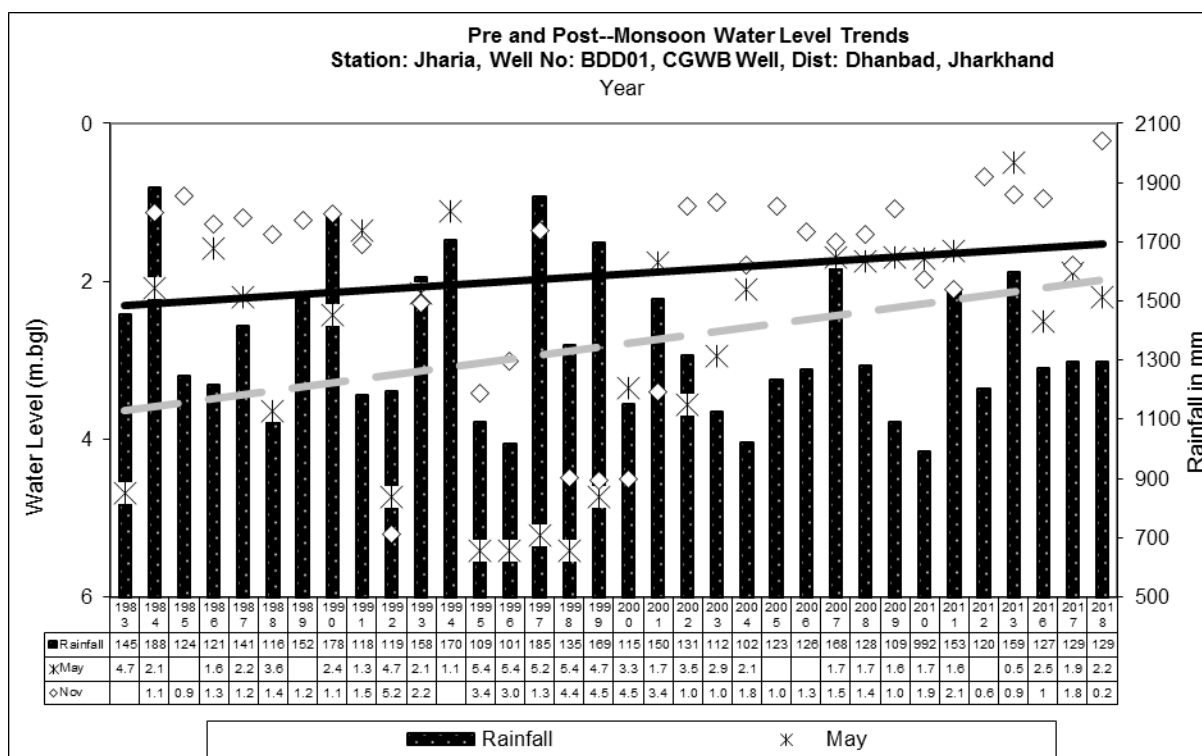
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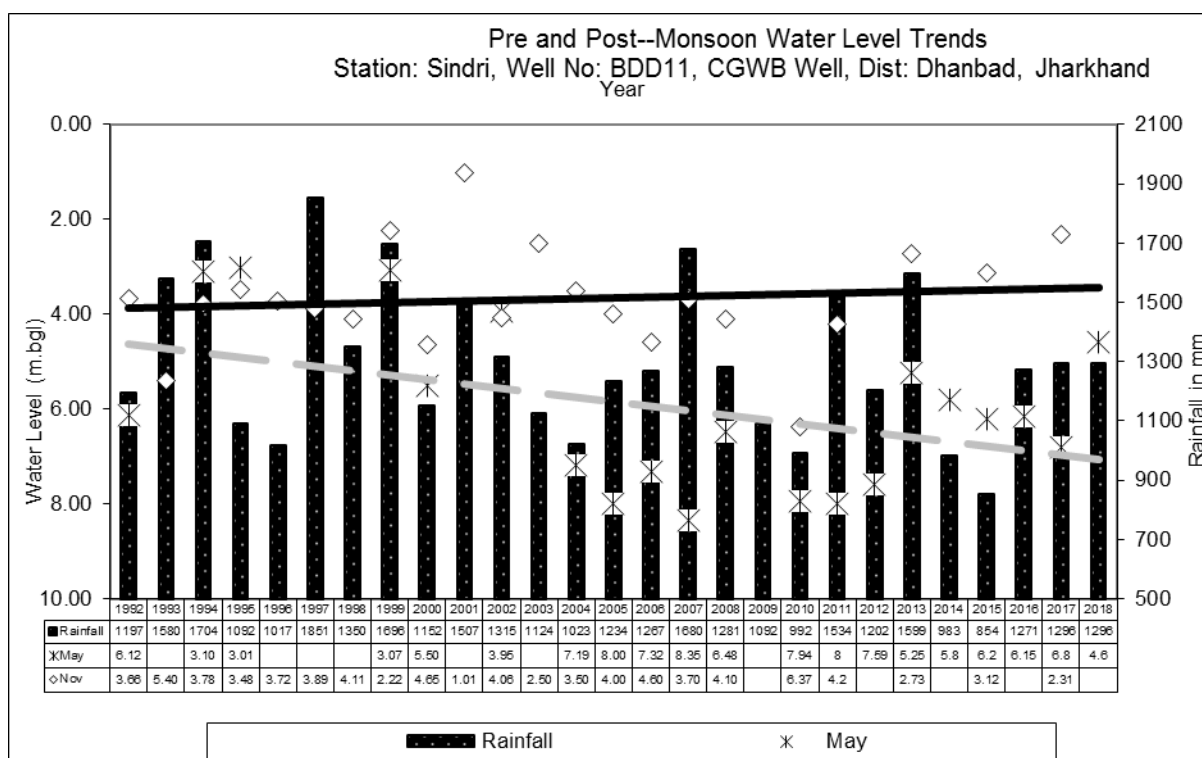
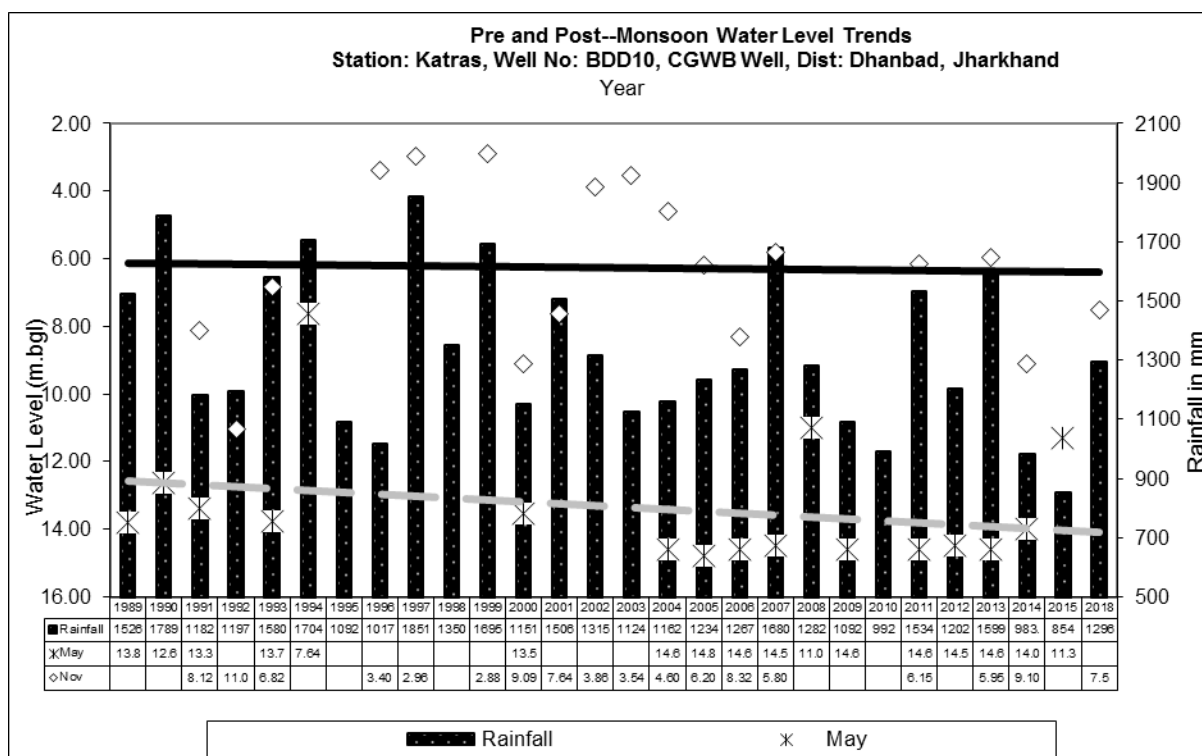
HYDROGRAPHS OF CLUSTER-XVI



HYDROGRAPHS OF CGWB PERMANENT OBSERVATION STATIONS



HYDROGRAPHS OF CGWB PERMANENT OBSERVATION STATIONS



GROUNDWATER SAMPLE LOCATION DETAILS

Sampling month: June month of the assessment year of 2021-22

SI No	Name of Cluster	Ground Water Sample	Dug well (CMPDI)	Location	Sampling Date
					June'2021
1	CLUSTER-I	GW-1	B-15	BERA VILLAGE	16.06.2021
2	CLUSTER-II	GW-2	B-59	KHODOVALY VILLAGE	16.06.2021
3	CLUSTER-III	GW-3	A-29	GOVINDPUR,AMBAGAN VILLAGE	16.06.2021
4	CLUSTER-IV	GW-4	B-64	KESHALPUR, BATIGHAR	16.06.2021
5	CLUSTER-V	GW-5	D-30	BORKIBOA VILLAGE	16.06.2021
6	CLUSTER-VI	GW-6	D-25	GODHUR MORE	16.06.2021
7	CLUSTER-VII	GW-7	D-80	DHANSAR MINE RESCUE STN.	16.06.2021
8	CLUSTER-VIII	GW-8	D-49	NEAR GHANOODIH OC	15.06.2021
9	CLUSTER-IX	GW-9	D-5	JEALGORA, NEAR P.O.	15.06.2021
10	CLUSTER-X	GW-10	D-35	PATHERDIH RLY. COLONY	15.06.2021
11	CLUSTER-XI	GW-11	A-32	MONNIDIH BAZAR	16.06.2021
12	CLUSTER-XIII	GW-13	A-23	MACHHAYARA	16.06.2021
13	CLUSTER-XIV	GW-14	B-23	LOHAPATTI VILLAGE	16.06.2021
14	CLUSTER-XV	GW-15	B-32A	MADHUBAND VILLAGE	16.06.2021
15	CLUSTER-XVI	GW-16	DB-22	DAHIBARI,NICHE BASTI	15.06.2021

WATER QUALITY

(GROUND WATER- ALL PARAMETERS)

Year: 2020-21

Sl. No	Parameter	Sampling Stations			Detection Limit	IS:10500 Drinking Water Standards	Standard / Test Method
		GW1 16.06.2021	GW2 16.06.2021	GW3 16.06.2021			
1	Boron (as B), mg/l, Max	<0.2	<0.2	<0.2	0.2	0.5	APHA, 23 rd Edition ,Carmin
2	Colour,in Hazen Units	1	2	2	1	5	APHA, 23 rd Edition ,Pt.-Co. Method
3	Calcium (as Ca), mg/l, Max	41	84	127	1.6	75	IS 3025, Part 40: 1991 R 2019 EDTA Method
4	Chloride (as Cl), mg/l, Max	47	78	124	2	250	IS-3025/32:1988, R-2019 Argentometric
5	Copper (as Cu), mg/l, Max	<0.03	<0.03	<0.03	0.03	0.05	IS 3025 Part 42 : 1992 R : 2019, AAS-Flame APHA, 23 rd Edition, AAS-GTA
6	Fluoride (as F) mg/l, Max	0.77	0.71	0.59	0.2	1.0	APHA, 23 rd Edition, Page 4-90 to , 4500 -F- D (SPADNS Method)
7	Free Residual Chlorine, mg/l, Min	<0.004	<0.004	<0.004	0.04	0.2	APHA, 23 rd Edition , 4500-Cl ⁻ B. (Iodometric Method-I)
8	Iron (as Fe), mg/l, Max	0.28	0.2	0.2	0.2	1.0	IS 3025 Part 53 : 2003, R : 2019 , AAS-Flame Method
9	Lead (as Pb), mg/l, Max	<0.005	<0.005	<0.005	0.005	0.01	IS:3025(Part 47):1994 (Reaffirmed 2019) APHA, 23 rd Edition, AAS-GTA
10	Manganese (as Mn), mg/l, Max	0.24	<0.02	<0.02	0.02	0.1	APHA, 23 rd Edition, 3111B, Direct Air Acetylene Flame AAS-Flame
11	Nitrate (as NO ₃), mg/l, Max	9.62	7.03	14.76	0.5	45	APHA, 23 rd Edition, P-4-127, 4500 - NO ₃ ⁻ B , UV-Spectrophotometric Screening Method
12	Odour	Aggreable	Aggreable	Aggreable	Qualitative	Agreeable	APHA, 23 rd Edition , 2150-C
13	pH value	7.72	7.85	7.91	0.2	6.5-8.5	IS 3025, Part 11 : 1983 R 2017 Electrometric method
14	Phenolic compounds (as C ₆ H ₅ OH), mg/l, Max	<0.001	<0.001	<0.001	0.001	0.002	APHA, 22 nd Edition, 4-Amino Autipyrine
15	Selenium, mg/l, Max	<0.007	<0.007	<0.007	0.007	0.01	IS -3025,part 56:2003,R-2019/APHA 23 rd Edition, AAS-VGA
16	Sulphate (as SO ₄) mg/l, Max	31	64	42	10	200	APHA -23 rd Edition. P-4-199, 4500 SO ₄ ²⁻ E
17	Taste	Acceptable	Acceptable	Acceptable	Qualitative	Acceptable	APHA, 23 rd Edition, 2160-C Flavour Rating Assesment
18	Total Alkalinity (CaCO ₃), mg/l, Max	105	121	137	4	200	IS 3025, Part 23: 1986 R 2019 Titration Method
19	Total Arsenic (as As), mg/l,Max	<0.006	<0.006	<0.006	0.006	0.01	IS-3025, part 37:1988,R-2019/APHA23 rd Edition AAS-VGA
20	Total Chromium (as Cr), mg/l, Max	<0.004	<0.004	<0.004	0.04	0.05	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA, 23 rd Edition, AAS-GTA
21	Total Dissolved Solids, mg/l, Max	425	510	622	25	500	IS 3025, Part 16: 1984 R 2017 Gravimetric method
22	Total Hardness (CaCO ₃), mg/l, Max	226	384	487	4	200	IS 3025, Part 21, 2009 R 2019 EDTA Method
23	Turbidity, NTU, Max	2	2	3	1	5	IS 3025, Part 10 : 1984 R 2017 Nephelometric Method
24	Zinc (as Zn), mg/l, Max	<0.1	<0.1	<0.1	0.1	5	IS 3025 Part 49 : 1994,R : 2019, AAS-Flame
25	Nickel as Ni, mg/l Max	<0.01	<0.01	<0.01	0.01	0.02	IS 3025 Pat 54 : 2003,R : 2019, AAS-Flame APHA 23 rd Edition, AAS-GTA

WATER QUALITY

(GROUND WATER- ALL PARAMETERS)

Year: 2021-22

Sl. No	Parameter	Sampling Stations			Detection Limit	IS:10500 Drinking Water Standards	Standard / Test Method
		GW4 16.06.2021	GW5 16.06.2021	GW6 16.06.2021			
1	Boron (as B), mg/l, Max	<0.2	<0.2	<0.2	0.2	0.5	APHA, 23 rd Edition ,Carmine
2	Colour,in Hazen Units	1	3	3	1	5	APHA, 23 rd Edition ,Pt.-Co. Method
3	Calcium (as Ca), mg/l, Max	49	122	78	1.6	75	IS 3025, Part 40: 1991 R 2019 EDTA Method
4	Chloride (as Cl), mg/l, Max	74	132	60	2	250	IS-3025/32:1988, R-2019 Argentometric
5	Copper (as Cu), mg/l, Max	<0.03	<0.03	<0.03	0.03	0.05	IS 3025 Part 42 : 1992 R : 2019, AAS-Flame APHA, 23 rd Edition, AAS-GTA
6	Fluoride (as F) mg/l, Max	0.50	0.83	0.80	0.2	1.0	APHA, 23 rd Edition, Page 4-90 to , 4500 -F- D (SPADNS Method)
7	Free Residual Chlorine, mg/l, Min	<0.04	<0.04	<0.04	0.04	0.2	APHA, 23 rd Edition, , 4500-Cl ⁻ B. (Iodometric Method-I)
8	Iron (as Fe), mg/l, Max	0.41	<0.2	0.32	0.2	1.0	IS 3025 Part 53 : 2003, R : 2019 , AAS-Flame Method
9	Lead (as Pb), mg/l, Max	<0.005	<0.005	<0.005	0.005	0.01	IS:3025(Part 47):1994 (Reaffirmed 2019) APHA, 23 rd Edition, AAS-GTA
10	Manganese (as Mn), mg/l, Max	<0.02	<0.02	0.16	0.02	0.1	APHA, 23 rd Edition, 3111B, Direct Air Acetylene Flame AAS-GTA
11	Nitrate (as NO ₃), mg/l, Max	11.32	29.01	14.21	0.5	45	APHA, 23 rd Edition, P-4-127, 4500 - NO ₃ - B , UV-Spectrophotometric Screening Method
12	Odour	Agreeable	Agreeable	Agreeable	Qualitative	Agreeable	APHA, 23 rd Edition, , 2150-C
13	pH value	8.03	7.65	7.77	0.2	6.5-8.5	IS 3025, Part 11 : 1983 R 2017 Electrometric method
14	Phenolic compounds (as C ₆ H ₅ OH), mg/l, Max	<0.001	<0.001	<0.001	0.001	0.002	APHA, 22 nd Edition, 4-Amino Autipyrine
15	Selenium, mg/l, Max	<0.007	<0.007	<0.007	0.007	0.01	IS -3025,part 56:2003,R-2019/APHA 23 rd Edition, AAS-VGA
16	Sulphate (as SO ₄) mg/l, Max	54	148	58	2	200	APHA –23 rd Edition. P-4-199, 4500 SO ₄ ²⁻ E
17	Taste	Acceptable	Acceptable	Acceptable	Qualitative	Acceptable	APHA,23 rd Edition, 2160-C Flavour Rating Assesment
18	Total Alkalinity (CaCO ₃), mg/l, Max	103	119	139	4	200	IS 3025, Part 23: 1986 R 2019 Titration Method
19	Total Arsenic (as As), mg/l,Max	<0.006	<0.006	<0.006	0.006	0.01	IS-3025, part 37:1988,R-2019/APHA23 rd Edition AAS-VGA
20	Total Chromium (as Cr), mg/l, Max	<0.04	<0.04	<0.04	0.04	0.05	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA, 23 rd Edition, AAS-GTA
21	Total Dissolved Solids, mg/l, Max	455	659	522	25	500	IS 3025, Part 16: 1984 R 2017 Gravimetric method
22	Total Hardness (CaCO ₃), mg/l, Max	281	531	329	4	200	IS 3025, Part 21, 2009 R 2019 EDTA Method
23	Turbidity, NTU, Max	4	2	2	1	5	IS 3025, Part 10 : 1984 R 2017 Nephelometric Method
24	Zinc (as Zn), mg/l, Max	<0.1	<0.1	0.18	0.1	5	IS 3025 Part 49 : 1994,R : 2019, AAS-Flame
25	Nickel as Ni, mg/l Max	<0.01	<0.01	<0.01	0.01	0.02	IS 3025 Pat 54 : 2003,R : 2019, AAS-Flame APHA 23 rd Edition, AAS-GTA

WATER QUALITY

(GROUND WATER- ALL PARAMETERS)

Year: 2021-22

Sl. No	Parameter	Sampling Stations			Detection Limit	IS:10500 Drinking Water Standards	Standard / Test Method
		GW7 16.06.2021	GW8 15.06.2021	GW9 15.06.2021			
1	Boron (as B), mg/l, Max	<0.2	<0.2	<0.2	0.2	0.5	APHA, 23 rd Edition ,Carmine
2	Colour,in Hazen Units	2	2	3	1	5	APHA, 23 rd Edition ,Pt.-Co. Method
3	Calcium (as Ca), mg/l, Max	117	65	139	1.6	75	IS 3025, Part 40: 1991 R 2019 EDTA Method
4	Chloride (as Cl), mg/l, Max	97	85	124	2	250	IS-3025/32:1988, R-2019 Argentometric
5	Copper (as Cu), mg/l, Max	<0.03	<0.03	<0.03	0.03	0.05	IS 3025 Part 42 : 1992 R : 2019, AAS-Flame APHA,23 rd Edition, AAS-GTA
6	Fluoride (as F) mg/l, Max	0.44	0.68	0.75	0.2	1.0	APHA, 23RD Edition, Page 4-90 to , 4500 -F- D (SPADNS Method)
7	Free Residual Chlorine, mg/l, Min	<0.04	<0.04	<0.04	0.04	0.2	APHA, 23rd Edition, , 4500-Cl ⁻ B. (Iodometric Method-I)
8	Iron (as Fe), mg/l, Max	<0.2	0.2	<0.2	0.2	1.0	IS 3025 Part 53 : 2003, R : 2019 , AAS-Flame Method
9	Lead (as Pb), mg/l, Max	<0.005	<0.005	<0.005	0.005	0.01	IS:3025(Part 47):1994 (Reaffirmed 2019) APHA, 23 rd Edition, AAS-GTA
10	Manganese (as Mn), mg/l, Max	<0.02	<0.02	<0.02	0.02	0.1	APHA, 23 rd Edition, 3111B, Direct Air Acetylene Flame AAS-GTA
11	Nitrate (as NO ₃), mg/l, Max	16.27	11.81	25.78	0.5	45	APHA, 23rd Edition, P-4-127, 4500 - NO ₃ ⁻ B , UV-Spectrophotometric Screening Method
12	Odour	Agreeable	Agreeable	Agreeable	Qualitative	Agreeable	APHA, 23rd Edition, , 2150-C
13	pH value	7.71	7.35	7.86	0.2	6.5-8.5	IS 3025, Part 11 : 1983 R 2017 Electrometric method
14	Phenolic compounds (as C ₆ H ₅ OH), mg/l, Max	<0.001	<0.001	<0.001	0.001	0.002	APHA, 22 nd Edition,4-Amino Autipyrine
15	Selenium, mg/l, Max	<0.007	<0.007	<0.007	0.007	0.01	IS -3025,part 56:2003,R-2019/APHA 23 rd Edition, AAS-VGA
16	Sulphate (as SO ₄) mg/l, Max	75	35	159	2	200	APHA –23rd Edition. P-4-199, 4500 SO ₄ ²⁻ E
17	Taste	Acceptable	Acceptable	Acceptable	Qualitative	Acceptable	APHA,23rd Edition, 2160-C Flavour Rating Assesment
18	Total Alkalinity (CaCO ₃), mg/l, Max	182	115	135	4	200	IS 3025, Part 23: 1986 R 2019 Titration Method
19	Total Arsenic (as As), mg/l,Max	<0.006	<0.006	<0.006	0.006	0.01	IS-3025, part 37:1988,R-2019/APHA23rd Edition AAS-VGA
20	Total Chromium (as Cr), mg/l, Max	<0.04	<0.04	<0.04	0.04	0.05	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA, 23 rd Edition, AAS-GTA
21	Total Dissolved Solids, mg/l, Max	783	724	889	25	500	IS 3025, Part 16: 1984 R 2017 Gravimetric method
22	Total Hardness (CaCO ₃), mg/l, Max	440	309	554	4	200	IS 3025, Part 21, 2009 R 2019 EDTA Method
23	Turbidity, NTU, Max	1	5	2	1	5	IS 3025, Part 10 : 1984 R 2017 Nephelometric Method
24	Zinc (as Zn), mg/l, Max	<0.1	<0.1	0.1	0.1	5	IS 3025 Part 49 : 1994,R : 2019, AAS-Flame
25	Nickel as Ni, mg/l Max	<0.01	<0.01	<0.01	0.01	0.02	IS 3025 Pat 54 : 2003,R : 2019, AAS-Flame APHA 23 rd Edition, AAS-GTA

WATER QUALITY

(GROUND WATER- ALL PARAMETERS)

Year: 2021-22

Sl. No	Parameter	Sampling Stations			Detection Limit	IS:10500 Drinking Water Standards	Standard / Test Method
		GW10 15.06.2021	GW11 16.06.2021	GW13 16.06.2021			
1	Boron (as B), mg/l, Max	<0.2	<0.2	<0.2	0.2	0.5	APHA, 23 rd Edition ,Carmine
2	Colour,in Hazen Units	3	2	3	1	5	APHA, 23 rd Edition ,Pt.-Co. Method
3	Calcium (as Ca), mg/l, Max	82	54	158	1.6	75	IS 3025, Part 40: 1991 R 2019 EDTA Method
4	Chloride (as Cl), mg/l, Max	80	39	103	2	250	IS-3025/32:1988, R-2019 Argentometric
5	Copper (as Cu), mg/l, Max	<0.03	<0.03	<0.03	0.03	0.05	IS 3025 Part 42 : 1992 R : 2019, AAS-Flame APHA,23 rd Edition, AAS-GTA
6	Fluoride (as F) mg/l, Max	0.54	0.60	0.43	0.2	1.0	APHA, 23 rd Edition, Page 4-90 to , 4500 -F- D (SPADNS Method)
7	Free Residual Chlorine, mg/l, Min	<0.04	<0.04	<0.04	0.04	0.2	APHA, 23 rd Edition, , 4500-Cl ⁻ B. (Iodometric Method-I)
8	Iron (as Fe), mg/l, Max	<0.2	<0.2	0.2	0.2	1.0	IS 3025 Part 53 : 2003, R : 2019 , AAS-Flame Method
9	Lead (as Pb), mg/l, Max	<0.005	<0.005	<0.005	0.005	0.01	IS:3025(Part 47):1994 (Reaffirmed 2019) APHA, 23 rd Edition, AAS-GTA
10	Manganese (as Mn), mg/l, Max	<0.02	<0.02	0.18	0.02	0.1	APHA, 23 rd Edition, 3111B, Direct Air Acetylene Flame AAS-GTA
11	Nitrate (as NO ₃), mg/l, Max	17.24	11.47	9.23	0.5	45	APHA, 23 rd Edition, P-4-127, 4500 - NO ₃ ⁻ B , UV-Spectrophotometric Screening Method
12	Odour	Agreeable	Agreeable	Agreeable	Qualitative	Agreeable	APHA, 23 rd Edition, , 2150-C
13	pH value	7.75	8.15	8.05	0.2	6.5-8.5	IS 3025, Part 11 : 1983 R 2017 Electrometric method
14	Phenolic compounds (as C ₆ H ₅ OH), mg/l, Max	<0.001	<0.001	<0.001	0.001	0.002	APHA, 22 nd Edition,4-Amino Autipyrine
15	Selenium, mg/l, Max	<0.007	<0.007	<0.007	0.007	0.01	IS -3025,part 56:2003,R-2019/APHA 23 rd Edition, AAS-VGA
16	Sulphate (as SO ₄) mg/l, Max	99	44	183	2	200	APHA -23 rd Edition. P-4-199, 4500 SO ₄ ²⁻ E
17	Taste	Acceptable	Acceptable	Acceptable	Qualitative	Acceptable	APHA,23 rd Edition, 2160-C Flavour Rating Assesment
18	Total Alkalinity (CaCO ₃),, mg/l, Max	119	178	115	4	200	IS 3025, Part 23: 1986 R 2019 Titration Method
19	Total Arsenic (as As), mg/l,Max	<0.006	<0.006	<0.006	0.006	0.01	IS-3025, part 37:1988,R-2019/APHA23 rd Edition AAS-VGA
20	Total Chromium (as Cr), mg/l, Max	<0.04	<0.04	<0.04	0.04	0.05	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA, 23 rd Edition, AAS-GTA
21	Total Dissolved Solids, mg/l, Max	666	578	782	25	500	IS 3025, Part 16: 1984 R 2017 Gravimetric method
22	Total Hardness (CaCO ₃), mg/l, Max	356	246	566	4	200	IS 3025, Part 21, 2009 R 2019 EDTA Method
23	Turbidity, NTU, Max	3	1	1	1	5	IS 3025, Part 10 : 1984 R 2017 Nephelometric Method
24	Zinc (as Zn), mg/l, Max	0.1	<0.1	<0.1	0.1	5	IS 3025 Part 49 : 1994,R : 2019, AAS-Flame
25	Nickel as Ni, mg/l Max	<0.01	<0.01	<0.01	0.01	0.02	IS 3025 Pat 54 : 2003,R : 2019, AAS-Flame APHA 23 rd Edition, AAS-GTA

WATER QUALITY **(GROUND WATER- ALL PARAMETERS)**

Year: 2021-22

Sl. No	Parameter	Sampling Stations			Detection Limit	IS:10500 Drinking Water Standards	Standard / Test Method
		GW14 16.06.2021	GW15 16.06.2021	GW16 15.06.2021			
1	Boron (as B), mg/l, Max	<0.2	<0.2	<0.2	0.2	0.5	APHA, 23 rd Edition ,Carminc
2	Colour,in Hazen Units	3	2	2	1	5	APHA, 23 rd Edition ,Pt-Co. Method
3	Calcium (as Ca), mg/l, Max	52	101	154	1.6	75	IS 3025, Part 40: 1991 R 2019 EDTA Method
4	Chloride (as Cl), mg/l, Max	54	136	119	2	250	IS-3025/32:1988, R-2019 Argentometric
5	Copper (as Cu), mg/l, Max	<0.03	<0.03	<0.03	0.03	0.05	IS 3025 Part 42 : 1992 R : 2019, AAS-Flame APHA,23 rd Edition, AAS-GTA
6	Fluoride (as F) mg/l, Max	0.61	0.78	0.55	0.2	1.0	APHA, 23RD Edition, Page 4-90 to , 4500 -F- D (SPADNS Method)
7	Free Residual Chlorine, mg/l, Min	<0.04	<0.04	<0.04	0.04	0.2	APHA, 23rd Edition , 4500-Cl ⁻ B. (Iodometric Method-I)
8	Iron (as Fe), mg/l, Max	<0.2	<0.2	0.2	0.2	1.0	IS 3025 Part 53 : 2003, R : 2019 , AAS-Flame Method
9	Lead (as Pb), mg/l, Max	<0.005	<0.005	<0.005	0.005	0.01	IS:3025(Part 47):1994 (Reaffirmed 2019) APHA, 23 rd Edition, AAS-GTA
10	Manganese (as Mn), mg/l, Max	<0.02	0.10	<0.02	0.02	0.1	APHA, 23 rd Edition, 3111B, Direct Air Acetylene Flame AAS-GTA
11	Nitrate (as NO ₃), mg/l, Max	14.83	9.44	15.73	0.5	45	APHA, 23rd Edition, P-4-127, 4500 - NO ₃ ⁻ B , UV-Spectrophotometric Screening Method
12	Odour	Agreeable	Agreeable	Agreeable	Qualitative	Agreeable	APHA, 23rd Edition , 2150-C
13	pH value	8.06	7.95	7.86	0.2	6.5-8.5	IS 3025, Part 11 : 1983 R 2017 Electrometric method
14	Phenolic compounds (as C ₆ H ₅ OH), mg/l, Max	<0.001	<0.001	<0.001	0.001	0.002	APHA, 22 nd Edition,4-Amino Autipyrine
15	Selenium, mg/l, Max	<0.007	<0.007	<0.007	0.007	0.01	IS -3025,part 56:2003,R-2019/APHA 23 rd Edition, AAS-VGA
16	Sulphate (as SO ₄) mg/l, Max	58	142	187	2	200	APHA -23rd Edition. P-4-199, 4500 SO ₄ ²⁻ E
17	Taste	Acceptable	Acceptable	Acceptable	Qualitative	Acceptable	APHA,23rd Edition, 2160-C Flavour Rating Assesment
18	Total Alkalinity (CaCO ₃), mg/l, Max	101	127	155	4	200	IS 3025, Part 23: 1986 R 2019 Titration Method
19	Total Arsenic (as As), mg/l,Max	<0.006	<0.006	<0.006	0.006	0.01	IS-3025, part 37:1988,R-2019/APHA23rd Edition AAS-VGA
20	Total Chromium (as Cr), mg/l, Max	<0.04	<0.04	<0.04	0.04	0.05	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA, 23 rd Edition, AAS-GTA
21	Total Dissolved Solids, mg/l, Max	569	766	807	25	500	IS 3025, Part 16: 1984 R 2017 Gravimetric method
22	Total Hardness (CaCO ₃), mg/l, Max	309	539	638	4	200	IS 3025, Part 21, 2009 R 2019 EDTA Method
23	Turbidity, NTU, Max	2	3	3	1	5	IS 3025, Part 10 : 1984 R 2017 Nephelometric Method
24	Zinc (as Zn), mg/l, Max	<0.1	0.1	0.84	0.1	5	IS 3025 Part 49 : 1994,R : 2019, AAS-Flame
25	Nickel as Ni, mg/l Max	<0.01	<0.01	<0.01	0.01	0.02	IS 3025 Pat 54 : 2003,R : 2019, AAS-Flame APHA 23 rd Edition, AAS-GTA

Abbreviations

AMSL: Above mean sea level

Avg.: Average

APT: Aquifer Pumping Test

BCCL: Bharat Coking Coal Ltd.

bgl: Below Ground Level

Buffer zone: periphery of the 10 km radius from the project boundary

Core zone: Project / mine / colliery boundary (leasehold area)

CMPDI: Central Mine Plan & Design Institute

DVC: Damodar Valley Corporation

DTW: Depth to water level

GW: Groundwater

IMD: Indian Meteorological Division

JCF: Jharia Coalfield

RCF: Raniganj Coalfield

MADA: Mineral Area Development Authority

MCM: Million Cubic Meter

MGD: Million Gallon per day

NTU: Nephelometric Turbidity unit

OC / UG: Opencast / Underground

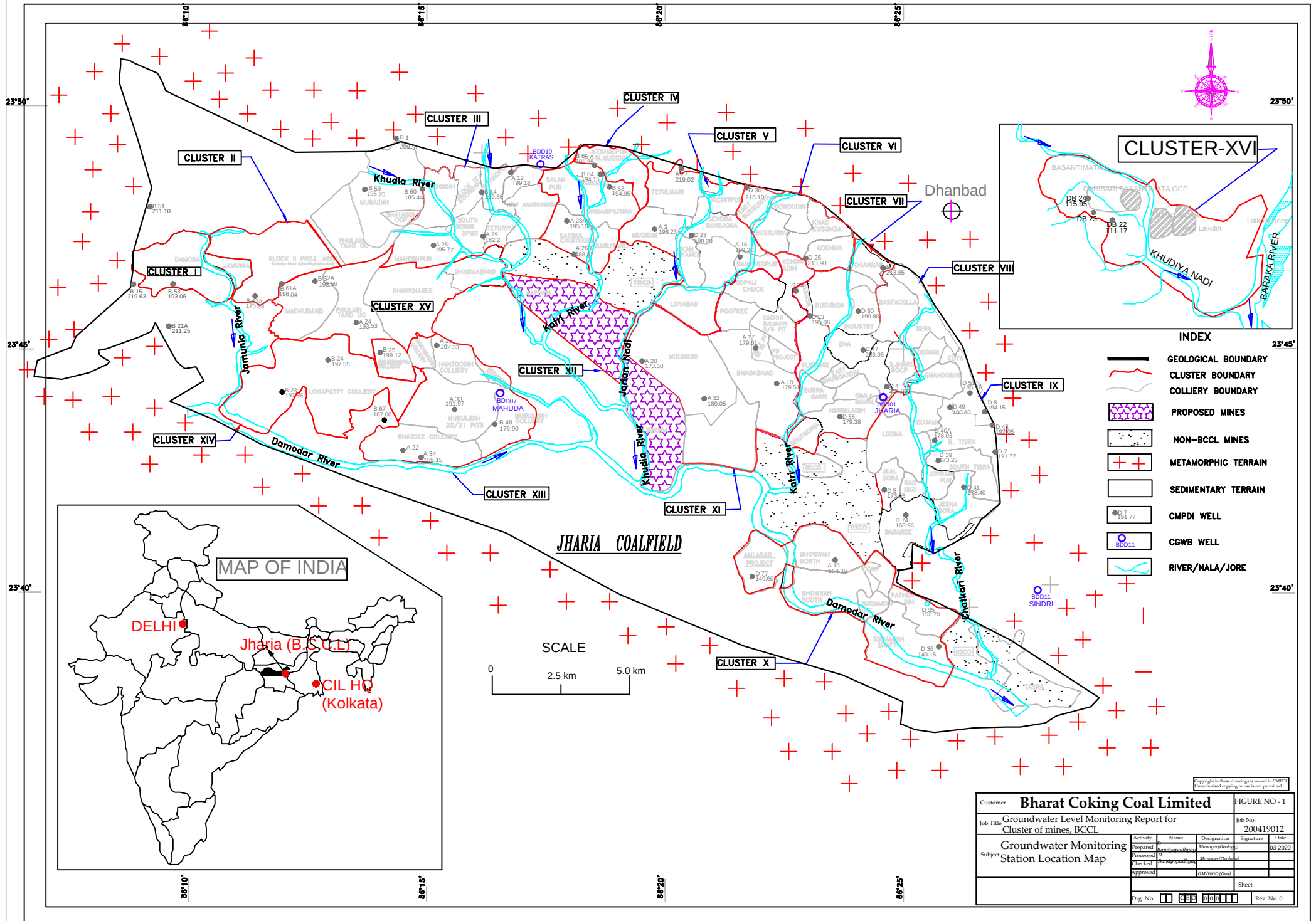
OCP / UGP: Opencast Project / Underground Project

RL: Reduced Level

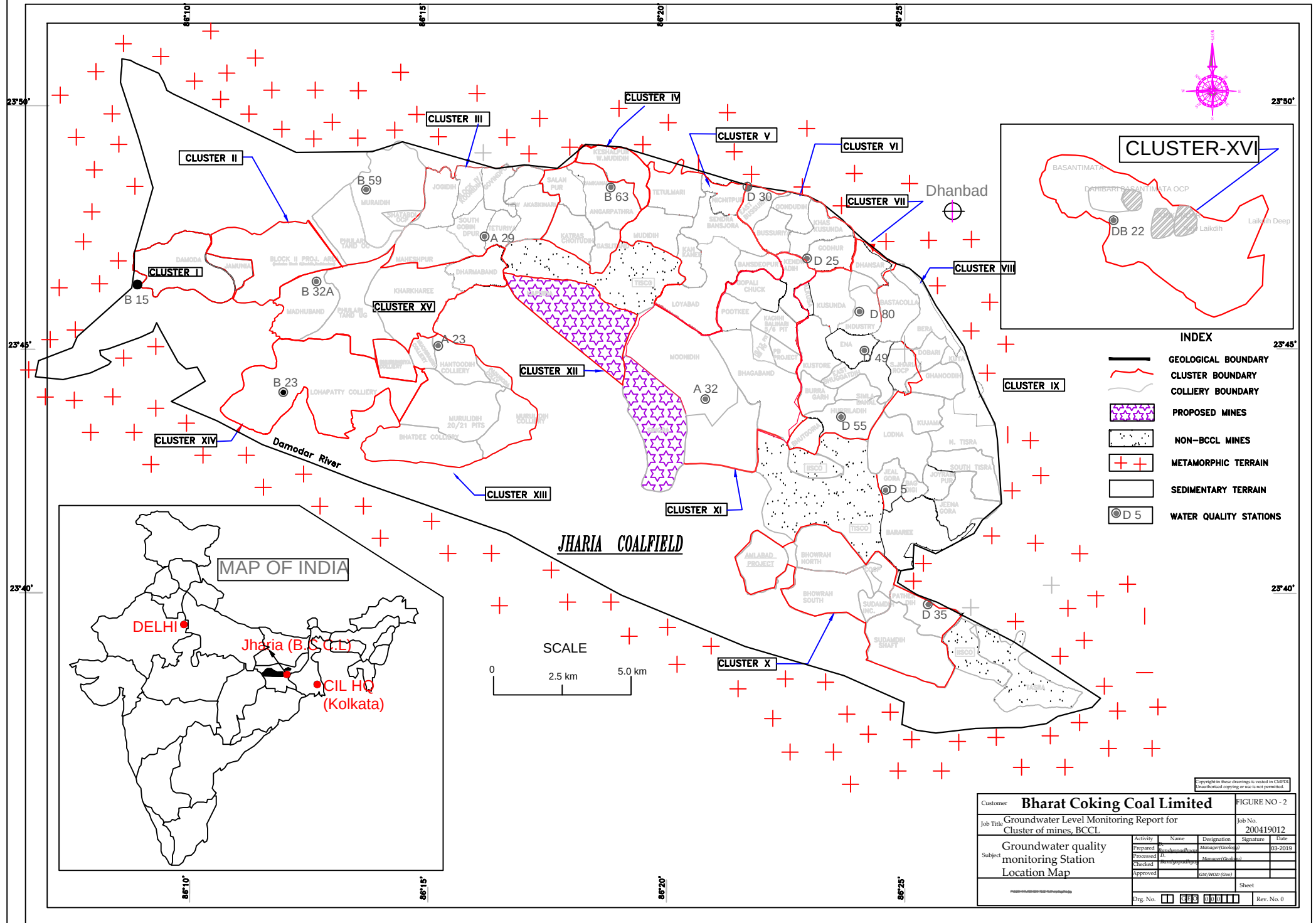
RWH: Rainwater Harvesting

FF: Fire Fighting

GROUNDWATER MONITORING STATION LOCATION MAP



GROUNDWATER QUALITY MONITORING STATION LOCATION MAP



Customer **Bharat Coking Coal Limited** FIGURE NO - 2

Job Title **Groundwater Level Monitoring Report for** Job No. **200419012**

Cluster of mines, BCCL

Subject **Groundwater quality monitoring Station Location Map**

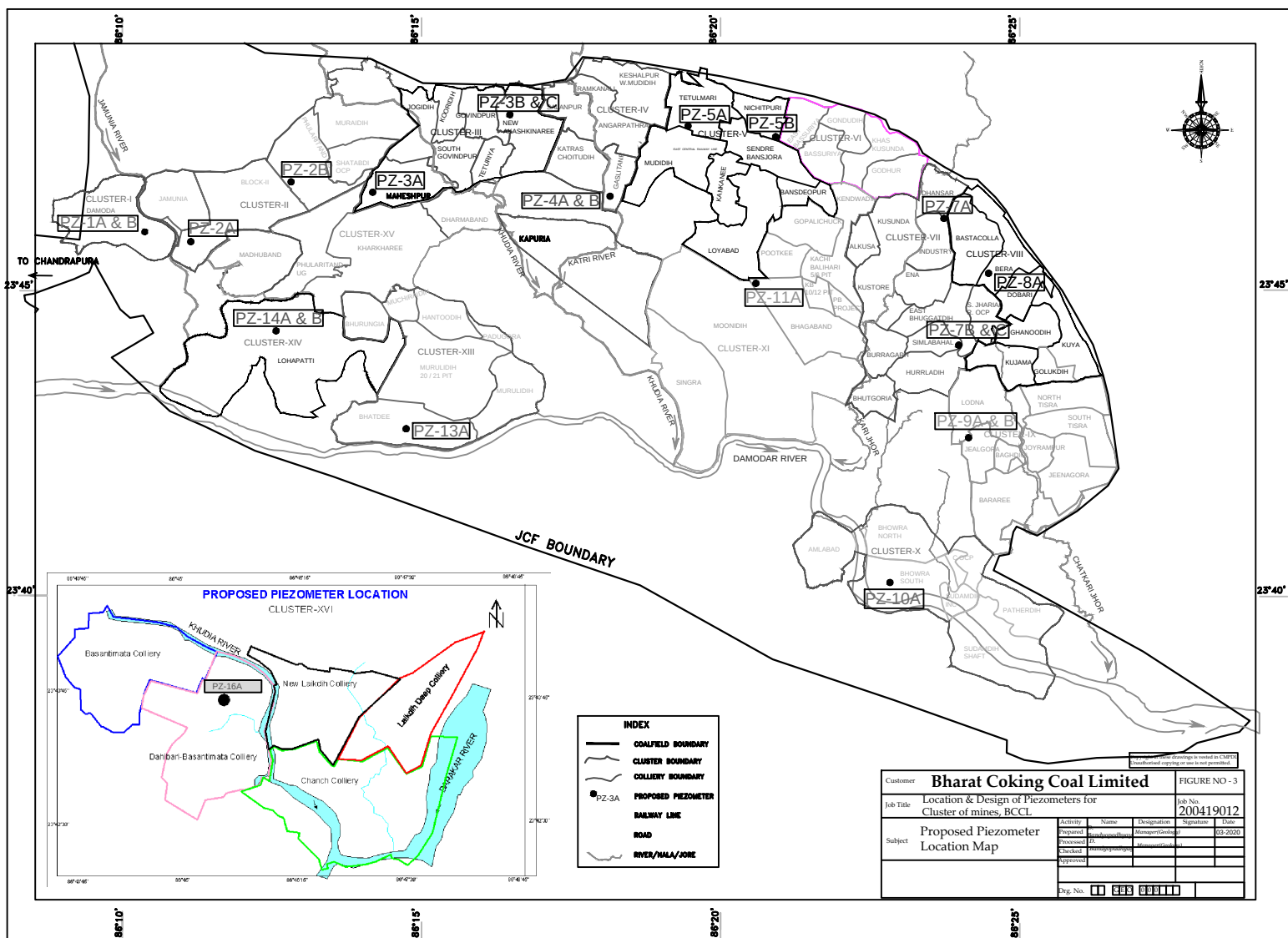
Activity	Name	Designation	Signature	Date
Prepared	Sanjay Singh	Manager (Geology)		03-2019
Processed	D. J.	Manager (Geology)		
Checked	Sanjay Singh	Manager (Geology)		
Approved		GM/HRD (Geo)		

Sheet

Prg. No. **001** Rev. No. **0**

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PROPOSED PIEZOMETER LOCATION MAP, JCF & RCF (part)



WATER TABLE CONTOUR MAP OF RCF (PART)

Legend:

- 160: WATER TABLE CONTOUR (m)
- D 90 159.17: CMPDI OBSERVATION WELL
- : EXISTING/ABANDONED MINES
- : GW FLOW DIRECTION

Figure NO-4

Customer: BHARAT COKING COAL LIMITED

Job Title: QUARTERLY GW LEVEL & QUALITY MONITORING

Job No.: 200421008

Subject: WATER TABLE CONTOUR MAP

Activity:

Activity	Name	Designation	Signature	Date
Prepared by	D.BANDOPADHYAY	MNG (GD)		
Checked by	D.BANDOPADHYAY	MNG (GD)		
Approved by	V.K.SRIVASTAVA	GM (EXPLORATION)		

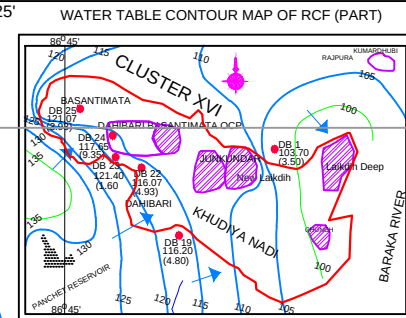
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Sheet:

Drp.No.: H C X X X X X X X X

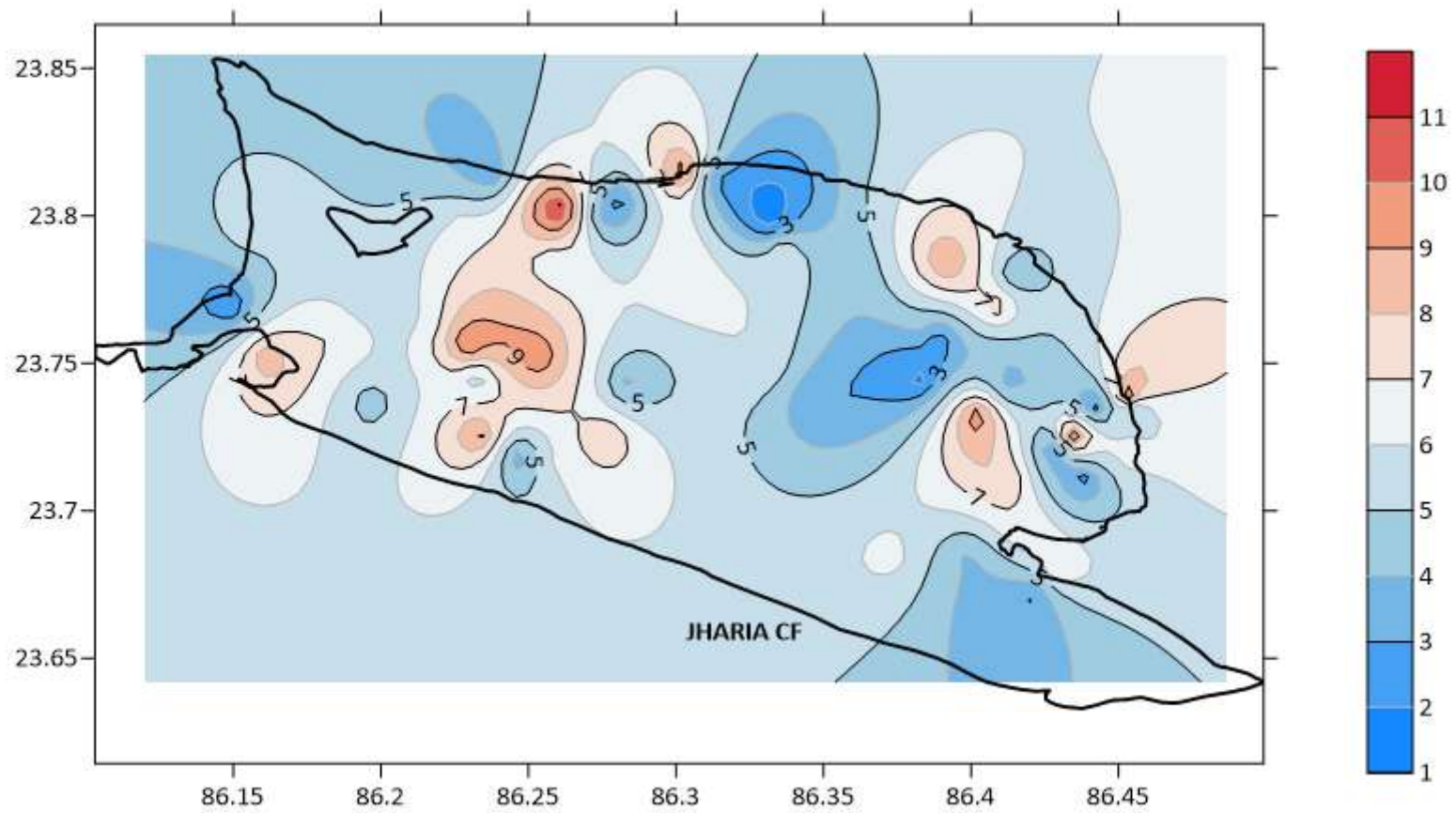
REV. No.: 0

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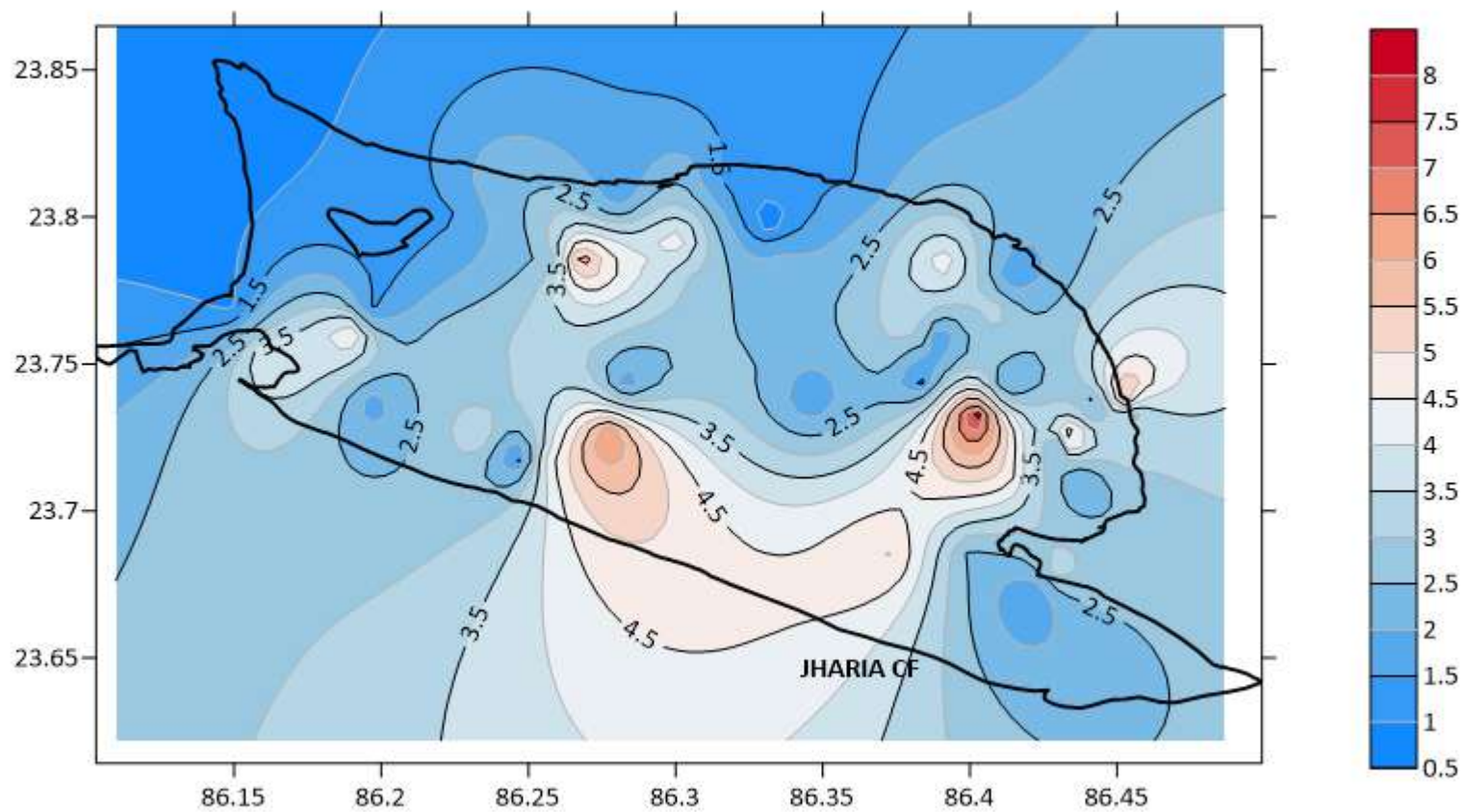


DEPTH TO WATER LEVEL MAP (PRE-MONSOON)





DEPTH TO WATER LEVEL MAP(POST-MONSOON)





Accreditation Board of CGWA

Certificate of Accreditation

M/s. Central Mine Planning and Design Institute Ltd. (CMPDIL)
Ranchi, Jharkhand

*Has been accredited as a Ground Water Professionals to prepare reports in the
Functional Areas of*

- Hydrogeological conditions in mining projects.*

Valid from : 15.02.2021

Certificate No. : CGWA/RGI/013

Valid thru : 14.02.2026

Dated : 07.07.2021

क्षेत्रीय निदेशक
Regional Director
आरजीएनजीडब्ल्यूटीआरआई
RGNGWT&RI

सदस्य
Member
आरजीएनजीडब्ल्यूटीआरआई
RGNGWT&RI



भारत सरकार
Government of India
जल शक्ति मंत्रालय
Ministry of Jal Shakti

E-877816
15.11.21



जल ससाधन, नदी विकास और गंगा संरक्षण विभाग
Department of Water Resources, River Development & Ganga Rejuvenation

केन्द्रीय भूमि जल बोर्ड / Central Ground Water Board

राजीव गांधी राष्ट्रीय भूमि जल प्रशिक्षण एवं अनुसंधान संस्थान

Rajiv Gandhi National Ground Water Training & Research Institute

फोन / Phone No. 07712220701

ई-मेल / E-mail: rgi-cgwb@nic.in

वेबसाइट / Website: cgwb.gov.in / ngwtri.org

सेक्टर 23, तुता, अटल नगर, नया रायपुर 492016 (छ.ग.)

Sector - 23, Tuta, Atal Nagar, Naya Raipur 492016 (C.G.)

File No. 29/TS/RGI/Accreditation/20-21-295

Date 02.08.2021

To,

The CMPDIL

Gondwana Place, Kanke Road

Ranchi, (Jharkhand)

PIN- 834031

Sub: - Accreditation Certificate – Reg.

Sir,

Please find enclosed the Certificate of Accreditation in respect of The CMPDIL for the period 2021-2026.

Please acknowledge the receipt of the Certificate

Encl : As Above

Yours Faithfully

(Satish Kumar)

Regional Director
RGNGWTRI, Raipur



Quality Council of India
National Accreditation Board for Education and Training
ITPI Building, 6th Floor, 4 - A, Ring Road, I P Estate, New Delhi - 110002



CERTIFICATE OF ACCREDITATION

**Under the QCI-NABET Scheme
for
Ground Water Consultant Organisation**



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED

CMPDI, GONDWANA PLACE, KANKE ROAD, RANCHI, JHARKHAND -834031

S.No.	SCOPE COVERAGE		
	Industrial Use	Mining Projects	Infrastructure Projects
1	Hydrogeological report: Comprehensive report on groundwater condition/situation		
2	Impact Assessment Reports without modelling studies		

Note: Names of approved Project Coordinators and Technical Area Experts are mentioned in IA AC Minutes dated Oct 14, 2021 on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in NABET's letter of accreditation bearing no. QCI/NABET/ENV/GWCO/21/57 dated Oct 27, 2021. The accreditation needs to be renewed before the expiry date by Oct 13, 2026 following due process of assessment.

Sr. Director, NABET
Issue Date : Oct 27, 2021



Certificate No.
NABET/GWCO/IA/GW021

Valid Upto
Oct 13, 2026



Ref. No. - QCI/NABET/ENV/GWCO/ACO/21/57

October 27, 2021

To,

M/s Central Mine Planning and Design Institute Limited
Gondwana Place, Kanke Road,
Ranchi, Jharkhand- 834031

Sub: Accreditation under NABET Scheme of Ground Water Consultant Organization (GWCO)

Ref.: With reference to your application No. QCI/NABET/GWCO/0011/IA dated October 22, 2020.

Dear Sir

QCI-NABET is hereby pleased to accredit 'Central Mine Planning and Design Institute Limited' for the scope coverage as mentioned in the Certificate of Accreditation.

The validity of accreditation is subject to continued compliance to the Scheme and the terms & conditions mentioned in **Annexure I to IV**.

NABET always look forward for your association and continued support.

With best regards,

A K Jha
Senior Director
QCI- NABET

Annexure-I

Ref. No.: QCI/NABET/ENV/GWCO/ACO/21/57

Date October 27, 2021

Name of organization: Central Mine Planning and Design Institute Limited

Accreditation of Ground Water Consultant Organization (GWCO) under NABET Scheme

Marks obtained in various aspect of Initial Assessment

Sl. No.	Aspect	Marks Scored	Out of
1.	Quality and performance of personnel		
	i. Project Coordinator/s	18.29 (Average)	25
	ii. Technical Area Expert/s	13.29 (Average)	20
2.	Infrastructure and software and hardware	13.20	15
3.	Field Invest. & Laboratory system	13.80	20
4.	Quality Management System	10.88	15
5.	Organizational Commitment	4.20	5
	Total	73.66	100
	Overall Score	73.66%	

The organization has scored 73.66% overall and awarded 3-Star (★★★)

Criteria for Star Rating:

S. No	Overall Score	Star Rating
1	40% to 60%	★
2	61% to 70%	★★
3	71% and Above	★★★



National Accreditation Board for
Testing and Calibration Laboratories

CERTIFICATE OF ACCREDITATION

**ENVIRONMENT LABORATORY, REGIONAL INSTITUTE -II,
CMPDI DHANBAD**

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

**"General Requirements for the Competence of Testing &
Calibration Laboratories"**

for its facilities at

CMPDIL, RI-2, KOYLABHAWAN, KOYLANAGAR, DHANBAD, JHARKHAND, INDIA

in the field of

TESTING

Certificate Number: TC-10122

Issue Date: 07/12/2021

Valid Until: 06/12/2023

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Identity : CENTRAL MINE PLANNING AND DESIGN INSTITUTE LTD.

Signed for and on behalf of NABL



N. Venkateswaran
Chief Executive Officer

REGISTERED OFFICE

Gondwana Place, Kanke Road
Ranchi -834 031
(Jharkhand)

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(महाराष्ट्र)

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सीपत रोड
बिलासपुर-495 001
(छत्तीसगढ़)

क्षेत्रीय संस्थान-VI

पोस्ट :जयंत कॉलरी,
जिला : सिंगरौली
पिन नं०- 486 890
(मध्य प्रदेश)

क्षेत्रीय संस्थान-VII

गृह निर्माण भवन
सचिवालय मार्ग
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(उड़ीसा)

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Regional Institute - II

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Dhanbad - 826 005
(Jharkhand)

Regional Institute - III

Gondwana Place, Kanke Road
Ranchi- 834 031
(Jharkhand)

Regional Institute - IV

Jaripathka, Kasturba Nagar
Nagpur - 440 014
(Maharashtra)

Regional Institute - V

Seepat Road
Bilaspur - 495 001
(Chattisgarh)

Regional Institute - VI

P.O Jayant Colliery
Dist. - Singrauli
PIN - 486 890
Madhya Pradesh

Regional Institute - VII

Grih Nirman Bhawan
Sachivalaya Marg
Bhubneswar - 751 001
(Orissa)

सेन्ट्रल माईन प्लानिंग एंड डिजाइन इन्स्टीच्यूट लिमिटेड

(कोल इंडिया की अनुषंगी कम्पनी)
एक मिनी रत्न कम्पनी

Central Mine Planning & Design Institute Limited

(A Subsidiary of Coal India Limited)

A Mini Ratna Company

गोंदवाना प्लेस, कान्के रोड, राँची - 834 031, भारत

दूरभाष : (91-0651) 2230002, 2230483

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क्षेत्रीय संस्थान-II

कोयला भवन, कोयला नगर
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क्षेत्रीय संस्थान-III

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क्षेत्रीय संस्थान-IV

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(Jharkhand)

Regional Institute - III

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Rain Water Harvesting

The recharge to semi-confined aquifers takes place due to infiltration of direct rainfall in the outcrop zones/areas of these partings and interconnections formed by faults, fractures, etc. between top unconfined aquifer and themselves. The semi-confined aquifer is confining in nature in down dip-side whereas the same aquifer is in unconfined condition in the incrop side within the mining area of Cluster-IV (Geological Plan, **Plate No-IV** and Geological Cross section, **Plate No-VI**).

The artificial recharge structure in the core zone area may not be a viable solution because of the reason that recharged water would drain into the mine at a faster rate due to the steep hydraulic gradients resulted in the mining activity. Again, it may also lead to mine inundation.

Rain Water harvesting is a deliberate collection and storage of rain water that runs off on natural and man-made catchments area. The amount of water harvested depends on the frequency and intensity of the rainfall and characteristics of the catchments to allow the precipitate to infiltrate through the sub-soil and percolate down to recharge aquifers.

The rainwater within the mining area is being accumulated in earthen water pool developed on the surface and abandoned mine void for recharging the ground water of the area. The details have been tabulated below:

Table No-21: Surface ponds / reservoirs

Name of Colliery	Area of pond/mine void		Location
	Area (Ha.)	Depth (m)	
Amalgamated Keshalpur & west Mudidih	0.60	1.75 m	Keshalpur
	0.30	1.2 m	
	0.30	1.3 m	Belaujabad
	1.0	2.0 m	West Mudidih
	0.30	1.25 m	
Amalgamated Ramkanali Angarpathra	0.90	2 m	Rampur
	1.10	3 m	
	1.0	2.5 m	
	0.60	1.75 m	Kumarjuri
	0.30	1.55 m	
Salanpur	0.42	2.0 m	Salanpur
	0.70	2.35 m	
Around 15750 cum/annum of water is added to the groundwater system within the Cluster-IV mining area due to this recharge structures. Considering average water spread area is 0.6 times of total area and recharge factor is 0.0014 m/day during 150 days in a year.			

After mine closure, void of opencast will be filled up with rainwater and will maintaining the water table in the surrounding areas and may become a source of water supply to the community.

The abandoned underground mine workings (Salanpur Colliery and Katras Chitudih Colliery) and old quarry behave as huge ground water reservoirs and contain groundwater runoff (i.e. planned recharge). The pond, tanks, stop dams etc constructed in the rehabilitated and affected villages also augment the groundwater recharge.





Roof-top rainwater harvesting (RWH) will be taken up in the project area using the administrative buildings. 138 no of quarters having roof-top area of about 14950 sq. m. is already prepared to harvest rainwater at Koyla Nagar Campus, Dhanbad. Proposal already made to facilitate this kind of RWH structure at suitable locations i.e. Lodna Area, Kusunda Area (Jawahar Nagar, Matkuria, Coal Board Colony), Sijua Area (Nichitpur and Tetulmari Colony) within Jharia Coalfield to augment groundwater recharge.

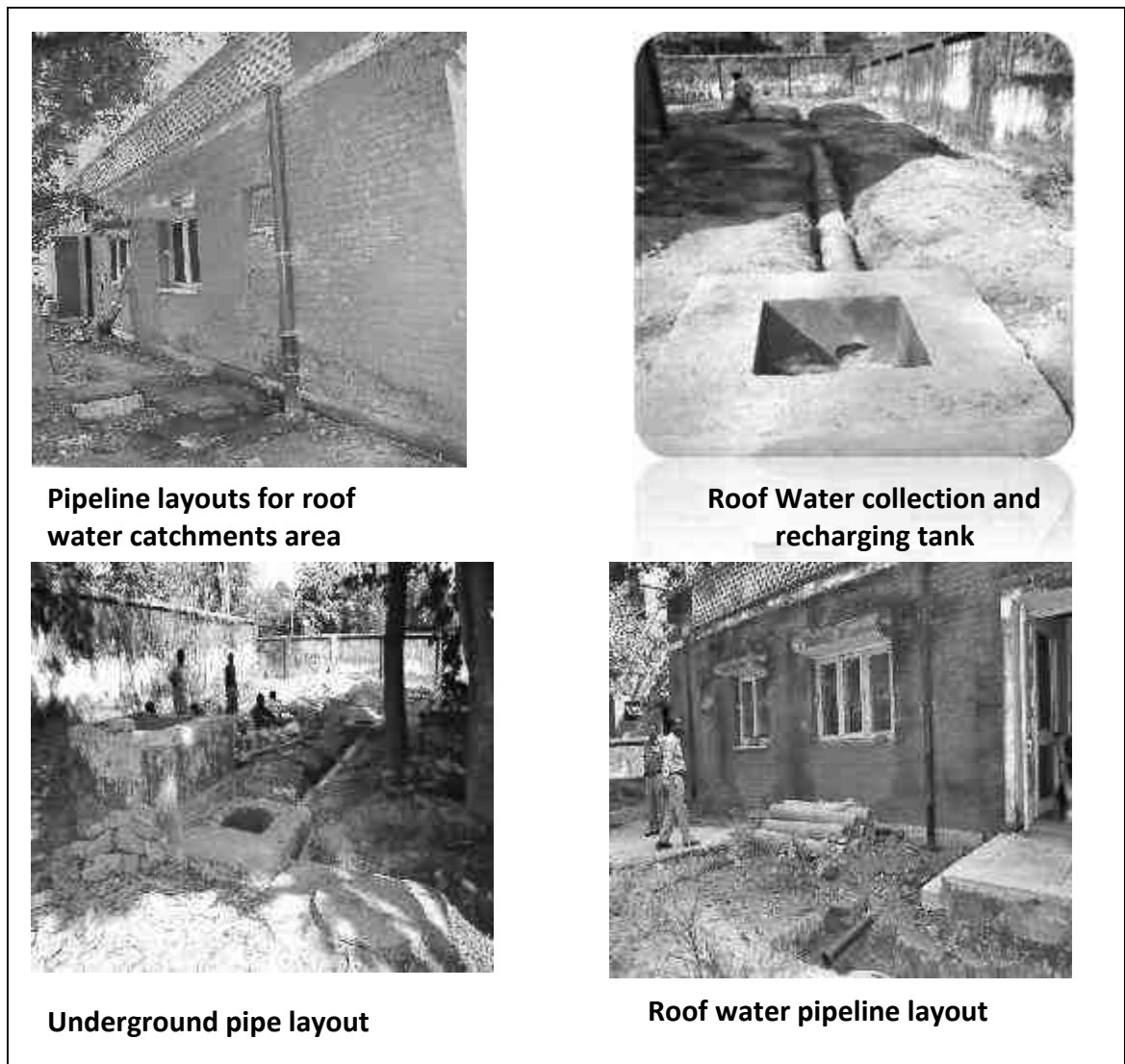


Figure No-3: Rain Water Harvesting Structure at Koyla Nagar, BCCL Township towards north-east of Cluster-IV.

Check dams/Nala bunds (**Figure No-4**) have been made in the Jogta Nala and Kari Jore for recharging ground water aquifer within the buffer zone of Cluster-IV. A check dams (Weighted area 0.95 hac) in Kari Jore near Dhansar Colliery (around 8.50 km towards east) and another one at Jogta nala (Weighted area 0.80 hac) around 1.8 km towards east of Cluster-IV boundary is provided to facilitate groundwater recharge in the mining area. Considering recharge factor of 0.0014 m/day around 3700 cum/annum of water is added to the groundwater system through this check dams or Nala bunds near to the Cluster-IV area.



Figure No-4: Check Dams / Nala bunds at Jogta Nala, near Nischitpur OCP Mine, BCCL. This Recharge structure is within the buffer zone (1.8 km towards east of Cluster-IV).

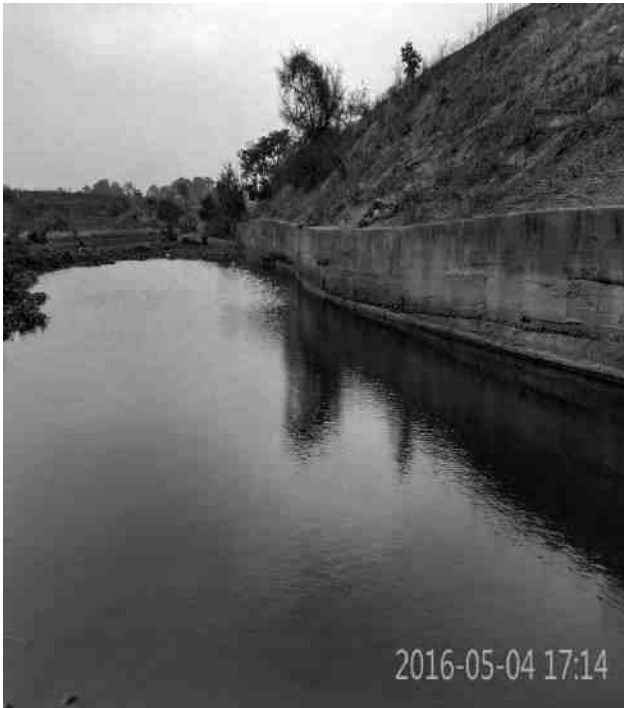


Rain Water Harvesting Pond at Green Park,Cluster-IV





Water Harvesting at Cluster IV



Toe wall and Embankment at Cluster IV

Oil and Grease Trap (48 KL)

AKWMC WORKSHOP, Katras Area





Sl.No.	Place at illumination obtained	Height at light source in (m)	Distance at light source in (m)	Standard at illumination	Illumination Obtained	Types at light provided	Remarks
01.	At haul road (Way to IX seam parking)						
	Pole - 1	08	10m from light source	H = 10	H = 21	1x4000 MH light	
	Pole - 2	08	10m — " —	— " —	H = 20	— " —	
	Pole - 3	08	20m — " —	— " —	H = 11	— " —	
	Pole - 4	08	15m — " —	— " —	H = 13	— " —	
02.	At IX seam parking OB bench	06	20m from lighting source	H = 10	H = 93	3x4000 MH light DH set provided.	
			20m east from light source	H = 10	H = 69	— " —	
03.	Near machine no. 627 at IX seam parking	Machine light & light coming from DH set.	15m from light source	H = 15, V = 25	H = 39, V = 27	4x front light at machine & 3x4000 DH set.	
			15m back from machine.	— " —	H = 40, V = 25	3x4000 DH set 2x Machine back light.	
04.	In machine cabin at machine no. 627	Machine cabin light	Machine cabin	H = 50	H = 51	Machine cabin light.	

Manager
AKWMC

Calligraphy Engineer
AKWMC

Safety Officer
AKWMC.

Illumination Survey at Amul Hared on: 09/03/2022

Sl. No.	Place at Illumination obtained	Height at light source in (m)	Distance at light source in (m)	Standard at illumination	Illumination Obtained	Types of light provided	Remarks.
05.	Near Machine. No. Volvo-300 at IV seam bench	① Machine light ② 8m	10m front at machine, 10m back at machine.	$H=15, V=25$ — " —	$H=42, V=29$ $H=35, V=24$	4x front light at machine. 4x LED light (Dh set) — " — 2x back light at machine.	
06.	At haul road (way to IV seam)	50	150m from light source.	$H=10$	$H=13$	5x400 4x MH light.	
07.	At pumping station (At IV seam)	12m, 08m.	10m west from light source. 20m south from light source.	$H=40$ $H=40$	$H=49$ $H=40$	2x LED light & 1x LED light. — " —	
08.	At junction point (Near IV seam)	12m	10m from lighting source	$H=10$	$H=18$	1x LED light.	

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Manager
ARWMC.

shd
09/03/22
Colliery Engineer
ARWMC

shd
Safety Officer
ARWMC

Illumination Survey at department ocp on 10/08/2022

S.No.	Place of illumination Obtained	Height of light source in (m)	Distance of light source in (m)	Standard of illumination	Illumination Obtained	Types of light provided	Remarks.
01.	At departmental parking - At center of parking	15m. approx	10m west from lighting source. 15m east from lighting source.	$H = 50$ $H = 50$	$H = 72$ $H = 59$	8 x LED light (lower light provided) 4 x MH light. — " —	
02.	East side of parking	12m. approx	10m north from lighting source	$H = 50$	$H = 49$	2 x HPSV light.	
03.	One lighting pole at south side of parking	12m approx.	10m north from lighting source	$H = 50$	$H = 52$	2 x HPSV light	
04.	At internal OB dump namely SADBHAV	15m, 12m,	10m west from lighting source 10m south from lighting source	$H = 15, V = 15$ — " —	$H = 15, V = 34$ $H = 21, V = 32$	1 pole x 2 LED light 1 pole x 4 LED light.	
05.	At type curve (Junction point)	15m approx	10m west from lighting source. 15m north from lighting source	$H = 10$ — " —	$H = 12$ $H = 10$	1 x LED light 1 x LED light.	

Manager
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Colliery Engineer
AKWMC

Safety Officer
AKWMC

Illumination Survey at departmental ocp on 10/03/2022

Sl. No.	Place of illumination obtained	Height at light source in (m)	Distance at light source in (m)	Standard at illumination	Illumination obtained	Types at light provided	Remarks
06.	Turn curve to VII, VIII & IX seam. →						
	At haul road - Pole 1	12m.	10m south from lighting pole.	$H = 10$	$H = 12$	1X LED light	
	Pole - 2	10m.	12 m south from lighting pole.	$H = 10$	$H = 11$	1 X LED light	
	Pole - 3	10m	10m south from lighting pole.	$H = 10$	$H = 12$	1X LED light	
07.	From OB dump to VII seam (Haul road)	12m	15m from lighting source.	$H = 10$	$H = 12$	1X LED light	
08.	Near shovel no. 579 at VII seam	Machine height	At front of machine (15m)	$H = 15, V = 25$	$H = 69, V = 39$	2X LED (Machine light)	
			At back side side of machine (10m)	— " —	$H = 45, V = 27$	1X LED (Machine light)	
09.	In machine cabin at shovel no. 579	Machine cabin light	In machine cabin	$H = 50$	$H = 132$	2 X LED light	

Manager
AKWMC

Colliery Engineer
AKWMC

Safety Officer
AKWMC.

Illumination Survey at departmental opf on 10/03/2022

Sl. No.	Place of illumination obtained	Height of light source in (m)	Distance of light source in (m)	Standard of illumination	Illumination Obtained	Types of light provided	Remarks
10.	Near shovel no. 577 at VII seam	Machine height	10m at front side of machine. 10m at back side of machine	$H = 15, V = 25$ — " —	$H = 70, V = 42$ $H = 50, V = 25$	2 x LED light 1 x LED light.	
11.	One pole light at VII seam	12m.	15m from lighting pole	$H = 10$	$H = 35$	2 x LED light	
12.	At coal dump (Near junction)	12m	10m east from lighting pole 10m south-east from light source.	$H = 10$ $H = 10$	$H = 13$ $H = 15$	lowest light (8 x LED light) — " —	
13.	At 8A coal dump (where loading-unloading of dumpers)	10m, 12m.	20m from lighting pole 10m from lighting pole.	$H = 15, V = 15$ — " —	$H = 29, V = 17$ $H = 37, V = 21$	3 x HPS light 1 x MH light	
14.	Near CTSF Chala (Rest shelter) (Entry point at coal dump from parking)	8m	20m from lighting pole	$H = 10$	$H = 55$	1 x LED light.	

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Manager
AKWMC

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Cellery Engineer
AKWMC

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Manager

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Safety Officer
AKWMC

Illumination Survey at DECO - AMPL - BKB (JV) Hired patch on 09/04/2022

SL.No.	Place of illumination Obtained	Height at light source in (m)	Distance at light source in (m)	Standard at illumination	Illumination Obtained	Types at light provided	Remarks
1.	OB dumping place beside haul road	12	30	H = 15 V = 15	H = 135 V = 75	8 X 600W (MH)	
	" - "	"	50	"	H = 72, V = 45	" - "	
	" - "	"	100	"	H = 11, V = 22	" - "	
2.	At haul road (I seam)	30	50	H = 10	H = 01	3 X 400W (MH)	
3.	At pumping station	12	30	H = 40	H = 550	2 X 1000W (LED)	
	" - "	"	100	"	H = 120	" - "	
04.	Near rest shelter at II seam near pumping station	10	50	H = 50	H = 44	" - "	
05.	At haul road way to I seam parking	30	50	H = 10	H = 05	4 X 400W (MH)	
06.	Near tower light at I seam parking	08	50	H = 10	H = 35	" - "	

Manager
AKWMC

Colliery Engineer
AKWMC

Safety Officer
AKWMC
09/04/2022

Sl. No.	Place at illumination obtained	Height at light source in (m)	Distance at light source in (m)	Standard at illumination	Illumination obtained	Types at light provided	Remarks
07.	Near haul road turning at X-seam	10	30	$H = 10$	$H = 11$	1 x 400 (MH)	
08.	At OB dump beside haul road	12	25	$H = 15$ $V = 15$	$H = 22$ $V = 27$	2 x 400w (MH)	
09.	At haul road near VII seam	40	50	$H = 10$	$H = 2$	1 x 400w (MH)	
10.	Near shovel no. Volvo - 353 (At bucket rest)	Machine height	20m from front at machine.	$H = 15$ $V = 25$	$H = 51$ $V = 43$	6 x LED light (Machine light)	
			10m from back at machine.	- " -	$H = 12$ $V = 07$	2 light (Machine light)	
11.	East of view point (Near OB dumping is being done)	12	50	$H = 15$ $V = 15$	$H = 1$ $V = 0$	1 x 400w (MH)	More light required.
12.	In machine cabin of machine no. Volvo - 353	Machine cabin light	In machine cabin.	$H = 50$	$H = 23$	2 x Machine cabin light	More light required.

Manager
ARWMC

Colliery Engineer
ARWMC

Safety Officer
ARWMC

Illumination survey at BSMCPL - BEPL (JV)

(Telukmari) hired Patch on 11/04/2022

SL	SL No.	Place at illumination Obtained	Height at light source in (m)	Distance at light source in (m)	Standard at illumination	Illumination Obtained	Types at light provided	Remarks.
	01.	Near weight bridge (Type curve)	08	20m west from light source	$H = 10$	$H = 32$	4x LED light DG set provided	
				50m north-east from light source	$H = 10$	$H = 12$	—	
	02.	At haul road - way to VIII seam	12	10m from light source	$H = 10$	$H = 14$	1x 250w (MH)	
	03.	Near shovel no. - Hyundai 500 LC-7 at V/VII seam coal bench	Machine height	20m front from machine	$H = 15$ $V = 25$	$H = 15$ $V = 10$	4x front light at machine	
				10m Back from machine	—	$H = 04$ $V = 02$	1x back light at machine	
	04.	In machine cabin at machine no. Hyundai 500 LC-7	Machine cabin	In machine cabin	$H = 50$	$H = 15$	2x Machine cabin light	
	05.	Way to V seam working face -						
		At haul road	08	20	$H = 10$	$H = 46$	DG set provided with 4x 400w (LED light)	

Manager
AKWMC

Colliery Engineer
AKWMC

Safety Officer
AKWMC

Illumination Survey at BSMCL - BEPL (TV) - (Tetuhmari hired ocp) on 11/04/2022

Sl. No.	Place at illumination obtained	Height at light provided in (m)	Distance at light provided in (m)	Standard at illumination	Illumination obtained	Types at light provided	Remarks
06.	Near tyre curve - Tetuhmari hired ocp Coal dump	08	20m north from light source	$H = 15$ $V = 15$	$H = 35$ $V = 29$	On set provided with 4x400w (LED light)	
			50m west from light source	—	$H = 17$ $V = 13$	—	
07.	Near shovel no. tata hitachi - 470 (1) at V seam bench	08	20m front from machine	$H = 15$ $V = 25$	$H = 09$ $V = 04$	Machine light	
08.	At Parking	08	20m from light source	$H = 50$	$H = 61$	On set provided with 4x400w (LED light)	
			50m from light source	—	$H = 39$	—	
09.	At haul road way to V seam	12	10m from light source	$H = 10$	$H = 13$	1x200w (MH)	

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Manager
ARWMC


Colliery Engineer
ARWMC


Safety Officer
ARWMC



Event Report

Date/Time Vert at 14:30:14 November 19, 2021
 Trigger Source Geo: 0.700 mm/s, Mic: 88.95 pa.(L)
 Range Geo: 254.0 mm/s
 Record Time 3.0 sec at 2048 sps
 Operator/Setup: Operator/factory.MMB

Serial Number UM10858 V 10-81 Micromate ISEE
 Battery Level 3.4 Volts
 Unit Calibration November 18, 2021 by CMFR Dhanbad
 File Name UM10858_20210304124715.IDFW

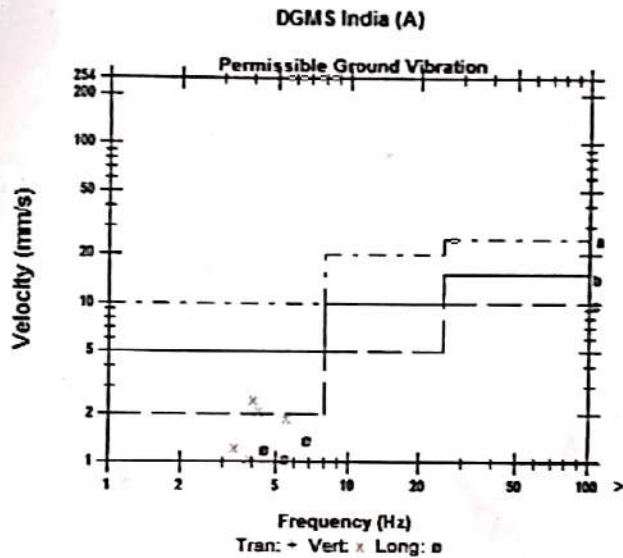
Notes
 Location:
 Client:
 User Name:
 General:

Post Event Notes
 AKWMC OCP
 Distance from blast -170 mtrs

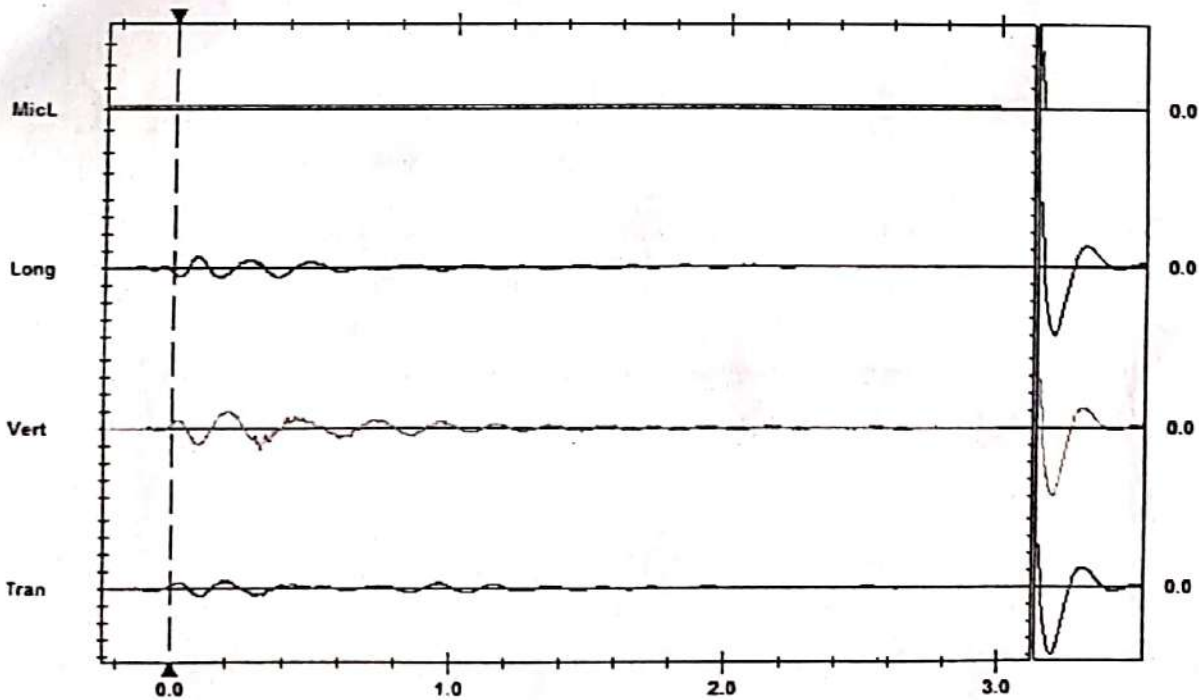
Microphone Linear Weighting
 PSPL <0.500 pa.(L)
 ZC Freq N/A
 Channel Test Check (Freq = 0.0 Hz Amp = 0 mv)

	Tran	Vert	Long	
PPV	0.930	2.491	1.379	mm/s
ZC Freq	4.1	4.0	6.8	Hz
Time (Rel. to Trig)	0.309	0.315	0.082	sec
Peak Acceleration	0.021	0.051	0.015	g
Peak Displacement	0.029	0.074	0.037	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.5	7.3	Hz
Overswing Ratio	3.6	3.6	3.4	

Peak Vector Sum 2.592 mm/s at 0.315 sec
 N/A: Not Applicable



a) Industrial Buildings
 b) Domestic houses/structures
 c) Historic objects, sensitive structures



Time Scale: 0.20 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 1.000 pa.(L)/div
 Trigger = 0.0 1.0 2.0 3.0

Sensor Check



Date/Time Long at 14:50:02 November 21, 2021
 Trigger Source Geo: 0.700 mm/s
 Range Geo: 254.0 mm/s
 Record Time 3.0 sec at 2048 sps
 Operator/Setup: Operator/factory.MMB

Serial Number UM16971 V 10-89 Micromate ISEE
 Battery Level 3.6 Volts
 Unit Calibration November 18, 2021 by CIMFR Dhanab
 File Name _TEMP.EVT

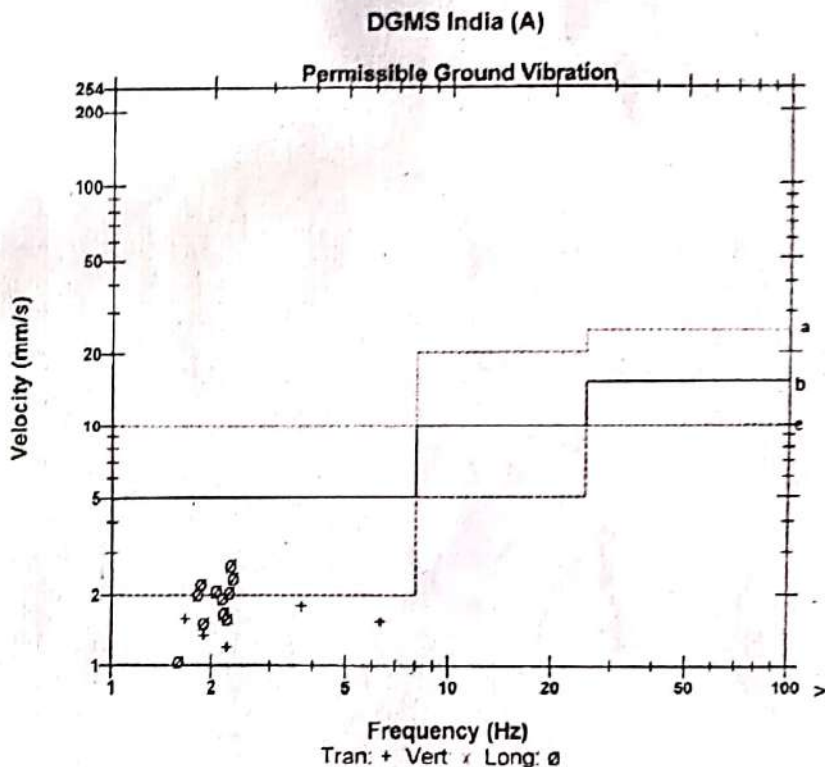
Notes
 Location:
 Client:
 User Name:
 General:

Post Event Notes
 AKWMC
 Distance-200m

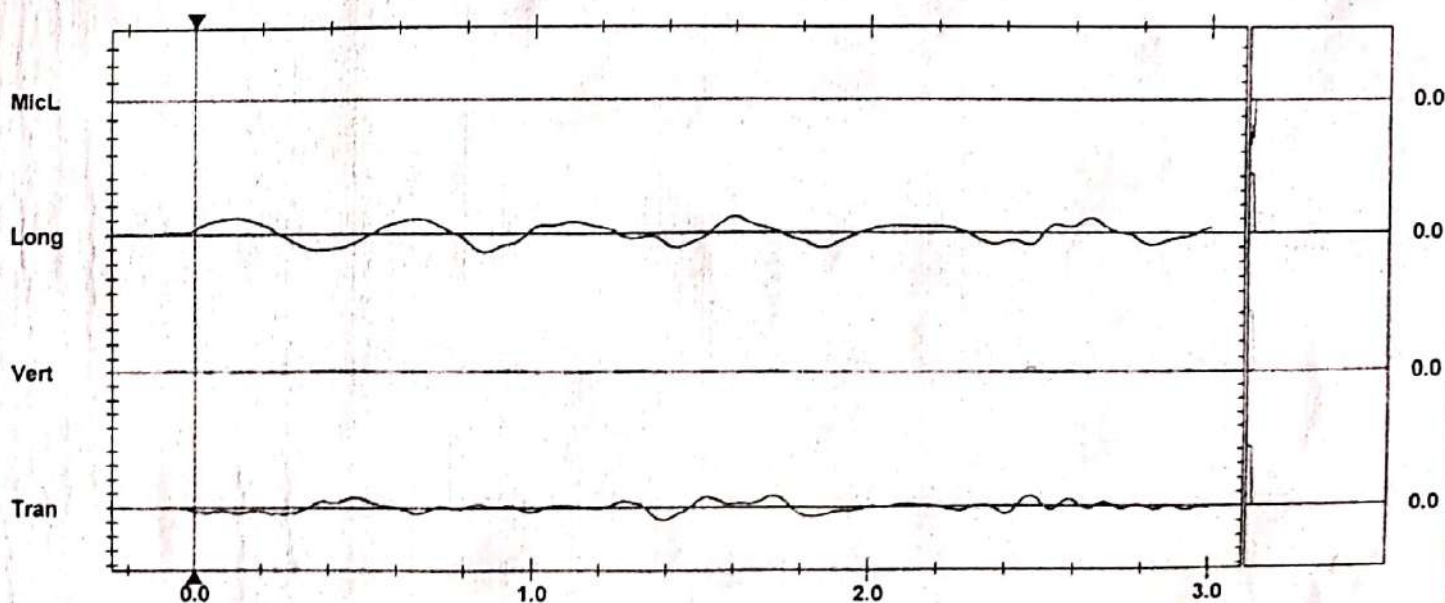
Microphone Linear Weighting
 PSPL <0.500 pa (L)
 ZC Freq >200 Hz
 Channel Test Check (Freq = 0.0 Hz Amp = 0 mv)

	Tran	Vert	Long	
PPV	1.797	0.528	2.680	mm/s
ZC Freq	3.7	2.9	2.3	Hz
Time (Rel. to Trig)	1.393	2.470	0.852	sec
Peak Acceleration	0.015	0.015	0.016	g
Peak Displacement	0.120	0.032	0.217	mm
Sensor Check	Check	Check	Check	
Frequency	1024.0	1024.0	1024.0	Hz
Overswing Ratio	0.0	0.0	0.0	

Peak Vector Sum 2.718 mm/s at 0.852 sec
 N/A: Not Applicable



- a) Industrial Buildings
- b) Domestic houses/structures
- c) Historic objects, sensitive structures



Time Scale: 0.20 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 1.000 pa (L)/div
 Trigger =

Date/Time Long at 15:02:55 November 21, 2021
 Trigger Source Geo: 0.700 mm/s
 Range Geo: 254.0 mm/s
 Record Time 3.0 sec at 2048 sps
 Operator/Setup Operator/factory MMB

Serial Number UM10971 V 10-89 Micromate ISEE
 Battery Level 3.6 Volts
 Unit Calibration November 18, 2021 by CIMFR Dhanabdi
 File Name _TEMP.EVT

Notes
 Location
 Client
 User Name
 General

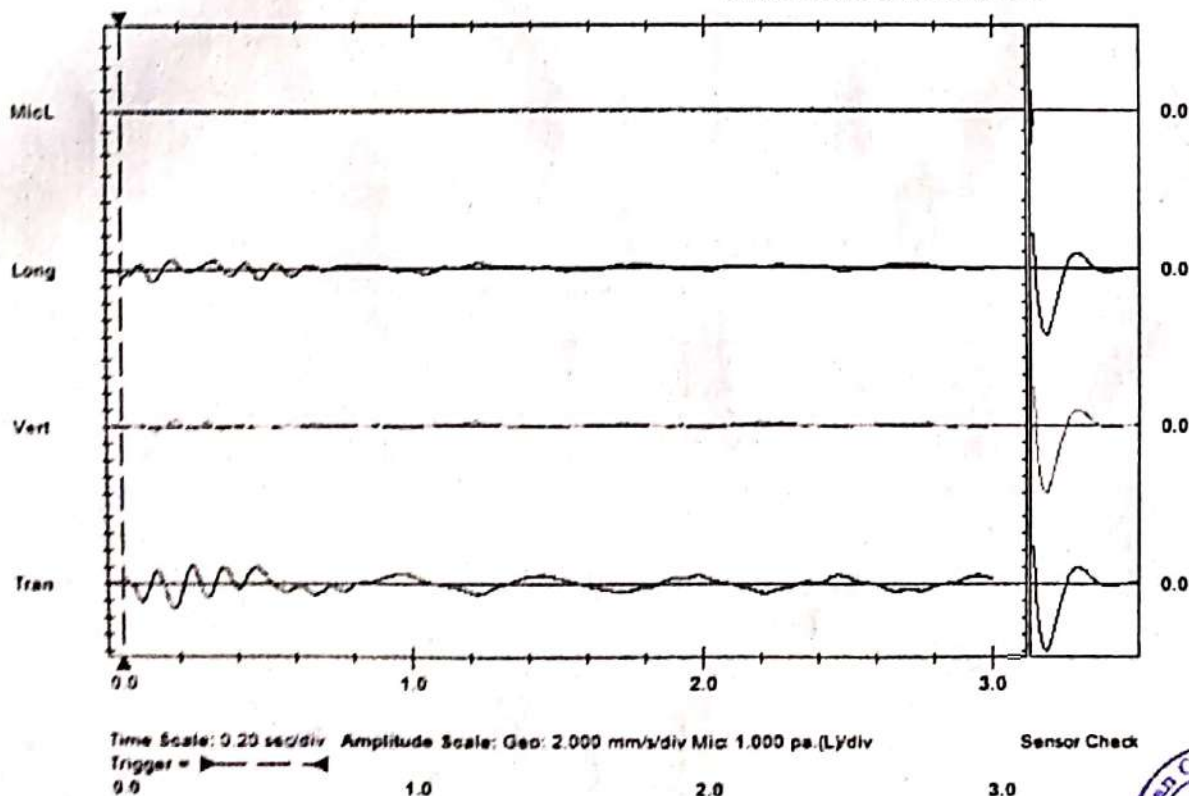
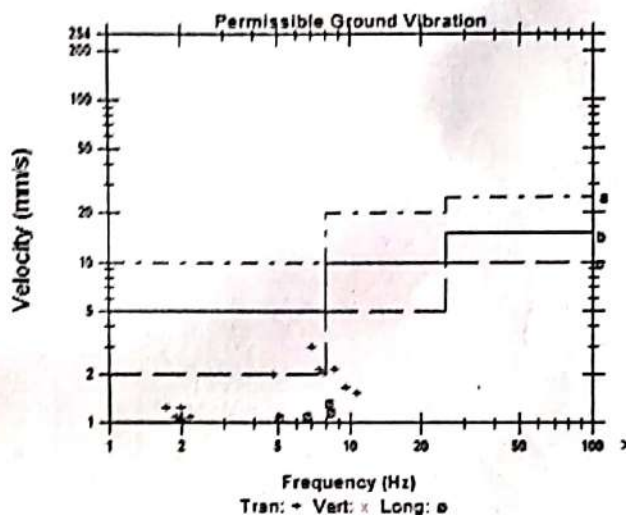
Post Event Notes
 AKWMC OCP
 Distance from blast -100 mtrs

Microphone Linear Weighting
 PSPL <0.500 ps (L)
 ZC Freq >200 Hz
 Channel Test Check (Freq = 0.0 Hz Amp = 0 mv)

	Tran	Vert	Long	
PPV	2.971	0.843	1.340	mm/s
ZC Freq	7.1	7.2	8.3	Hz
Time (Rel. to Trig)	0.178	0.192	0.110	sec
Peak Acceleration	0.021	0.013	0.015	g
Peak Displacement	0.035	0.034	0.038	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.3	7.5	Hz
Overswing Ratio	4.3	4.7	4.7	

Peak Vector Sum 3.234 mm/s at 0.178 sec
 N/A: Not Applicable

DGMS India (A)





Event Report

Date/Time Long at 14:50:30 November 25, 2021
Trigger Source Geo: 0.700 mm/s, Mic: 68.95 ps (L)
Range Geo: 254.0 mm/s
Record Time 3.0 sec at 2048 sps
Operator/Setup: Operator/factory.MMB

Serial Number UM10858 V 10-81 Micromate ISEE
Battery Level 3.4 Volts
Unit Calibration November 18, 2021 by CIMFR Dhanbad
File Name UM10858_20210304135356.IDFW

Notes

Location:
Client:
User Name:
General:

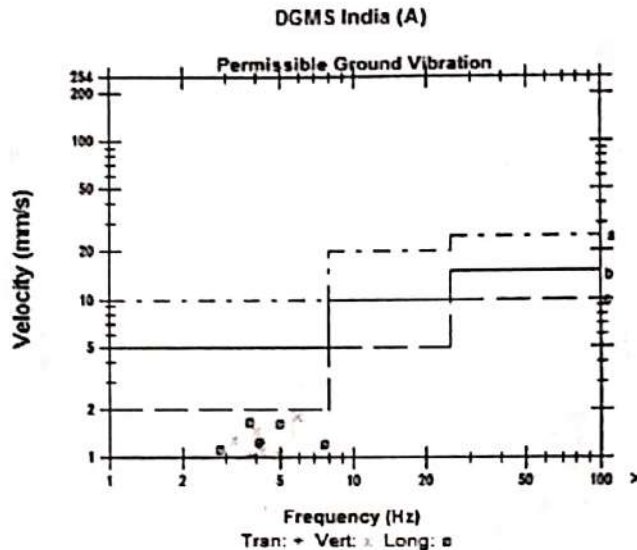
Post Event Notes

Tetumari hired patch
Distance from blast = 150 mtrs

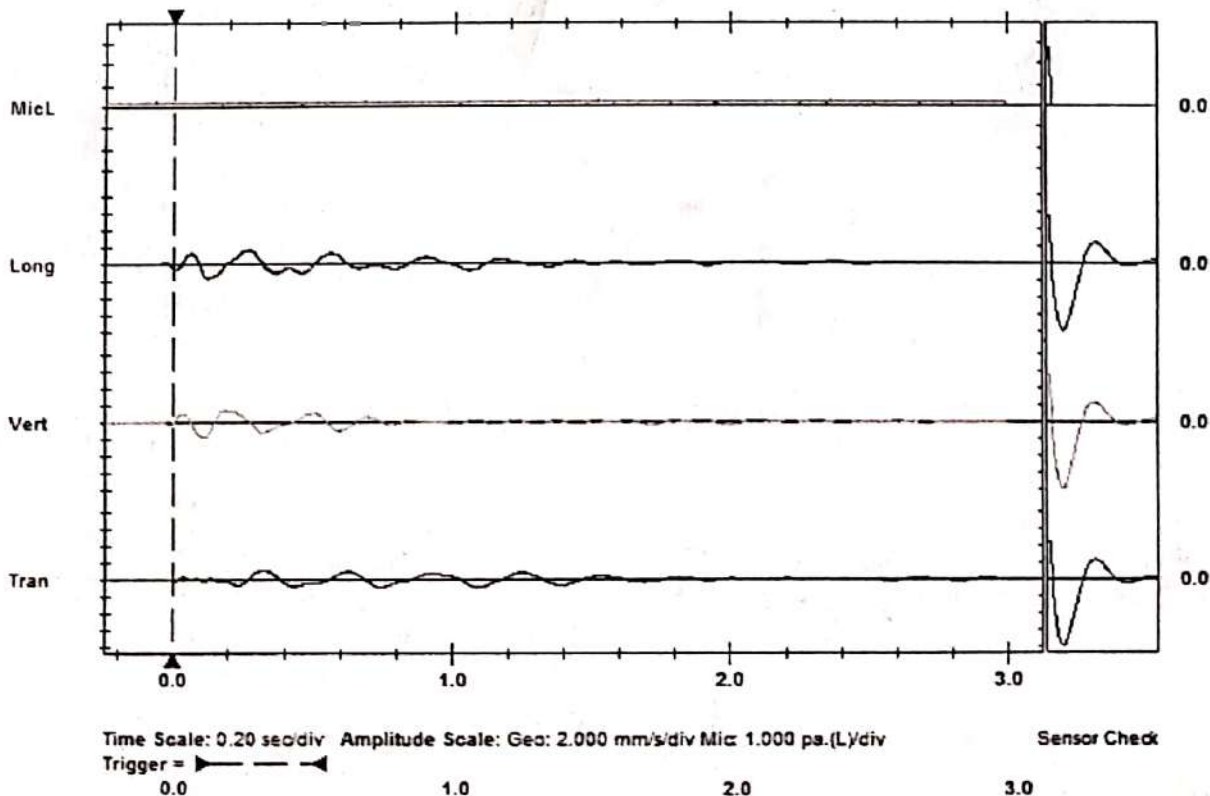
Microphone Linear Weighting
PSPL <0.500 ps.(L)
ZC Freq N/A
Channel Test Check (Freq = 0.0 Hz Amp = 0 mv)

	Tran	Vert	Long	
PPV	1.222	1.821	1.702	mm/s
ZC Freq	4.2	6.0	3.8	Hz
Time (Rel. to Trig)	0.322	0.110	0.265	sec
Peak Acceleration	0.015	0.020	0.028	g
Peak Displacement	0.043	0.059	0.066	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.5	7.3	Hz
Overswing Ratio	3.5	3.6	3.4	

Peak Vector Sum 2.439 mm/s at 0.115 sec
N/A: Not Applicable



a) Industrial Buildings
b) Domestic houses/structures
c) Historic objects, sensitive structures





Event Report

Date/Time Vert at 14:32:14 November 19, 2021
Trigger Source Geo: 0.700 mm/s, Mic: 68.95 pa (L)
Range Geo: 254.0 mm/s
Record Time 3.0 sec at 2048 sps
Operator/Setup: Operator/factory MMB

Serial Number UM10858 V 10-81 Micromate ISEE
Battery Level 3.7 Volts
Unit Calibration November 18, 2021 by CIMFR Dhanbad
File Name UM10858_20210106143830.IDFW

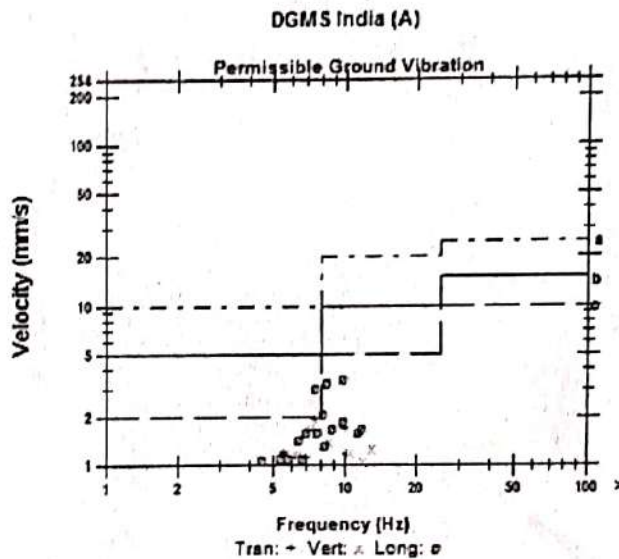
Post Event Notes
Kantapahari hired
Distance from blast= 180 mtrs

Notes
Location:
Client:
User Name:
General:

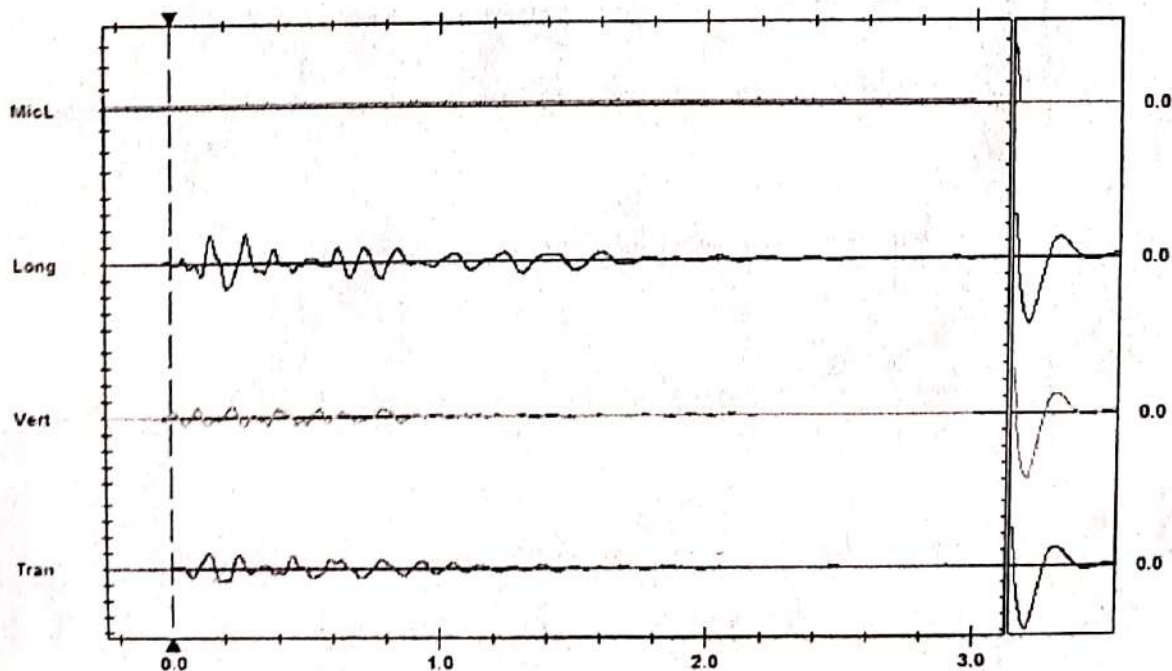
Microphone Linear Weighting
PSPL <0.500 pa (L)
ZC Freq N/A
Channel Test Check (Freq = 0.0 Hz Amp = 0 mv)

	Tran	Vert	Long	
PPV	1.923	1.403	3.515	mm/s
ZC Freq	7.5	8.5	9.8	Hz
Time (Rel. to Trig)	0.139	0.232	0.278	sec
Peak Acceleration	0.020	0.020	0.026	g
Peak Displacement	0.041	0.024	0.064	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.5	7.3	Hz
Overswing Ratio	3.6	3.6	3.5	

Peak Vector Sum 3.904 mm/s at 0.145 sec
N/A: Not Applicable



a) Industrial Buildings
b) Domestic houses/structures
c) Historic objects, sensitive structures



Time Scale: 0.20 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 1.000 pa (L)/div
Trigger 0.0 1.0 2.0 3.0

Sensor Check





Event Report

Date/Time: Vert at 15:02:53 November 21, 2021
Trigger Source: Geo: 0.700 mm/s
Range: Geo: 254.0 mm/s
Record Time: 3.0 sec at 2048 sps
Operator/Setup: Operator/factory: MMB

Serial Number: UM16971 V 10-89 Micromate ISEE
Battery Level: 3.0 Volts
Unit Calibration: November 18, 2021 by CIMFR Dhanab
File Name: _TEMP.EVT

Post Event Notes
Kantapahari hred
Distance from blast -140 mtrs

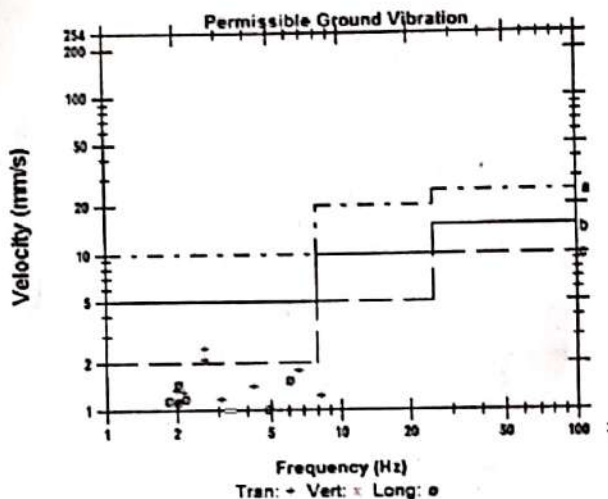
Notes
Location:
Client:
User Name:
General:

Microphone: Linear Weighting
PSPL: <0.500 pa.(L)
ZC Freq: >200 Hz
Channel Test: Check (Freq = 0.0 Hz Amp = 0 mv)

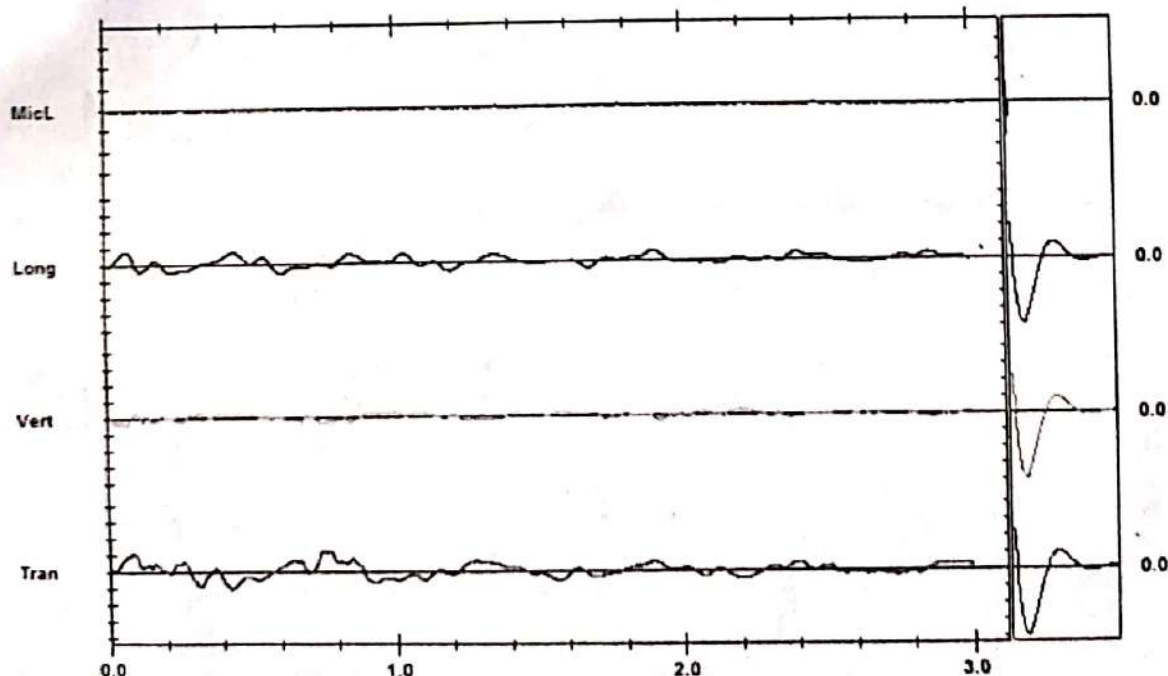
	Tran	Vert	Long	
PPV	2.487	0.859	1.576	mm/s
ZC Freq	2.7	7.6	8.1	Hz
Time (Rel. to Trig)	0.768	0.063	0.071	sec
Peak Acceleration	0.016	0.018	0.013	g
Peak Displacement	0.122	0.045	0.077	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.3	7.5	Hz
Overswing Ratio	4.3	4.7	4.7	

Peak Vector Sum: 2.718 mm/s at 0.073 sec
N/A: Not Applicable

DGMS India (A)



a) Industrial Buildings
b) Domestic houses/structures
c) Historic objects, sensitive structures



Time Scale: 0.20 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 1.000 pa.(L)/div

Sensor Check



Date/Time: Tran at 18:02:28 November 21, 2021
 Trigger Source: Geo: 0.700 mm/s
 Range: Geo: 254.0 mm/s
 Record Time: 3.0 sec at 2048 sps
 Operator/Setup: Operator/factory.MMB

Serial Number: UM10971 V 10-89 Micromate ISEE
 Battery Level: 3.6 Volts
 Unit Calibration: November 18, 2021 by CIMFR Dhanab
 File Name: _TEMP.EVT

Notes

Location:
 Client:
 User Name:
 General:

Post Event Notes

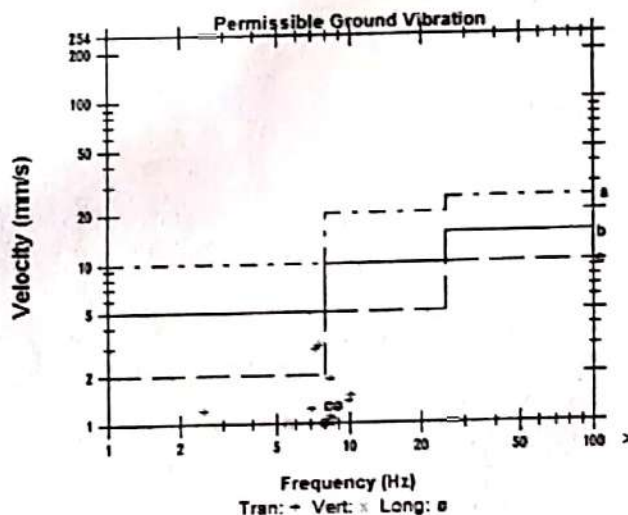
Kantapahari hired
 Distance from blast -170 mtrs

Microphone: Linear Weighting
 PSPL: <0.500 ps(L)
 ZC Freq: >200 Hz
 Channel Test: Check (Freq = 0.0 Hz Amp = 0 mv)

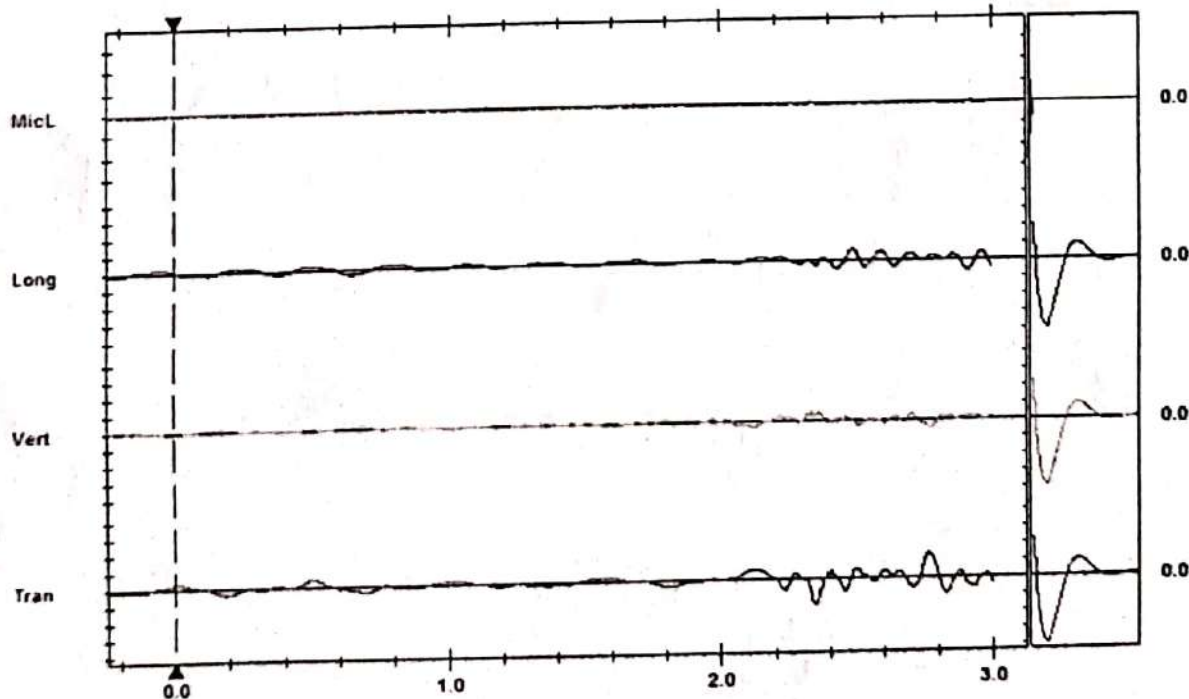
	Tran	Vert	Long	
PPV	3.035	1.017	1.316	mm/s
ZC Freq	7.6	5.7	9.1	Hz
Time (Rel. to Trig)	2.348	2.334	2.485	sec
Peak Acceleration	0.031	0.023	0.013	g
Peak Displacement	0.062	0.027	0.025	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.3	7.5	Hz
Overswing Ratio	4.3	4.7	4.7	

Peak Vector Sum: 3.144 mm/s at 2.348 sec
 N/A: Not Applicable

DGMS India (A)



a) Industrial Buildings
 b) Domestic houses/structures
 c) Historic objects, sensitive structures



Time Scale: 0.20 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 1.000 ps (LY/div)
 Trigger = 0.0 1.0 2.0 3.0

Time Scale: 0.20 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 1.000 ps (LY/div)
 Trigger = 0.0 1.0 2.0 3.0

Sensor Check

Sensor Check



Date/Time Tran at 15.02.21 November 21, 2021
 Trigger Source Geo: 0.700 mm/s
 Range Geo: 254.0 mm/s
 Record Time 3.0 sec at 2048 sps
 Operator/Setup: Operator/factory MMB

Serial Number UM16971 V 10-83 Micromate ISEE
 Battery Level 3.6 Volts
 Unit Calibration November 18, 2021 by CIMFR Dhanab
 File Name _TEMP EVT

Notes

Location:

Client:

User Name:

General

Post Event Notes

Kantapahani Hired

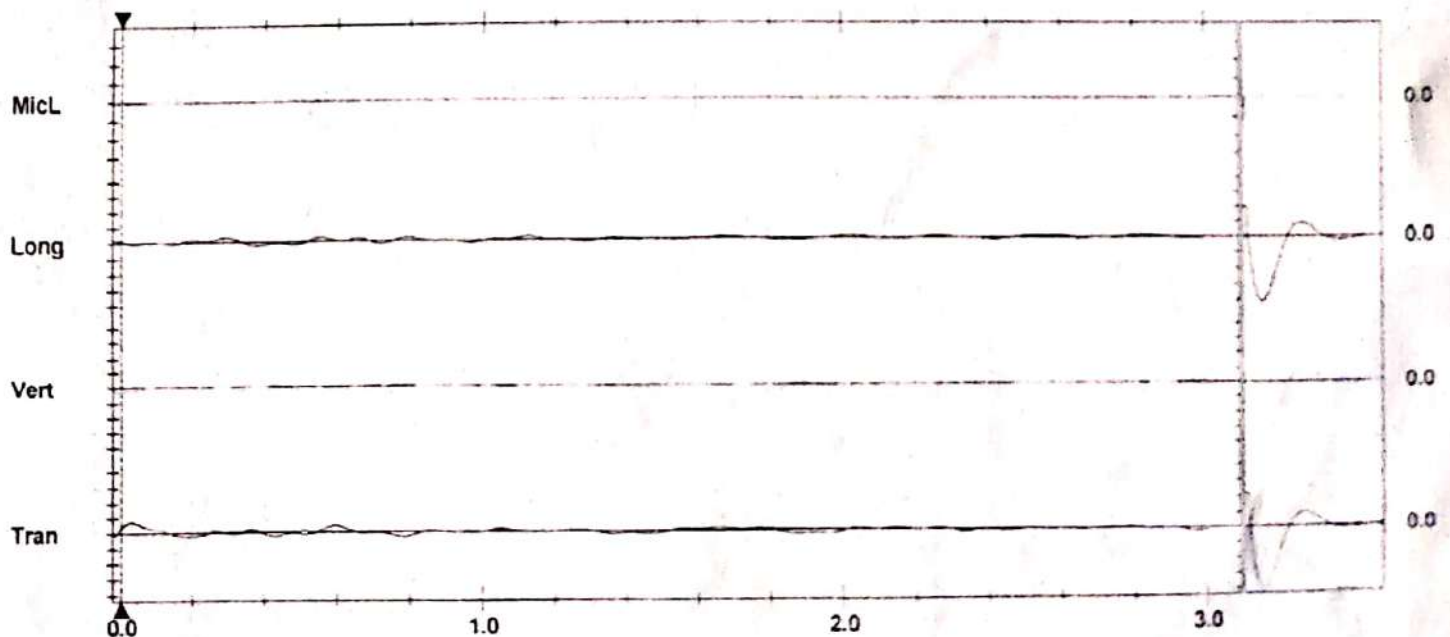
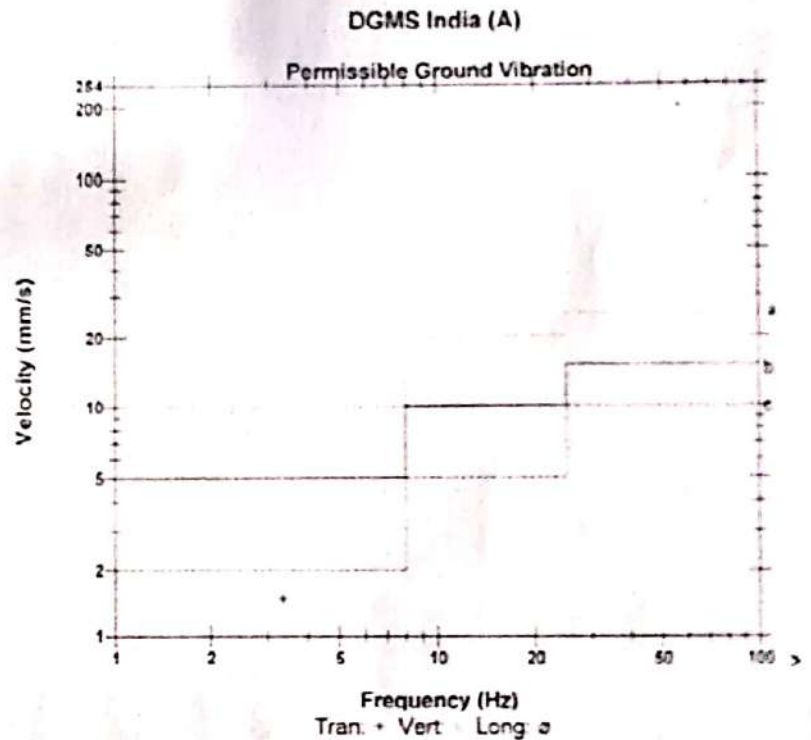
Distance-200m

Microphone Linear Weighting
 PSPL <0.500 pa (L)
 ZC Freq >200 Hz
 Channel Test Check (Freq = 0.0 Hz Amp = 0 mv)

	Tran	Vert	Long	
PPV	1.474	0.670	0.599	mm/s
ZC Freq	3.3	4.7	2.9	Hz
Time (Rel. to Trig)	0.031	-0.004	0.292	sec
Peak Acceleration	0.012	0.010	0.010	g
Peak Displacement	0.056	0.021	0.028	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.3	7.5	Hz
Overswing Ratio	4.3	4.7	4.7	

Peak Vector Sum 1.569 mm/s at 0.029 sec

N/A: Not Applicable



Time Scale: 0.20 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 1.000 pa (L)/div
 Trigger =



Event Report

Date/Time Long at 14:34:48 January 8, 2022
Trigger Source Geo: 0.700 mm/s
Range Geo: 254.0 mm/s
Record Time 3.0 sec at 2048 sps
Operator/Setup: Operator/factory/MMB

Serial Number UM16971 V 10-89 Micromate ISEE
Battery Level 3.7 Volts
Unit Calibration November 18, 2021 by CIMFR Dhanabd
File Name _TEMP.EVT

Post Event Notes
Kantapahari hired
Distance from blast -170 mtrs

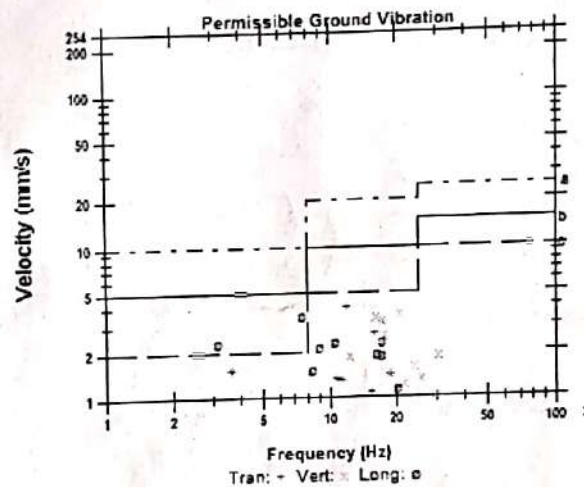
Notes
Location:
Client:
User Name:
General:

Microphone Linear Weighting
PSPL <0.500 pa (L)
ZC Freq >200 Hz
Channel Test Check (Freq = 0.0 Hz Amp = 0 mv)

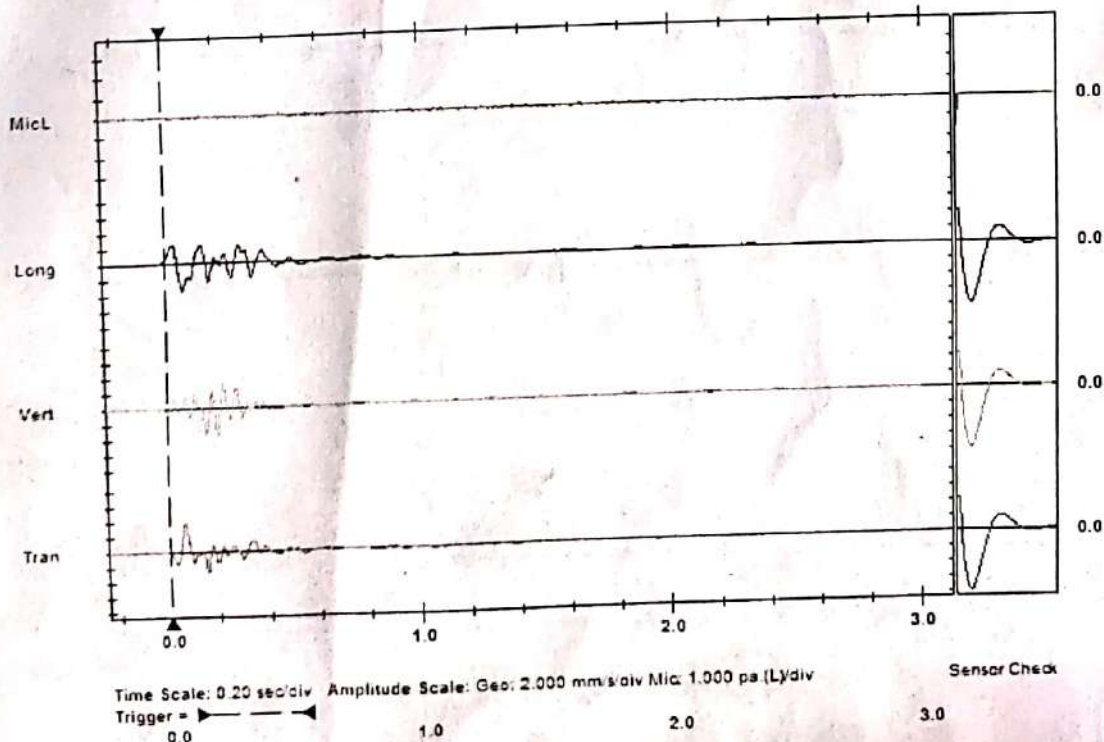
	Tran	Vert	Long	
PPV	3.941	3.508	3.484	mm/s
ZC Freq	12.0	20	7.5	Hz
Time (Rel. to Trig)	0.060	0.188	0.067	sec
Peak Acceleration	0.029	0.087	0.056	g
Peak Displacement	0.045	0.030	0.070	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.1	7.3	7.3	Hz
Overswing Ratio	4.5	4.7	4.8	

Peak Vector Sum 4.991 mm/s at 0.062 sec
N/A: Not Applicable

DGMS India (A)



- a) Industrial Buildings
- b) Domestic houses/structures
- c) Historic objects, sensitive structures





Event Report

Date/Time Vert at 14:21:27 January 13, 2022
Trigger Source Geo: 0.700 mm/s
Range Geo: 254.0 mm/s
Record Time 3.0 sec at 2048 sps
Operator/Setup: Operator/factory.MMB

Serial Number UM16971 V 10-89 Micromate ISEE
Battery Level 3.7 Volts
Unit Calibration November 18, 2021 by CIMFR Dhanabd
File Name _TEMP.EVT

Notes

Location:
Client:
User Name:
General:

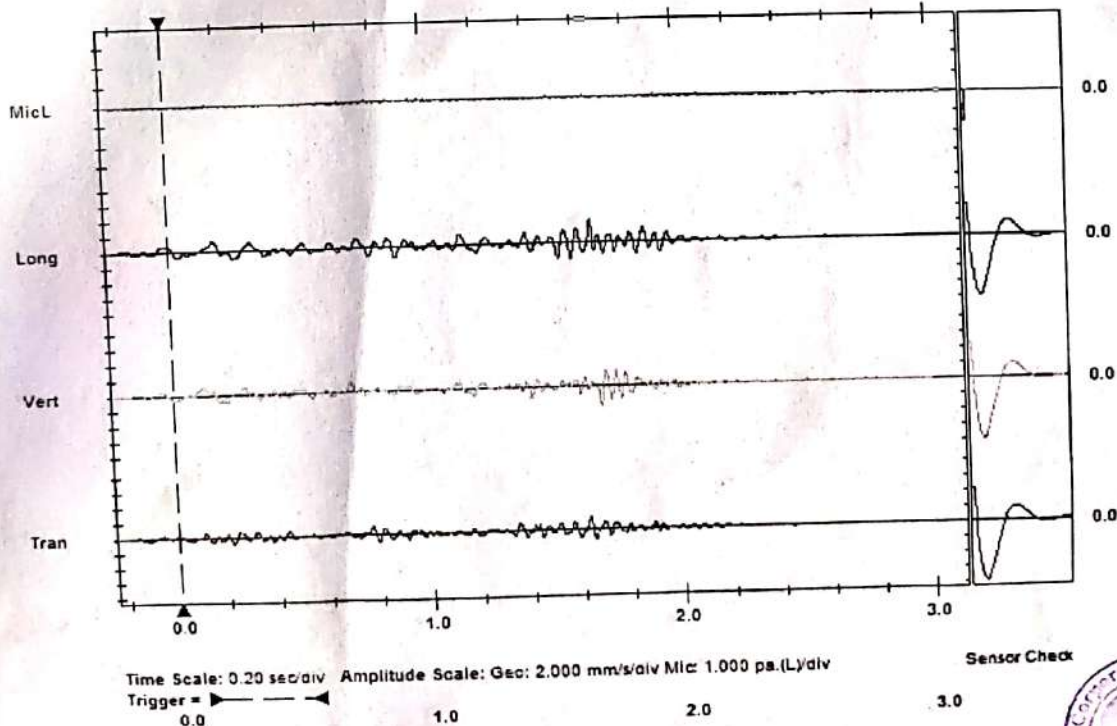
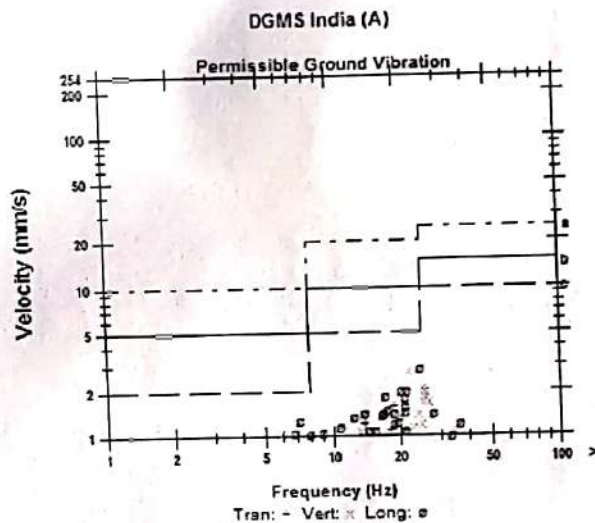
Post Event Notes

Kantapahari hired
Distance from blast -180 mtrs

Microphone Linear Weighting
PSPL <0.500 pa.(L)
ZC Freq >200 Hz
Channel Test Check (Freq = 0.0 Hz Amp = 0 mv)

	Tran	Vert	Long	
PPV	1.584	2.774	2.845	mm/s
ZC Freq	19.0	22	24	Hz
Time (Rel. to Trig)	1.622	1.680	1.651	sec
Peak Acceleration	0.030	0.058	0.048	g
Peak Displacement	0.012	0.028	0.024	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.1	7.3	7.5	Hz
Overswing Ratio	4.5	4.7	4.7	

Peak Vector Sum 3.095 mm/s at 1.680 sec
N/A: Not Applicable





Event Report

Date/Time Long at 16:35:43 January 17, 2022
Trigger Source Geo: 0.700 mm/s
Range Geo: 254.0 mm/s
Record Time 3.0 sec at 2048 sps
Operator/Setup: Operator/factory.MMB

Serial Number UM15971 V 10-89 Micromate ISEE
Battery Level 3.7 Volts
Unit Calibration November 18, 2021 by CIMFR Dhanabd
File Name _TEMP.EVT

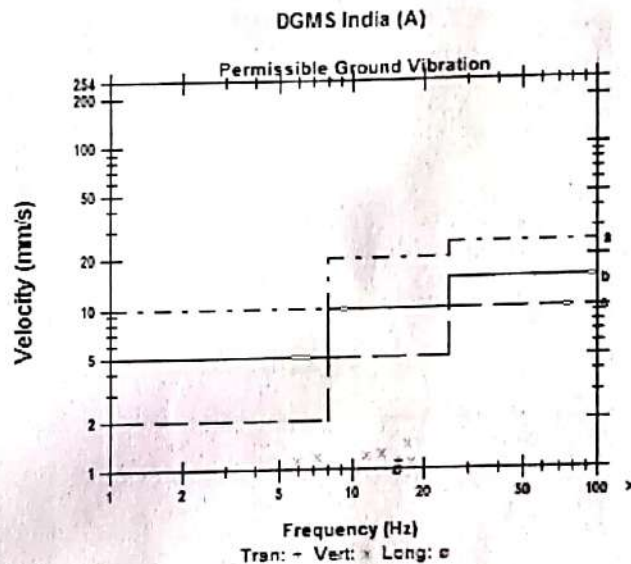
Notes
Location:
Client:
User Name:
General:

Post Event Notes
Tetulumari hired patch
Distance from blast = 150 mtrs

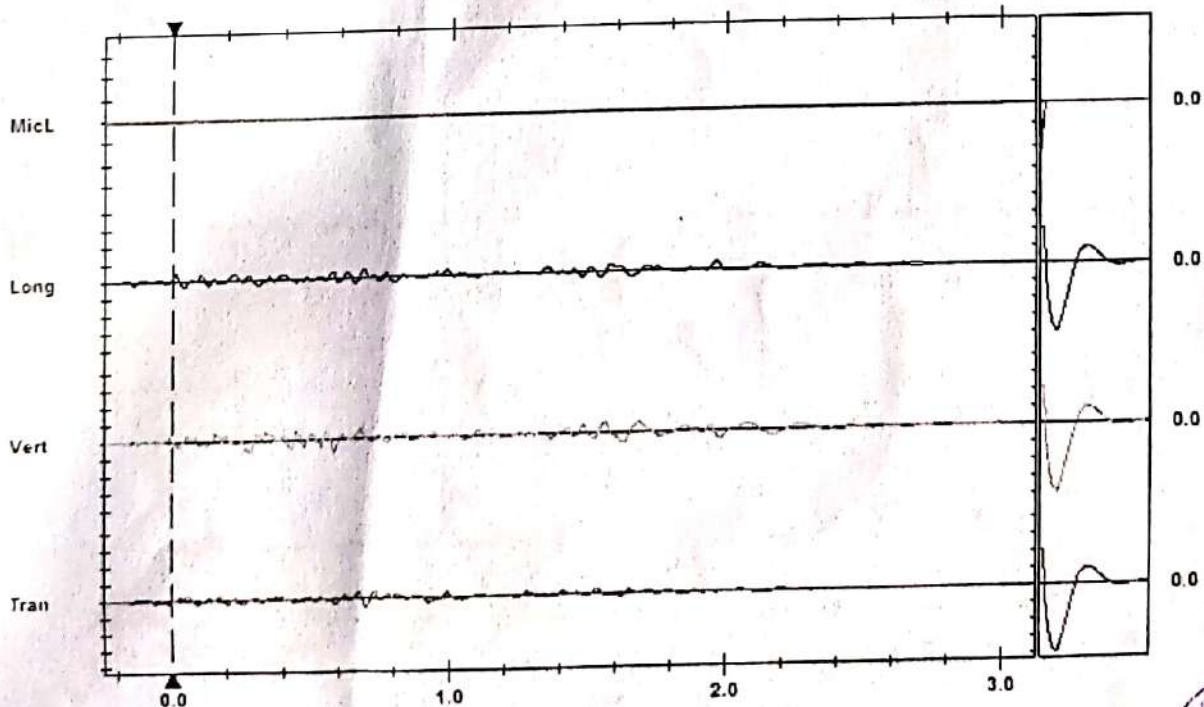
Microphone Linear Weighting
PSPL <0.500 ps.(L)
ZC Freq >200 Hz
Channel Test Check (Freq = 0.0 Hz Amp = 0 mv)

	Tran	Vert	Long	
PPV	1.127	1.455	1.001	mm/s
ZC Freq	15.8	16.8	15.5	Hz
Time (Rel. to Trig)	0.699	0.593	0.682	sec
Peak Acceleration	0.016	0.023	0.015	g
Peak Displacement	0.011	0.023	0.016	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.1	7.3	7.3	Hz
Overswing Ratio	4.5	4.7	4.7	

Peak Vector Sum 1.542 mm/s at 0.582 sec
N/A: Not Applicable



a) Industrial Buildings
b) Domestic houses/structures
c) Historic objects, sensitive structures



Time Scale: 0.20 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 1.000 ps.(L)/div
Trigger = 0.0 1.0 2.0 3.0

Sensor Check



Date/Time: Tran at 14:00:29 January 16, 2022
 Trigger Source: Geo: 0.700 mm/s
 Range: Geo: 254.0 mm/s
 Record Time: 3.0 sec at 2048 sps
 Operator/Setup: Operator factory MMB

Serial Number: UM15971 V 10-89 Micromate ISEE
 Battery Level: 3.7 Volts
 Unit Calibration: November 18, 2021 by CIMFR Dhanabdi
 File Name: _TEMP EVT

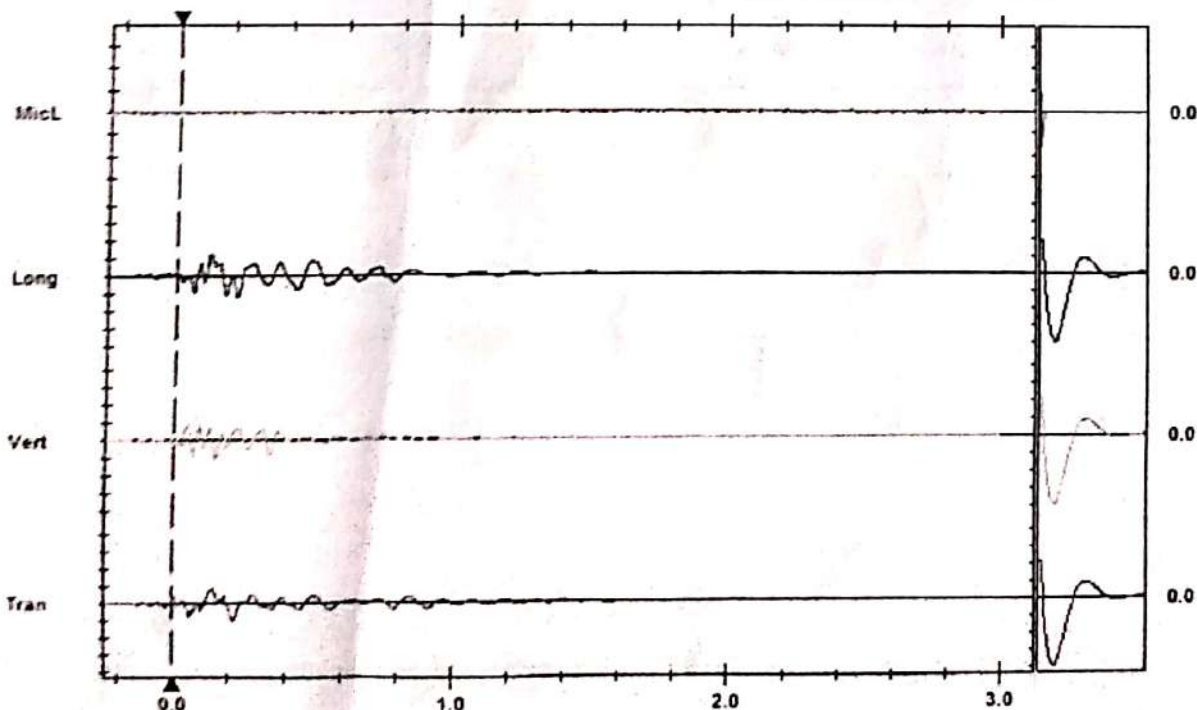
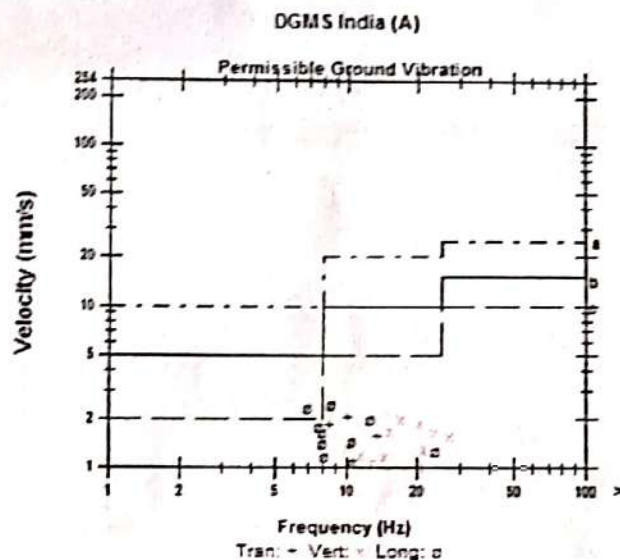
Notes:
 Location:
 Client:
 User Name:
 General:

Post Event Notes:
 AKWMO GCP
 Distance from blast - 160 mtrs

Microphone: Linear Weighting
 PSPL: <0.500 pa (L)
 ZC Freq: >200 Hz
 Channel Test: Check (Freq = 0.0 Hz Amp = 0 mv)

	Tran	Vert	Long	
PPV	2.045	1.878	2.459	mm/s
ZC Freq	10.2	15.8	8.7	Hz
Time (Rel. to Trig)	0.220	0.149	0.120	sec
Peak Acceleration	0.023	0.039	0.031	g
Peak Displacement	0.027	0.022	0.046	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.1	7.3	7.7	Hz
Overswing Ratio	4.5	4.6	4.6	

Peak Vector Sum: 3.307 mm/s at 0.218 sec
 N/A: Not Applicable



Time Scale: 0.20 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 1.000 pa (LY/div)
 Trigger = 0.0 1.0 2.0 3.0

Time Scale: 0.20 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 1.000 pa (LY/div)
 Trigger =

Sensor Check

Sensor Check



Date/Time: Vert at 14:00:26 January 16, 2022
 Trigger Source: Geo: 0.700 mm/s
 Range: Geo: 254.0 mm/s
 Record Time: 3.0 sec at 2048 sps
 Operator/Setup: Operator/factory NMB

Serial Number: UM16971 V 10.89 Micromate ISEE
 Battery Level: 3.7 Volts
 Unit Calibration: November 18, 2021 by CIMFR Dhanab
 File Name: TEMP EVT

Notes:
 Location:
 Client:
 User Name:
 General:

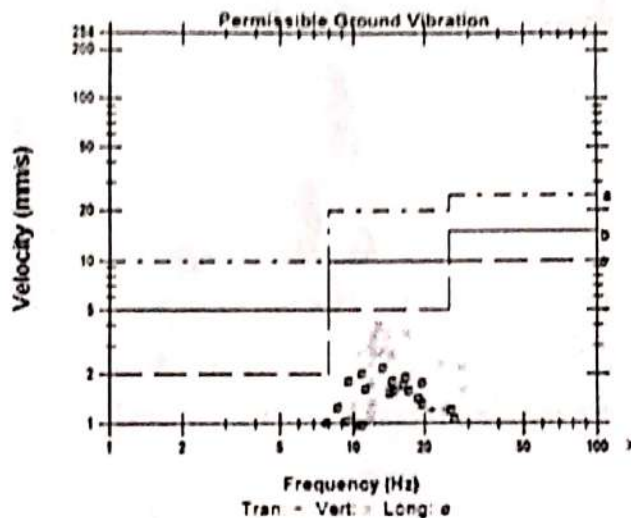
Post Event Notes
 Kantapahari hired
 Distance from blast = 175 mtrs

Microphone: Linear Weighting
 PSPL: <0.500 ps (L)
 ZC Freq: >200 Hz
 Channel Test: Check (Freq = 0.0 Hz Amp = 0 mv)

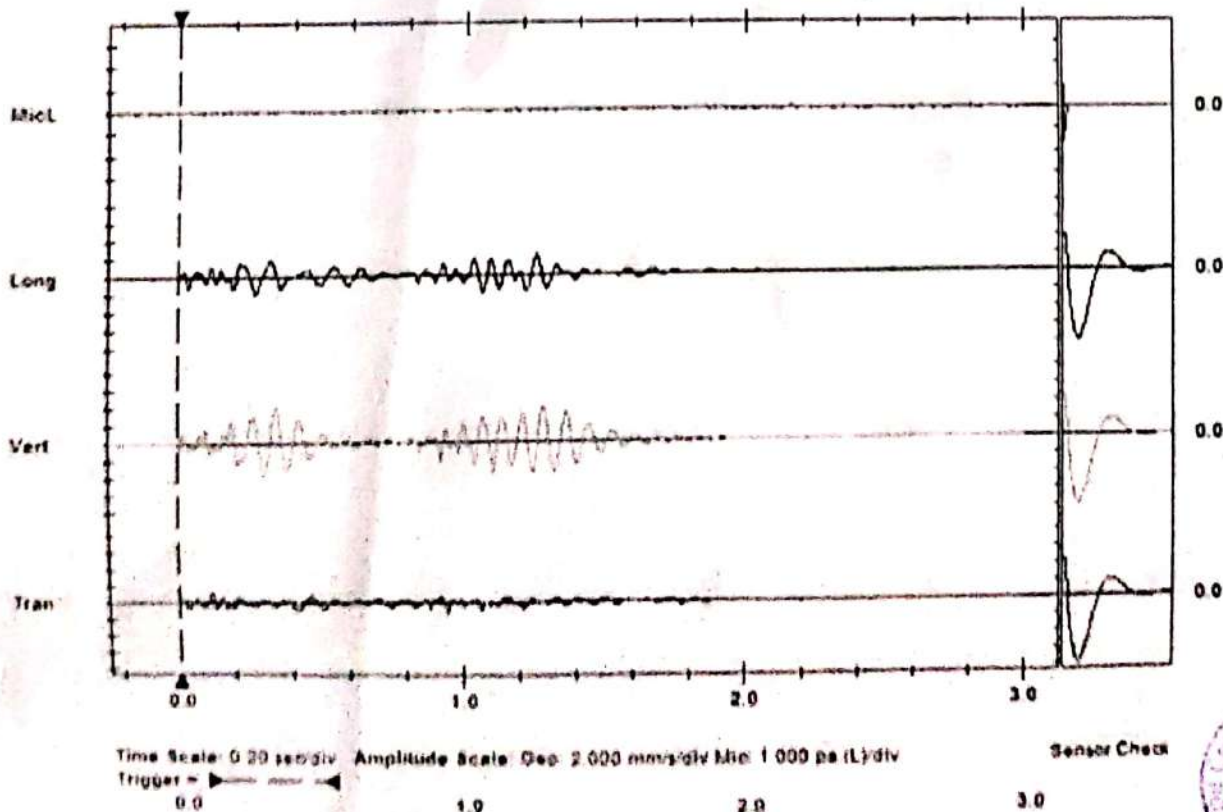
	Tran	Vert	Long	
PPV	1.230	4.091	2.231	mm/s
ZC Freq	24	12.6	13.3	Hz
Time (Rel. to Trig)	0.949	0.342	1.251	sec
Peak Acceleration	0.023	0.044	0.030	g
Peak Displacement	0.012	0.050	0.027	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.1	7.3	7.7	Hz
Overswing Ratio	4.5	4.8	4.6	

Peak Vector Sum: 4.251 mm/s at 1.260 sec
 N/A: Not Applicable

DGMS India (A)



a) Industrial Buildings
 b) Domestic houses/structures
 c) Historic objects, sensitive structures





Event Report

Date/Time Vert at 17:22:44 January 18, 2022
Trigger Source Geo: 0.700 mm/s
Range Geo: 254.0 mm/s
Record Time 3.0 sec at 2048 sps
Operator/Setup: Operator/factory MMB

Serial Number UM16971 V 10-89 Micromate ISEE
Battery Level 3.7 Volts
Unit Calibration November 18, 2021 by CIMFR Dhanab
File Name _TEMP.EVT

Notes

Location:
Client:
User Name:
General:

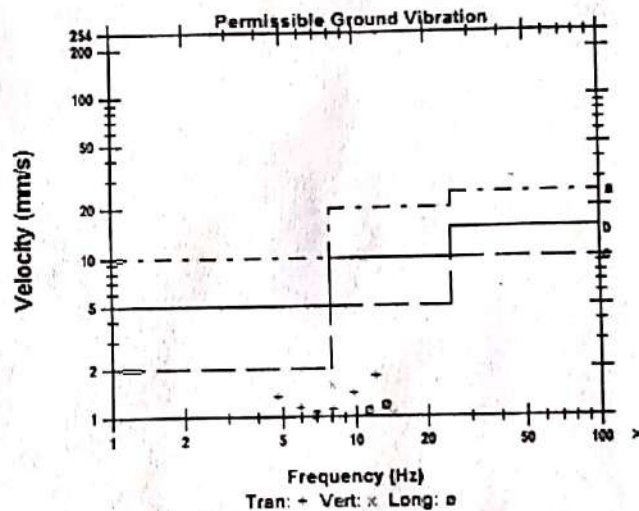
Post Event Notes
Kantapahari hired
Distance from blast - 150 mtrs

Microphone Linear Weighting
PSPL <0.500 pa.(L)
ZC Freq 79 Hz
Channel Test Check (Freq = 0.0 Hz Amp = 0 mv)

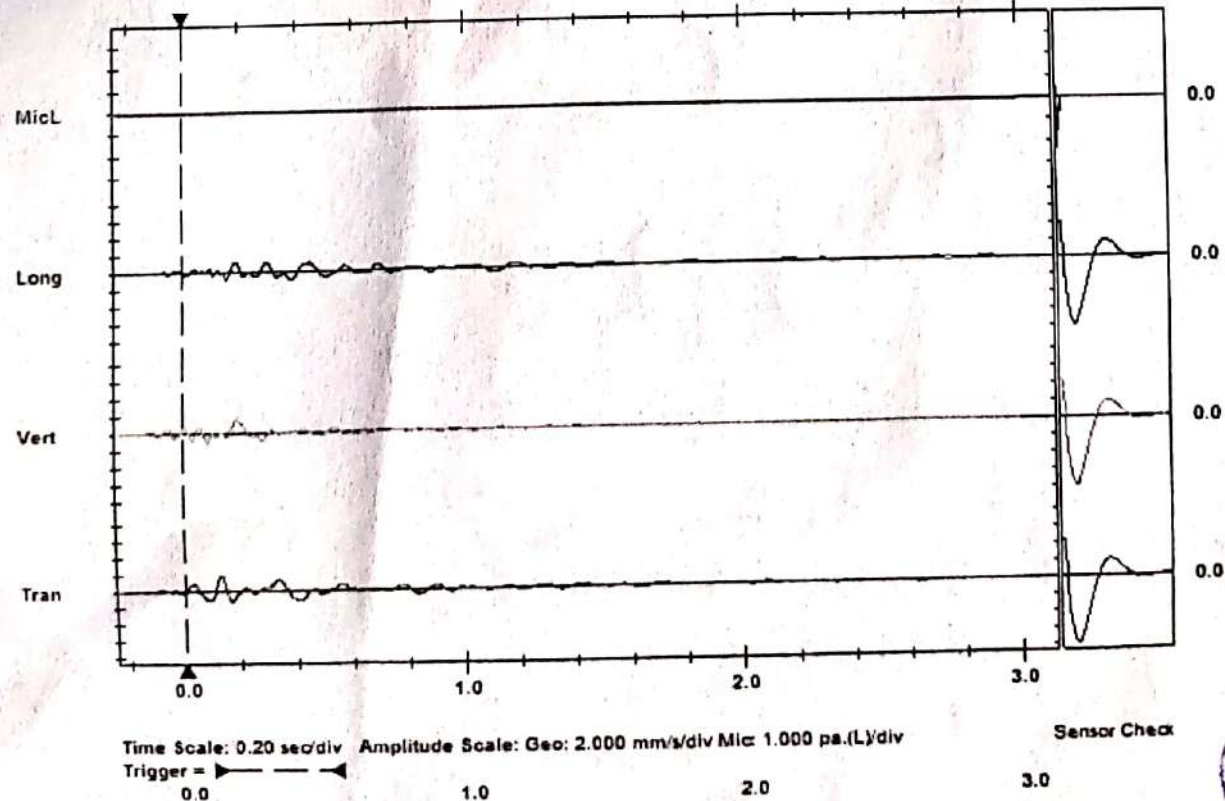
	Tran	Vert	Long	
PPV	1.773	1.624	1.198	mm/s
ZC Freq	12.3	8.1	13.5	Hz
Time (Rel. to Trig)	0.128	0.190	0.188	sec
Peak Acceleration	0.018	0.025	0.018	g
Peak Displacement	0.034	0.029	0.024	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.3	7.3	Hz
Overswing Ratio	4.4	4.7	4.8	

Peak Vector Sum 2.026 mm/s at 0.189 sec
N/A: Not Applicable

DGMS India (A)



a) Industrial Buildings
b) Domestic houses/structures
c) Historic objects, sensitive structures





Event Report

Date/Time: Tran at 17:42:27 January 27, 2022
Trigger Source: Geo: 0.700 mm/s
Range: Geo: 254.0 mm/s
Record Time: 3.0 sec at 2048 pts
Operator/Setup: Operator/Factory MMB

Notes
Location:
Client:
User Name:
General:

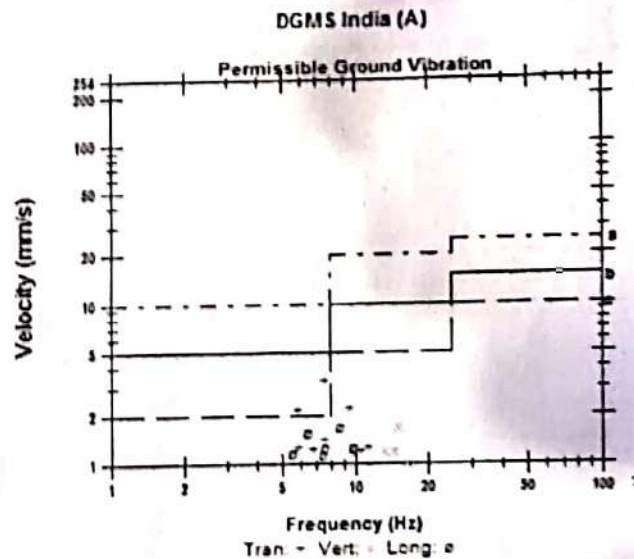
Serial Number: UM10971 V 10-89 Micromate ISEE
Battery Level: 3.8 Volts
Unit Calibration: November 18, 2021 by CIMFR Dhanab
File Name: _TEMP EVT

Post Event Notes
Kantapahan hired
Distance from blast- 180 mtrs

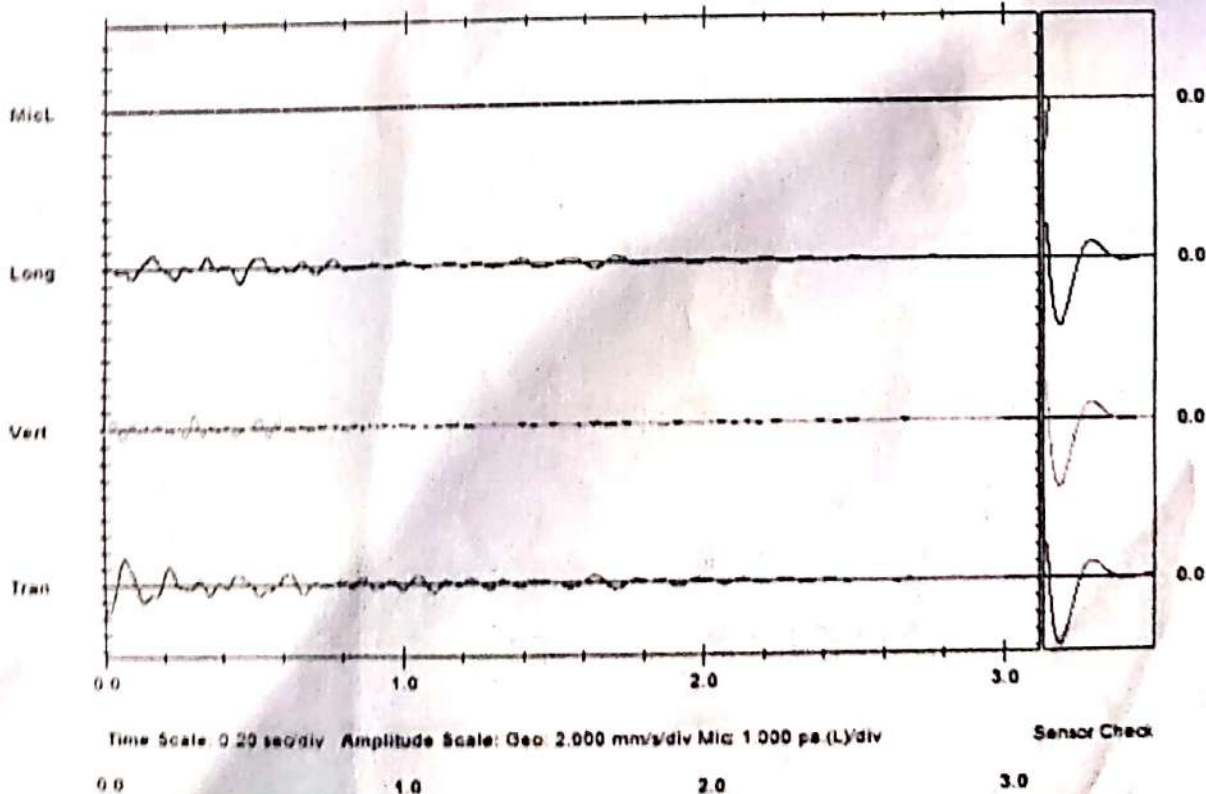
Microphone: Linear Weighting
PSPL: <0.500 ps (L)
ZC Freq: 6.7 Hz
Channel Test: Check (Freq = 0.0 Hz Amp = 0 mv)

	Tran	Vert	Long	
PPV	3.400	1.710	1.702	mm/s
ZC Freq	12.0	14.8	8.8	Hz
Time (Rel. to Trig)	0.014	0.304	0.453	sec
Peak Acceleration	0.023	0.026	0.016	g
Peak Displacement	0.066	0.018	0.033	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.3	7.3	Hz
Overswing Ratio	4.6	4.8	4.8	

Peak Vector Sum: 3.634 mm/s at 0.066 sec
N/A: Not Applicable



a) Industrial Buildings
b) Domestic houses/structures
c) Historic objects, sensitive structures





Event Report

Date/Time: Vert at 14:48:45 January 29, 2022
Trigger Source: Geo: 0.700 mm/s
Range: Geo: 254.0 mm/s
Record Time: 3.0 sec at 2048 sps
Operator/Setup: Operator/factory MMB

Serial Number: UM16971 V 10-89 Micromate ISEE
Battery Level: 3.8 Volts
Unit Calibration: November 18, 2021 by CIMFR Dhanabd
File Name: TEMP.EVT

Notes
Location:
Client:
User Name:
General:

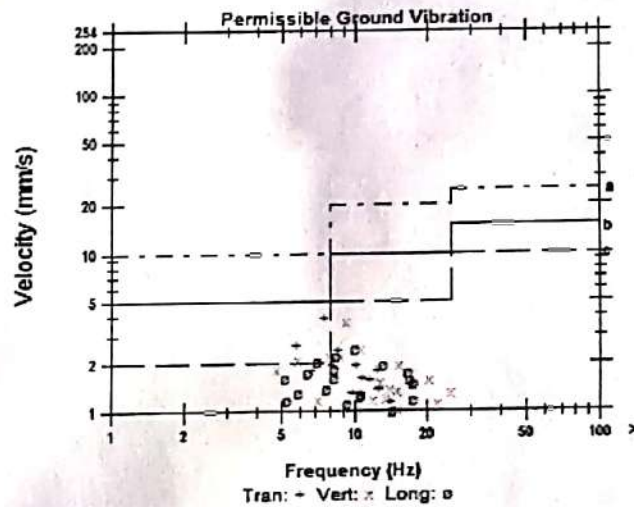
Post Event Notes
Kantapahari hired
Distance from blast -180 mtrs

Microphone: Linear Weighting
PSPL: <0.500 pa.(L)
ZC Freq: >200 Hz
Channel Test: Check (Freq = 0.0 Hz Amp = 0 mv)

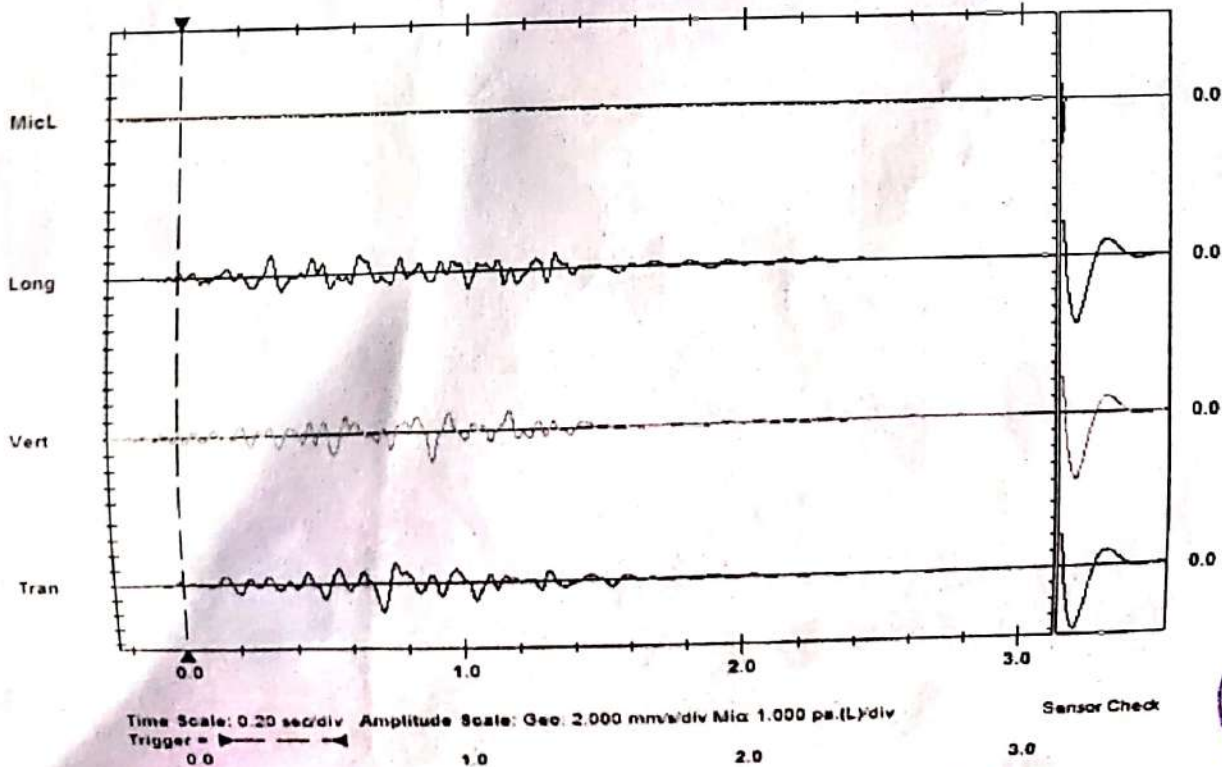
	Tran	Vert	Long	
PPV	3.854	3.681	2.459	mm/s
ZC Freq	7.6	9.3	10.1	Hz
Time (Rel. to Trig)	0.714	0.894	0.324	sec
Peak Acceleration	0.041	0.038	0.038	g
Peak Displacement	0.069	0.051	0.041	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.1	7.3	7.3	Hz
Overswing Ratio	4.5	4.7	4.7	

Peak Vector Sum: 3.913 mm/s at 0.893 sec
N/A: Not Applicable

DGMS India (A)



a) Industrial Buildings
b) Domestic houses/structures
c) Historic objects, sensitive structures



STRICTLY RESTRICTED**FOR COMPANY USE ONLY RESTRICTED**

The information given in this report is not to be communicated either directly or indirectly to the press or to any person not holding an official position in the CIL /GOVERNMENT.

ENVIRONMENTAL MONITORING REPORT OF BHARAT COKING COAL LIMITED, CLUSTER – IV

(FOR THE MONTH FEBRUARY, 2022)

E. C. no. J-11015/372/2010-IA.II (M) dated 23.10.2019.



CMPDI

ISO 9001 Company
Regional Institute-II
Dhanbad, Jharkhand

NOISE LEVEL QUALITY MONITORING

4.1 Location of sampling sites

- i) Govindpur (N7)
- ii) Katras Chotudih (N37)
- iii) Block IV(N6)
- iv) Nichitpur(N8)
- v) RudhiBasti (N18)

4.2 Methodology of sampling and analysis

Noise level measurements in form of 'L_{EQ}' were taken using Integrated Data Logging Sound Level Meter (NL-52 OF RION CO. Ltd. Make) during day time. Noise levels were measured for about one hour in day time. Noise levels were measured in Decibels, 'A' weighted average, i.e. dB (A).

4.3 Results & Interpretations

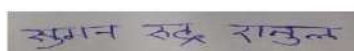
Ambient noise levels were recorded during day time and the observed values were compared with standards prescribed by MoEF&CC. The results of Noise levels recorded during day time on fortnightly basis are presented in tabular form along with the applicable standard permissible limits. The observed values in terms of L_{EQ} are presented. The observed values at all the monitoring locations are found to be within permissible limits.

NOISE LEVEL DATA

Name of the Project : Cluster -IV			Month: FEB 2022		
Sl. No.	Station Name/Code	Category of area	Date	Noise level dB(A)LEQ	*Permissible Limit of Noise level in dB(A)
1	Block IV(N6)	Industrial area	11.02.22	58.8	75
2	Block IV	Industrial area	25.02.22	59.3	75
3	Govindpur Village(N7)	Industrial area	11.02.22	59.9	75
4	Govindpur Village	Industrial area	25.02.22	60.6	75
5	Nichitpur(N8)	Industrial area	15.02.22	58.2	75
6	Nichitpur	Industrial area	28.02.22	59.4	75
7	Katras Chotudih(N37)	Industrial area	11.02.22	61.5	75
8	Katras Chotudih	Industrial area	25.02.22	62.1	75
9	Rudhi Basti(N18)	Residential area	01.02.22	54.1	55
10	Rudhi Basti	Residential area	16.02.22	53.7	55

*Permissible limits of Noise Level as per MOEF Gazette Notification No. GSR 742(E) dt. 25.09.2000 Standards for Coal Mines and Noise Pollution (Regulation and Control) Rules, 2000.

* Day Time: 6.00 AM to 10.00 PM,


 Analysed By
 JSA/SA/SSA


 Checked By
 Lab In Charge
 RI-2, CMPDI, Dhanbad


 Approved By
 HOD(In-charge) Environment
 RI-2, CMPDI, Dhanbad

KATRAS AREA

Safety

PME-Departmental

Year	Target (Annual)	Achievement(Target)
2012	1884	1752
2013	1920	1940
2014	1920	1826
2015	1730	1593
2016	1811	1338
2017	1650	1566
2018	1615	1393
2019	1512	1362
2020	1505	997(1505)
2021	720	720

IME_Contractor Workers

IME DONE 2013	IME DONE 2014	IME DONE 2015	IME DONE 2016	IME DONE 2017	IME DONE 2018	IME DONE 2019	IME DONE 2020	IME DONE 2021
283	423	298	384	267	124	30	06	260

VTC

SL No.	Worker				Years							
			2013	2014	2015	2016	2017	2018	2019	2020	2021 Up to Sep	Total
1	Basic		12	24	92	89	60	71	29	41	8	426
2	Refresher	T	610	610	590	660	610	650	610	635	625	5600
		A	708	687	816	1093	769	705	715	686	89	6268
3	Contractor		138	391	566	357	188	159	27	11	00	1837
4	Change of Job							44	69	60	26	199



Table 4.9 : Afforestation programme of the Cluster-IV

	Year	Quarry land (abandoned)		Active Quarry Area		OB dumped out side quarry area		Service Building/ Mine Infrastructure / Coal dump		Green belt around OCP		Barren Land		Total Plantation	Total Area Under Additional Plantation (Ha)	Total Plantation cost @ Rs.55101/Ha (in Rs.Lakhs)
		Area (ha)	Trees/saplings	Area (ha)	Trees/saplings	Area (ha)	Trees/saplings	Area (ha)	Trees/saplings	Area (ha)	Trees/saplings	Area (ha)	Trees/saplings			
During active mining (A)	1	2	5000							2	5000	2	5000	15000	6	3.31
	2	2	5000							2	5000	2	5000	15000	6	3.31
	3	2	5000							2	5000	2	5000	15000	6	3.31
	4	2	5000							2	5000	2	5000	15000	6	3.31
	5	2	5000							2	5000	2	5000	15000	6	3.31
	6	3	7500							2	5000	2	5000	17500	7	3.86
	7	3	7500							2	5000	2	5000	17500	7	3.86
	8	3	7500							2	5000	2	5000	17500	7	3.86
	9	3	7500							2	5000	2	5000	17500	7	3.86
	10	3	7500							2	5000	2	5000	17500	7	3.86
	11	5	12500							2	5000	2	5000	22500	9	4.96
	12	5	12500							2	5000	2	5000	22500	9	4.96
	13	5	12500							2	5000	2	5000	22500	9	4.96
	14	5	12500							2	5000	2	5000	22500	9	4.96
	15	5	12500	5	12500					2	5000	2	5000	35000	14	7.71
	16	5	12500	5	12500					3	7500	3	7500	40000	16	8.82
	17	5	12500	5	12500					3	7500	3	7500	40000	16	8.82
	18	5	12500	5	12500					3	7500	3	7500	40000	16	8.82
	19	4.75	11875	5	12500					3	7500	3	7500	39375	15.75	8.68
	20			5	12500					3	7500	3	7500	27500	11	6.06
	21			5	12500					3	7500	3	7500	27500	11	6.06
	22			5	12500					3	7500	3	7500	27500	11	6.06
	23			5	12500	2	5000			3	7500	3	7500	32500	13	7.16
	24			5	12500	2	5000			3	7500	3	7500	32500	13	7.16
	25			5	12500	2	5000			3	7500	5	12500	37500	15	8.27
	26			10	25000	2	5000			3	7500	5	12500	50000	20	11.02
	27			10	25000	2	5000			3	7500	5	12500	50000	20	11.02
	28			10	25000	2	5000			3	7500	5	12500	50000	20	11.02
	29			10	25000	2	5000			3	7500	5	12500	50000	20	11.02
	30			9.9	24750	2	5000			3	7500	8	20000	57250	22.9	12.62
	Total (A)	69.75	174375	104.9	262250	16	40000	0	0	75	187500	90	225000	889125	355.65	195.96671
Post mining (B)		10	25000	30	75000	4	10000	30	75000	10	25000	20	50000	260000	104	57.31
		10	25000	30	75000	4	10000	30	75000	10	25000	20	50000	260000	104	57.31
		10	25000	30	75000	4.89	12225	32.25	80625	10.55	26375	14.38	35950	255175	102.07	56.24
	Total (B)	30	75000	90	225000	12.89	32225	92.25	230625	30.55	76375	54.38	135950	775175	310.07	170.85167
Grand (A+B)		99.75	249375	194.9	487250	28.89	72225	92.25	230625	105.55	263875	144.38	360950	1664300	665.72	366.81838

CSR Works & Expenditure FY 2020-21*						
(CSR Budget - ₹ 5.54 Crore)						
SI No	CSR Projects identified	District and State of Project		Amt. spent (₹ lakhs)		Direct or through agency
		District	State	Direct Exp	Overheads	
A	Promoting education,including special education & employment enhancing vocation skills especially among children,women,elderly,and the differently abled & livelihood enhancement projects					
1	Works in RBB School, Rajganj	Dhanbad	Jharkhand	27.57	--	Direct
B	Rural Development Works					
1	Construction of marriage hall at Ratanpur panchayat, Govindpur Block	Dhanbad	Jharkhand	3.73	--	Direct
2	Other Civil Works	Dhanbad	Jharkhand	1.69	--	Direct
C	COVID-19 related initiatives					
1	Procurement of bleaching powder	Dhanbad	Jharkhand	6.4	--	Direct
2	Procurement of face masks	Dhanbad	Jharkhand	0.16	--	Direct
3	Financial assistance to D.C. Dhanbad to combat COVID-19 situation in Dhanbad	Dhanbad	Jharkhand	200	--	Depository mode of work execution through Dhanbad district administration
	Total			239.55	--	

** Figures unaudited for the FY 2020-21*

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(CSR Budget - ₹ 5.54 Crore)						
SI No	CSR Projects identified	District and State of Project		Amt. spent (₹ lakhs)		Direct or through agency
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	Total			239.55	--	

** Figures unaudited for the FY 2020-21*





Few CSR works done by BCCL during Covid 19 Pandemic



BHARAT COKING COAL LIMITED Corporate Environment Policy



ENVIRONMENTAL POLICY STATEMENT:

Bharat Coking Coal Limited (BCCL) is committed to promote sustainable development by protecting the environment through integrated project planning & design, prevention / mitigation of pollution, conservation of natural resources, restoration of ecology & biodiversity, recycling/ proper disposal of wastes, addressing climate change and inclusive growth. It also aims to bringing awareness amongst its stakeholders for continual improvement in environmental performances following best practices.

OBJECTIVES:

Bharat Coking Coal Limited shall endeavour to:

1. Plan & design projects with due consideration to environmental concerns for Sustainable Development.
2. Conduct mining and associated operation in an environmentally responsible manner to comply with applicable laws and other requirements related to environmental aspects.
3. Prevent pollution of surrounding habitation by continuous monitoring and adopting suitable measures for environment protection.
4. Implement Environment Management Plans in all our mines /projects/Clusters effectively to mitigate pollution, conservation of natural resources and restoration of ecology & biodiversity.
5. Ensure compliance of all applicable Environmental Clearance& Forestry Clearance conditions and other statutory conditions issued by regulatory agencies.
6. Recycling of wastes on the principle of REDUCE, REUSE and RECYCLE.
7. Put special thrusts on efficient energy utilization / renewable energy as a measure to reduce carbon foot-print.
8. Strive for continual improvement in our environmental performances by setting targets, measuring progress and taking corrective action.
9. Taking measures to render productive post mining land use.
10. Implementation of activities applicable to BCCL arising out of International Conventions.
11. Create environmental awareness among the employees and the local communities through pro-active communication and training

STRATEGIES FOR IMPLEMENTATION OF ENVIRONMENTAL POLICY:

BackGround:

Bharat Coking Coal Limited subscribes to the view of Sustainable Development. Unless the environment can sustain all the developmental activities, any pursuit of development in isolation can cause irreparable damage to the ecosystem and associated environmental attributes. Keeping this view in mind, Bharat Coking Coal Limited attaches top priority towards sustainable development and approved its 'Corporate Environmental Policy'. Based on CIL Environment Policy 2012, incorporating the Jharia Master Plan ,CEP of BCCL was approved by 285th BCCL board on 21.04.2012 and is complimentary to the National Environmental Policy, 2006. The Revised BCCL Policy, 2019 is the outcome of the experience gained since 2012, keeping in view the modifications / amendments made time to time in environmental policies and additional stipulation notified by MoEF&CC (Ministry of Environment, Forest& Climate Change), and other organisations concerning mine closure, reclamation of degraded land, environmental clearance etc. and also with the objective of revisiting the corporate policy. The Policy has a vision of Green Mining and mission of 100%

compliance of environmental statutes applicable to coal mining industry. This policy is prepared in line with that of CIL's policy with incorporation of prevailing local conditions.

STRATEGIES: Bharat Coking Coal Limited adopts the strategies appended below for effective implementation:

1. MINE/ PROJECT PLANNING & DESIGN FOR SUSTAINABLE DEVELOPMENT:

- a) Coal being a non-renewal energy source, extraction shall be planned prudently to meet national requirement in a planned way. The projects shall be designed on the principle of Sustainable Development with due consideration to environment, mine closure, safety and aspirations of the stakeholders at the planning & design stage itself with due regard to mine closure plan.
- b) While preparing the Mining plan/project reports, the effort shall be to incorporate latest mining technologies and equipment's with optimal capacity, which are more environment friendly
- c) All Mining Plan/ project reports will be provided with detailed provisions for ensuring environmental compliances

2. ENVIRONMENTAL IMPACT ASSESSMENT (EIA) & ENVIRONMENT MANAGEMENT PLAN (EMP)

- a. All mine planning and design shall be environmentally acceptable and operation shall be carried out in such a way as to facilitate the compliance of stipulated environmental standards.
- b. EIA& EMP for all projects/Clusters shall be formulated as per the approved ToR (Terms of Reference) and public consultations for obtaining Environmental Clearance (EC) from MoEF&CC. Similarly, in the existing projects needing enhancement of production capacities with or without increase in land, change of technology, renewal of lease and change in land use etc. fresh EC is required to be sought as per norms. The projects shall be operated after obtaining Consent to Establish (CTE)/ Consent to Operate (CTO) from State Pollution Control Boards (SPCB).
- c. Detailed Mine Closure Plans shall be prepared for all existing and new mines as per the MoC (Ministry of Coal) guidelines.

3. COMPLIANCE OF THE STATUTORY REQUIREMENTS:

The implementation of EMP and fulfilment of all other statutory requirements like conditions of EC, FC and consents to establish & operate, including timely submission of returns to statutory bodies and various agencies, are to be ensured at all levels.

4. MEASURES TO MITIGATE POLLUTION:

a) Air Pollution:

- i) Generation of dust is to be controlled at the source to the possible extent with necessary control measures during drilling, blasting, loading, unloading, CHP transfer points etc.
- ii) Deployment of eco-friendly mining technologies.
- iii) Dust generation is to be minimized along coal/ waste transportation routes.
- iv) Mechanized transportation of coal to be encouraged.
- v) Green belt is to be created around the source of dust

b) Water pollution:

- i) The mine water and other effluent shall be treated to ensure the discharge norms as per statute. The treated effluent shall be utilized to the extent possible with a view to achieve maximum water conservation.
- ii) Oil & grease from the effluent shall be removed by Oil & Grease Traps for proper disposal.

c) Noise / ground vibration:

- i) All measures to minimize noise pollution will be taken including maintenance of HEMM, equipment and provision of PPE where required.
- ii) Suitable blasting techniques shall be followed to reduce ground vibration as well as noise pollution.

d) Land reclamation:

- i) Progressive and concurrent reclamation of mined out areas will be carried out as per approved EIA/EMP and Mine Closure Plan (MCP).
- ii) Slopes of external dumps are the important area to be suitably graded / terraced for effective reclamation and plantation.
- iii) Preservation of top soil is required for future use. Old as well as existing nonactive dumps are to be technically and biologically reclaimed.
- iv) Monitoring of reclamation work of all opencast mines will be done through Satellite Surveillance. The outcome shall be put in the websites.

e) Mine closure plans:

Mine Closure Plan (MCP) shall be prepared for each mine on which Mine closure guidelines are applicable. MCP are being delineated in two phases viz. progressive and final mine closure. Appropriate funds are set aside and deposited under a special Escrow fund every year as per MoC guidelines, to be utilized for proper and final mine closure. For mines closed prior to issuance of MoC guidelines (i.e. 27th August, 2009) suitable action to be taken as per provisions of Mines Act 1952.

f) Mine fire & subsidence

BCCL shall endeavour to reduce occurrence of mine fire and subsidence due to mining activity for safety and conservation purpose and, shall take steps for prevention and control of coal mine fire. Monthly report shall be submitted to top management of the subsidiary and CIL and Quarterly to company board. Action Plan for mine fire control shall be implemented. Monitoring will be done through Satellite Surveillance/other suitable technology. Rehabilitation under Master Plan will be expedited to facilitate faster liquidation of fire. During the execution of the Master Plan since 2009, changes have occurred in the fire dealing methodology, the number of affected families and the infrastructure facilities to be provided to them. However, these modifications were executed in cognizance of HPCC committee for JMP.

BCCL is committed for implementation of the GOI approved Master Plan for Dealing with Fire, Subsidence and Rehabilitation in leasehold of BCCL (Jharia Master Plan) which is also required to be dovetailed with the implementation of EC conditions of various clusters of BCCL. Necessary steps shall be taken for implementation of Jharia master plan to deal with the problem of fire and subsidence in JCF along with R&R of affected people.

g) Monitoring:

All receptors in and around the mining projects/clusters shall be monitored regularly to assess the efficacy of the pollution control / mitigation measures within stipulated standards.

II. Effect of mining on the hydrology of the area will be monitored through measurement of water level and quality of nearby wells and bore holes provided for this purpose. Conservation of water through rainwater harvesting shall be taken up.

III. Area and Unit environmental cells shall have regular interaction with the people in and around the coal mines and other allied units on matters related to environment to take necessary and timely corrective actions.

V. Environmental initiatives and monitoring through self and third party environment audit shall be conducted for generating useful data for taking corrective actions and mitigation measures as per guidelines.

h) Other measures:

I. Special emphasis shall be given to undertake R&D related to various facets of coal mine environmental management in collaboration with Central Mine Planning and Design Institute (CMPDI) and other competent institutions.

II. Besides ensuring statutory compliance, the BCCL desires to set high standards and continual improvement.

III. Mines & establishments shall be ISO 14001 certified in phased manner.

IV. CSR and R&R policies of CIL are to be incorporated by BCCL for better planning and implementation of the socio-economic issues of coal mining areas.

V. The coal mining environmental issues are complex and require multi-disciplinary approach to address the same. BCCL will endeavour to enter into MoUs with expert agencies of repute to assist in environment issues and also help in capacity building of BCCL executives.

VI. BCCL conduct periodical medical examination (PME) of its work force on routine basis in compliance of the requirement mining rules and regulation, additional test will be done as and when required.

5. PRESERVATION OF BIO-DIVERSITY:

BCCL has made the ecological restoration a flagship programme for restoration of degraded mined areas and adopting 3- tier plantation consisting of native species grasses, bushes and trees under the technical expertise of Forest research institute, Dehradun, a renowned institute in the field of forests and ecology. Ecological restoration has been widely accepted as one of the most effective means to restore the ecology and biodiversity.

BCCL is committed towards the conservation and restoration of the natural biodiversity of the region on the degraded mined out areas and restore back to forest like areas. BCCL will strive to restore the habitats for the native fauna of the region by restoring the areas through ecological restoration.

BCCL is committed towards the wellbeing and betterment of the living standards for the local community through establishment of the eco-parks in the reclaimed mined areas in the coalfield and promoting the eco-mining tourism in the coalfield areas and exploring the new opportunities to the local communities. This will start from mine planning including technically and biologically reclamation of mined out areas in collaboration with State Forest Departments, Wild Life Divisions, NGOs, FRI Dehradun etc. working in the fields of biodiversity conservation.

6. COAL BENEFICIATION / COAL WASHERIES:

a) For beneficiation of Runoff Mines (ROM) coal, washeries are being set up in a phased manner as per requirement and statutes.

b) Slurry Management System (SMS) in all washeries shall be organized to ensure collection of fines, gainful utilization of rejects viz. power generation in Fluidized Bed Combustion (FBC) plants, selling to brick manufacturers or adopting other environmental friendly disposal options as feasible.

c) The reject dumps and tailings shall be suitably handled to avoid any contamination.

d) The effluent from washeries including tailings pond shall be suitably treated and reused to minimize water consumption with zero discharge concept.

7. CONSERVATION AND CLEAN TECHNOLOGY:

a) R&D projects shall be taken up to promote clean coal technology and improve the existing technologies.

b) Energy saved is energy produced. Voluntary energy audit to be done for corrective action to reduce carbon footprint.

c) Clean Development Mechanisms will be explored for reducing emission of Green House Gases by exploration, identification, preparation of projects reports for extraction of methane from Coal Bed, Coal Mine, Abandoned Mine, Ventilation Air, UG Coal Gasification, generation and utilization of renewable energy etc.

8. AWARENESS PROGRAMME:

- a) Publicity to generate awareness through exchange & communication of information, newsletters and periodicals on environment, seminars, workshops, celebration of World Environment Day etc, at BCCL HQ, Areas & units to be undertaken. Regular training programs to be organized at various levels to inculcate awareness among employees.
- b) Courses on environmental and forestry laws and Environmental Protection Measures and the Corporate Policy to be organized for project executives for improving knowledge.
- c) BCCL will felicitate its workers for best practices in eco-restoration, land reclamation, conservation, compliance of statutes and innovative ways of sustaining environment.

9. WASTE MANAGEMENT:

BCCL will undertake appropriate action for safe handling, storage and disposal of solid waste and hazardous waste generated from its industrial set up and colonies as per relevant rules. The biomedical waste generated from hospitals and dispensaries will be collected and disposed in appropriate facilities created as per statutes. E-waste management and handling of various types of e-waste generated in its operations will be done as per rule.

10. CORPORATE ENVIRONMENT RESPONSIBILITY:

Corporate Environment Responsibility (CER) is mandatory for issuing environmental clearance for all the Greenfield and Brownfield projects as per directives of MoEFCC with effect from 1st May, 2018 (O.M.No.22-65/2017- IAIII dt. 19.06.2018). Budgetary provisions should be kept for implementation of provisions of CER for all the projects which will be submitted to MoEFCC for grant of environmental clearance.

11. INCORPORATION OF VIEWS OF STAKEHOLDERS:

BCCL will critically examine and incorporate the viewpoints of various stakeholders like PAPs/PAFs, Parliamentary Committees, Standing Sub-Committees, NGOs etc.

12. IMPLEMENTATION OF POLICY:

i) Manpower: BCCL shall have environmental divisions at decision making & operational levels in its structure. The environment department shall be set up and strengthened at:

i) BCCL HQ

ii) Areas / Units / Collieries / Workshops / Washeries

ii) Roles and Responsibilities: The environmental department, set up at company HQs, Areas and Unit levels with appropriate manpower and resources, shall be responsible for implementation of policy, obtaining EC, FC, consent to establish & operate, statutes requirements and undertaking mitigation measures besides preparation of action plan every year and also to intimate the status of implementation to the management regularly.

iii) Annual Environment Budget (Revenue & Capital): The Annual Environment Budget (revenue & capital) shall be prepared based on the action plan including monitoring of various bench marks and the budget utilization. The year wise funds earmarked for environmental protection measures shall be kept in separate accounts with Environmental cost code.

REVIEW OF ENVIRONMENTAL POLICY:

In view of the present fast changing social, economic and environmental scenario, the CIL Policy shall be reviewed every 5 years to incorporate the changes in the legal, technical, environmental, economic and social inputs prevailing at that time. Whenever, there is change in National Environmental Policy or other National / State relevant policies, Acts etc, the CIL Corporate Environmental Policy would be reviewed and suitably revised. It will be followed by revision of this policy accordingly.

Place: Dhanbad

Date:

P. Chand
Chairman-cum-Managing Director

21/02/2022

Major Environmental measures cost for the year 2020-21

Sl. No.	Activity (20-21)	Approx Cost Incurred (In Lakhs)
1	Environmental Monitoring (Air, water and noise)	18.71
2	Procurement of 28 KL Water Tanker (3 Nos)	500.00
3	Ecological Restoration/Block Plantation/Green Park	143.0
4	Fire covering/blanketing/fighting	80.00
5	Water Sprinkling	75.00
6	Water treatment plant	35.00
7	Top soil Management	2.5
	Plantation by DFO	29.48
	Avenue Plantation (Gabion plantation)	2.58
Total Cost Incurred		886.27

Note:- Amount deposited in Escrow account for implementation of progressive mine closure Activity in the mines under cluster IV 5.66 Crores in the FY20-21.



झारखण्ड राज्य प्रदूषण नियंत्रण पर्वद्
Jharkhand State Pollution Control Board
HIG-1, Housing Colony, Dhanbad-826001

Ph: 0326-2204933

7

Letter No. 2650

Dated 6/7/13

From,

Regional Officer,
Dhanbad

To,

HOD (Envl.),
M/s. B.C.C.L.,
Koyla Bhawan, Koyla Nagar,
Dhanbad.Sub: **Fixing up monitoring station/Sampling location of Air, Water & Noise.**

Sir,

With reference to you letter no. GM(Envl.)/F-JSPCB/2013/783, dt. 06.07.2013 We have approved Air, Water & Noise monitoring Station/Sampling location after verification and return a copy of the map.

Encl-A/a.

Your's faithfully,

6/7/13
(Dinesh Prasad Singh)
Regional Officer.

Memo.....

Dhanbad, dated.....

Copy to: The Member Secretary, Jharkhand State Pollution Control Board for information & enclose a copy of the map for necessary action.

Encl-A/a.

(Dinesh Pd. Singh)
Regional Officer.

STRICTLY RESTRICTED**FOR COMPANY USE ONLY RESTRICTED**

The information given in this report is not to be communicated either directly or indirectly to the press or to any person not holding an official position in the CIL /GOVERNMENT.

**ENVIRONMENTAL MONITORING REPORT
OF
BHARAT COKING COAL LIMITED,
CLUSTER – IV**

(FOR THE MONTH FEBRUARY, 2022)

E. C. no. J-11015/372/2010-IA.II (M) dated 23.10.2019.



CMPDI

ISO 9001 Company
Regional Institute-II
Dhanbad, Jharkhand

CONTENTS

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EXECUTIVE SUMMARY

1.0 Introduction

The purpose of environmental monitoring is to assess the quality of various attributes that affects the fauna and flora. In accordance with the quality of these attributes appropriate strategy is to be developed to control the pollution level within the permissible limits. The three major attributes are air, water and noise level.

Bharat Coking Coal Limited (BCCL), a Subsidiary company of Coal India Limited is operating Underground and Opencast Mines in Jharia Coalfield (JCF) is a part of Gondwana Coalfields located in Dhanbad district of Jharkhand, the JCF is bounded by 23°37' N to 23°52' N latitudes and 86°09' E to 86°30' E longitude occupying an area of 450 Sq.km. BCCL has awarded Environmental monitoring work of Jharia Coalfield (JCF) to Central Mine Planning & Design Institute Limited (CMPDIL). The environmental monitoring has been carried out as per the conditions laid down by the MoEF&CC while granting environmental clearance of project, consent letter issued by the respective SPCB, and other statutory requirements.

2.0 Sampling location and rationale

2.1 Ambient air sampling locations

The ambient air quality monitoring stations were selected to represent core, buffer zone area. The rationale has been based on the guidelines stipulated by MoEF&CC, consent letter of SPCB, as well as other statutory requirements.

2.2 Water sampling stations

The Water sampling stations were selected for mine sump water.

2.3 Noise level monitoring locations

Noise levels vary depending on the various activities in mining areas. The monitoring of noise level in different locations will be helpful to take appropriate mitigating measures. The rationale has been based on the guidelines stipulated by MoEF&CC, consent letter of SPCB, as well as other statutory requirements.

3.0 Methodology of sampling and analysis

3.1 Ambient air quality

Parameters chosen for assessment of ambient air quality were Particulate Matter (PM₁₀), Fine Particulate Matter (PM_{2.5}), Sulphur Di-oxide (SO₂) and Nitrogen Oxides (NO_x). Respirable Dust Samplers (RDS) and Fine Dust Sampler (PM_{2.5}

sampler) were used for sampling of PM₁₀, SO₂, & NO_x and Fine Dust Sampler (PM_{2.5} sampler) were used for sampling of PM_{2.5} at 24 hours interval once in a fortnight and the same for the gaseous pollutants. The samples were analysed in Environmental Laboratory of CMPDI, RI-II, Dhanbad.

3.2 Water quality

Water samples were collected as per standard practice. The Mine effluent samples were collected and analysed for four parameters on fortnightly basis. Thereafter the samples were preserved and analysed at the Environmental Laboratory of CMPDI, RI- II, Dhanbad.

3.3 Noise level monitoring

Noise level measurements in form of 'L_{EQ}' were taken using Integrated Data Logging Sound Level Meter. Noise levels were measured in Decibels, 'A' weighted average, i.e. dB (A).

4.0 Results and interpretations

4.1 Air quality

It has been seen from the analysis results that the 24 hours average concentration parameters like PM₁₀, PM_{2.5}, SO₂ and NO_x are mostly within the permissible limits in all sampling locations as per MoEF&CC Gazette Notification No. GSR 742(E) dt 25.09.2000 Standards for Coal Mines and National Ambient Air Quality Standard -2009. Sometimes the concentration of PM₁₀& PM_{2.5} exceeds the limits due to heavy public traffic, poor road condition, coke oven plants, burning of coal by surrounding habitants, brick making, municipal waste dumps and industries like Steel Plant, thermal Plants including their fly ash etc.

The following preventive and suppressive mitigative measures can be undertaken to contain the pollution level within prescribed level:-

- Wet drilling and controlled blasting should be practice.
- Explosive used should be optimised to restrict the dust generation.
- Transportation roads should be permanently asphalted free of ruts, potholes etc.
- Water should be sprayed on coal transportation road, service road more frequently and at regular interval.
- Dust from roads should be removed physically or mechanically.
- Greenbelts around industrial sites, service building area besides Avenue plantation along roads should be created.
- Coal dust should be suppressed by using fixed sprinklers.
- Regular maintenance of plant and machinery should be undertaken.

4.2 Water quality

The test results indicate that the major parameters compared with MoEF&CC Gazette Notification No. GSR 742(E) dt 25.09.2000 Standards for Coal Mines, are within permissible limits.

4.3 Noise Level

During the noise level survey it has been observed that the noise level in the sampling locations is within the permissible limits prescribed as per MoEF&CC Gazette Notification No. GSR 742(E) dt 25.09.2000 Standards for Coal Mines for Industrial Area and Noise pollution (Regulation and Control) Rules, 2000.

INTRODUCTION

Any industry and development activities including coal mining is bound to affect environmental attributes. There are positive as well as negative impacts of such operations. For controlling the adverse impacts a regular monitoring is essential. The environmental monitoring is being done as per the guide-lines stipulated by Ministry of Environment, Forest and Climate Change (MoEF&CC), Govt. of India.

The very purpose of environmental monitoring is to assess the quality of various attributes which affects the environment. As per quality of these attributes appropriate strategy is to be developed to control the pollution level within the permissible limits. The three major attributes are air, water and noise level.

Bharat Coking Coal has awarded Environmental Monitoring work of all Projects, Cluster wise, to Central Mine Planning & Design Institute Limited (CMPDIL). The environmental monitoring has been carried out as per conditions laid down by MoEF&CC while granting environmental clearance to different projects. CMPDI has trained manpower and well equipped laboratory to carry out monitoring, analysis and R&D work in the field of environment.

The Cluster IV is in the Northern part of the Jharia coalfield. It includes Salanpur colliery, Katraschoitodih colliery(OC), Amalgamated Keshalpur – West Mudidih Mixed (OCP & UG) Mines, Amalgamated Ramkanali – Angarpathra UG mines, Gaslitand OC. The cluster– IV is situated about 25 – 30 kms from Dhanbad Railway Station. The mines of this cluster- IV are operating since pre nationalization period (prior to 1972-73). It is connected by both Railway and Road. The drainage of the area is governed by Katri Jore. The Project has Environmental Clearance from Ministry of Environment, Forest and Climate Change (MoEF&CC) for a rated capacity of 7.34 MTPA (normative) and 9.55 MTPA peak capacity of coal production vide letter no. J-11015/372/2013-IA.II (M) dated 23rd October, 2019

Ministry of Environment, Forest and Climate Change while granting environmental clearance has given one of the General conditions that “ Four ambient air quality monitoring stations should be established in the core zone as well as in the buffer zone for PM₁₀, PM_{2.5}, SO₂, NO_x monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets, other conditions regarding water / effluent and noise level monitoring in consultation with the State Pollution Control Board.”

In compliance of these conditions the Environmental Monitoring has been carried out & report prepared for submission to MoEF&CC& JSPCB and other statutory authorities.

AMBIENT AIR QUALITY MONITORING

2.1 Location of sampling station and their rationale:

(As per G.S.R. 742 (E) dt. 25th December, 2000)

2.1.1 Ambient Air Quality Sampling Locations

I. CORE ZONE Monitoring Location

i) Govindpur Village (A7): Industrial Area

The location of the sampling station is 23° 48'34" N, 86° 18'22" E. The sampler was placed at 1.5 m above the ground level at AARC agent Office.

ii) Katras Chotudih (A37): Industrial Area

The location of the sampling station is at the roof top of the Manager Office.

II. BUFFER ZONE Monitoring Location

i) Block IV (A6) : industrial area

The location of the sampling station is 23° 47.916' N 86° 15.333' E. The sampler was placed at a height of 1.5 m above the ground level in Safety office of Block IV OCP.

ii) Nichitpur (A8): Industrial Area

The location of the sampling station is 23° 48'20" N 86° 21'30" E. The sampler was placed at roof top at Safety office of Nichitpur.

iii) Rudhi Basti(A18): Residential Area

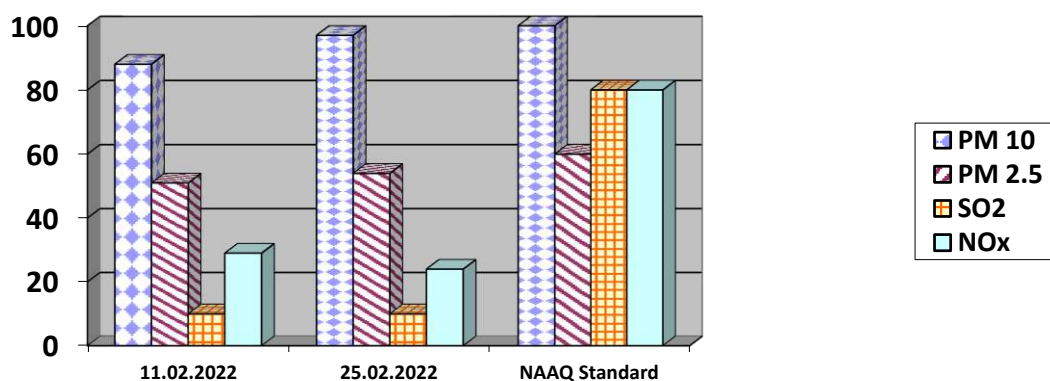
The sampler was placed at a height of 1.5 m above the ground level at Rudhi Basti.

AMBIENT AIR QUALITY DATA

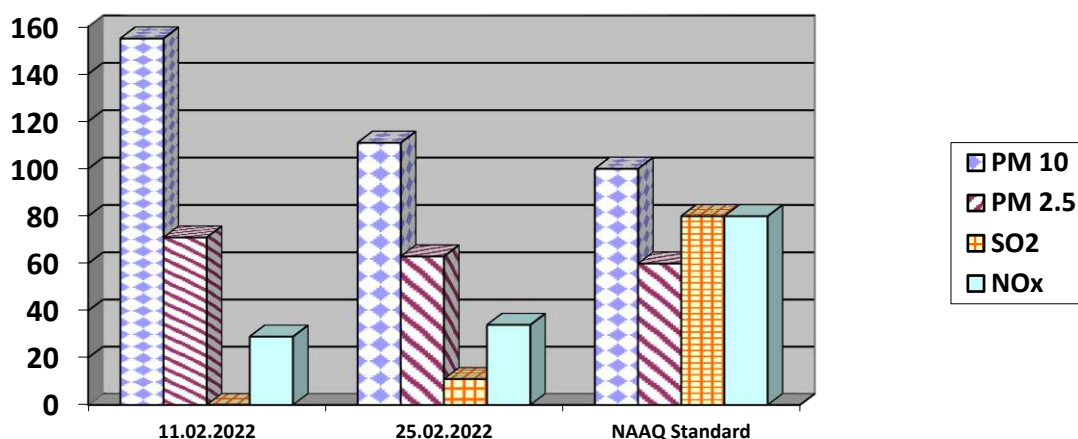
Cluster – IV, Bharat Coking Coal limited Month: FEB. 2022

Year: 2021-22.

Station Name: A7, Govindpur		Zone: Core		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO ₂	NO _x
1	11.02.2022	88	51	10	29
2	25.02.2022	97	54	10	24
	NAAQ Standard	100	60	80	80



Station Name: A37, Katras Chotudih		Zone: Core		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO ₂	NO _x
1	11.02.2022	155	71	<10	29
2	25.02.2022	111	63	11	34
	NAAQ Standard	100	60	80	80

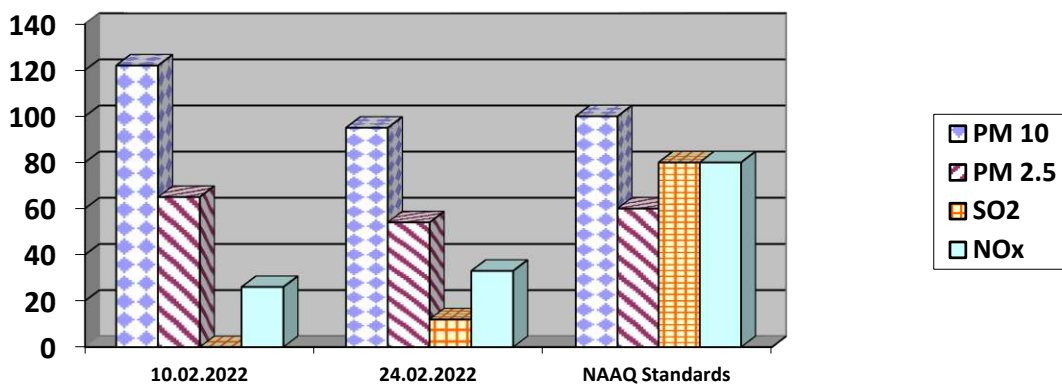



 Analysed By
 JSA/SA/SSA

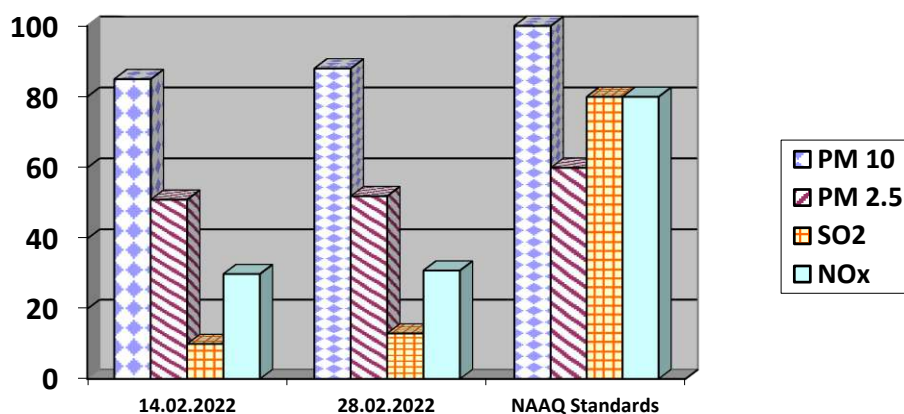

 Checked By
 Lab In Charge
 RI-2, CMPDI, Dhanbad


 Approved By
 HOD(In-charge) Environment
 RI-2, CMPDI, Dhanbad

Station Name: A6,Block IV		Zone: Buffer		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	10.02.2022	122	65	<10	26
2	24.02.2022	95	54	12	33
	NAAQ Standards	100	60	80	80



Station Name: A8,Nichitpur		Zone: Buffer		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	14.02.2022	85	51	10	30
2	28.02.2022	88	52	13	31
	NAAQ Standards	100	60	80	80

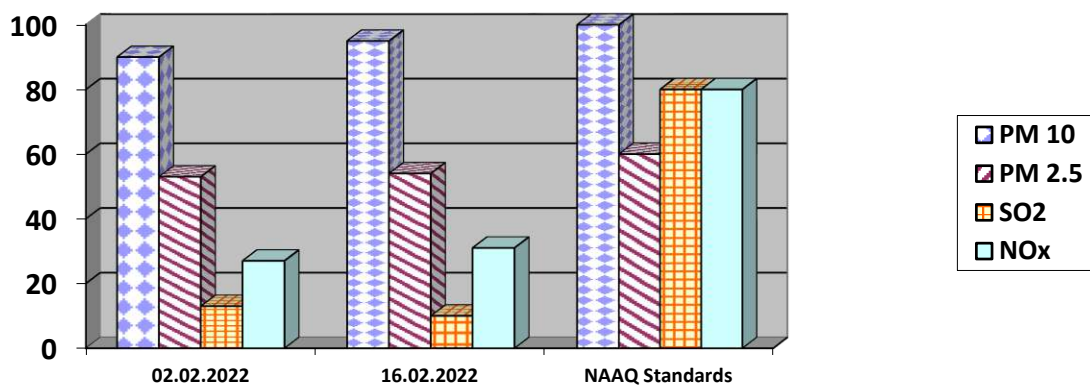


अमान रंजन रावत
Analysed By
JSA/SA/SSA

Checked By
Lab In Charge
RI-2, CMPDI, Dhanbad

अमित
Approved By
HOD(In-charge) Environment
RI-2, CMPDI, Dhanbad

Station Name: A18,Rudhi Basti		Zone: Buffer		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	02.02.2022	90	53	13	27
2	16.02.2022	95	54	10	31
	NAAQ Standards	100	60	80	80



- All values are expressed in microgram per cubic meter.
- 24 hours duration

सुमान रंज राहुन
Analysed By
JSA/SA/SSA

Checked By
Lab In Charge
RI-2, CMPDI, Dhanbad

अमित
Approved By
HOD(In-charge) Environment
RI-2, CMPDI, Dhanbad

WATER QUALITY MONITORING

3.1 Location of sampling sites

(Refer **Plate No. – II**)

i) **Mine Discharge of Chotudih (MW4)**

A sampling point is fixed to assess the effluent quality of Mine discharge. This location is selected to monitor effluent discharge in to Katri jore.

3.2 Methodology of sampling and analysis

Water samples were collected as per standard practice. The effluent samples were collected and analysed for four parameters on fortnightly basis at the Environmental Laboratory of CMPDI RI-II, Dhanbad.

3.3 Results & Interpretations

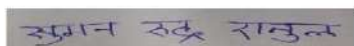
The results are given in tabular form along with the applicable standards. Results are compared with Schedule - VI, effluent prescribed by MoEF&CC. Results show that most of the parameters are within the permissible limits.

WATER QUALITY DATA

(EFFLUENT WATER- FOUR PARAMETERS)

Name of the Cluster: Cluster -IV		Month: FEB 2022	Name of the Station: Mine Discharge of Chotudih	
Sl. No.	Parameters	MW4 First Fortnight	MW4 Second Fortnight	As per MOEF General Standards for schedule VI
		07.02.2022	21.02.2022	
1	Total Suspended Solids	49	50	100 (Max)
2	pH	7.95	7.91	5.5 - 9.0
3	Oil & Grease	<2.0	<2.0	10 (Max)
4	COD	36	24	250 (Max)

All values are expressed in mg/lit unless specified.


 Analysed By
 JSA/SA/SSA


 Checked By
 Lab In Charge
 RI-2, CMPDI, Dhanbad


 Approved By
 HOD(In-charge) Environment
 RI-2, CMPDI, Dhanbad

NOISE LEVEL QUALITY MONITORING

4.1 Location of sampling sites

- i) Govindpur (N7)
- ii) Katras Chotudih (N37)
- iii) Block IV(N6)
- iv) Nichitpur(N8)
- v) RudhiBasti (N18)

4.2 Methodology of sampling and analysis

Noise level measurements in form of 'L_{EQ}' were taken using Integrated Data Logging Sound Level Meter (NL-52 OF RION CO. Ltd. Make) during day time. Noise levels were measured for about one hour in day time. Noise levels were measured in Decibels, 'A' weighted average, i.e. dB (A).

4.3 Results & Interpretations

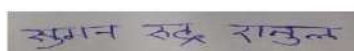
Ambient noise levels were recorded during day time and the observed values were compared with standards prescribed by MoEF&CC. The results of Noise levels recorded during day time on fortnightly basis are presented in tabular form along with the applicable standard permissible limits. The observed values in terms of L_{EQ} are presented. The observed values at all the monitoring locations are found to be within permissible limits.

NOISE LEVEL DATA

Name of the Project : Cluster -IV			Month: FEB 2022		
Sl. No.	Station Name/Code	Category of area	Date	Noise level dB(A)LEQ	*Permissible Limit of Noise level in dB(A)
1	Block IV(N6)	Industrial area	11.02.22	58.8	75
2	Block IV	Industrial area	25.02.22	59.3	75
3	Govindpur Village(N7)	Industrial area	11.02.22	59.9	75
4	Govindpur Village	Industrial area	25.02.22	60.6	75
5	Nichitpur(N8)	Industrial area	15.02.22	58.2	75
6	Nichitpur	Industrial area	28.02.22	59.4	75
7	Katras Chotudih(N37)	Industrial area	11.02.22	61.5	75
8	Katras Chotudih	Industrial area	25.02.22	62.1	75
9	Rudhi Basti(N18)	Residential area	01.02.22	54.1	55
10	Rudhi Basti	Residential area	16.02.22	53.7	55

*Permissible limits of Noise Level as per MOEF Gazette Notification No. GSR 742(E) dt. 25.09.2000 Standards for Coal Mines and Noise Pollution (Regulation and Control) Rules, 2000.

* Day Time: 6.00 AM to 10.00 PM,


 Analysed By
 JSA/SA/SSA


 Checked By
 Lab In Charge
 RI-2, CMPDI, Dhanbad


 Approved By
 HOD(In-charge) Environment
 RI-2, CMPDI, Dhanbad

Ambient Air Quality Standards for Jharia Coal Field
As per the Environment (Protection) Amendment Rules, 2000 notified vide
notification G.S.R. 742(E), dated 25.9.2000.

Category	Pollutant	Time weighted average	Concentration in Ambient Air	Method of Measurement
1	2	3	4	5
III Coal mines located in the coal fields of • Jharia • Raniganj • Bokaro	Suspended Particulate Matter (SPM)	Annual Average * 24 hours **	500 $\mu\text{g}/\text{m}^3$ 700 $\mu\text{g}/\text{m}^3$	- High Volume Sampling (Average flow rate not less than 1.1)
	Respirable Particulate Matter (size less than 10 μm) (RPM)	Annual Average * 24 hours **	250 $\mu\text{g}/\text{m}^3$ 300 $\mu\text{g}/\text{m}^3$	Respirable Particulate Matter sampling and analysis
	Sulphur Dioxide (SO_2)	Annual Average * 24 hours **	80 $\mu\text{g}/\text{m}^3$ 120 $\mu\text{g}/\text{m}^3$	1.Improvedwest and Gaeke method 2.Ultraviolet fluorescene
	Oxide of Nitrogen as NO_2	Annual Average * 24 hours **	80 $\mu\text{g}/\text{m}^3$ 120 $\mu\text{g}/\text{m}^3$	1. Jacob &Hochheiser Modified (Na-Arsenic) Method 2. Gas phase Chemilumine-scence

Note:

* Annual Arithmetic mean for the measurements taken in a year, following the guidelines for frequency of sampling laid down in clause2.

** 24hourly/8hourlyvaluesshallbemet92%ofthetimeinayear.However,8% of the time it MAY exceed but not on two consecutivedays.

NATIONAL AMBIENT AIR QUALITY STANDARDS

New Delhi the 18th November 2009

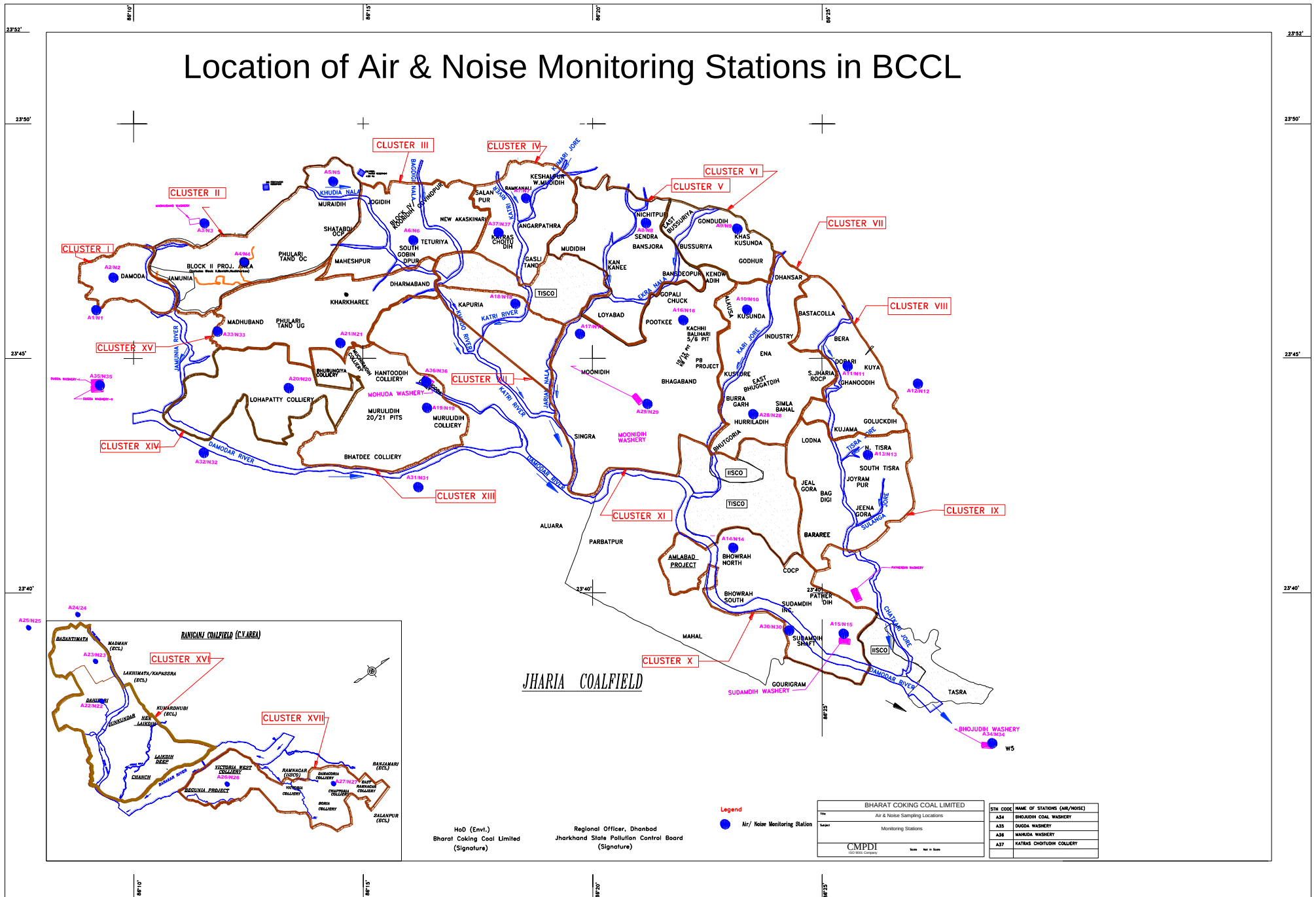
In exercise of the powers conferred by Sub-section (2) (h) of section 16 of the Air (Prevention and Control of Pollution) Act, 1981 (Act No. 14 of 1981), and in supersession of the notification No(s).S.O.384(E), dated 11th April 1994 and S.O.935(E), dated 14th NOVEMBER 1998, the Central Pollution Control Board hereby notify the National Ambient Air Quality Standards with immediate effect.

Pollutant	Time Weighted Average	Concentration in Ambient Air		Methods of Measurement
		Industrial, Residential, Rural and other Areas	Ecologically Sensitive Area (Notified by Central Government)	
Sulphur Dioxide (SO ₂), µg/m ³	Annual * 24 Hours **	50 80	20 80	-Improved West and Gaeke Method -Ultraviolet Fluorescence
Nitrogen dioxide (NO ₂), µg/m ³	Annual * 24 Hours **	40 80	30 80	-Jacob & Hochheiser modified (NaOH-NaAsO ₂) Method -Gas Phase Chemiluminescence
Particulate Matter (Size less than 10µm) or PM ₁₀ , µg/m ³	Annual * 24 Hours **	60 100	60 100	-Gravimetric -TEOM -Beta attenuation
Particulate Matter (Size less than 2.5µm) or PM _{2.5} , µg/m ³	Annual * 24 Hours **	40 60	40 60	-Gravimetric -TEOM -Beta attenuation
Ozone (O ₃), µg/m ³	8 Hours * 1 Hour **	100 180	100 180	-UV Photometric -Chemiluminescence -Chemical Method
Lead (Pb), µg/m ³	Annual * 24 Hours **	0.50 1.0	0.50 1.0	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper -ED-XRF using Teflon filter
Carbon Monoxide (CO), mg/m ³	8 Hours ** 1 Hour **	02 04	02 04	-Non dispersive Infrared (NDIR) Spectroscopy
Ammonia (NH ₃), µg/m ³	Annual * 24 Hours **	100 400	100 400	-Chemiluminescence -Indophenol blue method
Benzene (C ₆ H ₆), µg/m ³	Annual *	05	05	-Gas Chromatography (GC) based continuous analyzer -Adsorption and desorption followed by GC analysis
Benzo(a)Pyrene (BaP) Particulate phase only, ng/m ³	Annual *	01	01	-Solvent extraction followed by HPLC/GC analysis
Arsenic (As), ng/m ³	Annual *	06	06	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper
Nickel (Ni), ng/m ³	Annual *	20	20	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper

* Annual Arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 8 hourly or 1 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they MAY exceed the limits but not on two consecutive days of monitoring.

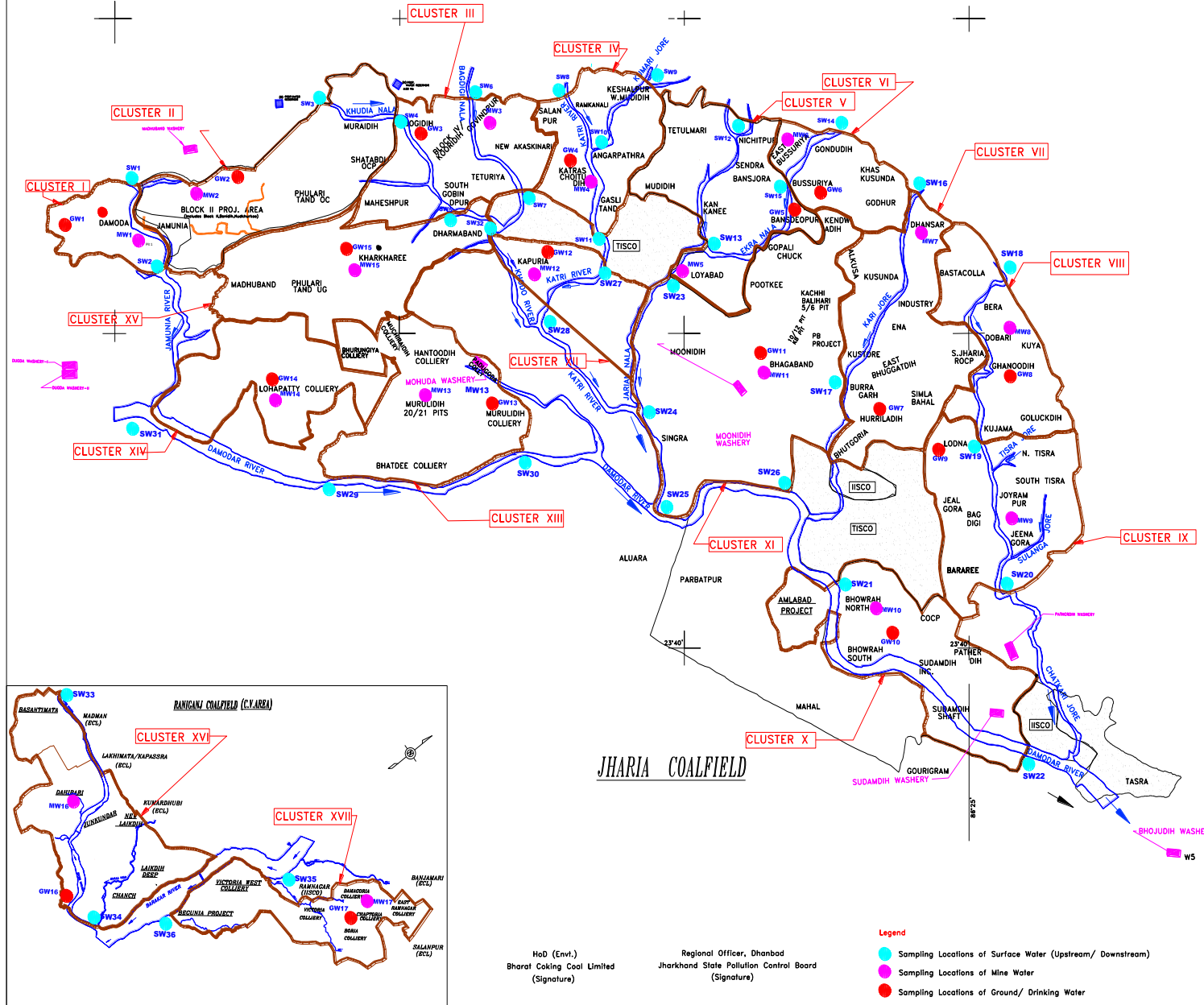
NOTE: Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigations.



Water Sampling Locations in BCCL

INDEX

Cluster	Surface Water (JUS, DIS)	Name of River/Nala / Jore	Mine/ Effluent Water	Sampling Location	Ground Water	Sampling Location
I	SW1, SW2	Damodar River	MW1	Damodar Area	GW1	Chakraborty Village
II	SW3, SW4	Khudra Nala	MW2	Block II OCP	GW2	Joyrampur Village
III	SW4, SW5, SW6, SW7	Khudra Nala, Bagdigi Nala	MW3	Govindpur Colliery	GW3	Jogdih Village
IV	SW8, SW11, SW9, SW10	Kanti River, Kuman Jore	MW4	Chotudih	GW4	Kankanee Village
V	SW12, SW13, SW15	Jarian Nala, Ekra Nala	MW5	Mudih	GW5	Nichitpur
VI	SW14, SW15	Ekra Nala	MW6	East Bassuria UGP	GW6	Bansjora Borewell
VII	SW16, SW17	Kanti Jore	MW7	Dhanbari UGP	GW7	Humladih
VIII	SW18, SW19	Kanti Jore	MW8	Dobani UGP	GW8	Ghanudih
IX	SW19, SW20	Kanti Jore	MW9	Jeevagrah	GW9	Lodna
X	SW21, SW22	Damodar River	MW10	Bhowrah North	GW10	Bhowrah South
XI	SW23, SW24, SW25, SW26	Jarian Nala, Damodar River	MW11	Bhagaband UGP	GW11	Bhagaband
XII	SW27, SW28	Kanti River	MW12	Kapuria	GW12	Kapuria
XIII	SW29, SW30	Damodar River	MW13	Murudih (20/21)	GW13	Murudih
XIV	SW31, SW32	Damodar River	MW14	Lohapatti	GW14	Lohapatti
XV	SW5, SW32	Kharkhar Nala	MW15	Kharkhar UGP	GW15	Kharkhar
XVI	SW33, SW34	Khudra River	MW16	Dahibani OCP	GW16	Palabani Village
XVII	SW35, SW36	Barakar River	MW17	Damagoria Colliery	GW17	Chaptoria



Customer	BHARAT COKING COAL LIMITED
Title	WATER SAMPLING LOCATIONS
Subject	MONITORING STATIONS
Scale	Not to Scale



Bharat Coking Coal Ltd.
(A Subsidiary of Coal India Limited)
Office of the General Manager, Katras Area
P.O. KATRAS, P.S.- Jogta, Dhanbad-828121
CIN: U1010JH1972GOI000918
Phone/Fax No.: 0326-2371213
Email ID: cgmkatras@bccl.gov.in

Dated- 30/11/2021

Ref. No.-BCCL/IV/2021/1061

To
The Director,
Ministry of environment, forest and climate charge
Regional office (ECZ)
Bungalow office no.42, Shyamali colony
Ranchi-834002

Sub:-six monthly compliance report on implementation of environmental measures for the period from April 2021 to September 2021

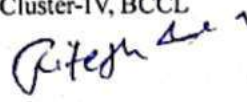
Dear Sir

Kindly find enclosed herewith the six monthly compliance report on implementation of environmental measures for the period from April 2021 to September 2021 in respect of cluster IV group of mines under Katras Area, BCCL.

Hope you will find in order.

Enclosed:-As Above.

Yours Faithfully


30/11/2021
General Manager
Cluster-IV, BCCL


Copy:-

- 1.The Director,IA Monitoring cell,Paryavaran Bhawan,CGO Complex, New Delhi-110003
2. Central Pollution Control Board, Parivesh Bhawan, CBD-cum-Office Complex East Arjun Nagar, DELHI - 110 032, INDIA
3. The Director,(S) Ministry of Environment & Forest,Govt.of India -Bhuneshwar751023
- 4.The Member Secretary, Jharkhand state Pollution Control Board,Ranchi-834004
5. The Regional Officer, Jharkhand state Pollution Board,Dhanabad-826001
- 6.HOD,(ENV),BCCL,Koyla Bhawan,Dhanbad
- 6.Office Copy



भारत कोकिंग कोल लिमिटेड

एक मिनीरत्न कम्पनी

(कोल इण्डिया लिमिटेड का एक अंग)

सभी संबन्धित व्यक्तियों को यह सूचित किया जाता है की 'क्लस्टर चार' जो बीसीसीएल के 5 मिश्रित खदानों का समूह है, को पर्यावरण वन एवं जलवायु परिवर्तन मंत्रालय (Ministry of Environment Forest & Climate Change) द्वारा पर्यावरणीय स्वीकृति (Environment Clearance) प्राप्त हुई है। विवरण निम्न है :-

समूह (Cluster) का नाम	स्वीकृत आदेश संख्या एवं तिथि
क्लस्टर चार- (घनबाद जिले में स्थित भारत कोकिंग कोल लिमिटेड के पांच मिश्रित कोयला खदानों का समूह- सलानपुर कोलियरी, कतरास चोइटुडिह कोलियरी, अमलगमेटेड केशलपुर पश्चिम मुडीडीह कोलियरी, अंगारपथरा और रामकानली कोलियरी, गजलीटांड कोलियरी) जिसका कुल क्षेत्र 1123.79 हेक्टेयर है और बढ़ी हुई सामान्य क्षमता 7.34 एमटीपीए है और अधिकतम क्षमता 9.55 एमटीपीए है।	ज-11015/372/2013 - आईए-II (एम) दिनांक 16th जुलाई 2018

पर्यावरण स्वीकृती की प्रतिलिपि झारखंड राज्य प्रदूषण नियंत्रण विभाग के पास उपलब्ध है एवं पर्यावरण वन एवं जलवायु परिवर्तन मंत्रालय की वेबसाइट www.environmentclearance.nic.in एवं कंपनी की वेबसाइट www.boclweb.in पर भी उपलब्ध है।

26.07.2018.

स्थ विभाग के निर्माण के 16 जिनिक निर्माण य सरकार के विभाग/डाक स्थान सरकार ई-प्रोक्यूरमेंट आईपीआर की an.gov.in ा सकता है।

SOB00503
SOB00504
SOB00505
SOB00506
SOB00507
SOB00508
SOB00509
SOB00510

स्यता
स्वास्थ्य



भारत कोकिंग कोल लिमिटेड

(एक मिनीरल कम्पनी)

(कोल इंडिया का एक उपक्रम)

सभी संबन्धित व्यक्तियों को यह सूचित किया जाता है कि 'क्लस्टर चार' जो बीसीसीएल के 5 मिश्रित खदानों का समूह है, को पर्यावरण वन एवं जलवायु परिवर्तन मंत्रालय (Ministry of Environment Forest & Climate Change) द्वारा पर्यावरणीय स्वीकृति (Environment Clearance) प्राप्त हुई है। विवरण निम्न है:

समूह (Cluster) का नाम	स्वीकृति आदेश संख्या एवं तिथि
क्लस्टर चार-(धनबाद जिले में स्थित भारत कोकिंग कोल लिमिटेड के पांच मिश्रित कोयला खदानों का समूह- सलानपुर कोलियरी, कतरास चोइटुडिह कोलियरी, अमलगमेटेड केशलपुर पश्चिम मुडीडीह कोलियरी, अंगारपथरा और रामकानली कोलियरी, गजलीटोंड कोलियरी) जिसका कुल क्षेत्र 1123.79 हैकटेयर है और बढी हुई सामान्य क्षमता 7.34 एमटीपीए है और अधिकतम क्षमता 9.55 एमटीपीए है।	ज-11015/372/2013- आईए- II (एम) दिनांक 16th जुलाई 2018

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PR-188890 (Health Med Edu and Family Welfare) 2018-19

स्वास्थ्य