भारत कोकिंग कोल लिमिटेड
(एक मिनीरत्न कंपनी)
(कोल इण्डिया लिमिटेड की एक अनुषंगी कंपनी)
(भारत सरकार का उपक्रम)

बीसीसीएल
BCCL
भारत कोकिंग कोल लिमिटेड
Bharat Coking Coal Limited

Bharat Coking Coal Limited
(A Miniratna Company)
(A Subsidiary of Coal India Limited)
(A Government of India Undertaking)

Ref no-BCCL/KA/IV/2026/ 143

Date-28/05/2026
30

To
The Director,
Ministry of environment, forest and climate charge
Integrated Regional office,
2nd floor,Headquarter-Jharkhand state housing Board
Harmu Chowk,Ranchi-834002

Subject: Submission of Six-Monthly EC Compliance Report on Implementation of Environmental Measures for the Period from October 2025 to March 2026

Dear Sir,

Kindly find enclosed herewith the six-monthly Environmental Clearance (EC) Compliance Report on implementation of environmental measures for the period from October 2025 to March 2026 in respect of Cluster-IV Group of Mines under Katras Area, BCCL.

It is hoped that the report will be found in order.

This is for your kind information and necessary action please.

Encl.: 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.Dy.GM(ENV),BCCL,Koyla Bhawan,Dhanbad
6.Office Copy

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EC Order no.J-11015/372/2013-Ia-II(M) dated 16th july 2018 &23rd october 2019		
Sr.no	**Condition**	**Complaince**
1	The project proponent shall carryout source apportionment study and establishment of piezometres within 3 years from the date of issue of this letter.	Source apportionment study for cluster iv has been done(copy attached).2 no's of piezometres with DWLR (one with telemetry system and one with nontelemetry) have been installed.
2	All other terms and condition stipulated in the said environmental clearance dated 16th July 2013 shall remain unchanged.	Agreed to comply
3	The proponent shall obtain all necessary clearance/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.	Agreed to comply
4	The coal company project performance shall be liable to pay the compensation against the illegal mining ,if any and as a by the respective state governments at any point of time in terms of order dated 2nd July 2017 of hon'ble supreme court in WP (civil) no. 114/2014 in the term in the matter of common cause vs union of India and others.	Agreed
5	The concern state government shall ensure that no mining operation 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 and geology in strict compliance of the judgement of honorable supreme court.	Agreed
6	The environmental clearance shall not be operation till such time the project proponent complies with the above said judgement of hon'ble supreme court,as applicable and other statutory requirements.	Agreed
7	This environmental clerance superseds the earlier environmental clerance granted vide letter no.J-11015/212/2010-IA-II(M) dated 6th february 2013.	Noted

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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. Two nos of fixed type fog cannon with 100mt. throw has been installed at siding to suppress the dust emission at siding. 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 apart from that 1 no's of truck mounted fog cannon of capacity 12 KL has been deployed in cluster IV group of mines. **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.	Application for renewal of No Objection Certificate (NOC) for groundwater abstraction has been submitted, and the CHR of same has been approved by the Expert Appraisal Committee (EAC).**Annexure-3(A)**

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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 has been approved on 03.08.2017 on 333th Board Meeting & revision of Katras choitudih colliery has also been made on 392nd Board Meeting of M/s BCCL. **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 ,2021&2024. **Annexure 8– Last Time-series map of 2024**
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/EIA/EMP 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. In line with the revised Mining Plan of Katras Choitudih approved in the 392nd Board Meeting of Bharat Coking Coal Limited, a bridge over the Katri River is being constructed without disturbing the natural flow of the drain. The construction of embankment to prevent any danger against inrush of surface water into the mine has been constructed. **Annexure- 9-** surface drainage plan

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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 topsoil), and afforestation plan is in conformity with the approved guidelines. The land-use pattern has already been submitted to the Ministry. A total green-belt area of 197.57 Ha(29.75 Ha over OB dumps 160.53 Ha under social forestry & avenue plantation,7.29 Ha over backfilled area)can be observed within cluster IV as per CMPDIL Land Reclamation Monitoring Report-2024.** **During FY 2024-25, greenery development has been carried out over 2.4 Ha of OB dump area. In addition, 1,200 nos. of avenue plantations have been undertaken.** **In FY 2025-26, plantation over 2.3 Ha area has developed.** **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.0.2804 (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.

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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 33 Ha OB area till date. Backfilling of excavated area is being done as per mine closure guidelines. green-belt area of 197.57 Ha(29.75 Ha over OB dumps 160.53 Ha under social forestry & avenue plantation,7.29 Ha over backfilled area)can be observed within cluster IV as per CMPDIL Land Reclamation Monitoring Report-2024. During FY 2024-25, greenery development has been carried out over 2.4 Ha of OB dump area. In addition, 1,200 nos. of avenue plantations have been undertaken. In FY 2025-26, plantation over 2.3 Ha area has developed. **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	

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1	Transportation of coal, to the extent permitted by road, shall becarried 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 PM1Q/PM2.s)such as haul road, loading/unloading and transfer points. Fugitive dust emissionsfrom all sourcesshall be controlled regularly. It shall be ensured that the Ambient Air Quality parameters confirm 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.
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.	During FY 2025–26, greenery development has been carried out over 2.3 Ha of OB dump area. In addition to this, 1,200 nos. of avenue plantations have been completed. To meet the green-belt development target, the work order has been issued to the DFO, Dhanbad. Till date, a total plantation over 24 Ha of OB dump area and 2,285 nos. of avenue plantations have been undertaken by DFO Dhanbad. Plantation activities are being carried out in all available spaces to achieve a dense and effective green belt within the project area. Green belt development is being complied with. A total green-belt area of 197.57 Ha has been developed, including:29.75 Ha over OB dumps 160.53 Ha under social forestry & avenue plantation 7.29 Ha over backfilled area can be observed within cluster IV as per CMPDIL Land Reclamation Monitoring Report-2024. Additionally, two Sneh Smriti Udyan (Fruit Orchard) sites have been developed over around 1.5 Ha area. Grass seeding has also been broadcast over around 36 Ha of OB dump area. **13 - 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

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		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 14- 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. Two nos of fixed type fog cannon with 100mt. throw has been installed at siding to suppress the dust emission at siding. 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 apart from that 1 no's of truck mounted fog cannon of capacity 12 KL has been deployed in cluster IV group of mines.
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 15- Ground water monitoring report** **Annexure 16- Rain water harvesting arrangement.**

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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 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.	It is being complied. A total **400 meters** length of toe wall has been constructed along the OB dump. With this, the cumulative toe wall length constructed till date stands at **1,200 meters.** Additionally, a **spillway** has been constructed to prevent the entry of silt into the main stream. **Annexure 17- Pic of toe wall made along OB dump.** **Annexure 18- 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 around the site. Appropriate embankment shall beprovided 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.	The embankment constructed along the river 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 19-Pic of embankment constructed.**

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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 20- 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 21- 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 22- 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 23- 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 24- IME/PME report**

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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. PPE kit have been provided to the personnel engaged in mining and working under cluster IV. **Annexure 25- 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.	For the FY 2025-26 plantation over 2.3 ha area has been developed.Ecological restoration are being done in consultation with FRI, dehradun. Road Map of Ecological restoration has been made. **Annexure 26- 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 27- 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.

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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 28- 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.

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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 29- 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. IIEST, 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.	Application for renewal of No Objection Certificate (NOC) for groundwater abstraction has been submitted, and the CHR of same has been approved by the Expert Appraisal Committee (EAC).
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	

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1	Continuous ambient air quality monitoring stations as prescribed in the statue be established in the core zone as well as in the buffer zone for monitoring of pollutants, namely PM1o, PM2.5, S02 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 done and technical evaluation is in progress, however PM10 analyzer has been installed at two locations one for monitoring of siding and one for mines. **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 zs" 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.

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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 34- 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 35 - 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.

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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 36- 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 provrsrons 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.

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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 vist on 22nd August, 201€.

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 (F&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/202277/2013 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 m^3/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 8 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 collierres 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/GoI 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 PM_{10}/$PM_{2.5}$) 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.II (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

(j) Monitoring of project

(i) Continuous ambient air quality monitoring stations as prescribed in the statue be established in the core zone as well as in the buffer zone for monitoring of pollutants, namely PM_{10}, $PM_{2.5}$, SO_2 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 NOx. 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 & othrs'.

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.

16/7/2018

(S K Srivastava)
Scientist E

Copy to

1. The Secretary, Ministry of Coal, Shastri Bhawan, New Delhi
2. The Secretary, Deptl 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

16/7/2018

(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:

Table1.1: Comparative representation of productions from nines 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	Kaitras Choltudih 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	Gasitand 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	

Scanned by CamScanner

Scanned by CamScanner

JH10AD
2936

Water Sprinkling at Coal Dump

Mist Sprinkler in Cluster-IV

TATA

Annexure-3A

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/REN/1/2025/11517	2.	**Date of Issuence**	28/04/2025
3.	Application No.:	21-4/320/JH/MIN/2018	4.	Category: (GWRE 2024)	Semi Critical
5.	Project Status:	Existing With Additional Ground Water Requirment	6.	NOC Type:	Renewal
7.	**Valid from:**	27/12/2023	8.	**Valid up to:**	26/12/2025

9. 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
0.00	0.00			10212.00	3727380.00	10212.00	3727380.00

10. Details of ground water abstraction /Dewatering structures

	Total Existing No						Total Proposed No					
	DW	DCB	BW	TW	MP	MPu	DW	DCB	BW	TW	MP	MPu
Dewatering Structure*	0	0	0	0	4	0	0	0	0	0	2	0

*DW- Dug Well; DCB-Dug-cum-Bore Well; BW-Bore Well; TW-Tube Well; MP-Mine Pit;MPu-Mine Pumps

11.	Ground Water Abstraction/Restoration Charges paid (Rs.):	51161460.00
12.	Environment Compensation (if applicable) paid (Rs.):	0.00

13.	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

CENTRAL GROUND WATER AUTHORITY

CENTRAL GROUND WATER AUTHORITY

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

(Compliance Conditions given overleaf)

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

CENTRAL GROUND WATER AUTHORITY

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

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 m 3 /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).
31) In the self-compliance report, the PP shall submit details of Drilling Agency/ Agencies, which has/ have constructed BW(s)/ TW(s) along with undertaking to the effect that all necessary measures have been taken as per directions of Hon'ble Supreme Court provided in Annexure-VII of guidelines dated 24.09.2020 in respect of abandoned/ failed BW(s)/ TW(s)/Piezometer(s), if any. The PP is advised to engage registered drilling agency/ agencies. In the event of any mishap/ unfortunate incident due to negligence in taking measures for prevention of accident due to falling in Bore Well, both PP and concerned drilling agency shall jointly be held responsible and penal action as per extant Government rules shall be taken.

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

CENTRAL GROUND WATER AUTHORITY

Term and conditions:

i. All disputes are subject to Delhi Jurisdiction.
ii. Any complaint in regard to the rates will not be entertained.

Member-Secretary
CGWA, New Delhi

CENTRAL GROUND WATER AUTHORITY

PPE distribution details of FY 2025-26 in respect of Cluster IV group of mine

Sl No.	ITEMS	Total distribution in nos
1	Mining Shoes	748
2	GUMBOOT	235
3	HELMET	371
4	DUST MASK	1000
5	Fluorescent Jackets	1100

L&T 9020

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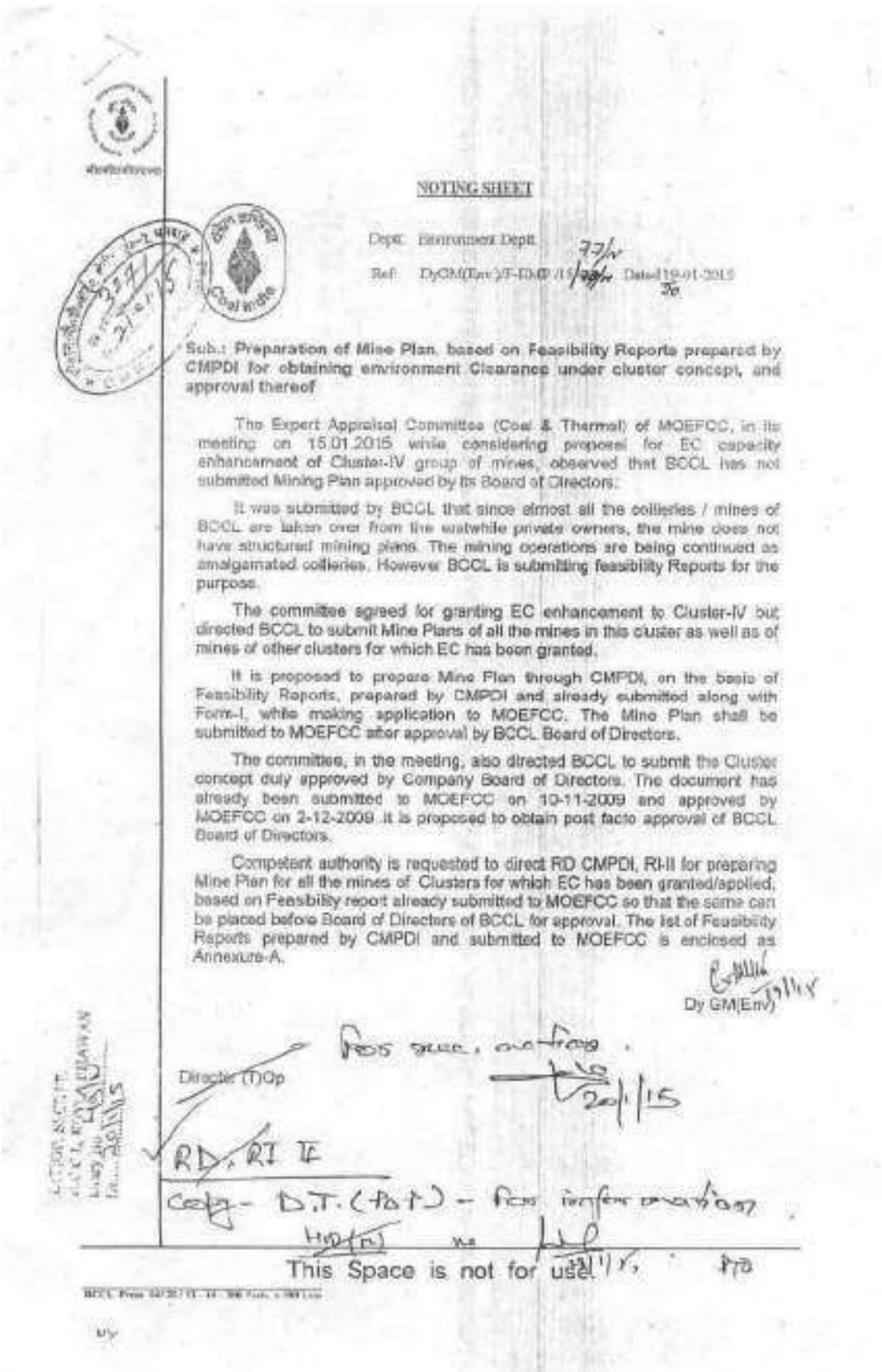
Annexure - I



NOTING SHEET

Dept: Environment Deptt.

Ref: DyGM(Env)/F-EMP /15/ 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 Feasbility 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 (T)Op

RD, RI II

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

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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 b) Amalgamated Keshalpur& West Mududih OC	0.60 4.9	0.78 6.37	325.00
		Amalgamated Angarpathra & Ramkanali colliery UG	0.190	0.25	254.64
	V	Nichalpur 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
		Pathardih (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
		Amlabad UG mine (Closed for coal production)	0	0	386.95
		Sudamdih Coal Washery	1.6	2.08	
	XI	Gopalichuk 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
		Kanuwadih 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
		Damagora 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
		Godhar 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
		Sindubahal 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	340.50
		Kuya UG	0.10	0.130	
		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	256.13
		Jealgora (UG) Closed	NIL	NIL	138.00
		Bagdiga (UG)	0.11	0.143	61.00
		Joyrampur (UG)	0.153	0.199	98.04
		Jeenagora (OC)	0.7	0.91	276.05
		Basuree (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: U10101JH1972GOI000918

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: U10101JH1972GOI000918

पत्रांक : बी.सी.सी.एल/ मु0 महाप्रबंधक (यो. ए. परि.)/फ-15/15/ 231 Dated-17.06.2015

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

933
17.06.15

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

महाप्रबंधक (योजना एवं परियोजना)

प्रतिलिपि:
महाप्रबंधक, कतरास एरिया, बी सी सी एल, धनबाद

D:\BCCL\Letter-15

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

26/05/15

PROJECT OFFICER
AKWMC

Annexure-III

A

भारत कोकिंग कोल लिमिटेड
(एक मिनी रत्न कंपनी)
योजना एवं परियोजना विभाग
कोयला भवन कोयला नगर
धनबाद- 826005
दूरभाष-0326-2230276
ईमेल: gmpp.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- gmpp.bccl@coalindia.in
CIN: U10101JH1972GO1000918

पत्रांक : बी.सी.सी.एल/महाप्रबंधक (यो. ए. परि.)/फा-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 & 3.708 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 /2016/851- 854/H) दिनांक : 16.01.2017

सेवा में,
महाप्रबंधक - योजना एवं परियोजना
भा०को०को०लि० ,धनबाद ।

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

महोदय,

For EC capacity enhancement of Cluster-IV (Katras Area) from existing 3.708 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,
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

Dept: Environment Deptt.

Ref: DyGM(Env)/F-RMP /15/ 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

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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.

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Dy GM(Env)

Director (T)Op

RD, RI II

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

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Annexure-A

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		Kustor UG (Closed)	-	-	250.71
		East Bhuggatdih UG (Closed)	-	-	242.62
		Vishwakerma 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	340.50
		Kuya UG	0.10	0.130	
		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
		Jealgora (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
		Banaree (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

पत्रांक : बी.सी.सी.एल/महाप्रबंधक (यो. ए. परि.)/क-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/2016/1269 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.
विभागाध्यक्ष (पर्यावरण), बी.सी.सी.एल.

D:\BCCL\Letter-16 77

Annexure-III

A

भारत कोकिंग कोल लिमिटेड
(एक मिनी रत्न कंपनी)
योजना एवं परियोजना विभाग
कोयला भवन कोयला नगर
धनबाद- 826005
दूरभाष-0326-2230276
ईमेल: gmpp.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- gmpp.bccl@coalindia.in
CIN: U10101JH1972GO1000918

पत्रांक : बी.सी.सी.एल/महाप्रबंधक (यो. ए. परि.)/फा-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 & 3.708 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 /2016/1251- दिनांक : 16.01.2017
254/H)

सेवा में,
महाप्रबंधक - योजना एवं परियोजना
भा०को०को०लि० ,धनबाद ।

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

महोदय,

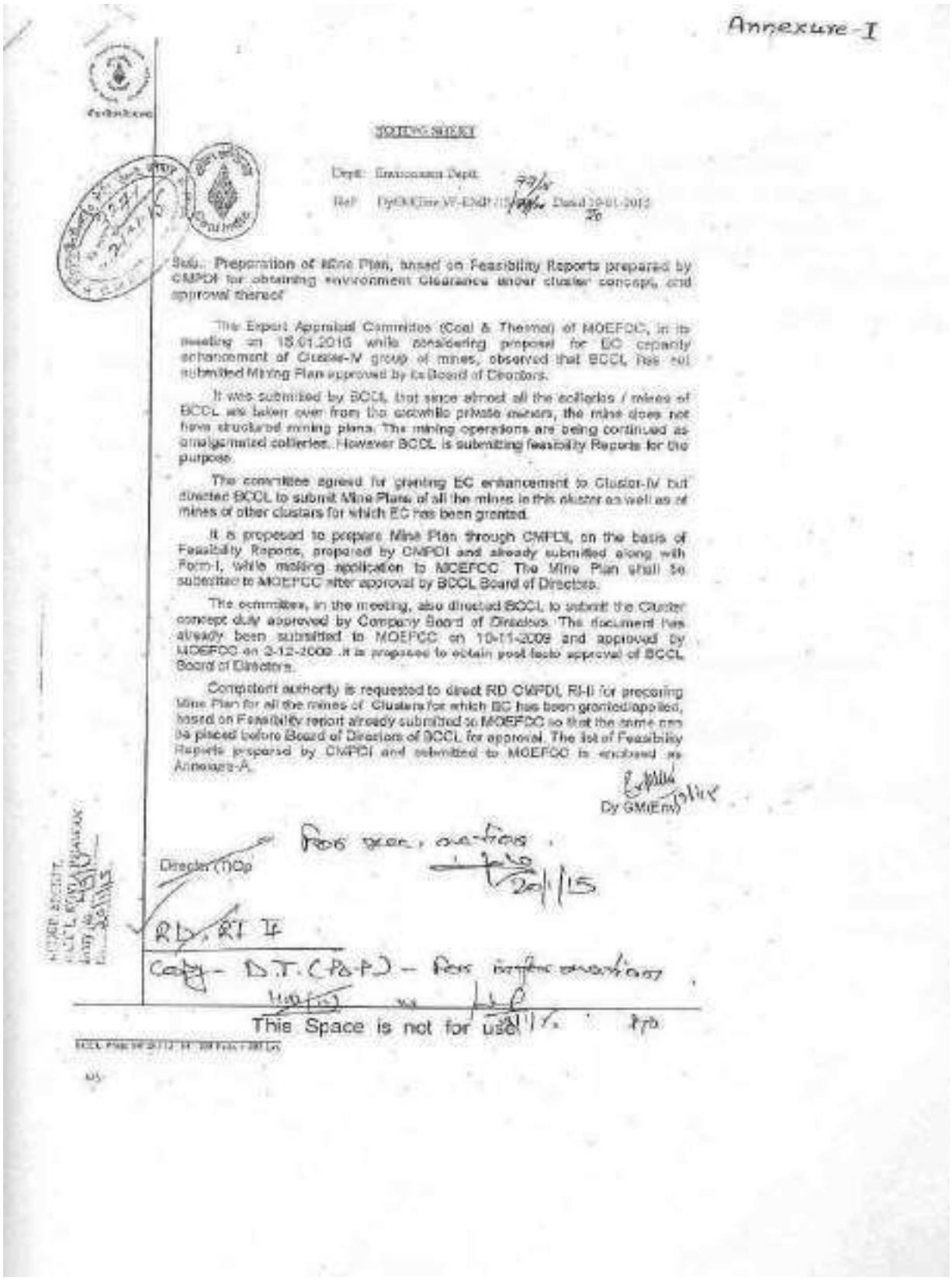
For EC capacity enhancement of Cluster-IV (Katras Area) from existing 3.708 MTPA peak to 9.55 MTPA peak, application was made to MoEFCC in 2013.

- 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,
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

Dept: Environment Dept.

Ref: Dated 29-01-2015

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 16.01.2015 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 3-12-2009. 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 (Tech)Op

RD, RI II

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

This Space is not for use

Annexure-II

18

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 : मा०को०को०लि०/म०प्र०/क०क्षे०/15/A-2/1210 दिनांक : **11.04.2015**

सेवा में,
The Chief General Manager (P&P)
BCCL/Koyla Bhawan
Dhanbad.

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)

Director (T)Op

For kind information and necessary action please.

20/1/15

RD, RI II

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

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Annexure - I

NOTING SHEET

Dept: Environment Deptt.

Ref: DyGM(Env)/F-RMP /15/77/h 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.

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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 (T)Op

RD, RI II

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

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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 b) Amalgamated Keshalpur& West Mududih OC	0.60 4.9	0.78 6.37	325.00
		Amalgamated Angarpathra & Ramkanali colliery UG	0.190	0.25	254.64
	V	Nichalpur 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)	0.183	0.240	391.50
		Amlabad 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
		Kandwadih 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
		Godhar 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
		Vishwakerma OC (Proposed)	0.700	0.910	43.5 (Within Dhansar & Industry LH
	VIII	Bastacolla OCP	0.10	0.130	239.45
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		Dobari Colliery (UG)	0.24	0.312	146.90
		Kuya OCP	0.60	0.780	340.50
		Kuya UG	0.10	0.130	
		Goluckdih (NC) OCP (Proposed)	1.2	1.560	
		Ghanoodih Colliery (OCP)	1.40	1.820	73.00
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		NT/ST (OCP)	1.65	2.145	256.15
		Jealgora (UG) Closed	NIL	NIL	138.00
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		Banaree (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

पत्रांक: बी.सी.सी.एल/ मु0 महाप्रबंधक (यो. ए. परि.)/फ-15/15/61 Dated-07.04.2015

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

105
18/4/15

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.

भवदीय

7/4/15

(आर एन प्रसाद)
मुख्य महाप्रबंधक (योजना एवं परियोजना)

संलग्नक: यथोपरि

KUD(M)

प्रतिलिपि:
महाप्रबंधक, कतरास एरिया, बी सी सी एल, धनबाद
श्री एस के अग्रवाल, वरीय प्रबंधक(खनन), योजना एवं परियोजना

Annexure-III

A

भारत कोकिंग कोल लिमिटेड
(एक मिनी रत्न कंपनी)
योजना एवं परियोजना विभाग
कोयला भवन कोयला नगर
धनबाद- 826005
दूरभाष-0326-2230276
ईमेल: gmpp.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- gmpp.bccl@coalindia.in
CIN: U10101JH1972GO1000918

पत्रांक : बी.सी.सी.एल/महाप्रबंधक (यो. ए. परि.)/फा-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 & 3.708 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/H)

सेवा में,
महाप्रबंधक - योजना एवं परियोजना
भा०को०को०लि० ,धनबाद ।

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

महोदय,

For EC capacity enhancement of Cluster-IV (Katras Area) from existing 3.708 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,
16/1/17
उप महाप्रबंधक (पर्यावरण)

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

भारत कोकिंग कोल लिमिटेड
Bharat Coking Coal Limited
(A Mini Ratna Company)
(A Subsidiary of Coal India Ltd.)
(www.bcclweb.in)

पं.का.:,कोयला भवन, कोयला नगर, धनबाद –826005.
Regd. Off: Koyla Bhawan, Koyla Nagar
, Dhanbad - 826005.
CIN: U10101JH1972GOI000918
दूरभाष: 0326-2230190
ईमेल: cos.bccl@coalindia.in

बोर्ड सचिवालय /Board Secretariat

पत्रांक : बीसीसीएल/सीएस/एफ– 1(A)/2022/1433(11) दिनांक: 23.09.2022

सेवा में,
विभागाध्यक्ष (परियोजना व योजना),
बीसीसीएल, कोयला भवन

विषय : **Certified copy of Minutes of 392nd Board Meeting held on 12.09.2022.**

Dear Sir,

We send herewith certified copy of Minutes of **Item No.392.6B, 392.POT-1 & 392.POT-2** of 392nd Meeting of the Board of Directors of Bharat Coking Coal Limited held at Koyla Bhavan, Dhanbad on 12.09.2022 for taking necessary action at your end.

You are requested to send the Action Taken Report (ATR) on implementation of the above decision / decisions of Board Meeting(s) for placing before the next Board Meeting.

भवदीय,

बी.के.पारूई
कंपनी सचिव

Encl: As above

GM(P&P)
15671
23/9/22
24.9.22

Sri Bahera

Item No. 392.6B

Approval of Power of Attorney for signing of ESCROW Agreement with Coal Controller of India in respect of Approved /Modified Mine Closure Plans.

Background:

Ministry of Coal has issued guidelines for preparation of Mine Closure Plan- REG. vide no. 55011-01-2009-CPAM dated 7th January, 2013 from Under Secretary to the Govt. of India, Ministry of Coal, New Delhi(Annexure 'A').

As per Clause 6(iii) of the Annexure of the said guidelines "An agreement, outlining detailed terms and conditions of operating the Escrow Account shall be executed amongst the mining company, the Coal Controller and the concerned bank in order to give effect to this. The agreement shall be executed before the grant of permission by the Coal Controller to open the mine".

In view of the above the company needs to authorized an executive by executing a power of attorney in his favour to execute the tripartite Escrow Agreement with Coal Controller of India on behalf of BCCL in respect of the Mine Closure Plans approved/modified by BCCL Board for the purpose and to authorized Company Secretary to affix the common seal of the Company on the above Power of Attorney.

BCCL Board had earlier approved nomination of Sri Niraj Kumar, HOD(P&P), BCCL as the authorised representative of the Company/owner in the matter and execute the Power of Attorney for the same in its 359th held on 17.01.2020 . Special power of attorney was executed in favour of Shri Niraj Kumar for a period of 2 years.

BCCL Board is requested to re-nominate Sri Niraj Kumar, HOD(P&P), BCCL as the authorised representative of the Company/owner in the matter and execute the Power of Attorney for the same.

Decision:

The Matter was discussed at length. The Board, after discussion, agreed to re-nominate Shri Niraj Kumar, HOD(P&P), BCCL as the authorised representative of BCCL in the matter and execute the Power of Attorney for the same.

The Board passed the following resolution:

"RESOLVED that Sri Niraj Kumar, Chief Manager (Min)/ HOD(P&P) ,BCCL be and is hereby authorized to execute Power of attorney and to act as the authorized representative of the Company/owner to execute the tripartite Escrow Agreement between Coal Controller of India, a nationalized Bank and Bharat Coking Coal Limited.

Resolved further that the Common Seal of the company be affixed on above Power of Attorney executed in favour of Shri Niraj Kumar, HOD(P&P), BCCL in presence of Director(Technical) and Company Secretary of the Company".

Item No.392.PoT-1

Approval of Mining Plan along with Mine Closure Plan of Katras Choitudih Colliery.

Background:

Katras Choitodih Colliery was one of the existing/operating mines under the administrative control of Katras Area, BCCL. Katras Choitodih Colliery came into existence w.e.f. 1st May'1972 under Section-2 of Coking Coal Mines Nationalization (CCMN) Act 1972.

The Dhanbad-Chandrapura Rly line lies in the north of the project area. Mohuda -Bhaga railway line lies in the south of the project area.

At present a hired Patch B upto 13 Seam is in operation in the south eastern side. After completion of the hired patch a quarry with XIII seam as base can be opened up from rise side

Certified to be True Copy

B. K. Pandi
Company Secretary
Bharat Coking Coal Limited
Koyla Bhawan

Decision:

The Board agreed to the recommendation of the ESC (T) Committee and approved the Mining Plan along with Mine Closure Plan of Katras Choitudih Colliery having Peak Capacity 0.65 MTPA, Lease hold Area 228 Ha , Balance Life 10 Years and the total Mine Closure cost being ₹2184.924 Lakhs, (including the already deposited amount of ₹753.00 lakhs only) as recommended by the Empowered Sub Committee to the BCCL Board.

Board also advised that entire mining operation will be carried out as per the Statutory provision given under Mines Act 1952, Coal Mine Regulation 2017 and wherever specific permission will be required and the company will approach the concerned authorities for the same.

Item No.392.PoT-2

Approval of revised Project Report of Amalgamated NT ST KUJAMA OCP (Capacity-8.5 MTY), Lodna Area, BCCL

Background:

NT ST OCP is a running mine situated in Jharia Coal field and is under the administrative control of the Lodna Area of Bharat Coking Coal Limited (BCCL). NT-ST OC Project having production capacity of 6.0 MTY was approved by BCCL Board in its 304th meeting held on 03.02.2014 and subsequently approved by CIL Board in its 304th meeting held on 12.02.2014 at a total Capital outlay of Rs.555.52 Crores with an IRR of 18.59% to be worked on hired HEMM basis. The Project is in operation and presently it comprises of two Hired HEMM Patches.

It is proposed to reorganize the leasehold area of BCCL in Jharia Coal Field into seven Blocks (Block A to Block G) to optimize the coal production of BCCL keeping in view the important surface features like river/jore, and important surface infrastructures like rail, road etc. Block-G comprises the property of NT/ST, Kujama and Amalgamated Joyrampur OCP i.e. from existing mining position of NT/ST Mine to Dhanbad -Sindri road on the west.

In view of the above, it was decided to prepare a Revised PR of NT/ST portion as Phase-1 of Block G, comprising of Amalgamated NTST Kujama OCP with target production capacity of 8.5 Mty considering major area of Amalgamated NT ST Jeenagora OC Mine (679.63 Ha), part area of Kujama Colliery (75.96 Ha) and some part area of Amalgamated Joyrampur Colliery (38.61 Ha).

The approved Project Report namely "Project Report for North Tisra/South Tisra (Expn.) OCP (6 Mty) will be dovetailed in Revised Project Report of Amalgamated NTST Kujama OCP (8.5 Mty).

A Revised Project Report (RPR) of Amalgamated NTST Kujama OCP (8.5 Mty), submitted by CMPDI, was approved by BCCL Board in its meeting held on 18.04.2022 for variant-III (MDO mode of operation) with some suggestions and Board recommended for approval of CIL Board.

Certified to be True Copy

B. K. Pandey
Company Secretary
Bharat Coking Coal Limited
Koyla Bhawan

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**.**

BHARAT COKING COAL LIMITED

MINING PLAN OF KATRAS CHOITUDIH COLLIERY

JULY 2022

CENTRAL MINE PLANNING & DESIGN INSTITUTE LTD.

(A Subsidiary of Coal India Limited)

Gondwana Place, Kanke Road, Ranchi - 834031(Jharkhand), INDIA

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CHAPTER – I

1.1 INTRODUCTION

BACKGROUND OF THE MINING COMPANY

Bharat Coking Coal Limited, a subsidiary of Coal India Limited, is a Central Public Sector undertaking, owned by the Govt. of India, engaged for extraction of coking coal and allied activities in Jharkhand and West Bengal.

It occupies an important place in coal mining industry in India, as it produces bulk of the coking coal mined in the country. BCCL was incorporated in January, 1972 to operate coking coal Mines operating in the Jharia & Raniganj Coalfields, taken over by the Govt. of India on 16th Oct, 1971 to ensure planned development of the scarce coking coal resources in the country.

BACKGROUND OF THE MINE

Katras Choitodih Colliery was one of the existing/operating mines under the administrative control of Katras Area, BCCL. Katras Choitodih Colliery came into existence w.e.f. 1st May'1972 under Section-2 of CCMN Act 1972.

The Dhanbad-Chandrapura Rly line lies in the north of the project area. Mohuda –Bhaga railway line lies in the south of the project area.

1.1.1 NAME OF COAL BLOCK AND ITS BOUNDARY

Katras Choitudih Colliery is located in Kumari geological block.

Total area of Katras Choitudih Colliery is 228 Ha (as per colliery records).

North: Amalgamated Keshalpur West Mudidih Colliery
South: Tata Amalgamated Bhelatand Colliery.
East: Gaslitand Colliery
West: New Akashkinaree Colliery.

1.1.2 NAME OF THE COAL FIELD

Katras Choitudih Colliery is located in Jharia coalfield.

1.1.3 BASE DATE OF MINING PLAN/MINE CLOSURE PLAN AND ZERO DATE

The Zero Date of the Mining Plan is 01.06.2022.

1.1.4 LINKED END USE PLANTS

The ROM coal will be sent to Mohuda and Moonidih washery as well as washery of Tata. The coal will also be sold through road sale.

1.1.5 DISTANCE OF END USE PLANT FROM THE PIT HEAD OF THE PROJECT

1.1.6 MODE OF COAL TRANSPORT

Road

1.1.7 COAL WASHING:

Coal Handling and washing is not available in Katras Choitudih Colliery.

1.1.8 SCOPE OF THE REPORT:

This mining plan and mine Closure plan has been prepared to facilitate environmental clearance process.

The scope of the mining plan is limited to opencast extraction of Seam VIII C and above with floor of Seam VIIIC as base of the quarry. The life of the mine will be 24 years.

1.2 LOCATION, TOPOGRAPHY & COMMUNICATION

1.2.1 LOCATION OF COAL DEPOSIT

Katras Choitudih Colliery is located in Katras area of BCCL. The colliery lies at around 11km from Dhanbad town.

1.2.2 COMMUNICATION

NATIONAL HIGHWAY & PWD ROADS

Katras Choitudih Colliery is well connected by rail and road. Dhanbad town is located at a distance of about 11 Km east of this colliery.

RAILWAY LINES

The Dhanbad-Chandrapura line of Eastern Railway passes from the northern part of the colliery and Mohuda Bhaga rail line of SE railway passes from the southern part of the colliery..

MAJOR TOWNSHIP

Dhanbad town is located at a distance of about 11 Km east of this colliery.

1.2.4 PROMINENT PHYSIOGRAPHIC FEATURES

There is no remarkable physiographic features existing in the area demarcated for mining.

1.2.5 LAND USE & OWNERSHIP/OCCUPANCY AND INVOLVEMENT OF FOREST OF LAND

Existing land use as provided by colliery authority is tabulated below:

SL NO	Land Use	Area (IN Ha)
1	Excavation Area	24.44
2	Backfilled Area	27.15
3	Excavated Void	1.02
4	Without Plantation	0.00
5	Top Soil Dump	0.00
6	External Dump	23.31
7	Safety Zone	0.00
8	Haul Road between quarries	0.00
9	Road Diversion	0.00
10	Diversion/ below River/ Nala/ canal	0.60
11	Settling pond / Pond	1.78
12	Railway, Road & Infrastructure area	36.24
13	Rationalisation area	0.00
14	Drains	0.99

SL NO	Land Use	Area (IN Ha)
15	Embankment	0.90
16	Green Belt (Social Forestry)	0.00
17	Water Reservoir near Pit	0.01
18	UG Entry	1.15
19	Undisturbed/ Mining right for UG / Barren Land	95.23
20	Resettlement*/ Homestead Land	15.18
21	Pit Head Power Plant	0.00
22	Water harvesting	0.00
23	Agricultural Land	0.00
24	OB Dump Area	0.00
	Total	**228.00**

The details of land distribution under different category are shown in the table below.

OWNERSHIP WISE DISTRIBUTION OF LAND

Sl. no.	Particulars	Area (in Ha)
1.	BCCL Owned Land (including in RS)	169.75
2.	Forest Land	
3.	Govt./Rly Land	29.12
4.	LA Land	0.70
5.	Tenancy Land	21.22
6.	Others (including GM and disputed)	7.21
	TOTAL	**228**

INVOLVEMENT OF FOREST LAND

No forest land is involved.

1.2.6 IMPORTANT SURFACE FEATURES , MAJOR DIVERSION OR SHIFTING INVOLVED AND CONSTRUCTION

DB Road :

The DB road passes through the leasehold in Katras Choitudih section. It will have to be diverted along the western boundary of the leasehold. Lakarka Drain will have to be diverted leaving sufficient distance from quarry northern edge.

The diverted route is given in the surface plan.

BRIDGE

A bridge will have to be constructed over Katri River to carry OB material for dumping in Gaslitand**.**

1.4 DETAILS OF THE ALLOTMENT AGREEMENT

	Parameters	**Details**
1.3.1	Name the Allottee	NA
1.3.2	Status of the Applicant Company	NA
1.3.3	Details of allotment / vesting order	NA
1.3.4	Name and address of the applicant	NA
1.3.5	Relationship between the applicant and allottee company	NA

1.3.6	Name of the previous allottee of the Block	NA
1.3.7	Starting Date of the Mine as per CMDPA	NA
1.3.8	Rated Capacity as per CMDPA	NA
1.3.9	Production Schedule as per opening permission (meeting provisions of CMDPA if any)	NA
1.3.10	End Use of Coal/Lignite as per allotment order if any	NA

1.5 PARAMETERS OF APPROVED MINING PLAN VIS-À-VIS PROPOSED MININ PLAN

	Parameters	**Details**	
		Approved Mining Plan	Proposed Mining Plan
1.5.1	Block Area in “Ha”	228	228
1.5.2	Block Area Projectised in “Ha”	83.72	176.80
1.5.3	Lease area in “Ha”	228	228
1.5.4	Project Area in “Ha”	83.72	176.80
1.5.5	Life of the Project in “Yrs”	6	24
1.5.6	Minimum and Maximum Depth of working in “m”	0-130	Min-160 Max-240
1.5.7	Net Geological Block in “Ha”		

	Parameters	Details	
		Approved Mining Plan	Proposed Mining Plan
1.5.8	Peak Production Target in "MTPA"	0.65	0.65
1.5.9	Seams Available "As per GR"		XVI T, XVI B, XV T, XV B, XV, XIV, XIII, XIII/XIV, XII, XI, X, VIII C, VIII A, VIII, VII, V/VI, IV, III, II T, II M, II B, I M, 0
1.5.10	Seams not considered for Mining with Reasons		Seam below VIIIC seam has not been considered as it is not possible to extract below VIII C seam with the available strike length. Parting between VIII C and next lower seam is on average 40m. Seams below VIIIC seam can be mined if adjacent mines are amalgamated in future
1.5.11	Gross Geological Reserve "Mt"		129.49 MT - Coking coal 149.68 MT- Non Coking coal
1.5.12	Net Geological Reserve "Mt"		117.72 MT - Coking coal 136.08 MT- Non Coking coal
1.5.13	Blocked Reserve "Mt"		30.31 MT
1.5.14	Minable Reserve "Mt"	1.209 Mt	14.83 MT - Coking coal
1.5.15	Extractable Reserve "Mt"	1.209 Mt	14.83 MT - Coking coal
1.5.16	% of Extraction /recovery		90%
1.5.17	Reserve Depleted (till the base date) Reserves "Mt"		NA
1.5.18	Balance Extractable reserves "Mt"	1.209 Mt-Coking coal	14.83 Mt - Coking coal
1.5.19	Average Grade	W-II	W-III
1.5.20	OB in Mm^3	17.186	178.43
1.5.21	SR m^3/te		12.03
1.5.22	Mining Technology		Shovel-Dumper combination

	Parameters	Details	
		Approved Mining Plan	Proposed Mining Plan
1.5.23	Coal Beneficiation envisaged		NA
1.5.24	Handling of Rejects		N.A
1.5.25	Reason for revision		Life as per last mining plan will expire soon.

Chapter – 2

EXPLORATION, GEOLOGY, SEAM SEQUENCE, COAL QUALITY & RESERVE

2.1 DETAILS OF THE BLOCK

2.1.1 Particulars of the block

The present report is confined to the assessment of the part area (South-western part of original Kumari Block (GR, September 1986), and Katras-Choitudih Block (GR, June 1998)) of Jharia Coalfield for mining of seams by opencast method. Both constitute leasehold area of Katras choitudih colliery.

Jharia coalfield is located in Dhanbad and Bokaro districts of Jharkhand. After nationalization and formation of Bharat Coking Coal Ltd. (BCCL), a feasibility report for reconstruction and development of the collieries (FR ’78) of this coalfield was prepared in collaboration with the Polish consultants, wherein amalgamation of the erstwhile collieries including virgin area was envisaged. In this FR, 9 large opencast blocks and 21 large underground blocks were envisaged. However, this could not be implemented in full due to various constraints. The katras-choitudih UG block and Kumari opencast block are two of these originally envisaged blocks (plate-I).

Katras choitudih Colliery shares its boundary with following collieries:

North: AKWMC
South: Amalgamated Tata Bhelatand colliery
East: Gaslitand
West: New Akashkinari Colliery

2.1.2 Location of the Block

The area under consideration is located in central part of Jharia coalfield, District: Dhanbad, Jharkhand. The colliery area lies between Latitude 23°46'40.50" to 23°47'52.40" (N) and Longitude 86°17'31.61" to 86°18'36.89"

(E). The area falls in Survey of India Toposheet No. 73I/5 of Jharia coalfield (RF 1:5000).

2.1.3 Area of the Block

According to colliery records the leasehold area under consideration has a total surface area of about 228 Ha.

2.1.4 Area of the block projectized

As per the surface extent of proposed quarry, area of the colliery proposed to be projectized is about 176.81 Ha.

2.1.5 Balance area yet to be projectized

Katras choitudih colliery has a mining history since pre-nationalization period. Underground mining has been done in the past in almost every part of the colliery leasehold. In this Mining Plan, 176.80 Ha out of 228 Ha has been considered for opencast mining. Rest area could not be considered due to statutory distance to be left form road, rail river etc.

2.1.6 Reserve in the area yet to be projectized

Seam XVI Top to seam VIII C has been proposed for mining in this report. Seams below seam VIII C (VIIIB to I Mid) have not been proposed for mining in this project. Net Geological Resource of seams below VIII C seam within the entire leasehold area of Katras-choitidih Colliery is 207.11 million tons. Net Geological Resource for seams XVI Top to VIII C outside proposed area to be projectized is 16.87 million tons (considering vertical boundary of the quarry). This resource is blocked under road, river and village.

2.1.7 Geo-Referenced UTM Co-ordinates of the Block Boundary

ID	x	y
0	429576.720865289	2630602.45236285
1	429572.761676519	2630571
2	429572.5	2630565
3	429571.691258982	2630558.95496359

4	429571.3	2630554.96200187
5	429570.959061223	2630549.14487889
6	429570.193662934	2630543.03828425
7	429569.373423519	2630536.92662666
8	429569.026308952	2630533.49835936
9	429568.724772032	2630531.43952816
10	429568.240245938	2630526.26015871
11	429567.272292062	2630516.33483202
12	429566.673980152	2630511.39135271
13	429565.893539068	2630504
14	429565.086930159	2630498.15118943
15	429564.321615653	2630491.04101978
16	429563.704131345	2630486.13806428
17	429563.615176011	2630484.40211625
18	429562.797808524	2630475.60516929
19	429561.257121246	2630458.59869692
20	429558.398784024	2630439.30960398
21	429557.946804666	2630433.29132043
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37	429575.715301559	2630323.34741681
38	429578.330105371	2630319.56458337
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40	429585.586819786	2630309.44524426
41	429589.854393785	2630303.64186391
42	429589.278591348	2630301.32298417
43	429587.909845119	2630293.92598129
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45	429584.927452836	2630275.90475951
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47	429582.286705038	2630261.18857838
48	429581.840762475	2630258

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51	429576.755200541	2630229.71036814
52	429575.589062404	2630222.97722397
53	429574.455153461	2630215.24617686
54	429573.491148291	2630209.58155508
55	429570.492343109	2630191.87618329
56	429568.713391822	2630181.07696842
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136	428005.8	2630693.25168453
137	427879.850255703	2630693.68884846
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139	427982.097004188	2630954.22602562

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150	428114.888177411	2631344.93931092
151	428123.807262431	2631366.65344278
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155	428154.447858343	2631439.63699855
156	428174.887410042	2631476.35821998
157	428184.230667573	2631493
158	428187.904451733	2631506.43267297
159	428201.962007697	2631550.40183618
160	428213.000323343	2631585.47025048
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163	428234.959286628	2631648.68486321
164	428255.840025572	2631705.37726841
165	428275.572251659	2631756.71818149
166	428296.1	2631808.10297225
167	428324.7	2631808.91215766
168	428336.366783587	2631859.37979105
169	428342.937077385	2631876.97568084
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172	428385.770667877	2631978.80914629
173	428458.306732876	2631921.16636239
174	428532.6	2631919.71448453
175	428548.575499685	2631973
176	428542.341988414	2631981.54328566
177	428544.428155273	2631994.30108123
178	428565.3	2631998
179	428573.052425682	2632026.36509909
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189	429221.680532231	2631657
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191	429331.527007381	2631638.17593885
192	429313.100105303	2631513
193	429374.342049412	2631433.11694018
194	429420.153062244	2631373.78119898
195	429477.235997478	2631322.53402859
196	429529.430976646	2631277.00019838
197	429526.116053592	2631273.82841692
198	429521.645631018	2631269.32547733
199	429525.4	2631265.07725468
200	429527.062682371	2631263.44389716
201	429533.442438011	2631256.38993115
202	429539.228673757	2631249.81055484
203	429543.366393144	2631245.17927229
204	429586.932835768	2631197.25418826
205	429590.065444573	2631193.34155367
206	429596.051167095	2631186.95169455
207	429610.754571916	2631170
208	429656.233412749	2631119.41801938
209	429661.083321204	2631114.10989629
210	429681.934061229	2631086.48215781
211	429693.536007937	2631070.87173905
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215	429711.326005452	2630968.34305412
216	429710.311436554	2630965.16230071
217	429707.806747085	2630957.58619603
218	429704.594935774	2630947.61151551
219	429701.2	2630937.25758937
220	429700.346494238	2630934.53984216
221	429698.320457541	2630928.06538707
222	429692.449136208	2630911.01331711
223	429691.099927457	2630906.45878582
224	429689.987455752	2630903
225	429688.708666058	2630899.50196196
226	429687.428456841	2630896
227	429685.7	2630889.30976839
228	429684.114910464	2630885
229	429682.154851236	2630878.93874222
230	429680.182920919	2630873.45103084

231	429679.172128959	2630870.37022332
232	429675.342516668	2630858.48926306
233	429671.118366699	2630845.18913073
234	429667.323631608	2630832.61765743
235	429664.491249694	2630823.92987469
236	429663.459911268	2630820.55454593
237	429662.086619306	2630816.68211331
238	429659.113924235	2630807.75280717
239	429657.453662606	2630803.24703277
240	429655.016327657	2630795.28844345
241	429650.583790284	2630781.98384376
242	429648.583696993	2630775.94248165
243	429648.539576142	2630774.96272219
244	429646.907098613	2630771.50504758
245	429645.853387677	2630769.71546388
246	429644.567380964	2630767.15441947
247	429641.268334702	2630759.89729318
248	429633.989240241	2630744.92137211
249	429629.166457302	2630734.40157521
250	429624.325599411	2630724.10031736
251	429616.978772493	2630709
252	429613.143579497	2630700.91669433
253	429609.415081609	2630690.93733416
254	429607.4	2630685.47118195
255	429605.493123574	2630680.64967009
256	429603.599633736	2630675.82673235
257	429597.424898873	2630659.41409257
258	429595.965502125	2630654.66405456
259	429594.725072799	2630651.66560833
260	429593.276817147	2630647.37558844
261	429591.789713791	2630644.00865458
262	429590.710057772	2630639.98884527
263	429589.091208911	2630636.33186744
264	429587.797206363	2630632.54265078
265	429576.720865289	2630602.45236285

2.1.8 Geo-Referenced UTM Co-ordinates of the Proposed project area of the Mining Plan

Surface Extent		
ID	x	y
0	428096.408499116	2630701.74374895
1	428020.529885292	2630883.84348178
2	428030.844915896	2630909.84492354
3	428048.754169808	2630920.03576322
4	428065.300446635	2630973.82172063
5	428091.875986064	2631061.08846169
6	428085.507587088	2631075.91452099
7	428098.349810395	2631115.93215427
8	428125.380245388	2631199.33866177
9	428134.341973866	2631228
10	428139.596293122	2631245.75437089
11	428152.047231647	2631274.33046679
12	428163.112415144	2631300.91926417
13	428169.969069122	2631317.37893664
14	428178.832459499	2631339.10203226
15	428186.143075704	2631356.85348559
16	428195.826529672	2631379.90095549
17	428204	2631400.04126558
18	428207.525005802	2631408.17854689
19	428226.461488092	2631442.53258869
20	428238.732112446	2631464.93541243
21	428243.731257614	2631483.33577119
22	428257.1	2631526.08861301
23	428267.875607621	2631561.60231702
24	428272.156030223	2631577.06878463
25	428273.408802186	2631580.18057709
26	428330.6	2631632.96858654
27	428345.854476476	2631634.25810986
28	428540.712119268	2631649.69558214
29	428675.3	2631649.03971514
30	428817.222558123	2631659.70016089
31	429168.684012217	2631651.27157301
32	429307.110028085	2631621.86427448
33	429292.776609607	2631500.79832326
34	429320.534627726	2631424.21755043
35	429329.5	2631406.27830045
36	429338.555364094	2631391.74629999
37	429346.335092907	2631382.07507657
38	429349.271582984	2631377.37690773

39	429356.598190337	2631361.89743323
40	429361.376063956	2631348.00275139
41	429372.385363942	2631323.24129248
42	429386.132850422	2631300.31028139
43	429398.482075194	2631285.68063761
44	429417.680318511	2631271.83252302
45	429450.811510323	2631252.03837446
46	429451.3	2631251.71172424
47	429472.178560349	2631231.19589012
48	429492.735041132	2631216.64041755
49	429511.700498133	2631207.53544341
50	429529.391257852	2631201.00522602
51	429545.676769424	2631198.73728535
52	429547.971672843	2631196.54227699
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54	429574.460656616	2631175.82201146
55	429590.183741861	2631166.33061542
56	429602.912929806	2631158.51892422
57	429616.605213368	2631149.85345986
58	429627.5	2631143.57221221
59	429629.808521567	2631138.64310571
60	429636.701877913	2631115.78215525
61	429652.613040071	2631076.64339544
62	429664.780460753	2631046.53434285
63	429670.864000232	2631029.63108423
64	429672.591173351	2631009.00262164
65	429672.120032716	2630979.34056407
66	429671.9	2630966.17907741
67	429669.1	2630944
68	429668.351809523	2630942.12600567
69	429663.006449825	2630928.58944464
70	429653.185022821	2630908.66562927
71	429648.2	2630893.32052374
72	429626.707887758	2630853.99039811
73	429602.307176247	2630804.67061728
74	429581.141443307	2630773.90058857
75	429568.639124968	2630757.92666446
76	429548.358282513	2630723.21611465
77	429534.474981646	2630686.59736983
78	429510.567808395	2630624.79121037
79	429513.167659945	2630573
80	429511.380040563	2630537.73056683
81	429508.383717767	2630510.60490799
82	429503.608314371	2630468.11819395
83	429502.351871356	2630454.19695068
84	429500.074093526	2630427.73343707

85	429504.189728435	2630384.04790643
86	429515.291204157	2630330.44652923
87	429519.554997837	2630308.94441592
88	429528.435651313	2630270.25715973
89	429530.600337082	2630254.08887977
90	429529.2	2630249.22582701
91	429524.226701344	2630216.20696392
92	429523.359920422	2630209.37288822
93	429504.360309784	2630214.30187047
94	429445.676539832	2630229.71702852
95	429289.311508621	2630252.20338459
96	429229.826980926	2630271.11865464
97	429128.261904789	2630280
98	429011.901530208	2630290.95885506
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100	428766.866343896	2630286.30038449
101	428720.912749794	2630303.23212775
102	428645.633855089	2630341.51562968
103	428518.396762424	2630421.05497481
104	428438.181162133	2630472.78063259
105	428382.258728744	2630520.24122215
106	428272.834339528	2630589
107	428235.414191325	2630613.34987696
108	428096.408499116	2630701.74374895

2.1.9 KML file of the proposed lease and geological block

Available.

2.1.10 Whether the proposed project area is confined within the allotted block boundary

Yes

2.1.11 If project extends outside the allotted block boundary

Not applicable

2.1.12 Type of Project and year of starting

Opencast mining patch is running in the colliery at present in which seams from Top up to seam XIII have been proposed for mining.

2.2 EXPLORATION, GEOLOGY AND ASSESSMENT OF RESERVE

2.2.1 Regional Geology of the Area

The Jharia coalfield (453 Km^2) is sickle shaped on plan and occurs in the form of syncline with its axis trending broadly in E-W direction and plunging towards west. The southern flank of this coalfield is truncated by boundary fault having maximum throw about 2.5 Km at Mohuda Basin. The non-coal bearing Talchir formation is mainly exposed along the northern and western portion of the coalfield. The Barakar formation covering an area of 218 Km^2 which is exposed in the northern, eastern and south-eastern part of the coalfield area contains over 40 coal horizons including local and persistent seams, some of which are exclusively store house of metallurgical coal in India. The Barakar formation is successively overlain by Barren Measure formation which is devoid of workable coal seams. This is mainly exposed in the central part of the coalfield. The Barren Measure is overlain by the coal bearing Raniganj formation (54 Km^2). These are exposed within a sub elliptical basin the south-western part of the coalfield

Stratigraphy

The Regional stratigraphic succession of Jharia coalfield is given in table no. 2.1

Archeans: The Archeans, consisting of gneisses and mica schists are exposed all along the periphery of Jharia Coalfield. The metamorphics are profusely intruded by quartz veins.

Talchir: In an Archean basement, the lower Gondwana sediments are deposited with a pronounced unconformity. The lowermost Gondwana sediments of Talchir formation are represented by variegated shale and greenish sandstones which at times show laths of unaltered feldspars. They are exposed all along the northern fringe of the coalfield. Near Lutipahar in the north-western part of the coalfield, Talchir formation is comparatively well developed in a large area and boulder bed shows exposures of spheroidal weathering.

Barakar: In the eastern, northern and north-eastern parts of the block, the Barakar are extensively developed. All along the southern boundary they are extending under the thick over of Barren Measures. The Barakar formation comprises pebbly sandstones, conglomerate, grit, coarse to fine grained sandstones, shales, carbonaceous shales and coal seams. Verma *et. al*. (1989) has observed a gradual decrease in thickness of Barakar from east to west. Its maximum thickness of more than 1250 m has been observed in the south-eastern part of the coalfield in Tasra region. Barakar is the most important geological formation as it contains more than 40 coal horizons having thickness more than 50 cm. In general seam X (Ten) and younger seams are better quality coal.

Barren Measure: The Barren Measure formation lying conformably over the Barakar formation consists of massive multistoried sandstone alternating with carbonaceous shale, grey shale and sandstone/ shale intercalations with occasionally very thin, impersistent and non-workable coal horizons in the lower part of the formation. The Barren Measures show a widespread development extending from the central part of the coalfield up to the southern margin. The maximum thickness of the Barren Measure has been estimated to be around 625m in the central part of the basin. It gradually decreases westward and eastward.

Raniganj: Raniganj formation is deposited in sub elliptical basin that is called Mohuda basin the south-western part of the coalfield. The formation is represented by sandstone, shale, carbonaceous shale and coal seams. There are 24 coal seams reported from this formation. These seams comprise high volatile, high moisture, medium coking coal. The maximum thickness around 725m of Raniganj formation has been observed.

Igneous Intrusive: Mica peridotite and dolerite are the two most common Post Gondwana intrusives. The mica peridotite occurs as dyke and sill throughout the entire coalfield and has caused widespread devolatilization of the coal seams. The dolerite dykes are mostly confined in the western part of the coalfield and has limited effect on coal seams. The mica peridotite sills have devolatilized the extensive reserve of good quality coal in the coalfield.

As mentioned earlier most of the area is covered by sandy soil and alluvium. The thickness of soil varies from 1.0 m to 9.0 meter.

Table-2.1

Geological Succession of Jharia coalfield

Stratigraphic Division	Age	Formation	Lithological characters
	Recent	Alluvium/Soil/Sand	
	Cretaceous to Jurassic	Mica Peridotite/Dolerite Dyke	
	---------- Unconformity ----------		
Lower Gondwana	Upper Permian	Raniganj Formation	Mainly fine to medium grained grey current bedded sandstone with shale and coal seam
	Middle Permian	Barren Measures	Black carbonaceous micaceous shale with clay, ironstone and sandstone.
	Lower Permian	Barakar Formation	Coarse grained to conglomeratic white sandstone with shale and coal seams
	Lower Permian	Talchir Formation	Coarse grained sandstone, white or slightly variegated at Top, green shale with undecomposed feldspar, boulder bed etc.
	---------- Unconformity ----------		
	Archeans		Granites, gneisses and schists.

2.2.2 Local Geology

The area under consideration is located in the north central part of the Jharia coalfield, and includes rocks of Barakar formation which is overlain by thin layers of sandy soil and clay. Based on available borehole data, thickness of soil ranges between 3.23m. (KC-15) to 13.95 m. (AP-92) with average thickness of about 7.89 m. The rocks of Barakar formations can be divided into the top argillaceous strata- fine to medium grained with repeated intercalation of shales and lenses of sandstones as observed in the Quarries of seam XIV and XIII and bottom arenaceous strata- coarse grained to pebbly. Coal seams XVI Top to I (Middle) occur within the project area and seams XVI Top to X are under the

purview of this Geological note for their extraction by opencast method (Plate No. G-III). Incrop of seam XII touches the north-western corner of the colliery boundary. Incrop positions of the coal seams have been taken on the basis of geological plan viz. geological cross section, floor contour and quarry/incline positions and are interpretative. Geology and correlation of the seams have been established mainly on the basis of sub-surface data obtained from borehole and mine workings.

Table-2.2

Sequence of Coal Seams (within the colliery boundary)

SEAM/PARTING	VERTICAL THICKNESS (m)		AVERAGE THICKNESS (m)	NUMBER OF BH INTERSECTION
	MINIMUM	MAXIMUM		
XVIT	2.45 (KC009)	2.45 (KC009)	2.45	1
P	1.93	1.93	1.93	1
XVIB	0.67 (KC009)	0.67 (KC009)	0.67	1
P	39.2	39.2	39.2	1
XVA	1.20 (KC009)	1.24 (KC020)	1.22	2
P	17.4	26.51	21.95	2
XVT	2.09 (KC020)	2.45 (KC009)	2.32	3
P	2.45	2.5	2.47	2
XVB	1.18 (KC011)	1.52 (KC009)	1.37	3
P(XVT-XIV)	43.56	43.56	43.56	1
P(XVB-XIV)	45.7	54.29	50.81	3
XIV	2.38 (KC010)	7.04 (KC009)	5	12
P	4.33	13.11	9.46	11
XIII	0.60 (AP076)	4.86 (KC020)	2.79	11
P(XIV-XII)	47.85	47.85	47.85	1
P(XIII-XII)	29.65	43.26	35.82	8
XII	1.25 (KC013)	2.85 (KC011)	1.88	13
P(XIII-XI)	49.59	49.59	49.59	1
P(XII-XI)	9.34	13.76	11.76	13
XI	0.66 (KC015)	3.50 (AP092)	1.88	15
P	55.13	75.2	66.02	6
X	3.90 (KC004)	8.60 (KC013)	6.52	13

P	5.2	8.86	7.52	12
VIIIC	0.92 (KC004)	3.70 (AP098)	2.48	12
P(VIIIC-VIIIA)	11.32	28.98	19.4	11
VIIIA	3.02 (KC009)	4.28 (AP098)	3.64	11
P(X-VIIIT)	15.6	15.6	15.6	1
P(VIIIC-VIIIT)	25.31	25.31	25.31	1
P(VIIIA-VIIIT)	1.92	8.39	4.85	11
VIIIT	0.58 (KC013)	2.45 (AP095)	1.67	13
P	14.77	14.77	14.77	1
VIIIBOT	1.05 (AP076)	1.05 (AP076)	1.05	1
P(XI-VII)	107.05	107.05	107.05	1
P VIIIT- VII)	19.42	30.05	26.45	8
P(VIIIBOT- VII)	5.77	5.77	5.77	1
VII	1.52 (KC015)	4.53 (KC004)	3.4	14
P	30.63	30.63	30.63	1
V/VI	6.3 (AP076)	10.31 (AP095)	8.44	12
IV/V/VI	19.33 (KC009)	19.33 (KC009)	19.33	1
P(V/VI-IV)	4.33	10.18	6.64	12
IV	15.55 (KC015)	18.25 (KC019)	17.01	12
P	4.23	19.45	9.2	6
III	1.35 (KC020)	4.21 (KC020)	3.1	6
P	17.56	17.56	17.56	1
IIT	0.45 (AP098)	0.45 (AP098)	0.45	1
P(III-IIM)	38.96	38.96	38.96	1
P(IIT-IIM)	17.51	17.51	17.51	1
IIM	3.34 (KC010)	4.75 (KC020)	4.22	5
P	16.73	16.73	16.73	1
IM	2.15 (KC010)	4.29 (AP076)	3.3	3

Note-

1. Seam VIII B and seam IX has not been intersected in any borehole within the colliery leasehold.

Geological Structure of the Block

Strike & Dip

The intersecting structural details of the area explored are repetition of outcrops of seams by major strike-fault. The general strike of the strata is generally N65°W – S65°E. The dip direction is generally towards South direction and its amount generally varies from 3° to 16°.

Faults

Based on boreholes/colliery data 9 nos. of faults have been interpreted within the project area. Throw of these faults varies from 10m to 65 m. The details of faults are given in Table No–2.3.

Table- 2.3

Description of faults

Sl. No.	Fault No.	Extent & Location	Trend/Dip	Max. Throw (m)	Nature & Evidence
1	F1-F1'		NE-SW with ESE dip.	20m	Dip Fault 1. Encountered in the working of IX, X & XI/XII, X, IX. 2. Encountered in workings of VIIC of East Katras Colliery. 3. Encountered in workings of VIIIC of East Katras Colliery. 4. Encountered in quarry of VII& V/VI seams in Salanpur Colliery 5. III seam roof faulted in AP-73. Seams in East Katras and adjoining Katras Choitudih Colliery.
2	F2-F2'		NE-SW with ESE dip.	20m	Dip Fault 1. Shifting of incrop of seams. 2. Omission of X seam in KC-14. 3. Omission of XIII Bot seam in KC-6 4.Encountered in the workings of IX/X, XI/XII, XIIIT & XIV. 5. Encountered in the workings of VIIC seam in East Katras and Katras-Choitudih collieries. 6. The fault extends into Katras U/G Project area.

3	F3-F3'	0.21	NNE-SSW with NNW Dip	10m	1. Omission of part of Seam X from roof as well as reduction in parting between seam X and XI in BH KC-14. 2. Omission of seam-XI from roof in AP-97
4	F4-F4'	0.24	NE-SW with north-westerly dip	10m	Occurrence of FRLs of various seams at some level in boreholes KC-18 & KC-19, as well as displacement of stratum contours of various seams between BHs KC-10 & KC-13, & AP-95
5	F5-F5'	0.63	WNW-ESE with NNE dip	25m	Strike slip Fault Intersected in AP-50 omitting seam II (Top) and II (Middle).
6	F15-F15'	1.36	NNW-SSE with dip towards ENE	65m	Strike Fault 1. Encountered in workings XVI(T), XVI(BOT) of Gaslitand Colliery. 2. Intersected in AP-51 omitting seam XVII and in AP-85 omitting part of seam III from floor.
7	F17-F17'	0.34	E-W with Southerly dip	20m	Roof of XI/XII seam is faulted in KC-4
8	F18-F18'	0.6	E-W with Southerly dip	45m	Curvilinear Fault 1. Intersected in JSG-2 omitting seam XI and XII and thus reducing parting between seam X and XIII in AP-89 omitting seam IV and III thus reducing parting between seams V/VI and APL-22. 2. Omission of all the seam from XVII to XVIB/C in KC-4
9	F20-F20'	1.2	E-W with northerly dip	40m	Curvilinear Fault 1. Encountered in workings of Seam XIV, XIII, XV(T), XV(BOT) of Gaslitand Colliery.

Additionally, existence of other minor faults (throw up to 5m) in the project area cannot be ruled out.

2.2.3 Geological Block Area

Katras choitudih Colliery falls in Katras-Choitudih and partly in Kumari Block of Jharia Coalfield. As per colliery records total surface area of Katras choitudih colliery is about 176.81 Ha.

2.2.4 Status of Exploration of the block

The entire area under consideration has been covered by detailed exploration and data is partly available in the “Geological Report on exploration for coal in Kumari Open Cast Block, Jharia coalfield, Dhanbad (September, 1986)”, prepared by MECL and partly by Geological Report on Exploration for coal Katras Choitudih (UG 3) Block, Jharia coalfield, Dhanbad (June 1998) prepared by CMPDI.

2.2.5 Area covered by detailed exploration within the block

The entire area under consideration has been covered by detailed exploration.

2.2.6 Whether entire area covered by detailed exploration

Yes.

2.2.7 No. of boreholes drilled within the block

A total of 93 boreholes of AP and JSG have been drilled within Kumari OCP geological block, out of which 4 boreholes fall within the leasehold of Katras choitudih Colliery involving a total meterage of 1265.50 and total 18 boreholes of KC series have been drilled within Katras choitudih Block, out of which 11 boreholes fall within the leasehold of Katras choitudih colliery involving a total meterage of 3900.17.

Table- 2.4

Status of Exploration

Serial No.	Year	BH series	No. of BH in Katras choitudih colliery	Meterage drilled in Katras choitudih Colliery
1	1979-1985	AP	04	1265.50
2	1978-1981	KC	11	3900.17
Total			15	5165.67

2.2.8 Whether any further exploration is required or not

Seams below seam IV in the southwestern corner of the colliery leasehold fall in indicated category. But drilling may not be possible due to multiple sections of working in the upper seams.

2.2.9 Year wise future program of exploration

Not applicable.

2.2.10 Borehole density within the block (no./sq. km)

Within the colliery leasehold, the borehole density is approximately 7 BHs/Km^2.

2.2.11 No. of Seams available as per GR

The lay and deposition of coal seams is based primarily on the data available in the "Geological report on Exploration for coal in Kumari Open Cast Block" Jharia coalfield, Dhanbad (September-1986, prepared by MECL) and Geological report on Exploration for coal Katras Choitudih (UG3) Block Jharia coalfield (June-1998 prepared by CMPDI) and updated mine data provided by colliery authorities.

Coal seams XVIT to I (Middle) occur within the colliery (Table-2.2). Incrop of seam XII touches the north-western corner of the colliery boundary. Seam IX and VIIIB has not been intersected in any borehole within the leasehold. Seam XV is splited into XV Top and XV Bottom, and seam II is splited into II Top, II Mid and II Bottom. Standard geological name of coal seams and corresponding colliery nomenclature is given in Table-2.5.

Table – 2.5

Nomenclature of coal seams Vis-À-Vis Colliery Nomenclature

Standard Nomenclature (Geological)	Nomenclature (Geological) Katras choitudih	Nomenclature (Geological) Kumari ocp	KATRAS CHOITHUDIH Colliery Nomenclature
XVI TOP	XVI-I	XVI TOP	XVI A
XVI BOT	XVI-H	XVI BOT	XVI

L-4	XVI-G		
XV-A	XVI-E	XV-A	XV-A
XV T	XVI-C	XV TOP	XV (T)
XVB	XVI-B	XVBOT	XV (B)
XIV	XVI/XVIA	XIV	XIV
XIII	XV	XIII	XIII
XII	XIV	XII	XII
XI	XIII TOP	XI	XI
APL-8	XIII BOT	APL-8	XIA
XA		XA	
X	XI/XII	X	X
VIII-C	X	VIII-C	IX
VIII-B	L	VIII-B	
VIII-A	IX	VIII-A	VIIIB
VIII TOP	VIII-C	VIII TOP	
VIII BOT & VIII		VIII BOT & VIII	
VII	VIII-B	VII	VIIIT
APL-3	VIII-A		VIIIB
V/VI	VII	V/VI	
IVT	V/VI	IV	IV
III	IV TOP	III	
II TOP		II TOP	
II MID	IVB	II TOP& IITOP/IIMID	
I MID	III	I MID	
0	I/II		

Quality

As per the GR of Kumari OCP, seams XVIT, XVIB, XV, XIV, XIII, XII, XI, X exhibit good coking characteristics and have been categorized as coking in the area where UVM is > 20%, seam VIIIC, VIIIA, VIII Top, VIII Bot, VII, V/VI and IV have been considered both Coking as well as non-coking and seam III, IITop, IIMid, IIBot and I M have been considered non-coking where UVM is < 20%. within the colliery boundary. Seamwise average in-band thickness (I-100), average grade and GCV is given in Table No-2.7. Details of seam thickness and quality is available in seam folio plans (Plate No: G-VII).

To arrive at the in-band thickness of the coal seams as per opencast norms, all combustible dirt bands up to 1.00 m thickness occurring within the seam have been included. Dirt bands having thickness more than 1.00 m occurring within the seam have been excluded.

If the non-combustible bands that are developed within the seam persist in a considerable area, the seam has been considered as split and line of split or merger has been drawn in relevant floor contour and seam folio plans.

Due to unavailability of Gross Calorific Values (GCV) that have been determined in the laboratory, it has been calculated by the following formula (Majumder's formula for low moisture coal).

$$GCV = \frac{165F+136(VM-0.1A)-108M}{1.8} \quad \text{..... (i)}$$

Where:

F = Fixed carbon %, VM = Volatile Matter %

A = Ash %, M = Moisture %

Specific Gravity of coal has been calculated by the following empirical formula–

SG =1.28+ (0.01A) ..... (ii)

Where:

A = Ash%

Exploitation Status

Presently, seams from top to XIII are being worked by Open cast method. Seam XVIT, XVIB, XV, XIV, XIII, have been worked in the past primarily by underground method and also by opencast method at places in the past and XII, XI, X, VIIIC, VIIIA and VII have been worked in the past by underground method. Underground working of seam X is in two sections. Thin and impersistent seams such as seam XVA, VIIIB, VII, II Top, II Bot, I Top, and I Mid have not been exploited. Seam IX is not developed in the leasehold area. Details of working and quarry of each seam is available in floor contour plans (Plate No: G-VI) and seam folio plans (Plate No: G-VII).

An element of approximation exists in location and extent of mine workings when matched with borehole location plan. Surface features like quarries, Incline, roads etc. shown on the plan supplied by colliery do not well match with Survey of India Topo sheet available.

Seams Considered for Mining

Only seams XVI Top to seam VIII C has been proposed to be projectized within the proposed area. Floor extents of proposed quarry of each seam is available in floor contour plans (Plate No: G-VI) and seam folio plans (Plate No: G-VII).

2.2.12 Seams not considered for Mining

Seam VIII A, VIII Top, VIII Bot, VII, V/VI, IV, III, II Top, II Mid, II Bot and I mid in entire part of the leasehold has not been considered within the area to be projectized. Therefore, these seams have not been considered for mining.

In addition to that, Seam IX, VIII B and 0 seam is not persistent within the colliery leasehold and seam thickness is also less than 0.5 m in major part of its persistence.

2.2.13 Strike & Dip of the Seam

The general strike of the strata is generally N65°W – S65°E. The dip direction is generally towards South direction and its amount generally varies from 3° in northern part to 16° in eastern part. Local variation in the strike and dip have been observed particularly near incrops and faults.

The relevant details of strike and dip of seams can be seen from the floor contour plans and geological cross sections (Plate-G-V & G-VI).

2.2.14 Seam wise thickness, depth and reserve

Seam wise summary of in-band thickness (I-100) based on borehole data, depth range and reserve within Katras choitudih colliery leasehold are given in Table- 2.6 for their extraction by opencast method. 10 percent of the net geological resource available within the proposed quarry has been considered as mining losses. Therefore, 90 percent of net geological resource available within the proposed quarry has been considered as minable reserve.

Table – 2.6

Seam wise thickness, depth and reserve within colliery leasehold

Seam	In-Band Thickness Range (m)	Depth Range (m)	Net Geological Reserve (Mt)	Blocked Reserve Below (Mt)			Min Reserve (Mt)		Mining Losses
				Highwall/Batter	Nala/River/Road/ Village/Barrier	Total	UG	OC	
XVI TOP	1.5	INCROP-105	0.5007	0.47	0.02	0.49	NIL		
XVI BOT	2.45	INCROP-125	0.1828	0.15	0.01	0.16	`	0.00801	0.08
XV TOP	2.02-2.45	INCROP-185	2.6589	0.74	0.29	1.03	NIL	1.45467	0.14
XVBOT	1.18-1.52	INCROP-185	1.86	0.78	1.07	1.85	NIL		
XIV	4.0-7.04	INCROP-255	8.3953	2.35	1.48	3.83	NIL	4.18995	0.41
XIII	1.55-4.82	INCROP-265	3.284	1.17	0.38	1.55	NIL	1.5543	0.15
XII	1.1-2.85	INCROP-315	2.6513	1.21	0.62	1.83	NIL	0.73161	0.07
XI	0.66-2.66	20-305	2.8674	1	0.97	1.97	NIL	0.80181	0.08
X	3.9-8.30	90-365	18.3075	4.1	8.71	12.81	NIL	4.94325	0.49
VIII-C	0.92-3.05	100-365	5.9798	1.38	3.32	4.7		1.14201	0.11
VIII-A	3.02-4.06	120-395	14.2528	Not Proposed for mining					
VIII TOP	1.04-2.55	130-405	5.5134						
VIII BOT	0.65-2.48	140-435	5.1776						
VII	1.52-4.53	160-445	10.12						
V/VI	7.92-10.31	200-465	27.81						
IV/V/VI	19.33								
IV	15.88-18.25	220-505	108.5334						
III	1.35-4.21	230-505	9.97						
II TOP		240-335							
IIMID	3.34-4.75	260-505	12.32						
IIBOT			3.67						
I MID	2.15	300-495	6.52						
0			3.23						
TOTAL			**253.8049**	**13.35**	**16.87**	**30.22**		**14.82561**	**1.53**

2.2.15 Methodology of Reserve estimation

Reserve Estimation Criteria

A) The seam wise status of developed, depillared and goaved areas in addition to virgin patches has been identified on the basis of seam working plan provided by the concerned area/colliery officials. These have been clearly marked on the seam folio plans and floor contour plans of all the seams proposed for quarrying in the area.

B) Goaf & Quarries: These areas have been considered as devoid of coal, however in case of goaf the devoid zone is considered according to the height of the goaf.

C) Developed Areas: In developed areas, where reserves are standing on pillars, seam wise dimension of extraction (height & width) have been decided on the basis of seam working plan made available by area/collieries authorities and after detailed discussion with them. And only after that percentage of extraction factor for each seam has been arrived which ranges from 25 % to 30 %. For standing on pillars an average of 30% extraction of coal have been considered and accordingly Net Geological Reserve has been calculated.

D) Thickness: - Only the In-band (I100) thickness of the seam has been considered for reserve estimation.

Areas having thickness less than 0.5 m have not been considered for reserve estimation.

Methodology of Reserves Calculation

The reserve has been estimated through “MINEX” software.

1. The reserve has been calculated using “Detailed resource reporting” menu of **MINEX 6.1.3** software along with separate template for each individual seam.

2. A deduction of 10% from the 'gross reserves' of coal has been made to account for unidentified geological uncertainties like structural disturbances, washout zones etc. to arrive at the 'net geological reserves.'

3. The seam wise status of developed, depillared areas in addition to virgin patches has been identified on the basis of seam working plan supplied by the concerned area/colliery officials. These have been clearly marked on the seam folio plans and floor contour plans of all the seams.

4. Heave Zone: The areas falling within the heave zone of a fault has been excluded for the purpose of reserve estimation.

5. Reserve is calculated within the proposed project boundary demarcated by the mining department.

2.2.16 Average GCV

Seam wise average quality/GCV parameters of available coal resource of Katras choitudih colliery leasehold are given in Table No.-2.7.

Table No. - 2.7

Seam wise average grade

Seam	Average Thickness (m)	Average Ash% (Coking)	Average GCV(Kcal/Kg)	Average Grade
XVI TOP	1.5	21		W-II
XVI BOT	2.45	18.465		W-I
XV-A	1.22	27.19		W-III
XV TOP	2.29	21.19		W-II
XVBOT&XV	1.37	26.45		W-III
XIV	5.54	24.07		W-III
XIII	2.83	24.37		W-III
XII	1.91	19.53		W-I
XI	1.45	25.53		W-III
X	6	27.49		W-III
VIII-C (Coking)	2.21	29.63		W-IV
VIII-C (non-Coking)	3.05	26.9	6064.644	G5

VIII-A(Coking)	3.62	25.63		W-III
VIII-A (non-Coking)	3.7	28.45	5932.35	G5
VIII TOP(Coking)	1.69	33.1		W-IV
VIII TOP (non-Coking)	1.8	33.68	5601	G6
VII (non-Coking)	3.92	31.8	5889.333	G5
V/VI (Coking)	8.79	35.23		W-V
IV(Coking)	16.645	35.87		W-V
IV (non-Coking)				
III	3.15			
II TOP	0.74			

2.2.17 Gross Geological Reserve of the block

Seamwise – Gradewise gross geological reserve of non-coking and coking coal within the leasehold of Katras choitudih colliery at present is given below in Table-2.8(A) and Table- 2.8 (B) respectively.

Table No. - 2.8 (A)

Gross Resource of Non Coking Coal (in Million Tonne) within Leasehold Boundary													
Seam	**G1**	**G2**	**G3**	**G4**	**G5**	**G6**	**G7**	**G8**	**G9**	**G10**	**G11**	**G 12**	**TOTAL**
VIII-C					0	0							**0**
VIII-A					3.806	1.562							**5.368**
VIII TOP													
VIII BOT									0.429	2.431			**2.86**
VII				2.981	3.355	2.354	1.694	0.748					**11.132**
V/VI	3.212	6.666	8.118	7.194	3.366	2.024	0.011						**30.591**
IV						38.511	21.95						**60.456**
III								0.055	3.289	5.676	1.947		**10.967**
II TOP													
IIMID					0.286	5.984	5.764	1.518					**13.552**
IIBOT			1.551	2.387	0.099								**4.037**
I MID		0.044	1.848	4.73	0.55								**7.172**
0	2.387	0.286	0.253	0.209	0.187	0.132	0.077	0.022					**3.553**
TOTAL	**5.599**	**6.996**	**11.77**	**17.5**	**11.649**	**50.567**	**29.49**	**2.343**	**3.718**	**8.107**	**1.947**		**149.688**

Table No. - 2.8 (B)

Gross Resource of Coking Coal (in Million Tonne) within Leasehold Boundary								
SEAM	**S-I**	**S-II**	**W-I**	**W-II**	**W-III**	**W-IV**	**W-V**	**TOTAL**
XVI TOP			0.55077					**0.55077**
XVI BOT	0.01969	0.02486	0.01276	0.01243	0.02607	0.08052	0.02475	**0.20108**
XV TOP	0.06666	1.10583	0.25289	0.3641	0.86273	0.27258		**2.92479**
XV BOT			0.01155	0.3432	0.61688	1.07437		**2.046**
XV			0	0	0	0		
XIV			0.26257	5.34171	3.36325	0.2673		**9.23483**
XIII		0.1474	1.05039	1.25829	1.08372	0.0726		**3.6124**
XIII/XIV								
XII		0.70928	0.9878	0.75834	0.31262	0.14839		**2.91643**
XI		0.01947	0.16258	0.83765	1.60204	0.5324		**3.15414**
X			0	1.06634	13.4827	5.55423	0.03498	**20.13825**
VIII-C			0.0418	0.28105	3.16338	2.50008	0.59147	**6.57778**
VIII-A			0.97922	1.41284	7.07333	0.84469		**10.31008**
VIII TOP					0.14289	4.4473	1.47455	**6.06474**
VIII BOT					0.00341	1.54506	1.28689	**2.83536**
VII								
V/VI								
IV						36.11872	22.81202	**58.93074**
TOTAL	**0.08635**	**2.00684**	**4.31233**	**11.67595**	**31.73302**	**53.45824**	**26.22466**	**129.497**

2.2.18 Net Geological Reserve of the block

Seamwise – Gradewise net geological reserve of non-coking and coking coal within the leasehold of Katras choitudih colliery at present is given in Table-2.9(A) and Table- 2.8 (B) respectively.

Table No.- 2.9 (A)

Net Geological Resource of Non Coking Coal (in Million Tonne) within Leasehold Boundary													
Seam	**G1**	**G2**	**G3**	**G4**	**G5**	**G6**	**G7**	**G8**	**G9**	**G10**	**G11**	**G12**	**TOTAL**
VIII-C													
VIII-A					3.46	1.42							**4.88**
VIII TOP													
VIII BOT									0.39	2.21			**2.6**
VII				2.71	3.05	2.14	1.54	0.68					**10.12**
V/VI	2.92	6.06	7.38	6.54	3.06	1.84	0.01						**27.81**
IV						35.01	19.95						**54.96**
III								0.05	2.99	5.16	1.77		**9.97**
II TOP													
IIMID					0.26	5.44	5.24	1.38					**12.32**
IIBOT			1.41	2.17	0.09								**3.67**
I MID		0.04	1.68	4.3	0.5								**6.52**
0	2.17	0.26	0.23	0.19	0.17	0.12	0.07	0.02					**3.23**
TOTAL	**5.09**	**6.36**	**10.7**	**15.91**	**10.59**	**45.97**	**26.81**	**2.13**	**3.38**	**7.37**	**1.77**		**136.08**

Table No.- 2.9 (B)

Net Geological Resource of Coking Coal (in Million Tonne) within Leasehold Boundary								
SEAM	**S-I**	**S-II**	**W-I**	**W-II**	**W-III**	**W-IV**	**W-V**	**TOTAL**
XVI TOP			0.5007					**0.5007**
XVI BOT	0.0179	0.0226	0.0116	0.0113	0.0237	0.0732	0.0225	**0.1828**
XV TOP	0.0606	1.0053	0.2299	0.331	0.7843	0.2478		**2.6589**
XV BOT			0.0105	0.312	0.5608	0.9767		**1.86**
XV								
XIV			0.2387	4.8561	3.0575	0.243		**8.3953**
XIII		0.134	0.9549	1.1439	0.9852	0.066		**3.284**
XIII/XIV								
XII		0.6448	0.898	0.6894	0.2842	0.1349		**2.6513**
XI		0.0177	0.1478	0.7615	1.4564	0.484		**2.8674**
X				0.9694	12.257	5.0493	0.0318	**18.3075**
VIII-C			0.038	0.2555	2.8758	2.2728	0.5377	**5.9798**
VIII-A			0.8902	1.2844	6.4303	0.7679		**9.3728**
VIII TOP					0.1299	4.043	1.3405	**5.5134**
VIII BOT					0.0031	1.4046	1.1699	**2.5776**
VII								
V/VI								
IV						32.8352	20.7382	**53.5734**
TOTAL	**0.0785**	**1.8244**	**3.9203**	**10.6145**	**28.8482**	**48.5984**	**23.8406**	**117.7249**

2.2.19 Minable Geological Reserve of the block

Seamwise – Gradewise mineable reserve by opencast method of coking coal within the leasehold of Katras choitudih colliery at present is given in Table-2.10 (A). Mineable reserve has been estimated as 90 percent of net geological reserve estimated within proposed quarry extent.

Table No.- 2.10 (A)

MINABLE RESOURCE OF COKING COAL(IN MT) WITHIN PROPOSED FLOOR LIMIT EXTENT COMBINED								
Seam	**S-I**	**S-II**	**W-I**	**W-II**	**W-III**	**W-IV**	**W-V**	**TOTAL**
XVI TOP								
XVI BOT	0.0027	0.00342	0.00189					**0.00801**
XV TOP	0.03303	0.58005	0.1314	0.17001	0.35955	0.18063		**1.45467**
XV BOT								
XV								
XIV			0.1287	1.3401	2.62413	0.09702		**4.18995**
XIII			0.35514	0.57078	0.61065	0.01773		**1.5543**
XIII/XIV								
XII		0.11484	0.351	0.19323	0.07254	0		**0.73161**
XI			0.02007	0.27891	0.30465	0.19818		**0.80181**
X				0.65934	3.90654	0.37737		**4.94325**
VIII C					0.57528	0.31302	0.25371	**1.14201**
TOTAL	**0.03573**	**0.69831**	**0.9882**	**3.21237**	**8.45334**	**1.18395**	**0.25371**	**14.82561**

2.2.20 Blocked Reserve

Seamwise – Gradewise blocked reserve of coal within the leasehold of Katras choitudih colliery at present is given in Table-2.11.

Table No.- 2.11

BLOCKED RESOURCE OF COKING COAL(IN MT) WITHIN PROPOSED FLOOR LIMIT EXTENT COMBINED								
Seam	**S-I**	**S-II**	**W-I**	**W-II**	**W-III**	**W-IV**	**W-V**	**TOTAL**
XVI TOP	0	0	0.5007					**0.5007**
XVI BOT	0.0149	0.0188	0.0095	0.0113	0.0237	0.0732	0.0225	**0.1739**
XV TOP	0.0239	0.3608	0.0839	0.1421	0.3848	0.0471		**1.0426**
XV BOT			0.0105	0.312	0.5608	0.9767		**1.86**
XV								
XIV			0.0957	3.3671	0.2391	0.1352		**3.8371**
XIII		0.134	0.5603	0.5097	0.3067	0.0463		**1.557**
XIII/XIV								
XII		0.5172	0.508	0.4747	0.2036	0.1349		**1.8384**
XI		0.0177	0.1255	0.4516	1.1179	0.2638		**1.9765**
X				0.2368	7.9164	4.63	0.0318	**12.815**
VIII C			0.038	0.2555	2.2366	1.925	0.2558	**4.7109**
TOTAL	**0.0388**	**1.0485**	**1.9321**	**5.7608**	**12.9896**	**8.2322**	**0.3101**	**30.3121**

2.2.21 Corresponding extractable reserve of the block

For opencast mining extractable reserve is considered same as minable reserve in Table- 2.10(A) and Table- 2.10(B).

2.2.22 Percentage of extraction

For opencast mining percent of extraction is considered 100 percent.

2.2.23 Reserve already depleted

Not applicable.

Note- Mining activities are going on in Katras choitudih colliery since pre-nationalization period. Resource in the present work is estimated after deducting already depleted reserves.

2.2.24 Balance Reserve

Since, depleted resource is already accounted for in resource estimation, Balance reserve in Katras choitudih colliery is considered same as minable reserve in Table: -2.10 (A), 2.10(B) and Table: - 2.10(C).

CHAPTER - III

MINING

3.1 MINING METHOD

3.1.1 Existing Method of Mining if the Mine is Under Operation:

The mine is being worked by opencast method by means of hiring of HEMM.

3.1.2 Proposed Method of Mining with Justification on Suitability of Method of Mining

Present status of seams within the boundary of Katras Choitudih Colliery is detailed below:

Seam	Status
XVI Top	The seam outcrops at the northern side of Mahuda – Bhaga Line. Only 3-4 Nos. of pillars had been developed before nationalization from outcrop region by Inclines and rest is virgin. Inclines are filled up. No approach exists.
XVI Bottom	The seam outcrops at the northern side of Mahuda – Bhaga Line. The seam has been developed through inclines from the outcrop region. Part of the area on the outcrop region in the east had been caved while the area on the west and the dip side is standing on pillars. A small part of outcrop has been quarried. No approach exists.
XVA	The seam is partly quarried and rest is virgin.
XV Top and Bottom	The seam outcrops near village no. 2. 15 Top seam is developed upto the boundary and also quarried out in most of the area. 15 Bottom seam was developed in a limited area, however it has been quarried later on.

XIV	In Katras Choitudih section, the seam outcrops at the southern side of no 8, 9 & 6 Pit. The seam has been fully developed in single lift and mostly depillared. During the year 1963, on the south side of 6 Pit towards Lakurka village, fire occurred in the edge of the XIV seam quarry. The quarry edge and surface have been filled up with mutti and a water pool is being maintained over this. The outcrop region has been quarried in three separate patches along the strike. In the southern side the seam has been quarried out.
XIII	In Katras Choitudih section seam outcrops near pit no.6. Pit. The seam has been mostly depillared by caving, partly standing on pillar and stook out. Some of the area has been sealed off due to heating in the year 1953. In southern side, seam has been quarried out.
XII	Seam outcrops at the northern side of the property (Beneath the Dhanbad Chandrapura Railway line). The seam has been fully developed, partly caved, and partly splitted and rest SOP. The seam is connected to XI seam of New Akaskinaree colliery.
XI	Seam outcrops beyond the northern boundary of the colliery. The seam has been mostly developed and partly depillared. The dip side area is virgin. Water dam has been provided at inset of XI Seam in 6 Pit, 5 Pit & 2 Pit. No approach exists. The seams from XV to XI are interconnected through drifts/caved goaves.
X **(Top and bottom section)**	The seam has been mostly developed in one/two sections in the entire area and SOP. Rest is virgin. The workings are connected to X seam workings of New Akashkinari, AKWMC and Salanpur Collieries. There are three connections between KCC section and Salanpur. 4 nos. water dam and one isolation stopping with door have been provided and the door is used as escape route for the mine. There are two connections between KCC and New Akashkinari through drift across fault. 2 dams have been provided. .There is one connection between KCC section and AKWMC between X Bot. (KCC section) and X Top (AKWMC). One water dam has been provided. Presently dewatering is going on through 2Pit. North of S.E. Railway line had been extensively developed in two sections (2.5 m each) leaving about 3 m of coal parting in-between and had been partly

	depillared with stowing or caving and partly standing on pillars and waterlogged. South side of S.E. Railway line is virgin.
VIII C	Sseam is mostly developed and SOP and rest virgin.
VIII B	Seam is developed in west-central portion and standing on pillars. Rest portion is virgin.
VIII A	In the leasehold the seam is partly developed in north western and central region and standing on pillar. In rest of the area seam is virgin.
Seam below VIII A	Virgin

In this mining plan, it is proposed to extract the VIIIC seam and all above occurring seams in the mine through opencast operation.

Thus, seam XVI T to VIIIC is proposed to be worked by opencast method of working.

BCCL management can decide whether the operation of opencast would be done departmentally or by outsourcing means.

- **Choice of mining method**

  Considering the dip of beds which varies from 5^{O} to 8^{O} and mining of multiple seam separated by multi partings, the shovel dumper combination with horizontal slicing is being proposed for mining. Presently the opencast is being operated with Shovel-Dumper System of mining by hired HEMM.

- **Optimisation of targeted capacity**

  As per the current mining parameters of the mine, the normative production of the mine is 0.5 MTY. The peak production from the mine will be about 30% higher than the normal production (0.65 MTY) which will be achieved by better

utilization of resources and favourable geo-mining conditions. The OB from the shovel benches will be transported to internal dump through flank roads.

Sequence of mining

At present a hired Patch B upto 13 Seam is in operation in the south eastern side. After completion of the hired patch a quarry with VIII C seam as base can be opened up from rise side.

Production scheduling

The mining schedule has been formulated based upon the adopted sequence of mine development and optimum condition of mining operation for the entire life of opencast project.

The normative target production of the mine will be 0.50 MTY. However the peak production capacity of 0.65 MTY.

The year wise production from the AGKCC is given below:

	Coal (Mt)	**OB (Mm3)**
Y1	0.49	7.26
Y2	0.51	7.00
Y3	0.52	7.20
Y4	0.5	6.50
Y5	0.52	6.11
Y6	0.65	7.64
Y7	0.65	7.63
Y8	0.65	7.64
Y9	0.65	7.63
Y10	0.65	7.64
Y11	0.65	7.63
Y12	0.65	7.64
Y13	0.65	7.63
Y14	0.65	7.64

	Coal (Mt)	OB (Mm3)
Y15	0.65	7.63
Y16	0.65	7.64
Y17	0.65	7.63
Y18	0.65	7.64
Y19	0.65	7.63
Y20	0.65	7.64
Y21	0.65	7.63
Y22	0.65	7.64
Y23	0.65	7.63
Y24	0.59	6.93
Total	**14.83**	**178.43**

The average stripping ratio of the mine is 12.03 cum/Te.

Equipment configuration

There is no existing departmental HEMM available at Katras Choitudih Colliery.

In this mining plan, additional provisioning of HEMM has not been made.

- **Description of all mining operation**

a) Wining

Coal Extraction:

Considering the thickness range, number of seams to be worked, status of exploitation of seams and status of production level, Shovel will be used for extraction of coal after proper drilling and blasting.

All the seams considered for exploitation will be mined in separate single benches wherever possible.

Drilling in coal benches will be done by 100 mm/ 160mm drills or as decided by the outsourcing agency and after proper drilling & blasting, the blasted coal will be loaded by hydraulic Shovels on to 35t/60t dumpers or as decided by the outsourcing agency for transportation up to the surface stock yard.

OB Excavation

O.B. will be excavated in benches after proper drilling & blasting. Drilling in OB benches will be done by 160mm drills or as decided by the outsourcing agency. The blasted OB will be dozed, heaped and loaded on to 35t/ 60t dumpers or as decided by the outsourcing agency for transportation to OB dumps.

Variation in thickness of OB will make it difficult to maintain uniform bench height in OB horizons. However, it is proposed to have a ceiling on OB bench height from safety reasons. The height of the bench generally shall not exceed the boom height of shovel. The height of the OB bench is proposed as 10 m. Height of the coal bench will be equal to seam thickness subject to maximum bench height as 10 m.

Height of each deck for OB dumps will be 30 m and slope of individual dump benches will be 37^0. Width of berm between two adjacent benches will be about 30 m. Dumping will be done by End-Tipping method. The OB removal is totally by shovel dumper combination.

The working benches of OB and coal will be kept at a slope angle of 70^o and 80^0 respectively during operation.

The effect of inter bench access roads on the quantity of Coal extracted and OB removed is not incorporated in the Pit layout determination.

However, a scientific study should be carried out before starting a mechanised opencast working, including its method of working, ultimate pit slope, dump slope and monitoring of slope stability.

b) Transport

Coal Transportation:

Coal will be transported to Mohuda, Moonidih or Tata washery by road.

OB Transportation

Ob will be transported to dumps from face by means of dumpers.

c) Blasting

The drilling and blasting operations for loosening of coal and OB are necessary before excavation by shovels. The sufficient number of dozers provided in the project will carry out the site preparation. The blast-hole drilling will be done in patterns decided in advance depending on the strata hardness and the requirement of DGMS for drilling on the developed galleries. DGMS circulars issued in this regard may be referred (DGMS (Tech) Circular No. 3 & 4 of 1980, DGMS (Tech) Circular No. 11 of 1979 etc.).

The standard practice involving the electric detonators for the initiation of detonating cord, detonating relays to achieve hole-to-hole delays, use of Heavy ANFO, slurry or emulsion explosives as the column charge will be used for blasting as per the DGMS circular.

All necessary precautions as mandated through DGMS circulars will have to be taken while blasting in hot strata if any.

Elements of drilling & blasting in OB & Coal

The blast hole pattern (along with Burden & Spacing) will depend on actual site condition. However, specific consumption of explosives has been

envisaged as 0.3 kg/cum. for OB from Shovel benches and 0.2 kg/cum. for coal from coal seams.

d) Overburden Removal & Disposal

In-situ OB to be excavated	178.43 Mm^3
Loose OB to be handled	9.39 Mm^3
Stripping ratio (in-situ OB)	12.03

OB dump is to be dumped internally as well as in the adjoining Gaslitand Colliery of Cluster IV.

The dump parameters of internal OB dump (m) are given below:

Maximum internal Dump height	:	230 RL (30 m above ground level)
Individual Dump bench angle		37^o
Height of individual bench (m)	:	30 m
Berm width	:	30 m

Time frame for commencement of Backfilling & Justification therefor:

Internal dumping has been proposed in this mine plan and the distance of Internal dumping is not less than 100m from the toe of the active mine working in most places.

Life of the mine

As per calendar plan considering period of gradual build-up, existing hiring patch schedule and tapering down of production, the total life of the project will be 24 years at projected level of production.

Geological & extractable reserve

For furnishing account of reserves, geological and mineable reserves have been defined as follows:

Net Geological Reserve (NGR)

The reserves have been estimated upto the Seam VIIIC within delineated quarry using Minex model. It has been calculated using "Detailed resource reporting" menu of MINEX software along with separate template for each individual seam.

Mineable Reserve (MR):

A part of net geological reserve (NGR) is lost during process of exploitation. Therefore, the part of NGR that can be exploited successfully and transported to pit head coal stockyard is termed as mineable reserve (MR) [Mineable Reserve = Extraction Factor x Net Geological Reserve]. Extraction Factor is taken as 0.90.

Within the proposed quarry, the Net Geological Reserves (NGR) has been assessed at 16.47 MT upto Seam VIII C, all of which is coking coal.

Summarised account of reserves is as follows:

Sl. No.	Particulars	Total
1.	Surface Area of the Mining Block (Ha.)	228
2.	Net Geological Reserves (MT)	253.80
3.	Net Geological Reserves (MT) within quarry limit	16.47
4.	Mineable Reserves (MT)	14.83

Net Geological Reserve of the block

Seamwise – Gradewise net geological reserve of non-coking and coking coal within the leasehold of Katras Choitudih colliery at present is tabulated below:

Net Geological Resource of Non Coking Coal (in Million Tonne) within Leasehold Boundary													
Seam	**G1**	**G2**	**G3**	**G4**	**G5**	**G6**	**G7**	**G8**	**G9**	**G10**	**G11**	**G12**	**TOTAL**
VIII-C													
VIII-A					3.46	1.42							**4.88**

Net Geological Resource of Non Coking Coal (in Million Tonne) within Leasehold Boundary													
Seam	**G1**	**G2**	**G3**	**G4**	**G5**	**G6**	**G7**	**G8**	**G9**	**G10**	**G11**	**G12**	**TOTAL**
VIII TOP													
VIII BOT									0.39	2.21			**2.6**
VII				2.71	3.05	2.14	1.54	0.68					**10.12**
V/VI	2.92	6.06	7.38	6.54	3.06	1.84	0.01						**27.81**
IV						35.01	19.95						**54.96**
III								0.05	2.99	5.16	1.77		**9.97**
II TOP													
IIMID					0.26	5.44	5.24	1.38					**12.32**
IIBOT			1.41	2.17	0.09								**3.67**
I MID		0.04	1.68	4.3	0.5								**6.52**
0	2.17	0.26	0.23	0.19	0.17	0.12	0.07	0.02					**3.23**
TOTAL	**5.09**	**6.36**	**10.7**	**15.91**	**10.59**	**45.97**	**26.81**	**2.13**	**3.38**	**7.37**	**1.77**		**136.08**

Net Geological Resource of Coking Coal (in Million Tonne) within Leasehold Boundary								
SEAM	**S-I**	**S-II**	**W-I**	**W-II**	**W-III**	**W-IV**	**W-V**	**TOTAL**
XVI TOP			0.5007					**0.5007**
XVI BOT	0.0179	0.0226	0.0116	0.0113	0.0237	0.0732	0.0225	**0.1828**
XV TOP	0.0606	1.0053	0.2299	0.331	0.7843	0.2478		**2.6589**
XV BOT			0.0105	0.312	0.5608	0.9767		**1.86**
XV								
XIV			0.2387	4.8561	3.0575	0.243		**8.3953**
XIII		0.134	0.9549	1.1439	0.9852	0.066		**3.284**
XIII/XIV								
XII		0.6448	0.898	0.6894	0.2842	0.1349		**2.6513**
XI		0.0177	0.1478	0.7615	1.4564	0.484		**2.8674**
X				0.9694	12.257	5.0493	0.0318	**18.3075**
VIII-C			0.038	0.2555	2.8758	2.2728	0.5377	**5.9798**

Net Geological Resource of Coking Coal (in Million Tonne) within Leasehold Boundary								
SEAM	**S-I**	**S-II**	**W-I**	**W-II**	**W-III**	**W-IV**	**W-V**	**TOTAL**
VIII-A			0.8902	1.2844	6.4303	0.7679		**9.3728**
VIII TOP					0.1299	4.043	1.3405	**5.5134**
VIII BOT					0.0031	1.4046	1.1699	**2.5776**
VII								
V/VI								
IV						32.8352	20.7382	**53.5734**
TOTAL	**0.0785**	**1.8244**	**3.9203**	**10.6145**	**28.8482**	**48.5984**	**23.8406**	**117.7249**

Average stripping ratio

Mineable reserve, OB volume & average stripping ratio of the proposed quarry are as follows:

Sl. No.	Description	Unit	Quantity
1	Total mineable Reserve	Mt	14.83
2	Total OB volume (Loose + In situ)	Mm^3	178.43 (in-situ) 9.39 (loose)
3	Av. Stripping Ratio (considering only in situ)	m^3/te	12.03

Quarry parameters

The broad parameters of Katras Choitudih Colliery are given here

Mine boundaries delineation

The quarry limits of the AGKCC on the surface is delineated within the leasehold boundary as under:

North : 45m from railway acquired land

South : 45 m from railway acquired land.

East : 45 m from diverted DB Road

West : 60 m from Katri River

Considering the dip of the seams, it is proposed to excavate the OB from advance benches by horizontal slicing. The variation in thickness of OB will make it difficult to maintain uniform bench height in OB horizons. However, it is proposed to have a ceiling on OB bench height from safety reasons. The height of the bench generally should not exceed the boom height of the shovel. But due to variation in thickness of parting / cover, the bench height sometimes may exceed the boom height by few meters temporarily for effective utilization of shovel in certain cases (with due regard to safety). Necessary relaxation in this regard will have to be obtained from DGMS.

The slope angle of the working benches is adopted as 80^o and 70^o for coal and OB respectively, while for OB dump deck it is adopted as $37^o \pm 1^0$. In the light of the experience gained the elements of mining system can be modified during the actual mining operations depending upon the physical and mechanical properties of rock.

Mining parameters of the quarry is given below:

Sl.NO.	Description	Unit	Value
1	Area of Excavation	Ha	176.8
2	Strike Length	m	980-1600
3	Dip rise width	m	980-1300
4	Min and Maximum depth	m	160-240
5	Base of quarry	Floor of VIII C seam	

3.1.3 Coal Production Capacity Proposed “Mtpa”:

The peak coal production capacity of the AGKCC has been proposed as 0.65 MTY.

3.1.4 Calendar Year from Which the Production will Start:

Katras Choitudih colliery is already under operation.

3.1.5 Coal Production Plan "MT":

	Coal (Mt)	OB (Mm3)
Y1	0.49	7.26
Y2	0.51	7.00
Y3	0.52	7.20
Y4	0.5	6.50
Y5	0.52	6.11
Y6	0.65	7.64
Y7	0.65	7.63
Y8	0.65	7.64
Y9	0.65	7.63
Y10	0.65	7.64
Y11	0.65	7.63
Y12	0.65	7.64
Y13	0.65	7.63
Y14	0.65	7.64
Y15	0.65	7.63
Y16	0.65	7.64
Y17	0.65	7.63
Y18	0.65	7.64
Y19	0.65	7.63
Y20	0.65	7.64
Y21	0.65	7.63
Y22	0.65	7.64
Y23	0.65	7.63

	Coal (Mt)	OB (Mm3)
Y24	0.59	6.93
Total	**14.83**	**178.43**

3.1.6 Peak Rated Capacity:

- By OC: 0.65 MTY
- By UG: Nil
- Overall: 0.65 MTY

3.1.7 Life of the Mine:

- By OC: 24 Years
- By UG: Nil
- Overall: 24 Years

3.1.8 Whether the Proposed External OB Dump Site is Coal/Lignite Bearing: If So, Whether Coal/Lignite Below Waste Disposal Area is Extractable:

No external dump proposed

3.1.9 Whether Negative Proving for Coal / Lignite in the Proposed Site for OB Dump/Infrastructure has been Done:

Not applicable

3.1.10 Results of Any Investigation Carried Out for Scientific Mining, Conservation of Minerals and Protection of Environment; Future Proposals:

No such results are available for any scientific study in the area under consideration. The slopes of the quarry and dumps have been proposed on the basis of experience in the adjoining areas. However, to ascertain optimum slope angles for stability of quarry batter and dumps a scientific study need be

carried out. Similarly hydro-geological study of the area is to be done for the mine as none is available at present.

3.1.11 Type of Equipment/HEMM Proposed:

No equipment is proposed in the mining plan.

CHAPTER - IV
SAFETY MANAGEMENT

4.1 MINING METHOD

Elaborate safety measures have been laid out as per statute concerning safety in mines. In addition to existing provisions, reference has been made here to some special precautionary measures which have been considered important and require special attention for the safety of men and mine.

Safety of men and machine deployed in the mining area should be properly taken care of irrespective of whether the mining activities are performed by departmental or by outsourcing option.

All the provisions and precautionary measures as stipulated in CMR 2017, (especially Reg. 106 to 110) and orders made there under shall be strictly complied with. The important safety aspects have been deliberated subsequently.

In addition to those relevant clauses as stipulated in Act & Regulation, all clauses and sub clauses as mentioned in the permission granted by DGMS, Min. of Labour and Employment, GOI for working of Katras Choitudih Colliery shall be followed strictly.

The other rules / regulation applicable to mining industry shall be comply with like CEA Regulation 2010, Explosive Act etc.

4.1.1 Important Safety Aspects:

a) Proximity to river

Katri river flows southwards to the east of the leasehold and also governs the drainage system of the area. The eastern boundary of quarry is delineated leaving 60 m distance from the bank of Katri river.

b) Adjacent working

The AKWMC Collliery, Gaslitand colliery, New Akashkinaree colliery and Tata Bhelatand amalgamated mine situated in North, East, West, and south of the mine respectively. These neighboring mines have old underground working.

c) Geo-mining disturbances

The mine is generally free from pyrolisation.

d) Slope stability and remedial measures suggested

The slopes of the quarry and dumps have been proposed on the basis of experience in the adjoining areas. However, to ascertain optimum slope angles for stability of quarry batter and dumps a scientific study need be carried out (Ref. Regulation 106(2) of CMR 2017). Recommendation of this report should be followed strictly to avert any slope failure in the mine. DGMS (Tech.) circular No. 03 of 2020 dated 16.01.2020 and other circular issued from time to time for slope stability should be adhered.

Monitoring being the most effective mitigation measures against any impending slope failure, a constant vigil in this regard should be maintained in this regard.

e) Disaster management

Mining is a hazardous industry. There is risk to life and property associated with various mining and allied activities of the project. The Mining Plan has been drawn in conformity with the prevailing statutory provisions as per Mines Act, 1952 & CMR 2017 applicable for safety in mines. A detailed study has been carried out covering identification and assessment of risk, and recommendation of measures to prevent damage to life and property against such risks.

Safety Audit is an integrated component of Risk Assessment and Safety Management, which is required to be undertaken on regular basis by System Study and Safety Audit (SYSSA). Such System Study and Safety Audit (SYSSA) should be conducted at least once in every year, after every major

accident or disaster or dangerous occurrence, before implementation of any new technology or use of any new system or machinery in the mine. Such Study may be subject wise as well as an integrated report of the mine incorporating all subjects such as mining, mechanical, electrical, personal, occupational Health & Hygiene, and any other subject applicable to the mine and the system prevailing or to be used therein.

Risk Reduction Programme (RRP) is an ongoing process to achieve Zero Harm Status of Safety in any mine and should be incorporated in the Disaster Management Programme.

f) Danger from inrush of water

Although adequate precaution has been taken into account while deciding the quarry boundary and the final pit floor boundary so that the operational area of the quarry does not come within 60m of any underground workings which is likely to contain an accumulation of water or other liquid matter or any material that is likely to flow when wet. For the above said 60m, the distance between the said workings shall mean the shortest distance between the workings of the same seam or between any two seams or sections, as the case may be, measured in any direction whether horizontal, vertical or inclined. However, during operation, advance drills holes need to be provided while approaching underground workings as per statutes to prevent inadvertent connections.

g) Existing underground mine fire (if any)

During implementation of the fire dealing measures and excavation & dumping of hot materials, monitoring of status of fire, its movement, temperature condition and efficiency of fire dealing measures, is to be done regularly. Even on dump sites, such a monitoring is required so that quenching can be done in time to avoid dump fire. Necessary precaution should be done to quench / stop the fire.

In addition to statutory provisions, the measures for fire fighting and prevention of fires are as follows:

1) Organisation of special cell for systematic observations to examine and prevent fire.

2) Removal of spillage of coal on benches and cleaning of coal horizons to prevent cases of coal heating.

3) Storage of lubricants and cotton waste in enclosed fireproof containers in working places.

4) Provision of fire extinguishers

The recommendation made in the DGMS (Approval) Circular No. 02, 2013 should strictly be followed in the mine to prevent fire in HEMM. It says that "all types of fire fighting and fire suppression system including automatic fire detection and suppression systems to be used in HEMMs, materials and chemicals to be used in fire fighting or suppression system in mines both on surface and below ground including oil and gas mines/fields shall conform to the following minimum requirement";

a) All types of fire fighting and fire suppression systems including automatic fire detection and suppression systems to be used in HEMMs. Materials and chemicals to be used in fire fighting or suppression systems shall have valid test certificate(s) from any Government or Government approved Laboratory in compliance with relevant Indian Standards.

b) All material used in the fire fighting/ fire suppressant systems shall be non-toxic and in no manner harmful to human beings during handling and use.

c) The high pressure storage vessels and hoses, if used with fire-fighting and fire suppressant systems, shall conform to the requirements stipulated in the relevant Indian Standards.

4.2.2 Commitment from the Company Board

A Commitment from the Company Board that entire mining operation will be carried out as per the Statutory provision given under Mines Act 1952, Coal Mine Regulation 2017 and wherever specific permission will be required and the company will approach the concerned authorities for the same.

The same will be furnished as a part of Annexure during the approval of the Mining Plan.

CHAPTER - V

INFRASTRUCTURE FACILITIES

5.1 Mine infrastructure required e.g. Equipment maintenance planning, Office buildings, Workshop, Power supply arrangement, Water supply etc.

5.1.1 Existing Infrastructure facilities available

A. Road-

a) D.B.Road – A D.B roads exists from Dhanbad to Katras, nearly 0-1 Km from mine.

b) National Highway – No national highway passes through the property of mine, however distance of nearby national highway is 12 km from the mine.

c) Colliery Road –No separate colliery road exists inside the colliery property

B. Rail-

Katras Railway station, exists as Railway infrastructure 2 KM distant from the the colliery property

C. Water Storage

Water supply arrangement - Total colony and colliery water requirement, which is 2500 GPM are being fulfilled by mine water (2000 GPM) and river water(500 GPM).

Water consumption and usage -

i) Industrial - **60 KLD.**
ii) Domestic - Drinking- Nil

Non-Drinking- **1570 KLD**

D. Coal Stock Yard and its Locations-

Coal staking/heap name

Sl. No.	Heap number	Distance from quarry	Capacity in te	Location
01.	17	1.2 Km	30000	North- west side within OC Patch B

E. Existing effluent treatment plant & sewage treatment plant

At present there is no ETP & STP available in the mine.

F. Pit / Shaft in the Leasehold Area

Exists but, sealed off

5.1.2 WORKSHOP & STORE

WORKSHOP

Regional workshop & Store exists at AWS, Choitudih, while central workshop & Store is situated at Ekra colliery which is 10 km distant from the mine.

5.1.3 MAGAZINE – LOCATION, CAPACITY AND AREA

There is Keshalpur Central Magazine from where Explosive and Detonators are being used at the mine.

5.2 POWER SUPPLY & ILLUMINATION

5.2.1 PRESENT POWER SUPPLY

I. Power Supply: At present, the AGKC colliery of Katras Area is receiving power at 33 KV from DVC Putki Sub-station through two Nos. Single circuit 33 KV O/H Line (Ramkanali feeder and Sendra feeder). In addition to these, there is a tie feeder (connecting KC2 Pit substation and Ramkinali Substation) feeding from Malkera feeder.

Both Ramkanali substation and KC 2 Pit substation are independently feeding power to Katras-Chaitudih Colliery.

II. Existing Power Supply System:

Presently, there are single Substation KC 2 Pit substation to cater all electrical equipment & lighting loads of the Colliery.

- **33/ 6.6 kV KC 2 Pit regional Substation, Katras Area:-**
  There are main two transformers which are receiving power at 33 kv from the Ramkanali sub station and DVC Putki(Malkera) are given below:-

  1. 7.5/10 MVA, 33 /6.6 kV transformer
  2. 5/7.5 MVA, 33/6.6 kV transformer

- Power is being supplied to all the electrical equipment, lighting &domestic loads of Chaitudih Colliery and Area III from different feeder of the above sub-station. Details are given Below:-

1. Feeder No. 06 is supplying power to 1 PIT Water Plant, Katras – Chaitudih.

(i) One no. 1000 kVA, 6.6/0.550 kV transformer is being used for supplying power to Rampur Basti, Pasitand Basti and lighting transformer of

a. 250 KVA,0.550/0.440 KV Transformer for Lighting Loads of Pasitand Colony.

2. Feeder No. 06 is supplying power to 2 PIT Sub-station, Katras – Chaitudih.

(i) One no. 300 kVA, 6.6/0.550 kV transformer is being used for supplying power to Lal Dhowra Basti,KC-2 Pit Colony and Malkera New Qtrs.

(ii) One no. 1000 kVA, 6.6/0.550 kV transformer for supplying power to 02 nos. 200 HP Sumbersible Pump.

3. **Feeder No. 09 is supplying power to 6 PIT Sub-station, Katras –Chaitudih.**

   (i) One no. 500 kVA, 6.6/0.440 kV transformer for supplying power to 6&9 Pit lakarka and Lakarka Nichhe Basti.

   (ii) One no. 1000 kVA, 6.6/0.550 kV transformer is being used for supplying power to Lakarka Upper Basti, New Qtr Lakarka,,Loading Dhowra,13 Seam Habitation area Katri River and 170 HP Submersible Pump.

4. **Feeder No. 11 is supplying power to all the electrical loads of AREA-III of BCCL.**

5. **Feeder No. 17 is supplying power to following Sub-station.**

   (1) Regional Store Area-IV Sub-station:-

   (i) One no. 750 kVA, 6.6/0.440 kV transformer for supplying power to Area-IV.
   (ii) One no. 300 kVA, 6.6/0.440 kV transformer for supplying power to Area-IV.

   (2) 5 PIT Substation:-

   (i) One no. 1500 kVA, 6.6/0.440 kV transformer for supplying power to Area-IV Loads.

   (3) Hadadia Substation:-

   (ii) One no. 1000 kVA, 6.6/0.550 kV transformer for supplying power to following pumps
   (a) 150 HP Pump:-01 No.
   (b) 180 HP Pump:-02 Nos.

   (4) AGKCC Office Substation:-

(i) One no. 250 KVA, 6.6/0.440 kV transformer for supplying power to Office Colony.

(ii) One no. 300 KVA ,6.6/0.550 kV transformer for supplying power to Area work shop-KCC.

(iii) One no. 500 KVA ,6.6/0.440 kV transformer for supplying power to 10 Nos. Qtrs, AGKCC Office & CISF.

(iv) One no. 1000 KVA ,6.6/0.440 kV transformer for supplying power to Kathal Dhowra Lal Dhowra & Kodia Basti and 8 Nos. Basti &16&8 Nos. Colony.

6. Feeder No. 24 is supplying power to 500 KVA 6.6/0.550 KV Transformer for following Loads.

(i) Two nos. 10 kVA, 0.550/0.220 kV transformer for supplying power to Bengali Dhowrah.

(ii) One no. 50 kVA, 0.550/0.440 kV transformer for supplying power to Weigh Bridge.

(iii) One no. 150 kVA, 0.550/0.440 kV transformer for supplying power to 2 No. dhowrah.

(iv) 2x65 HP Motor pump

III. Existing Electrically Operated HEMM Equipment in KCC:

Nil

5.2.2 PROPOSED POWER SUPPLY

In the proposed system the existing supply system will continue.

Existing Sub-Station inside Quarry Area will be shifted to South - west corner of Lease Hold Area of Mines and all HT & LT Line will be shifted/diverted along the DB Road.

5.3 Drainage & Pumping: Assessment of Volume of Water for Pumping, Pumping Capacity and Pump Selection

5.3.1 PRESENT PUMPING ARRANGEMENT

Make of water-

SEASON	Make of water (GPM)	Distribution	colony supply	Dust Suppression/Fire fighting
MONSOON	8000	Use of water(GPM)	-----	------
OTHER DAYS	2500	use of water (GPM)	2000	500

The following pumps currently exists at Mine to pump out water .

Sl. No.	Pumping capacity (GPM)	Head(m)	Location	Power (kw/hp)	Voltage	purpose	Quantity(Nos.)
1.	1000	200	2 pit kcc	200 hp	550 v	Colony supply	01
2.	500	200	6 pit kcc	170 hp	550 v	Colony supply	01
3.	500	150	Mine ocp	100 hp	550 v	Fire fighting	01
4.	500	150	River side	65 hp	550 v	Colony supply	01

PROPOSED PUMPING ARRANGEMENT

Estimation of Surface Make of Water for Quarry

Sl. No.	Particulars	Unit	Value
1	**Water accumulation in the quarry:**		
1.1	**Maximum daily rainfall, h :**	m	0.180
1.2	**Catchment Areas :**		
a)	Maximum depth, d :	m	240
b)	Total Quarry Area to be Excavated, A	m^2	1768000
c)	Maximum exposed area at any point of time = A1 (33% of total quarry area)	m^2	583440
d)	Area beyond Excavation = A2 (5% Of A)	m^2	88400

e)	Internal Dump Area A3	m^2	859200
1.3	**Assumed Run-off co-efficients:**		
a)	For level terrain with thick soil cover	n_1	0.70
b)	For area beyond Excavation	n_2	0.15
c)	For Internal dump area	n_3	0.10
1.4	**Volume of Water accumulation in mine Q :**		
a)	Volume of water likely to fall in Quarry, Q = ($A_1xn_1xh + A_2xn_2xh + A_3xn_3xh$) Cum/day per day	Cum/day	91366
b)	Considering 10% seepage from surrounding strata, total water accumulation will be Q_1 = 1.1Q	Cum/day	100502
2.1	**Pumping capacity in Quarry :**		
a)	Water accumulation in the quarry,	Cum/day	100502
b)	Pumping capacity required to dewater the above accumulated water in 5 days with 18 hours of pumping per day.	Cum/min	19
		GPM	4000
c)	Considering 25% as stand- bye capacity	GPM	1000
d)	Total pumping capacity	GPM	5000

Proposed Pumping Arrangement

As in future total pumping requirement will be around 5000 GPM, hence additional 2500 GPM will be required for de watering of sump water, for this purpose following pumping arrangement are being proposed.

Sl. No.	Pumping capacity (GPM)	Head(m)	Power (kw/hp)	Voltage	Total in Numbers
1.	1000	200	200 hp	550 v	02 nos.
2.	500	200	170 hp	550 v	01 no.

5.4 Coal Handling Arrangement: Brief detail of the CHP/Mode of Dispatch, Coal quality and Coal staking and handling arrangement

At present produced coal is being brought to coal dump/stock yard from coal face by contractual dumper (Volvo- 30 te dumper)

As produced coal are being dispatched to different Non power sectors, so from the stock yard, coal is being transferred through Contractual dumper to Railway siding for final dispatch to customers.

At present, no crushing arrangement available at site.

5.5 Coal Washing and the proposed handling/ disposal of rejects.

No existing coal washing arrangement exists at colliery also there is no proposal for washing of coal is in this mine plan.

CHAPTER VI
LAND REQUIREMENT

6.1 LAND REQUIREMENT

6.1.1

Sl. no.	Particulars	Area (in Ha)
1.	BCCL Owned Land (including in RS)	169.75
2.	Forest Land	
3.	Govt./Rly Land	29.12
4.	LA Land	0.70
5.	Tenancy Land	21.22
6.	Others (including GM and disputed)	7.21
	TOTAL	**228**

Ownership wise land data not provided by colliery authority.

6.1.2 Landuse Details

Existing land use as provided by colliery authority is tabulated below:

SL NO.	TYPE	Area (in Ha)
1	Excavation Area	24.44
2	Backfilled Area	27.15
3	Excavated Void	1.02
4	External Dump	23.31
5	Diversion/ below River/ Nala/ canal	0.60
6	Settling pond / Pond	1.78

SL NO.	TYPE	Area (in Ha)
7	Railway, Road & Infrastructure area	36.24
8	Drains	0.99
9	Embankment	0.90
10	Water Reservoir near Pit	0.01
11	UG Entry	1.15
12	Undisturbed/ Mining right for UG / Barren Land	95.23
13	Resettlement*/ Homestead Land	15.18
	Total	**228.00**

6.1.3 Surface Features Over the Block Area

Important surface features are as follows:

Road: DB Road and colliery road

Rail: Dhanbad Chandrapura Railway Line , Mohuda Bhaga rail line

DB Road will have to be diverted along the western boundary of the mine.

6.1.4 No. of Villages/Houses to be Shifted

1) Lakarka village no. 1

2) Lakarka village no. 2

6.1.5 Population to be Affected by the Project

The village/ location wise affected people who needs rehabilitation are given in the following table:

Sl. No.	Site Code	Area Name	Colliery/Unit Name	Site Name	NON- LTH	LTH	BCCL qtrs
1	I/105	Katras	Katras-Chaitudih	Bastee No.4/11	102	0	18
2	I/106	Katras	Katras-Chaitudih	Kathal Dhowrah/08	84	0	18
3	I/107	Katras	Katras-Chaitudih	Lakurka Vill. No.1/12	12	283	0
4	I/108	Katras	Katras-Chaitudih	Lakurka Vill. No.2/13	49	113	0
5	I/109	Katras	Katras-Chaitudih	Lal Dhowra To Pokherpar/03	16	0	11
6	I/110	Katras	Katras-Chaitudih	Near 3 Pit Habitation/02	91	0	12
7	I/111	Katras	Katras-Chaitudih	North of 1 Pit/04	91	0	15
8	I/112	Katras	Katras-Chaitudih	Ramakant Bhartiya House/18	0	0	0
9	I/113	Katras	Katras-Chaitudih	Yule Pit Qtrs./07	33	0	18
10	II/99	Katras	Katras-Chaitudih	2 Pit Dhowrah /06	130	0	7
11	II/100	Katras	Katras-Chaitudih	5 No. Pit Area/10	0	0	0
12	II/101	Katras	Katras-Chaitudih	Bengali Dhowrah /05	139	0	15
13	II/102	Katras	Katras-Chaitudih	Dhowra of SW portion of 9 Pit/15	18	0	12
14	II/103	Katras	Katras-Chaitudih	Habitation North of 13 Seam Quarry/17	73	0	6
15	II/104	Katras	Katras-Chaitudih	Lakurka Bunglow Surrounding Area/09	71	236	16
16	II/105	Katras	Katras-Chaitudih	Lakurka Staff Qtrs./14	95	0	88
17	II/106	Katras	Katras-Chaitudih	Loading Dhowrah (Lakurka Section)/16	113	0	31
Total					**1117**	**632**	**267**

Note: The data is as per the data supplied by area/ mine official and may be verified by conducting proper socio-economic survey of the area before commencement of actual rehabilitation program.

6.1.6 Proposed Rehabilitation Programme

The actual site of re-settlement is yet be decided by Area/BCCL.

6.2	**DETAILS OF LEASE**	
6.2.1	Status of Lease	Renewed upto 7th December 2030
6.2.2	Existing Lease Area "Ha"	228 Ha
6.2.3	Period for which Mining Lease has been granted/~~is to be renewed/is to be applied for.~~	30 years from 8th December 2000
6.2.4	Date of expiry of earlier Mining Lease, if any	7th December 2030
6.2.5	Whether the lease boundary/required boundary is same as mentioned in the allotment order	NA
6.2.6	Lease Area (~~applied~~/required) as per the Mining Plan under consideration (Ha)	228
6.2.7	Whether the applied lease area falls within the allotted block	NA
6.2.8	Area (Ha) of lease which falls outside the delineated block/sub-block	NA
6.2.9	**Details of outside area:**	No outside block area has been considered for project area of this mine
	▪ Whether forms part of any other coal block	Not Applicable
	▪ Whether it contains any coal/lignite	Not Applicable

	reserves	
	▪ Purpose for which it is required, e.g. roads/ OB dumps/ service buildings/ colony/ safety zone/ others(specify)	Not Applicable
6.2.10	**Whether some part(s) of the allotted block has not been applied for mining lease.**	The whole area in the existing lease area has been proposed for mining lease
	- Total area in Ha of such part(s).	Not Applicable
	- Total reserves in such part(s). (Mt)	Not Applicable
	- Brief reasoning for leaving such part(s)	Not Applicable

Chapter 7: ENVIRONMENTAL MANAGEMENT

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</table>
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Impact Assessment

The ambient air quality is influenced due to the presence of PM10, PM2.5, SO_2, NO2, etc., which are generated from above sources in operational and post operational stage.

Further, the ambient air quality is affected to a varying degree due to the mining activities of other nearby opencast and underground coalmines of the same coalfield. The concentration of pollutants may vary depending upon the various micro-meteorological parameters and the seasons of a year.

Fortnightly Ambient Air Quality Monitoring of KCC Mine as a part of Cluster IV is being carried out at following stations as part of routine Environmental Monitoring by CMPDI RI-II, Dhanbad:

Core Zone:

- **Govindpur Village (A7): Industrial Area**
- **Katras Chotudih (A37): Industrial Area**

Buffer Zone:

- **Block IV (A6) : industrial area**
- **Nichitpur (A8): Industrial Area**
- **Rudhi Basti(A18): Residential Area**

Air quality monitoring data at above stations for the period Jan 2022 to March 2022 is as given in the following tables.

Station Name: A7, Govindpur		Zone: Core		Category: Industrial	
Sl. No.	**Dates of sampling**	**PM 10**	**PM 2.5**	**SO2**	**NOx**
1	06.01.2022	118	64	12	23
2	17.01.2022	94	52	<10	23
3	11.02.2022	88	51	10	29
4	25.02.2022	97	54	10	24
5	04.03.2022	90	44	12	29
6	24.03.2022	119	56	11	25
	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**	**SO2**	**NOx**
1	07.01.2022	178	72	11	22
2	17.01.2022	126	67	<10	24
3	11.02.2022	155	71	<10	29
4	25.02.2022	111	63	11	34
5	11.03.2022	127	69	13	20
6	24.03.2022	93	50	12	26
	NAAQ Standard	100	60	80	80

Station Name: A6,Block IV		Zone: Buffer		Category: Industrial	
	Dates of sampling	**PM 10**	**PM 2.5**	**SO2**	**NOx**
1	07.01.2022	88	50	13	25
2	17.01.2022	85	49	10	20
3	10.02.2022	122	65	<10	26
4	24.02.2022	95	54	12	33
5	11.03.2022	93	47	14	26
6	23.03.2022	115	57	10	23
	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	10.01.2022	86	48	13	32
2	27.01.2022	89	51	10	25
3	14.02.2022	85	51	10	30
4	28.02.2022	88	52	13	31
5	15.03.2022	121	58	11	23
6	25.03.2022	91	44	<10	27
	NAAQ Standards	100	60	80	80

Station Name: A18,Rudhi Basti		Zone: Buffer		Category: Residential	
Sl. No.	**Dates of sampling**	**PM 10**	**PM 2.5**	**SO2**	**NOx**
1	04.01.2022	85	50	<10	19
2	18.01.2022	98	57	<10	22
3	02.02.2022	90	53	13	27
4	16.02.2022	95	54	10	31
5	01.03.2022	88	45	15	24
6	21.03.2022	92	47	12	20
	NAAQ Standards	100	60	80	80

Following measures will be adopted to mitigate Air pollution from KCC Mine:

- At the points of dust generation, Fog Cannon/Mist Sprinklers shall be installed along with water sprinkling / spraying.
- Water sprinkling on surface roads, coal handling area, loading site, railway siding and coal stock yard to be done for minimizing fugitive dust emission
- Reclamation of subsided area (for UG mines).
- Proper maintenance of all Machines etc. will be undertaken so as to reduce harmful exhaust and noise.
- Personal protective gears will be given to workmen exposed to dusty and noise work environment.
- Development of green belt around infrastructure, colony, along roads and in vacant land against villages would be undertaken for arresting dust and noise propagation.

- Appropriate design of the geometry of blast holes.
- Coal transportation will be done through covered trucks/conveyor belt to washery and also to the siding.

Water Quality Management:

Sources

(i)	Sanitary (domestic) wastewater	:	Suspended solids and BOD.
(ii)	Water pumped out from Mine	:	Suspended solids of coal, clay and oil.
(iii)	Surface run-off passing through coal stockpiles	:	Suspended solids.
(iv)	Storm water from leasehold area and built-up area	:	Suspended solids.

Water Quality Report

Any adverse impact or pollution consequence of water will have serious effect on the environment. Hence, it becomes important to assess the water quality periodically in the mining area. Thus, to assess the water quality, samples were collected from two (02) locations (for mine water) and analysed for physico-chemical characteristics.

The water sampling points in Cluster IV were selected by consultation between BCCL & JSPCB officials. The different sources of water were identified for water quality characterization depending on their use for potable/industrial purposes and considering likely impact on these sources due to project activities. Based on these considerations, it was thought necessary to assess the existing quality of different water sources in the study area including both up & down stream of surface water body, ground water and mine water.

Name of the Cluster: **Cluster -IV**		Month: **Jan' 2022**	Name of the Station: **Mine Discharge of Chotudih**	
Sl. No.	**Parameters**	**MW4** First Fortnight 10.01.2022	**MW4** Second Fortnight 17.01.2022	**As per MOEF General Standards for schedule VI**
1	Total Suspended Solids	44	42	100 (Max)
2	pH	8.05	8.03	5.5 - 9.0
3	Oil & Grease	<2.0	<2.0	10 (Max)
4	COD	12	36	250 (Max)

Name of the Cluster: **Cluster -IV**		Month: **Feb' 2022**	Name of the Station: **Mine Discharge of Chotudih**	
Sl. No.	**Parameters**	**MW4** First Fortnight 07.02.2022	**MW4** Second Fortnight 21.02.2022	**As per MOEF General Standards for schedule VI**
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)

Name of the Cluster: **Cluster -IV**		Month: **March 2022**	Name of the Station: **Mine Discharge of Chotudih**	
Sl. No.	**Parameters**	**MW4** First Fortnight 14.03.2022	**MW4** Second Fortnight 21.03.2022	**As per MOEF General Standards for schedule VI**
1	Total Suspended Solids	38	36	100 (Max)
2	pH	7.95	7.84	5.5 - 9.0
3	Oil & Grease	<2.0	<2.0	10 (Max)
4	COD	32	32	250 (Max)

Water pollution control measures:

- Oil & Grease trap to treat effluent from Workshop.
- Entire domestic effluent will be treated in septic tanks and soaked into soak pits.
- Leak proof containers for storage and transportation of waste oil/grease.
- Regular testing of mine, surface and ground water will be carried out.
- Industrial water will be put into a closed circuit.
- Properly designed system to collect and divert the storm water shall be provided.

Ground water resources

In coal mines, the different aquifers overlying the working coal seam would be contributing groundwater to the mine by gravity drainage which need to be pumped out for safe operation of the mines.

Generally steep draw down cone would be formed in poor potential aquifers thereby the influence area is to small distance and reverse is established in respect of aquifers with high hydraulic conductivity. The Impact of mining activities is likely to be pronounced in the dip side which are estimated by utilising aquifer and mine parameters at final mine depth. It may be appropriate to mention here that the presence of prominent boundaries/water bodies, faults and also interfringing of sandstone and shale beds may restrict the propagation of draw down cone.

Further, the ground water level decline is more in the close vicinity of the pit. The effect will be pronounced in the down – dip side and milder in the up – dip side. But

this effect will be temporary in nature and once the project is over, after 2-3 rains, the regime will regain its almost original status.

Any shortage of water in the affected villages during the temporary period will be supplemented through supply of treated water pumped out from the mine.

Water conservation measures

- Provision of Rain water Harvesting system has been made for conservation of water.
- Settling pond for surface run-off with drainage system shall be provided.
- Closed water circuit will be provided.

Impact on Noise level

Fortnightly Noise Level Monitoring of KCC Mine as a part of Cluster IV is being carried out at following stations as part of Routine Environmental Monitoring by CMPDI RI-II, Dhanbad:

Core Zone:

- **Govindpur Village (A7): Industrial Area**
- **Katras Chotudih (A37): Industrial Area**

Buffer Zone:

- **Block IV (A6) : industrial area**
- **Nichitpur (A8): Industrial Area**
- **Rudhi Basti(A18): Residential Area**

Noise level data at the aforementioned stations is as given below:

Name of the Project : **Cluster -IV**			**Station Name: A7, Govindpur**	
Sl. No.	**Category of area**	**Date**	**Noise level dB(A)LEQ**	***Permissible Limit of Noise level in dB(A)***
1	**Industrial area**	06.01.22	59.8	75
2	**Industrial area**	17.01.22	60.3	75
3	**Industrial area**	11.02.22	59.9	75
4	**Industrial area**	25.02.22	60.6	75
5	**Industrial area**	07.03.2022	59.3	75
6	**Industrial area**	24.03.2022	57.3	75

Name of the Project : **Cluster -IV**			**Station Name: A37, Katras Chotudih**	
Sl. No.	**Category of area**	**Date**	**Noise level dB(A)LEQ**	***Permissible Limit of Noise level in dB(A)***
1	**Industrial area**	06.01.22	57.1	*75*
2	**Industrial area**	24.01.22	61.2	*75*
3	**Industrial area**	11.02.22	61.5	*75*
4	**Industrial area**	25.02.22	62.1	*75*
5	**Industrial area**	03.03.2022	60.3	*75*
6	**Industrial area**	24.03.2022	58.2	*75*

Name of the Project : **Cluster -IV**			**Station Name: A6,Block IV**	
Sl. No.	**Category of area**	**Date**	**Noise level dB(A)LEQ**	***Permissible Limit of Noise level in dB(A)***
1	**Industrial area**	10.01.22	56.6	*75*
2	**Industrial area**	17.01.22	60.2	*75*
3	**Industrial area**	11.02.22	58.8	*75*
4	**Industrial area**	25.02.22	59.3	*75*
5	**Industrial area**	11.03.2022	59.3	*75*
6	**Industrial area**	24.03.2022	57.6	*75*

Name of the Project : **Cluster -IV**			**Station Name: A8,Nichitpur**	
Sl. No.	**Category of area**	**Date**	**Noise level dB(A)LEQ**	***Permissible Limit of Noise level in dB(A)***
1	**Industrial area**	10.01.22	58.6	*75*
2	**Industrial area**	24.01.22	59.4	*75*
3	**Industrial area**	15.02.22	58.2	*75*
4	**Industrial area**	28.02.22	59.4	*75*
5	**Industrial area**	12.03.2022	60.2	*75*
6	**Industrial area**	26.03.2022	56.8	*75*

Name of the Project : **Cluster -IV**			**Station Name: A18,Rudhi Basti**	
Sl. No.	**Category of area**	**Date**	**Noise level dB(A)LEQ**	***Permissible Limit of Noise level in dB(A)***
1	**Residential area**	03.01.22	52.3	*75*
2	**Residential area**	19.01.22	53.4	*75*
3	**Residential area**	01.02.22	54.1	*75*
4	**Residential area**	16.02.22	53.7	*75*
5	**Residential area**	01.03.2022	54.6	*75*
6	**Residential area**	21.03.2022	52.4	*75*

Noise pollution control measures

- Adequate and regular maintenance of plants and machineries will be carried out.
- The noise absorbing pads at foundations will be provided.
- Green belt has been proposed to prevent the propagation of sound and also to dampening its intensity.
- Proper blasting techniques by designing a suitable blasting pattern after actual field observation would be followed to minimize adverse effects of ground vibration and noise if required.
- Personal protective gears are given to workmen exposed to dusty and noise work environment.

Hazardous Waste:

Details of Hazardous waste generated and their method of disposal:

Sl. No.	Waste description	Method of disposal
1.	Used oil	Will be stored in drums safely in store for disposal through auction to the authorized re-processors
2.	Oil and grease	
3.	Used batteries	To be stored safely for auction to the authorized re-processors.
4.	Oily sludge	Disposal in accordance with Hazardous Waste Management rules 2016 & any futher applicable
5.	Filters & filter materials containing oil during maintenance of vehicles	

Door to door Municipal Solid Waste will be collected and subsequently this waste will be disposed by Municipal Corporation as per existing Rules.

Sewage will be treated in Septic Tank cum Soak Pit prior to disposal

Socio-Economic Issues:

The project is likely to give a boost to the economy of the area by providing primary and secondary employment to local people . The infra-structural facilities including healthcare facilities provided by the project will benefit local villagers. The progressive mine closure activity is likely to significantly reduce the impact of mining

activity on the land apart from increasing the green cover and surface water availability. The yearly CSR expenditure as per existing CIL Policy ie 2% of average net profit of the company for the immediate three preceeding years or 2.00 per tonne of coal production of previous year whichever is higher, which is proposed to be spent in vicinity will help in bringing about better socio-economic benefits to the local population.

Biological reclamation

For successful biological reclamation of the reclaimed area, preference will be given to endemic species and mixed culture. The species will be selected carefully from the following groups for quick reclamation :

- Nitrogen fixing tree species for fuel wood, timber and fodder
- Fruit bearing tree species
- Tree species with dense foliage for shade
- Flowering and ornamental tree species.

Plantation Program of KCC mine is given in the following table:

Plantation Details	Year	PLANTATION		Total Plantation
		Area (ha)	Trees/ saplings	
PLANTATION SITE-1	1	0.54	1350	1350
	2	0.54	1350	1350
	3	0.54	1350	1350
	4	0.54	1350	1350
	5	0.54	1350	1350
	6	0.54	1350	1350

		7	0.54	1350	1350
		8	0.54	1350	1350
		9	0.54	1350	1350
		10	0.54	1350	1350
		11	0.54	1350	1350
		12	0.54	1350	1350
	PLANTATION SITE-2	13	0.6	1500	1500
		14	0.6	1500	1500
		15	0.6	1500	1500
		16	0.6	1500	1500
		17	0.6	1500	1500
		18	0.6	1500	1500
		19	0.6	1500	1500
		20	0.6	1500	1500
		21	0.6	1500	1500
		22	0.6	1500	1500
		23	0.6	1500	1500
		24	0.6	1500	1500
	Post Mining	PC1	1.8	4500	4500
		PC2	1.1	2750	2750
		PC3	0.6	1500	1500
		TOTAL	**17.18**	**42950**	**42950**

Plantation program has been delineated in Plate No XIV

Monitoring & Management Organisation:

To have a close watch on the environmental condition and implementation of the various measures suggested, a multi-disciplinary approach is essential.

ORGANISATION CHART

Sl. No.	Measures/Actions		Agency
1.	Environmental Pollution Control	1	General Manager, Katras Area
		2	Officer in Charge, (Environment), Katras Area
		3	Project Officer, KCC Colliery
		4	Area Manager (Civil), Katras Area
		5	Environment Cell (BCCL H.Q.)
2.	Environmental Monitoring	1	General Manager, Katras Area
		2	Area Manager (Civil), Katras Area
		3	Officer in Charge, (Environment), Katras Area
		4	Project Officer, KCC Colliery
		5	Environment Cell of BCCL Headquarters
		6	Environmental Laboratory of CMPDI, RI-II, Dhanbad
3.	Reclamation	1	Project Officer, KCC Colliery
		2	Officer in Charge (Environment), Katras Area

CHAPTER VIII

PROGRESSIVE AND FINAL MINE CLOSURE PLAN

- Mine Closure Plan has two components viz. i) Progressive or Concurrent Mine Closure Plan, and ii) Final Mine Closure Plan. Progressive mine Closure Plan would include various land use activities to be done concurrently and sequentially during the entire period of the mining operations, whereas the Final mine Closure activities would start towards the end of mine life, and may continue even after the reserves are exhausted and/or mining is discontinued till the mining area is restored to an acceptable level. The Mine Closure details of the Mining Plan should be oriented towards the restoration of land back to its original condition as far as practicable.

- Mining is to be carried out in a phased manner along with reclamation and afforestation work in the mined out area.

- This Progressive mine closure plans shall be reviewed after a period of every five years. These plans would be examined periodically in every five years period and to be subjected to the third party monitoring by the agencies approved by the Central Government, like Central Mine Planning and Design Institute Ltd. (CMPDIL), National Environmental Engineering Research Institute (NEERI), Indian Institute of technology (IIT-ISM) or any other institutes/organizations/agencies specified from time to time for the purpose.

- Various project specific activities viz. mined-out land details & their technical and biological restoration plan, water quality management, infrastructure to be retained and demolished, disposal of mining machinery, etc. have been furnished in the relevant paras. As the backfilling of the mine void is being carried out as part of regular mining operation, it shall not be included in the list of progressive mine closure activities. However, in case, if the backfilling of mine void is being carried out specifically for closure of the mine in future due any reason, the same shall be included in the list of activities to be taken up for mine closure.

	Parameters	*Details*
8.1	**Land Degradation and restoration Schedule**	

8.1.1 Land Degradation and Technical Reclamation (Commutative Area "Ha")

Stage/Year	Land Degraded				Technically Reclaimed Area			
	Excav	Dump (Extn+Top Soil)	Infra/others*	Total	Backfill	Dump (Extn+Top Soil)	Infra/others	Total
Up to Base year*	46.93	23.70						
Y-5	85.43		0.5					
Y-15	133.43				40.4			
Y-24	176.80				85.4			

8.1.2 Biological Reclamation (Cumulative in "Ha")

Stage/Year	Biologically Reclaimed Area					Forest land (Return)	Un Distrubed/To be left for Public/com Use	Total
	Agriculture	Plantation	Water Body	Public Company Use	Total			
Up to Base year*								
Y-1		0.54						
Y-2		0.54						
Y-3		0.54						
Y-4		0.54						
Y-5		0.54						
Y-6		0.54						
Y-7		0.54						
Y-8		0.54						
Y-9		0.54						
Y-10		0.54						
Y-11		0.54						
Y-12		0.54						
Y-13		0.6						
Y-14		0.6						
Y-15		0.6						
Y-16		0.6						
Y-17		0.6						
Y-18		0.6						
Y-19		0.6						
Y-20		0.6						

Y-21			0.6							
Y-22			0.6							
Y-23			0.6							
Y-24			0.6							
Post Closure										
Y-25			1.8	32.4						
Y-26			1.1							
Y-27			0.6							

8.2 Post Closure Water Quality management:

Routine Environmental Monitoring will be carried out for water quality analysis of following samples:

S. No.	Sample	Frequency
1	Mine Water	Fortnightly
		Half Yearly
2.	Surface Water	Quarterly
3.	Ground Water	Quarterly

If any discrepancy from statutory standards is observed, necessary corrective measures will be undertaken by the management.

8.3 Post Closure Air Quality management:

Fortnightly Air Quality Monitoring will be carried out at 03 Air Quality monitoring Stations during three years post closure period.

8.4 **Waste Management** (Figures in MM3)

Stage/Year		OB Removal (Cumulative)			External Dump (Cumulative)		Internal Backfilling (Cumulative)		Embankment (Cumulative)	
		Top Soil	OB	Total	Top Soil	OB	Top Soil	OB	Top Soil	OB
Up to Base year*		0.23	24.84	25.07						
Y-1		0.23	32.1	32.33						
Y-3		0.23	46.3	46.53						
Y-5		0.24	58.9	59.14						
Y-10		0.36	96.96	97.32						
Y-15		0.51	134.98	135.49			0.10			
Y-20		0.66	173.01	173.67	0.12		0.22			
Y-24		**0.68**	**202.82**	203.5	0.24	123.92	0.42	78.9		
Post Closure										

8.5

Top Soil Management – (Including Action Plan for Top Soil Management)

(All Figures are Cumulative and in MM3)

Stage/Year	Top Soil Removal Plan	Top Soil Used				
		Spreading Over Embankment	Spreading Over Backfill area	Spreading over External OB Dump area	Used in Green Belt Area	Total Utilised
Up to Base year*	0.23					
Y-1	0.23				0.001	
Y-3	0.23				0.003	
Y-5	0.24				0.005	
Y-10	0.36				0.008	
Y-15	0.51		0.10		0.01	
Y-20	0.66		0.22	0.12	0.015	
Y-24	**0.68**		0.42	0.24	0.02	
Post Closure						

Top Soil removed will be used in Plantation activities, Spreading over External OB Dump area, Spreading Over Backfill area and also in Green Belt Area.

8.6	Management of Coal Rejects.	There is no washery.

8.7 Restoration of Land used for Infrastructure

The other entire infrastructure related to the opencast coal mining operation will be dismantled, after end of the mineable reserve/ mine life. The list of infrastructure to be dismantled at the end of the mine life is given in the following table:

Sl. No.	Particulars
1.	Workshop, Mine Office & Stores

8.8 Disposal of Mining Machinery

After end of production life of Cluster IV group of mines, all mining machinery will be shifted to other mines of BCCL as per requirements.

8.9 Safety & Security

Fencing around Opencast Workings:

i) The top edge of the opencast working shall be kept fenced with wire rope strands or barbed wire, supported by posts of timber, iron or concrete (movable). The gap between the adjacent rope strand or wires shall not be more than 0.30 m and bottom most rope, strand or wire shall not be more than 0.25 m and the topmost rope, strand or wire shall not be less than 1.0 m from ground level.

ii) At the finishing stage, opencast working shall be fenced with a masonry wall using lime mortar not less than 0.40 m thick and not less than 1.2 m high, with a parapet top.

8.10 Abandonment Cost and Financial Assurance

8.10.1 Abandonment Cost: Cost of Activities to be taken up for closure of the mine**

Head	Parameters	Unit	Quantity	Escalated rate (in Rs. Crs.)	Escalated Amount (in Rs. Crs.)
Progressive Closure	Water Quality Management	LS	1	0.39	0.3893925
	Air Quality Management	LS	1	0.74	0.7417000
	Waste Management	MM3		-	-
	Barbed wire fencing around dump	m	1000	0.000332669	0.3326691
	Barbed wire fencing around the pit	m		0.000332669	-
	Filling of Void- Rehandling of Crown Dump	MM3		0	-
	Top Soil Management	MM3	0.5	7.42	3.7084999
	Technical and biological Reclamation of Mined cut of land and OB Dump	Ha	50	0.13	6.4898748
	Plantation over virgin area including green belt	Ha	14	0.06	0.8307040
	Manpower Cost and supervision	Year	24	0.19	4.4501999
	Toe wall around the dump	m	1000	0.001762865	1.7628651

Head	Parameters	Unit	Quantity	Escalated rate (in Rs. Crs.)	Escalated Amount (in Rs. Crs.)
	Garland Drain	m	1000	0.00	0.0927125
	Garland Drain around the dump	m		-	-
	Subsidence management	LS		0.55627	0.5562750
	Any other Activity(Avenue Plantation)	Nos.	1000	0.00046	0.4635625
Dismantling of Infrastructure & Disposal / rehabilitation of Mining Machinery	Dismantling of workshop and washery	sq m	12375	0.00002	0.2294634
	Rehabilitation of the Dismantled facilities	LS	15	0.01	0.1390687
	Dismantling of pumps /other facilities	No.	25	0.01	0.1390687
	Dismantling of pipes/other facilities	Km	10	0.01	0.1297975
	Dismantling of Stowing Bunker, provisioning of pumps for bore well pumping arrangement	CUM		0.00	-
	Dismantling of UG equipment	L.S.		-	-
	Rearranging water pipeline to dump top park / Agriculture land (Assumed Data)	Km	10	0.01	0.0834412
	Dismantling of power lines (33KV H.T. Line)	*km*	*7*	0.01	0.0778785
Safety and Security	Barbed wire fencing around dump	m		-	-
	Barbed wire fencing around the pit	m		0.000332669	-
	Barbed wire fencing with masonry pillar	m	1000	0.0007417	0.7417000
	Concrete wall with Masonry pillars around the pit	m		0.001162615	-
	Securing air shaft and installation of bore well pump	sqm	750	0.000463562	0.3476719
	Securing incline	sqm	750	0.000463562	0.3476719
	Concrete wall fencing around water body	m		-	-
	Boundary wall around the water body	m		-	-
	Stabilization (viz benching, pitching etc.) of side walls of the water body	sqm		-	-
	Toe wall around the dump	m		0.00	-
	Garland Drain	m		0.00	-
	Garland Drain around the dump	m	1000	9.27125E-05	0.0927125
	Drainage Channel from main OB Dump (Assumed Data)	m		-	-
Technical and Biological Reclamation of Mined Out of land and OB Dump	Filling of Void			-	-
	Top Soil Management	Ha		-	-
	OB Rehandling for backfilling			-	-
	Terracing, Blanketing with soil and vegetation of External OB Dump	sqm		0.00	-
	Peripheral road, gates, view point cemented steps on bank	m	1000	0.00185425	1.8542500
	Expenditure on development of Agricultural land	Ha		-	-
	Landscaping and Plantation	Ha	3.5	0.06	0.2076760
Post Closure management and supervision	Power Cost	LS	1	0.09	0.0927125
	Post Mining Water quality management		114	0.00	0.1220957
	Post Mining Air quality management		216	0.01	1.1503678
	Subsidence monitoring for 5 years	LS		-	-
	Waste Management		0	-	-
	Manpower Cost and supervision	Year	3	1.11	3.3376499
Others	Entrepreneurship development (Vocational/ Skill development training for sustainable income of affected people)	1.6684185			

Head	Parameters	Unit	Quantity	Escalated rate (in Rs. Crs.)	Escalated Amount (in Rs. Crs.)
	Golden Handshake/ Retrenching benefits to 100 employees of OC				
	Golden Handshake/ Retrenching benefits to 200 employees of UG				
	Onetime financial grant to societies/institutions/organizations which is dependent upon the project				
	Provide jobs in other mines of the Company				
	Continuation of other services like running of Schools etc.				
Total		**30.5801**			

Note: ** The cost shown above is only estimated and the exact cost for these activities can be established at the time of execution only. If the total cost at the time of execution of above mentioned activities exceed the total estimated cost, the shortfall shall be borne by the company.

8.10.2 Financial Assurance: Amount to be deposited in Escrow account as a security against the mine activities to be carried out of the closure of the mine

COST CALCULATION- KCC OC MINE			
WPI as on	Apr-19		121.1
WPI as on base date	Mar-22		148.9
Escalation rate of Closure cost			1.229562
	UG	OC	
Base Rate of Closure Cost "Rs . Crs/Ha"	0.015	0.09000	
Closure Cost "Rs. Crs/Ha"	0.0184434	0.11066	
Project Area	39.83	176.800	
Amount to be deposited into Escrow Account "Rs. in Crs.	0.734602	19.56480	
Amount already deposited into Escrow Account "Rs. in Crs.		7.53000	
Amount already released from Escrow Account "Rs. in Crs.			
Net Amount to be deposited into Escrow Account "Rs. in Crs.	0.734602	12.03480	
Rate of compounding of Annual Closure Cost		5.00%	
Balance Life of the project "in yrs"		24	

Amount to be deposited into escrow account annually				
Year	**OC**	**Year**	**UG**	**Total**
Y1	0.50145	Y-1	0.73460	1.23605
Y2	0.52652	Y-2		0.52652
Y3	0.55285	Y-3		0.55285
Y4	0.58049	Y-4		0.58049
Y5	0.60952	Y-5		0.60952
Y6	0.63999	Y-6		0.63999
Y7	0.67199	Y-7		0.67199
Y8	0.70559	Y-8		0.70559
Y9	0.74087	Y-9		0.74087
Y10	0.77791	Y-10		0.77791
Y11	0.81681	Y-11		0.81681
Y12	0.85765	Y-12		0.85765
Y13	0.90053	Y-13		0.90053
Y14	0.94556	Y-14		0.94556

Annual Closure Cost	0.73460	0.50145	
Amount to be deposited into Excrow Account after compounding @ of 5% "Rs. in Crs"		**23.05012**	

Y15	0.99284	Y-15		0.99284
Y16	1.04248	Y-16		1.04248
Y17	1.09460	Y-17		1.09460
Y18	1.14933	Y-18		1.14933
Y19	1.20680	Y-19		1.20680
Y20	1.26714	Y-20		1.26714
Y21	1.33050	Y-21		1.33050
Y22	1.39702	Y-22		1.39702
Y23	1.46687	Y-23		1.46687
Y24	1.54022	Y-24		1.54022
Total	22.31552		0.73460	23.05012

Mining and Mine Closure Plan of Katras Choitodih Colliery was prepared and approved by BCCL Board. And as per the approved Mine Closure Plan total deposited amount in the Escrow Account till **31.3.2022** was **Rs. 753.0 Lakhs**. The amount already accrued in account shall be adjusted against the new closure cost calculated.

The amount calculated above shall be deposited every year by BCCL in the Escrow Account in the name of Katras Chotudih OC Mine.

Thus, total amount that shall be deposited for final mine closure activities of **KCC Group of mines during the life of 24 years stands out to be Rs. 23.05012 Crores** as per the present status of the mine.

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.

	Amount (Rs. in Lakhs)	
	UG Section	**OC Section**
Amount Already Deposited in Escrow Account		**753.0**
Amount to be Deposited in the Escrow Account in the Future	**73.460**	**2231.552**
Total Amount available for Mine Closure Activities	**73.460**	**2984.552**
Grand Total	**3058.012**	

The amount deposited in Escrow Accounts is appended below:

Name of Mine: Katras Chatudihl OC Mine Escrow account no: 00150100010086			
S.No :	Year	Rs. in Lakhs	
		OC	Total
1	2013-2014	-	-
2	2014-2015	82.12	82.12
3	2015-2016	86.23	86.23
4	2016-2017	90.54	90.54
5	2017-2018	114.64	114.64
6	2018-2019	120.37	120.37
7	2019-2020	126.39	126.39
8	2020-2021	132.71	132.71
9	**2021-2022**	**-**	**-**
Total		**753.0**	**753.0**

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 final mine closure

Mine Closure Plan of following two mines have been approved by BCCL Board are mentioned below:

Name of Mine	BCCL Board No.	Date	Escrow A/c at Bank of Baroda, Dhanbad Branch
Katras Choitudih OC Mine	312th Board of BCCL	13.12.2014 02.02.2018	00150100010086

- **Implementation of the approved Mine Closure Plan shall be sole responsibility of the mine owner**. Mining is to be carried out in a phase manner i.e. continuation of mining activities from one phase to another indicating the sequence of operations depending on the geo-mining conditions of the mine. Up to 50% of the total deposited amount including interest accrued in the escrow account may be released after every five years in line

with the periodic examinations of the closure plan. The amount released should be equal to expenditure incurred on the progressive mine closure in past five years or 50% whichever is less. The balance amount shall be released to the mine owner//leaseholder at the end of the final mine closure on compliance of all provisions of Closure Plan. This compliance report should be duly signed by the lessee and certify that said closure of mine complied all statutory rules, regulations order made by the central or state government, statutory organizations, court etc. and certified by the coal controller.

Final Mine Closure would be considered to be completed only after acceptance of the third party audit report by the coal controller on the compliance of all provisions on Mine Closure Plan. Any institute/ Organization/ Agency as may be notified by the Government for this purpose may be engaged for third party audit.

BHARAT COKING COAL LIMITED
(A Subsidiary of Coal India Limited)
Office of the General Manager
Katras Area.
CIN U10301JH19/GOI100918

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

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.

Yours faithfully,

15/3/17

Chief Manager (Env.)
Katras Area
BCCL

15/3/17

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

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Annexure-1

गैरमजरुआ जंगल–झाड़ी (Deemed Forest) भूमि की विवरणी (प्रपत्र III)

अंचल का नाम – बाघमारा, जिला का नाम – धनबाद

क्रमांक	अंचल	मौजा	थाना नं0	खाता	प्लॉट	रकबा	किस्म	बंदोबस्त / हस्तांतरित / लीज भूमि की विवरणी			की विवरणी (7–9)			अभियुक्त
								खाता	प्लॉट	रकबा	खाता	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	घोराडी		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	दग्घो		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 ,671,869,898,1064 ,1061,983,1062,239	336.32								
9	माटीगढ़ा		74		5,6,113,114,115 ,118,119,32,33, 116,120,112	443.2								
10	डोमचलकरो		75		48,52,37,38,55,51,1,46	246.91								
11	भीमकनाली		76		2,6,248,355,261,262,273	195.03								
12	बक्सपुरा		80		3,11,219,28	80.7								

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क्रमांक	अंचल	मौजा	थाना नं0	खाता	प्लॉट	रकबा	किस्म	बंदोबस्त / हस्तांतरित / लीज भूमि की विवरणी			की विवरणी (7–9)			अभियुक्ति
								खाता	प्लॉट	रकबा	खाता	प्लॉट	रकबा	
1	2	3	4	5	6	7	8	9			10			11
13	लुत्तीपहाड़ी		81		2,1,3,148,160,5,14	73.44								
14	आमटीह		64		5,154	12.1								
15	टामंझलाडीह		66		1,3,75,82,201,203, 85,246,288,130,99	131.55								
16	नावाडीह		102		327,328,331,389	61.2								
17	बेहराकुदर		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	जरमुनई		181		1	4.8								
22	महेशपुर		185		118	1.72								
23	कर्णपुरा		186		1,71	5.75								
24	लालधक		207		142,119,86,87,80,78,74,402	14.47								
25	बागदाड़ा		217		2163,2940,2970,2966,2967 , 2968,2960,2971,2975,2980 ,2935,2083,2331,2324,345 2	60.12								
			217		3434,3433,3421,3231,3230 ,3227,3216,3208									

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क्रमांक	अंचल	मौजा	थाना नं0	खाता	प्लॉट	रकबा	किस्म	बंदोबस्त/हस्तांतरित/लीज भूमि की विवरणी			की विवरणी (7–9)			अभियुक्ति
								खाता	प्लॉट	रकबा	खाता	प्लॉट	रकबा	
1	2	3	4	5	6	7	8	9			10			11
			217		3203,3436,3215,2972,2946 , 1482									
26	बौआकला		228		1,11,2326,2715,2400,2420, 2711,2712,2794,78,	85.34								
27	महतोटांड		180		3,40	18.8								
28	तिलाटांड		213		389,383,395,1387,1,2,3,4,7 , 65,77,78,89,80,81,82,132,1 38, 134,135,383,384,385	132.11								
29	फाटामाड़ुल		222		137,148,626,1633,1954	76.67								
30	गोविन्दाडीह		221		833,1,1362,2094	200.57								
31	घारजोरी		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	मधुगोड़ा		214		454,343	54.25								
36	चुगी		191		519,1232	8.81								
37	लोहपिट्टी		319		17,26,32,83,1604,2294, 2078,3278	59.96								

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क्रमांक	अंचल	मौजा	थाना न0	खाता	प्लॉट	रकबा	किस्म	बंदोबस्त / हस्तांतरित / लीज भूमि की विवरणी			की विवरणी (7–9)			अभियुक्ति
								खाता	प्लॉट	रकबा	खाता	प्लॉट	रकबा	
1	2	3	4	5	6	7	8	9			10			11
38	तेलमच्चें		320		2782,2796,2755,2943,2962 , 2942,2754,2797,2807	102.9								
39	घुजी		321		1,3,25,764,26,435,131,135, 142,436,434,650,614,612,7 01 ,800,801,751,695,794,255, 739,	167.48								
40	तारगा		306		1352,1676,1411,	68.96								
					कुल	3678.35								

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Project Report

On

Delineation of Surface Coal Fire and associated Land Subsidence in Jharia Coalfield (2022-2024), Jharkhand using satellite based remote-sensing techniques

A collaborative project between

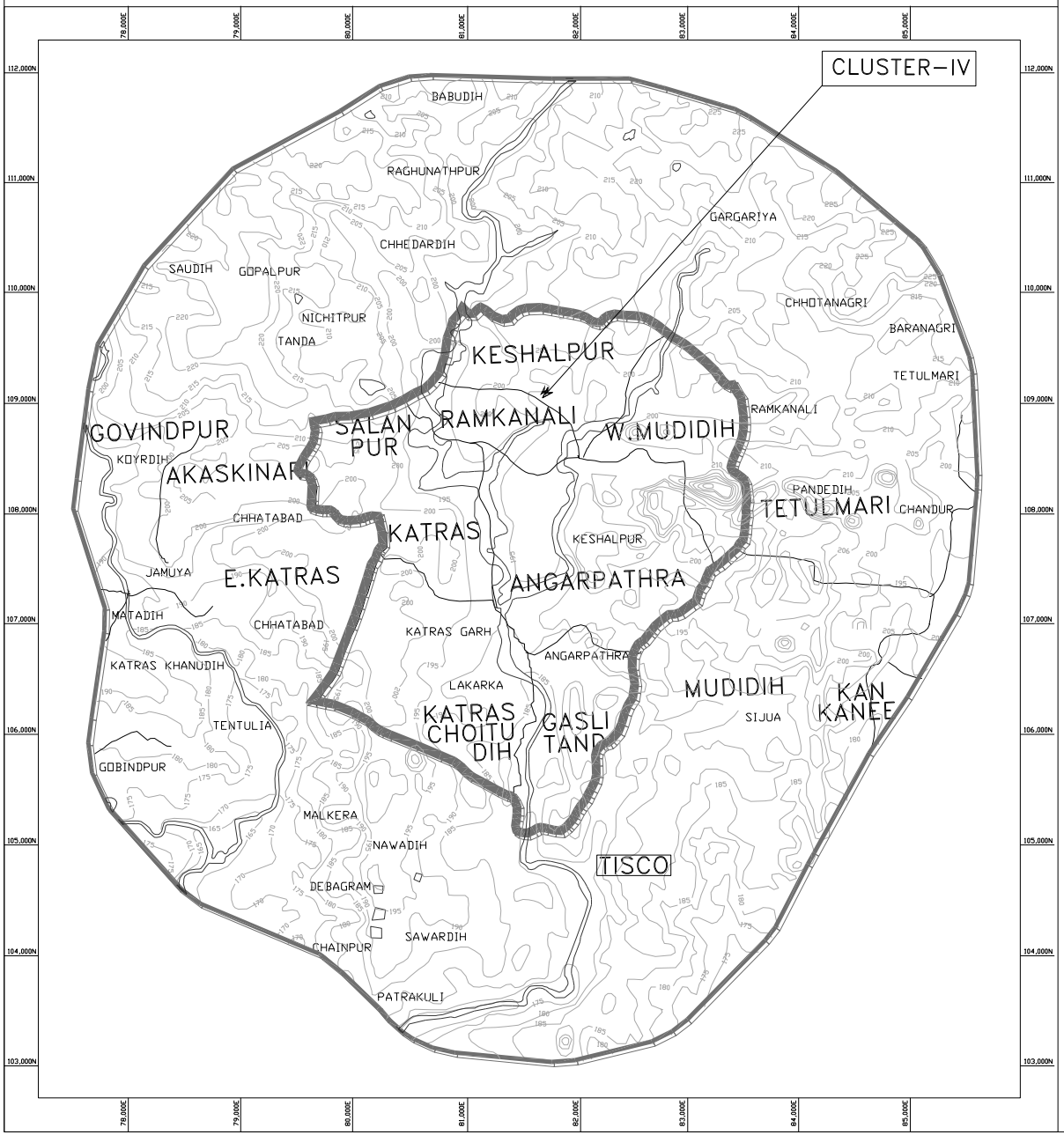
National Remote Sensing Centre (NRSC)
Indian Space Research Organisation (ISRO)
Hyderabad - 500 037

Bharat Coking Coal Limited

Bharat Coking Coal Limited
Koyla Bhawan, Koyla Nagar
Dhandbad, Jharkhand

May, 2025

STUDY AREA OF CLUSTER - IV SHOWING DRAINAGE CONTOUR



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POND

RIVER

PROPOSED PROJECT (CORE ZONE)

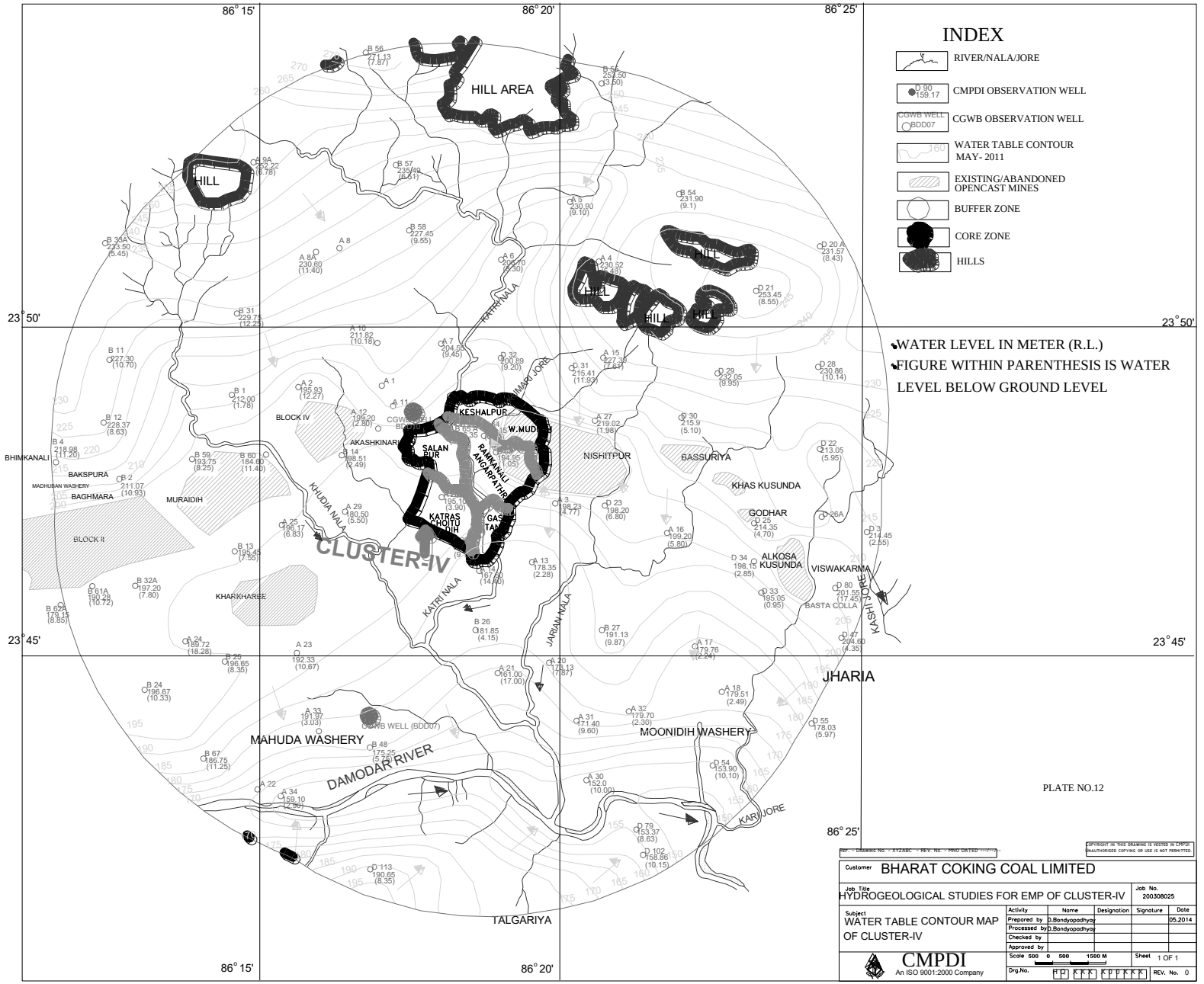
2 KM. ZONE

CONTOUR(m)

PLATE NO -11

A/C No.:- D\CLUSTER_IV\
\CLUSTER_IV DRAINAGE CONTOUR

WATER TABLE CONTOUR MAP OF CLUSTER-IV



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Customer: BHARAT COKING COAL LIMITED

Job Title: HYDROGEOLOGICAL STUDIES FOR EMP OF CLUSTER-IV

Job No. 200308025

Subject: WATER TABLE CONTOUR MAP OF CLUSTER-IV

Activity	Name	Designation	Signature	Date
Prepared by	D.Bandyopadhyay			05.2014
Processed by	D.Bandyopadhyay			
Checked by				
Approved by				

CMPDI
An ISO 9001:2000 Company

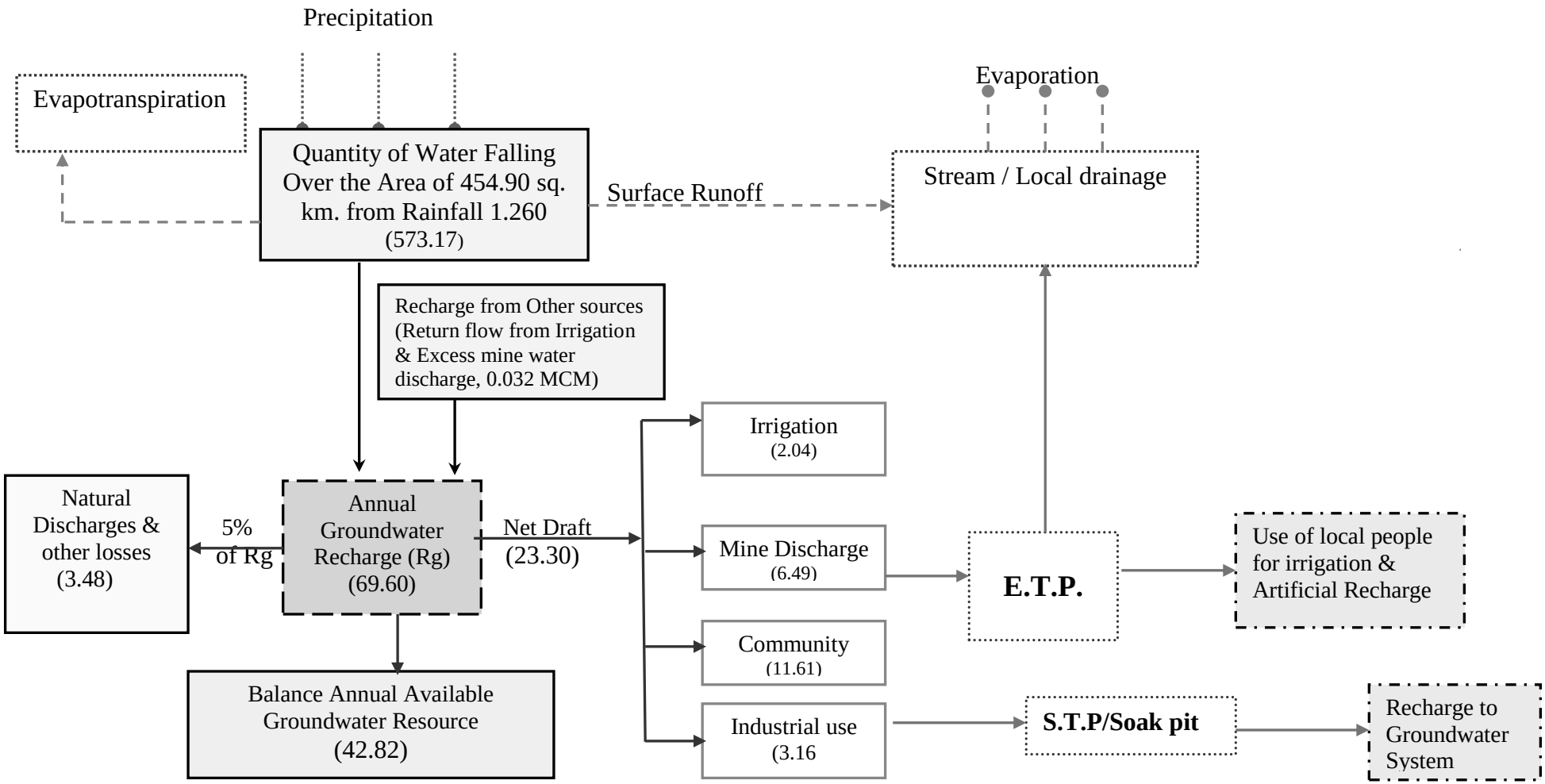
Scale 500 0 500 1000 M

Sheet 1 OF 1

Drg.No. [illegible] REV. No. 0

GROUNDWATER BALANCE FLOW DIAGRAM, BUFFER ZONE OF CLUSTER-IV

(All Values are in M.Cu.m)



Job No - 200308025

PLATE NO: 13

CMPDI

WATER USAGE DIAGRAM OF CLUSTER-IV MINES

(All Values are in m^3 / day)

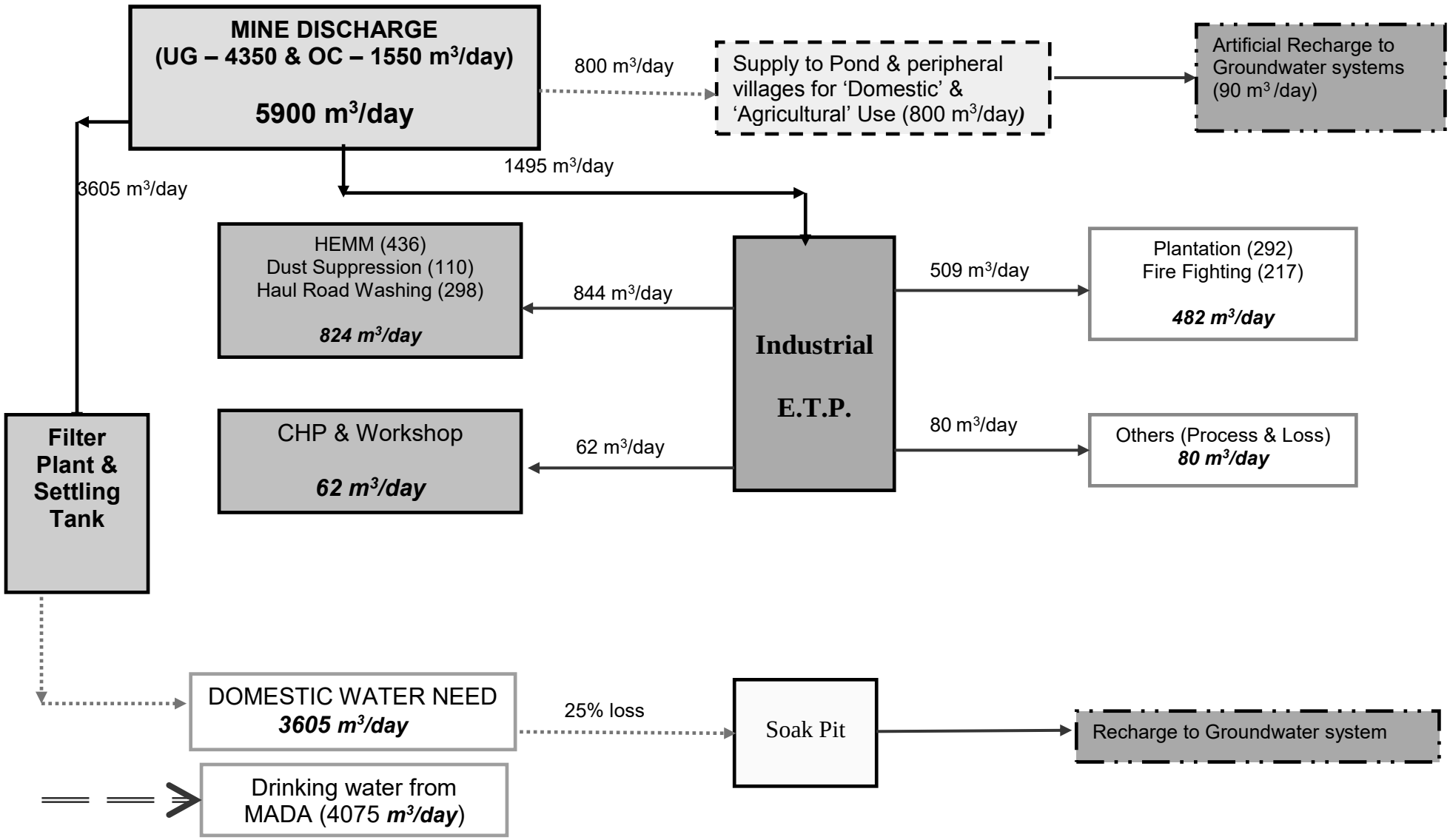


PLATE NO: 14

JOB NO - 200308025

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

Net ground water Recharge 66.12

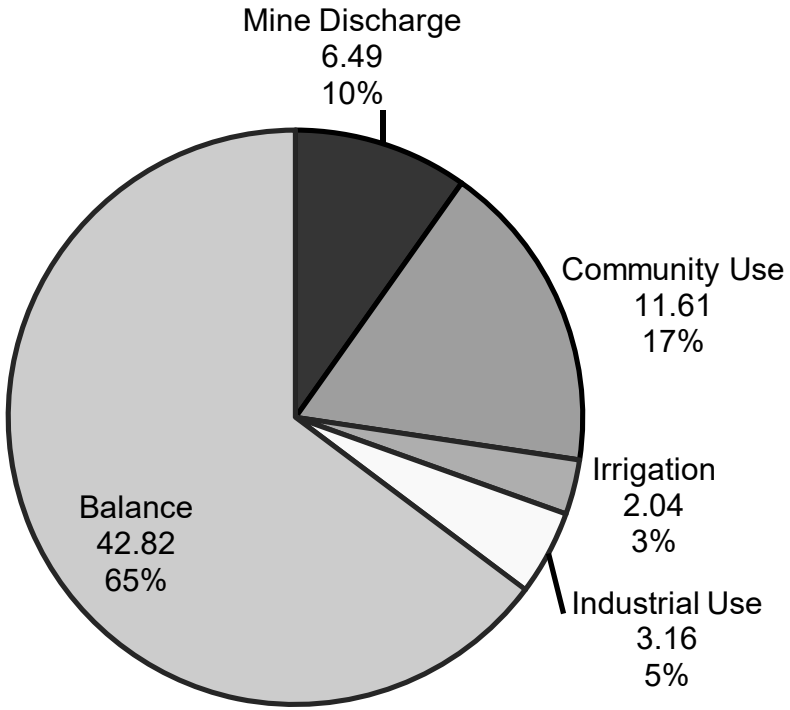
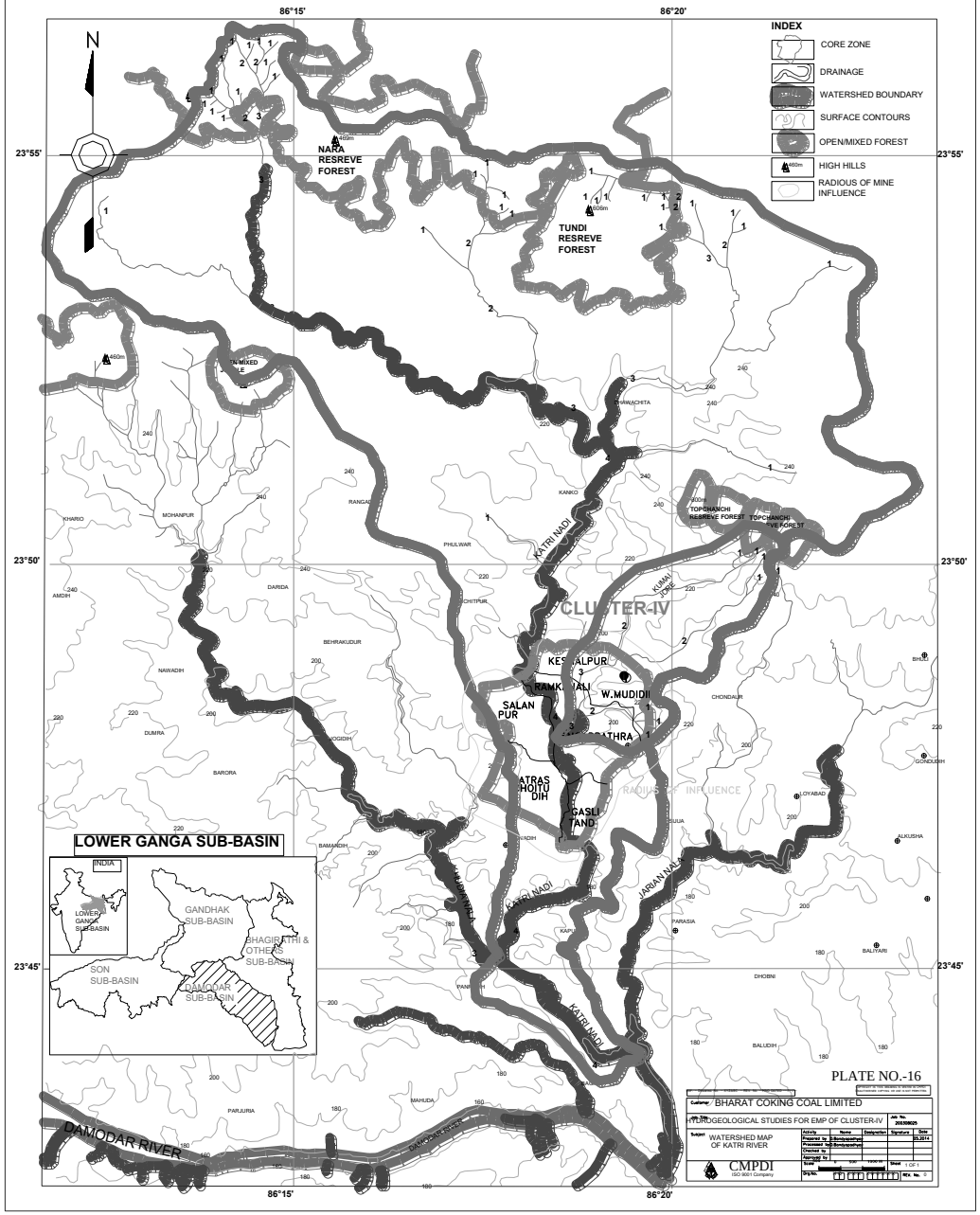
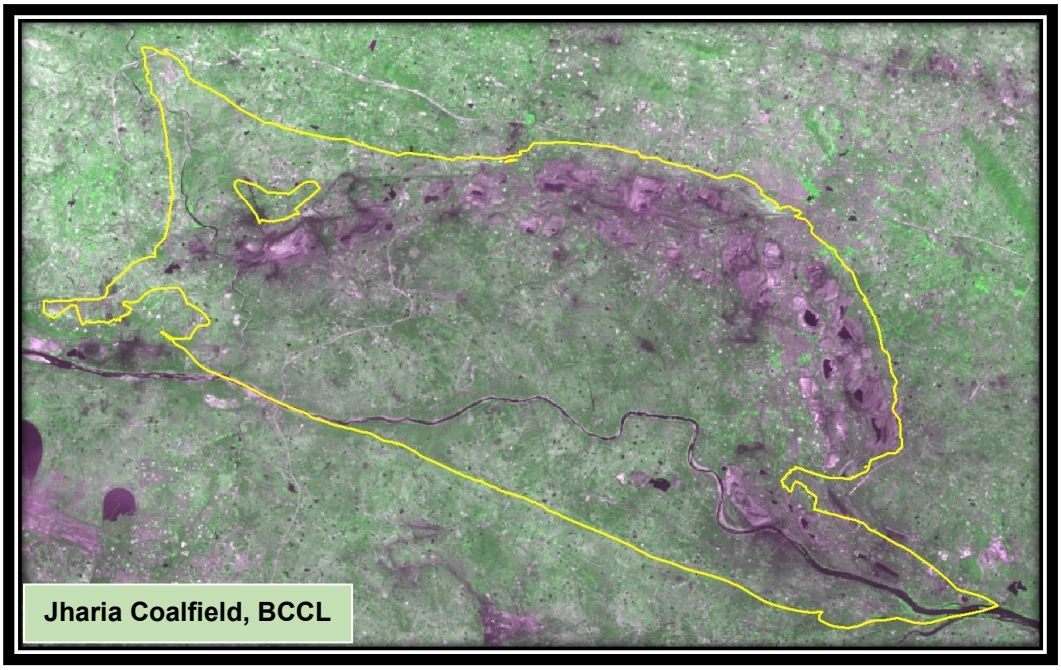


PLATE NO-15

WATERSHED MAP OF CLUSTER IV



Report on Land Use / Vegetation Cover Mapping of Jharia Coalfield based on Satellite Data of the year 2025



Submitted to

Bharat Coking Coal Limited

सर्वजन हिताय | सर्वजन सुखाय
WELFARE FOR ALL | HAPPINESS OF ALL

Report on Land Use/ Vegetation Cover Mapping of Jharia Coalfield based on Satellite Data of the year 2025

Submitted to

Bharat Coking Coal Limited

March-2026

Remote Sensing Cell

Geomatics Division

CMPDI (HQ), Gondwana Place,

Kanke Road, Ranchi – 834 008

JHARKHAND

सर्वजन हिताय | सर्वजन सुखाय
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Document Control Sheet

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(9)	Executing Unit	Remote Sensing Cell Geomatics Division Central Mine Planning & Design Institute Ltd. Gondwana Place, Kanke Road, Ranchi Ranchi 834 008, India
(10)	User Agency	Bharat Coking Coal Limited
(11)	Authors	Ayesha Parida, Manager (Geology) Mohit Rastogi, GM (Geomatics)
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Chapter-1

1. Introduction

1.1 Project Reference

Coal India Limited requested CMPDI to take up the study based on remote sensing satellite data for creating the geo-environmental database of coalfields for monitoring the impact of coal mining on land use and vegetation cover. Accordingly, a road map for implementation of the project was submitted to Coal India Ltd. for land use and vegetation cover mapping of major coalfields for creating the geo-environmental database and subsequent monitoring of impact of coal mining land environment at a regular interval of three years. A work order No CIL/ENVT/11463 dated 03.07.2024 from Coal India Limited for the period 2024-25, 2025-26 & 2026-27 for land reclamation monitoring of opencast projects and vegetation cover monitoring of 19 major coalfields including Jharia Coalfields, BCCL as per a defined plan for monitoring the impact of mining on Vegetation Cover. Prior to this, Land Use/Vegetation Cover Mapping of Jharia Coalfields of Bharat Coking Coal Ltd. was carried out in the year(s) 2008, 2013, 2016, 2019 and 2022. The present study, which has been carried out at an interval of three years is based on satellite data of the year 2025 to assess the regional impact of coal mining on land use/vegetation cover in Jharia Coalfield.

1.2 Project Background

Bharat Coking Coal Ltd. is an ISO 9001:2015, ISO 14001:2015, ISO 45001:2018 Company, dedicated for maintaining the ecological balance in the region, has initiated a massive plantation programme on backfilled area, OB dumps and wasteland. The advent of high resolution, multispectral satellite data has opened a new avenue in the field of mapping and monitoring of vegetation cover. The present study has been taken up to assess the changes in vegetation cover in Jharia coalfield in a span of last three years. While assessing the Land Use/ Vegetation Cover in the coalfield, changes in different categories Vegetation Cover are also analysed to formulate the remedial measures, if any; required to be taken to maintain the ecological balance in the region.

1.3 Objectives

The objective of the present study is to prepare a regional land use/ vegetation cover map of Jharia Coalfields on 1:50,000 scale based on IRS R2 LISS-IV satellite data of the year 2025 using digital image processing technique for accessing the impact of coal mining and associated industrial activities on the land use/ vegetation cover in the Coalfield.

1.4 Location of the Area & Accessibility

The Jharia Coalfield (JCF) is located in the north east part of the State of Jharkhand, approximately 260 km west of Kolkata. It is linked to Kolkata and Delhi through NH 2, which is the part of Golden Quadrilateral highway network of India. The coalfield contains proven coal reserves of approximately one billion tonnes in a crescent-shaped basin. Jharia coalfield covers an area of about 440.25 sq km. It is bounded by Lat $23^0$49'0.63"N and $23^0$38'36.50"N and Long $86^0$08'49.91"E and $86^0$25'54.92E. The major part of coalfield lies in Dhanbad district of Jharkhand. Coalfield is connected by Major Highways road with Ranchi (117 km), Asansol (60 km), Jamshedpur (108 km) and Dhanbad (8 km). The nearest major railway station is Dhanbad, located on Delhi-Howrah Grand Chord line on East Central Railway which passes parallel to northern boundary of the coalfield.

1.5 Physiography and Geology

Jharia coalfield is characterized by gently undulating to a rolling topography with an overall slope towards east-southeast. The coalfield is roughly sickle shaped on plan and occurs as a basin with its axis trending broadly east-west and plunging towards the west. The southern flank is truncated by a major Boundary Fault. The general dip of the formation is 10 to 15 degrees. Flatter dips have also been noted at places. The entire southern part of Jharia coalfield in the vicinity of the Boundary Fault, however shows generally steep dipping beds with amounts increasing even up to 70 degrees.

The drainage pattern in the Jharia coalfield is dendritic in nature. This may be due to more or less homogeneous lithology and structural controls. Damodar River is the main control of drainage system along the Jharia coalfield. It is a fourth order

stream to which a number of third to first order streams, viz. Jamunia, Khudia, Katri, Ekra, Tisra, Chatkari etc. join. Damodar River flows along the southern periphery of the coalfield and is guided by the Main Boundary Fault. The main flow direction is from west to east.

The strike of the formation is generally WSW to ENE in the western part and WNW to ESE in the southern part of the coalfield. This gradually swings to EW in the centre of the coalfield and then to NS further east. In the south-eastern part the strike is generally WNW-ESE. Besides the boundary part the coalfield is traversed by a number of other major and minor faults.

The Barakar formation contains 18 standard coal horizons (numbered I to XVIII). Of the Barakar formations, the coal seams XIII and above are generally thin and of relatively superior quality. Seams XII to IX/X are of medium to superior quality and attain sizable thickness at places. The V, VI, VII, IV, III & II are generally thick seams of inferior quality. The bottom most seam I is of superior medium coking quality in the eastern part of the coalfield.

A map of India showing the location of Jharia Coalfield is given in Fig1.1.

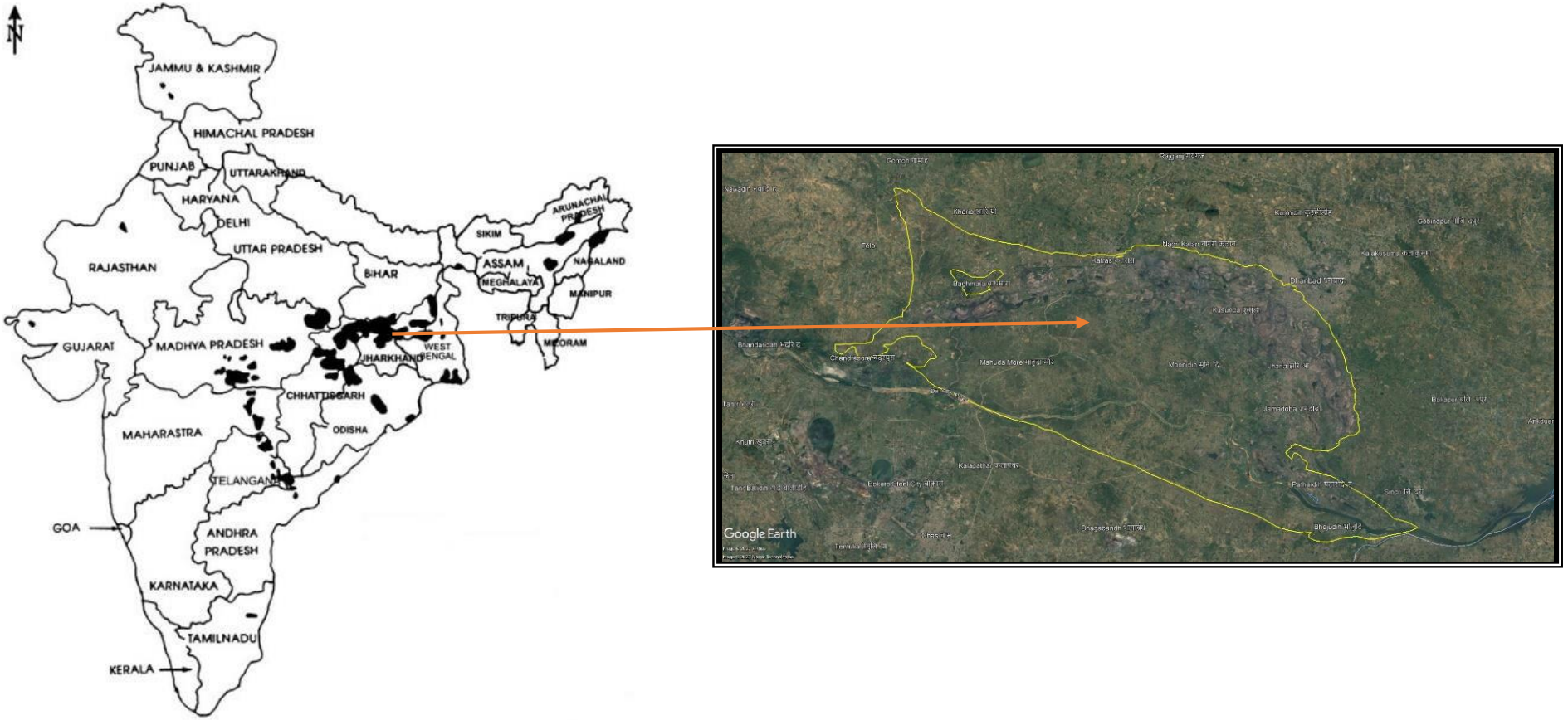


Fig. 1.1: Map of India showing Location Map of Jharia Coalfield

Chapter-2

2. Remote Sensing Concepts and Methodology

2.1 Remote Sensing

Remote sensing is the science and art of obtaining information about an object or area through the analysis of data acquired by a device that is not in physical contact with the object or area under investigation. The term remote sensing is commonly restricted to methods that employ electro-magnetic energy (such as light, heat and radio waves) as the means of detecting and measuring object characteristics.

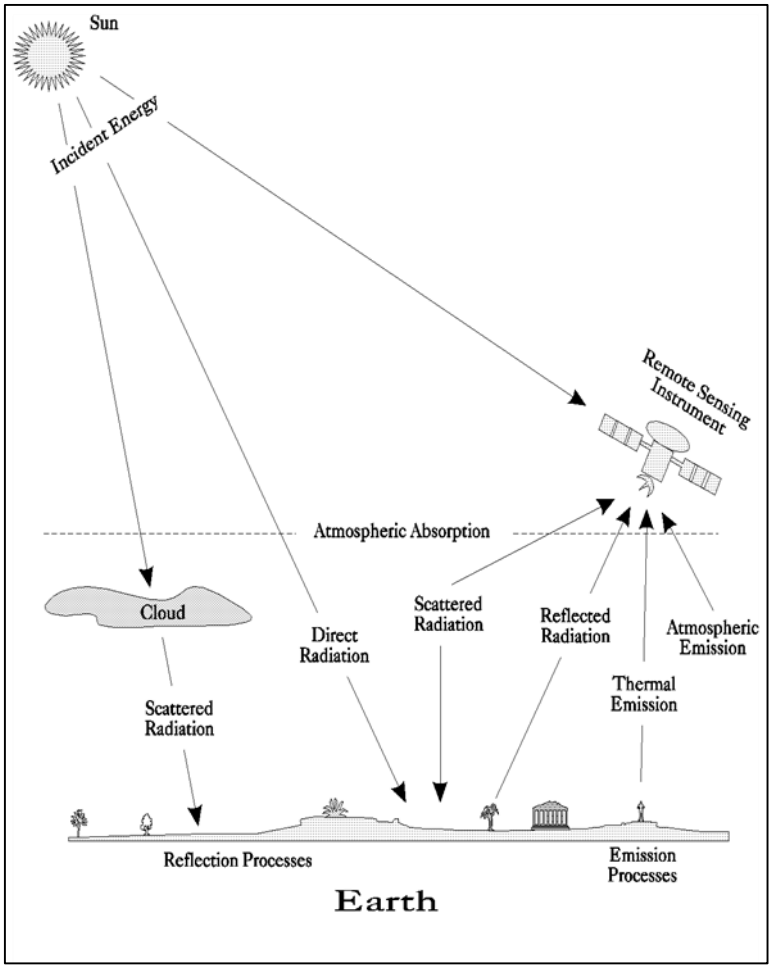


Figure 2.1: Remote Sensing Radiation System

All physical objects on the earth surface continuously emit electromagnetic radiation because of the oscillations of their atomic particles. Remote sensing is largely concerned with the measurement of electro-magnetic energy from the SUN, which is reflected, scattered or emitted by the objects on the surface of the earth. Figure 2.1 schematically illustrate the generalised processes involved in electromagnetic remote sensing of the earth resources.

2.2 Electromagnetic Spectrum

The electromagnetic (EM) spectrum is the continuum of energy that ranges from meters to nanometres in wavelength and travels at the speed of light. Different objects on the earth surface reflect different amounts of energy in various wavelengths of the EM spectrum.

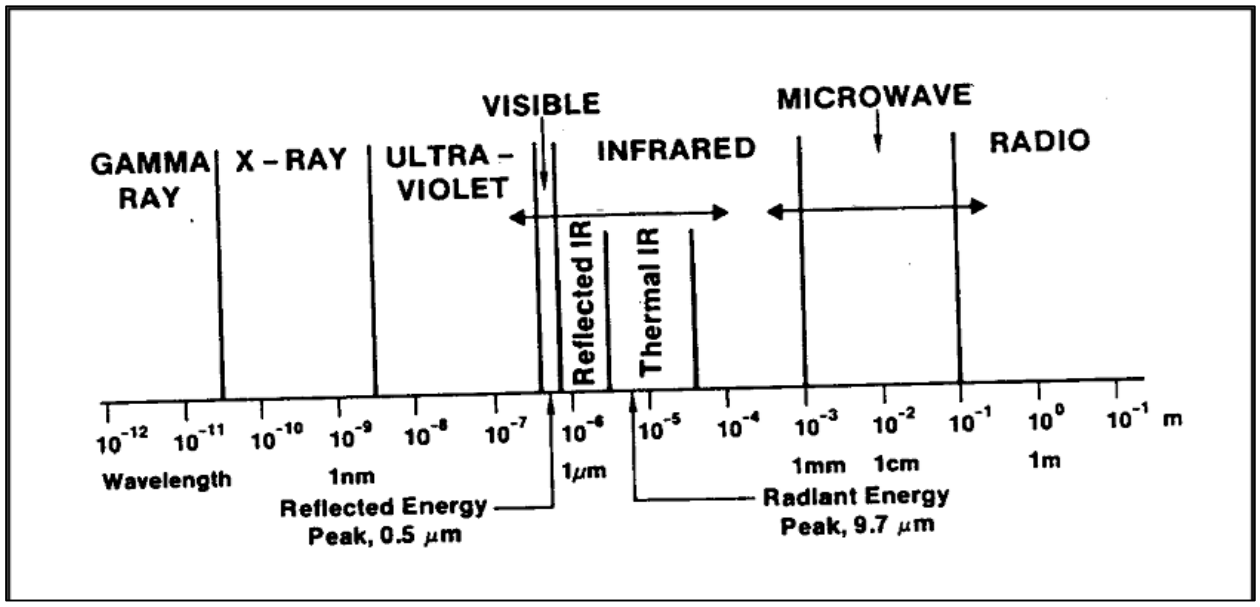


Figure 2.2: Electromagnetic Spectrum.

Figure 2.2 shows the electromagnetic spectrum, which is divided on the basis of wavelength into different regions that are described in Table 2.1. The EM spectrum ranges from the very short wavelengths of the gamma-ray region to the long wavelengths of the radio region. The visible region (0.4-0.7μm wavelengths) occupies only a small portion of the entire EM spectrum.

Energy reflected from the objects on the surface of the earth is recorded as a function of wavelength. During daytime, the maximum amount of energy is reflected at 0.5μm wavelengths, which corresponds to the green band of the visible region, and is called the reflected energy peak (Figure 2.2). The earth also radiates energy both day and night, with the maximum energy 9.7μm wavelength. This radiant energy peak occurs in the thermal band of the IR region (Figure 2.2).

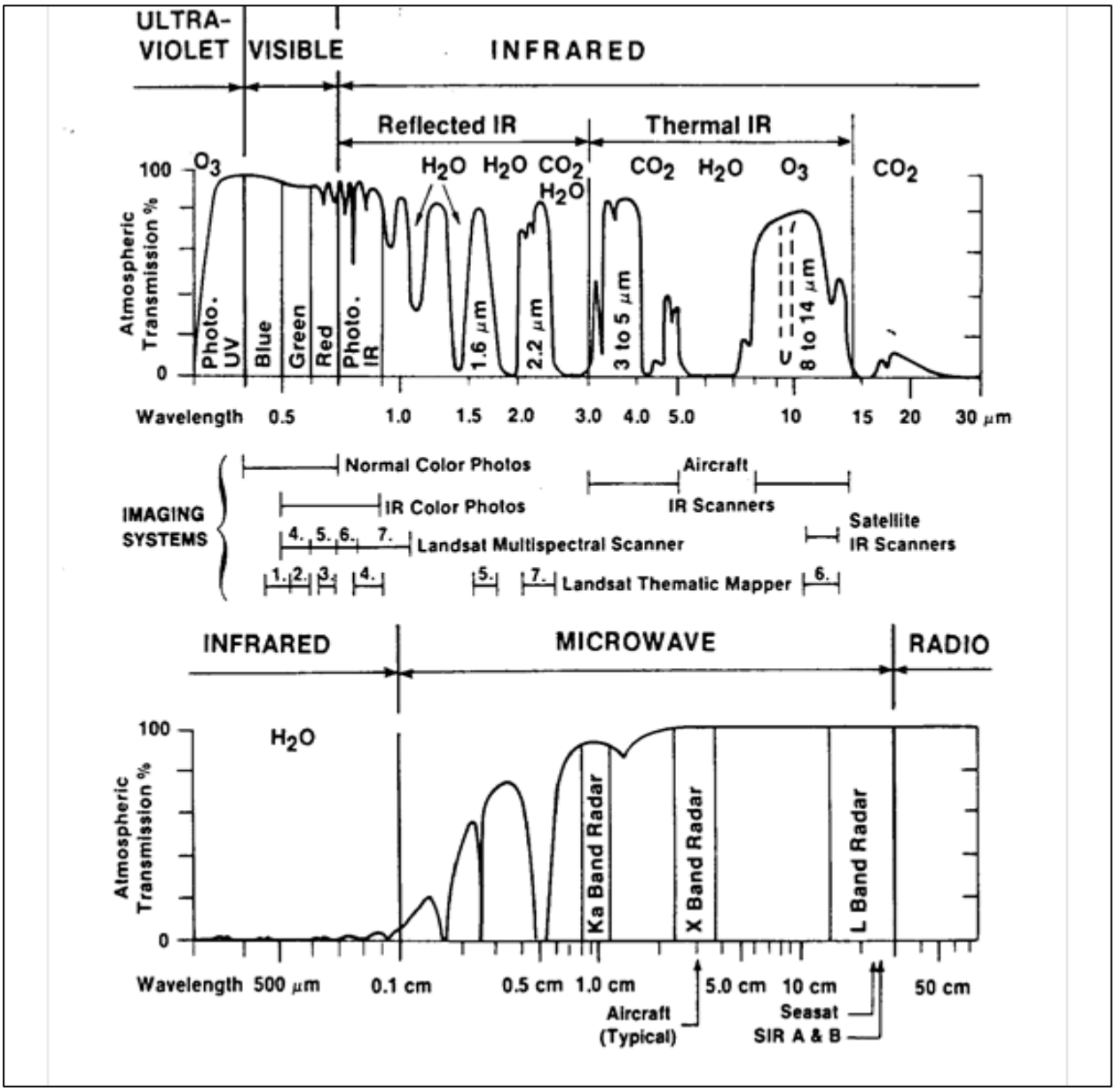


Figure 2.3: Expanded diagrams of the visible and infrared regions (upper) and the microwave regions (lower)

showing atmospheric windows. Wave-length bands of commonly used remote sensing systems are indicated. Gases responsible for atmospheric absorption are shown.

Table 2.1: Electromagnetic spectral regions

Region	Wavelength				Remarks
Gamma ray		<	0.03	**nm**	Incoming radiation is completely absorbed by the upper atmosphere and is not available for remote sensing.
X-ray	0.03	to	3.00	**nm**	Completely absorbed by atmosphere. Not employed in remote sensing.
Ultraviolet	0.03	to	0.40	**µm**	Incoming wavelengths less than 0.3mm are completely absorbed by Ozone in the upper atmosphere.
Photographic UV band	0.30	to	0.40	**µm**	Transmitted through atmosphere. Detectable with film and photo detectors, but atmospheric scattering is severe.
Visible	0.40	to	0.70	**µm**	Imaged with film and photo detectors. Includes reflected energy peak of earth at 0.5mm.
Infrared	0.70	to	100.00	**µm**	Interaction with matter varies with wavelength. Absorption bands separate atmospheric transmission windows.
Reflected IR band	0.70	to	3.00	**µm**	Reflected solar radiation that contains no information about thermal properties of materials. The band from 0.7-0.9mm is detectable with film and is called the *photographic IR band*.
Thermal IR band	3.00 8.00	to to	5.00 14.00	**µm** **µm**	Principal atmospheric windows in the thermal region. Images at these wavelengths are acquired by optical-mechanical scanners and special Videocon systems but not by film.
Microwave	0.10	to	30.00	**cm**	Longer wavelengths can penetrate clouds, fog and rain. Images may be acquired in the active or passive mode.
Radar	0.10	to	30.00	**cm**	Active form of microwave remote sensing. Radar images are acquired at various wavelength bands.
Radio		>	30.00	**cm**	Longest wavelength portion of electromagnetic spectrum. Some classified radars with very long wavelength operate in this region.

The earth's atmosphere absorbs energy in the gamma-ray, X-ray and most of the ultraviolet (UV) region; therefore, these regions are not used for remote sensing. Details of these regions are shown in Figure 2.3. The horizontal axes show wavelength on a logarithmic scale; the vertical axes show percent atmospheric transmission of EM energy. Wavelength regions with high transmission are called atmospheric windows and are used to acquire remote sensing data. The major remote sensing records energy only in the visible, infrared and micro-wave regions. Detection and measurement of the recorded energy enables identification of surface objects (by their characteristic wavelength patterns or spectral signatures), both from air-borne and space-borne platforms

2.3 Scanning System

The sensing device in a remotely placed platform (aircraft/satellite) records EM radiation using a scanning system. In scanning system, a sensor, with a narrow field of view is

employed; this sweeps across the terrain to produce an image. The sensor receives electromagnetic energy radiated or reflected from the terrain and converts them into signal that is recorded as numerical data. In a remote sensing satellite, multiple arrays of linear sensors are used, with each array recording simultaneously a separate band of EM energy. The array of sensors employs a spectrometer to disperse the incoming energy into a spectrum. Sensors (or detectors) are positioned to record specific wavelength bands of energy. The information received by the sensor is suitably manipulated and transported back to the ground receiving station. The data are reconstructed on ground into digital images. The digital image data on magnetic/optical media consist of picture elements arranged in regular rows and columns. The position of any picture element, pixel, is determined on a x-y co-ordinate system. Each pixel has a numeric value, called digital number (DN), which records the intensity of electromagnetic energy measured for the ground resolution cell represented by that pixel. The range of digital numbers in an image data is controlled by the radiometric resolution of the satellite's sensor system. The digital image data are further processed to produce master images of the study area. By analysing the digital data/imagery, digitally/visually, it is possible to detect, identify and classify various objects and phenomenon on the earth surface.

Remote sensing technique provides an efficient, speedy and cost-effective method for assessing the changes in vegetation cover certain period of time due to its inherited capabilities of being multi-spectral, repetitive and synoptic aerial coverage.

2.4 Data Source

The following data are used in the present study:

- **Primary Data** –Satellite data, downloaded from Bhoonidhi website, National Remote Sensing Centre (NRSC), Hyderabad, as follows, was used as primary data source for the study.

S.N.	Satellite	Row	Path	Date of Pass
1	IRS-R2A/LISS IV	106	55	15.02.2025

The detail specification of the data is also given in Table 2.2:

- **Secondary Data**

Secondary (ancillary) and ground data constitute important baseline information in remote sensing, as they improve the interpretation accuracy and reliability of remotely sensed data by enabling verification of the interpreted details and by supplementing it with the information that cannot be obtained directly from the remotely sensed data. For Jharia Coalfield, Survey of India topo sheet numbers (73 I/1, 73 I/2, 73 I/5, 73 I/6, 73 I/9, 73 I/10, 73 I/13 & 73 I/14) as well as map showing location of coal blocks supplied by BCCL were used in the study.

2.5 Characteristics of Satellite/Sensor

The basic properties of a satellite's sensor system can be summarised as:

(a) Spectral coverage/resolution, i.e., band locations/width; (b) spectral dimensionality: number of bands; (c) radiometric resolution: quantisation; (d) spatial resolution/instantaneous field of view or IFOV; and (e) temporal resolution. Table 2.2 illustrates the basic properties of IRS-Resourcesat 2A satellite/sensor that is used in the present study.

Table 2.2: Characteristics of the satellite/sensor used in the present project work

Platform	Sensor	Spectral Bands in µm					Radiometric Resolution	Spatial Resolution	Temporal Resolution	Country
IRS-Resourcesat 2A	LISS-IV	B2 B3 B4	0.52 0.62 0.77	- - -	0.59 0.68 0.86	Green Red NIR	16-bit (256-grey levels)	5.8 m 5.8 m 5.8 m	5 days	India

NIR: Near Infra-Red MIR: Middle Infra-Red

2.6 Data Processing

The methodology for data processing carried out in the present study is shown in Figure 2.4. The processing involves the following major steps:

(a) Geometric correction, rectification and geo-referencing;
(b) Image enhancement;
(c) Training set selection;
(d) Signature generation and classification;
(e) Creation/overlay of vector database;
(f) Validation of classified image;
(g) Layer wise theme extraction using GIS
(h) Final vegetation map preparation.

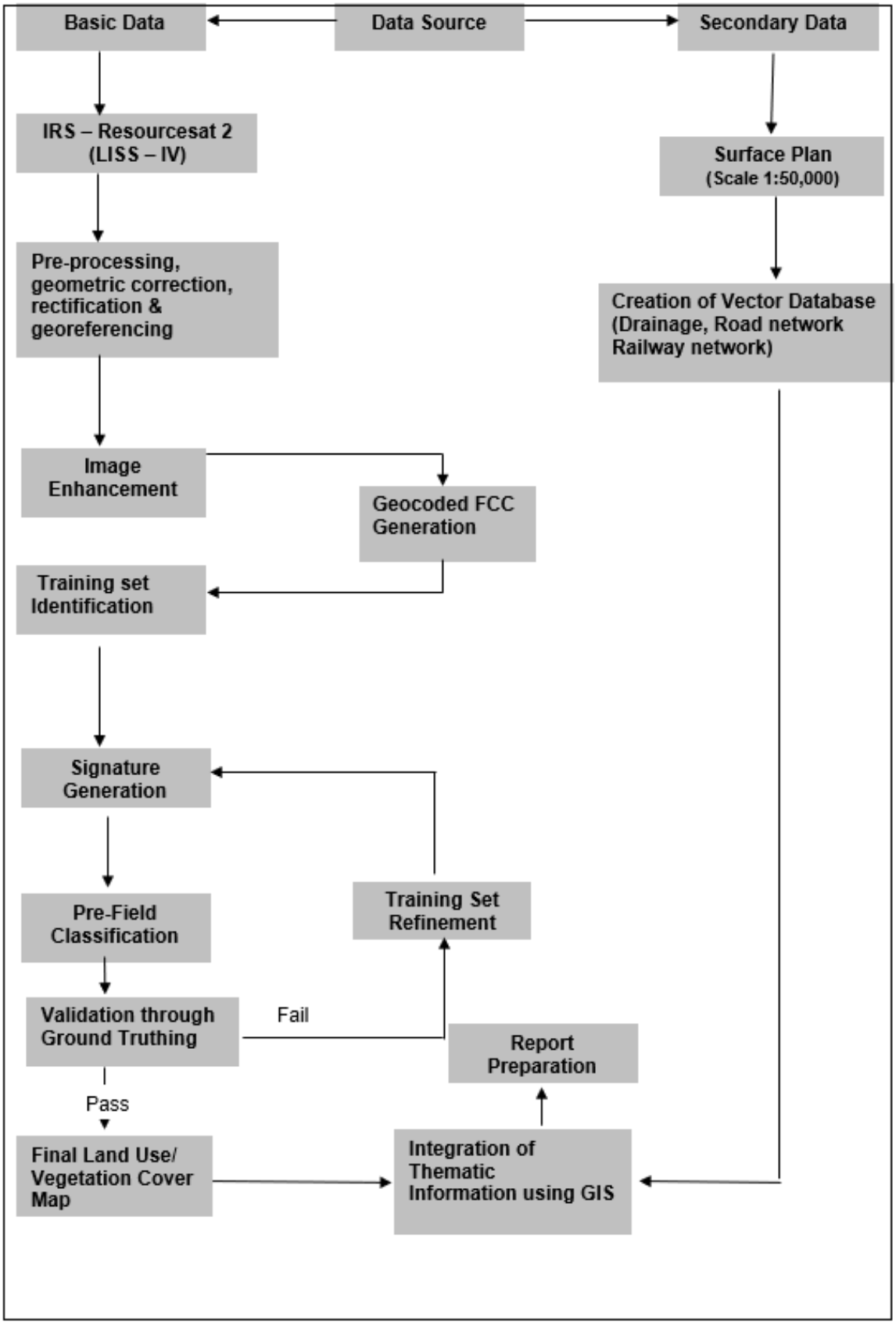


Figure 2.4: Methodology for Land Use / Vegetation Cover Mapping

2.6.1 Geometric correction, rectification and 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 intermittent sensor malfunctions, etc. Systematic errors are corrected at the satellite receiving station itself while non-systematic errors/ random errors are corrected in pre-processing stage.

In spite of 'System / Bulk correction' carried out at supplier end; some residual errors in respect of attitude attributes still remains even after correction. Therefore, fine tuning is required for correcting the image geometrically using ground control points (GCP).

Raw digital images contain geometric distortions, which make them unusable as maps. A map is defined as a flat representation of part of the earth's spheroidal surface that should conform to an internationally accepted type of cartographic projection, so that any measurements made on the map will be accurate with those made on the ground. Any map has two basic characteristics: (a) scale and (b) projection. While scale is the ratio between reduced depiction of geographical features on a map and the geographical features in the real world, projection is the method of transforming map information from a sphere (round Earth) to a flat (map) sheet. Therefore, it is essential to transform the digital image data from a generic co-ordinate system (i.e. from line and pixel co-ordinates) to a projected co-ordinate system. In the present study geo-referencing was done with the help of Survey of India (SoI) topo-sheets so that information from various sources can be compared and integrated on a GIS platform, if required.

An understanding of the basics of projection system is required before selecting any transformation model. While maps are flat surfaces, Earth however is an irregular sphere, slightly flattened at the poles and bulging at the Equator. Map projections are systemic methods for "flattening the orange peel" in measurable ways. When transferring the Earth and its irregularities onto the plane surface of a map, the following three factors are involved: (a) geoid (b) ellipsoid and (c) projection. Figure 2.5 illustrates the relationship between these three factors. The geoid is the rendition of the irregular spheroidal shape of the Earth; here the variations in gravity are taken into account. The observation made on the geoid is then transferred to a regular geometric reference surface, the ellipsoid. Finally, the geographical relationships of the ellipsoid (in 3-D form) are transformed into

the 2-D plane of a map by a transformation process called map projection. As shown in Figure 2.5, the vast majority of projections are based upon cones, cylinders and planes.

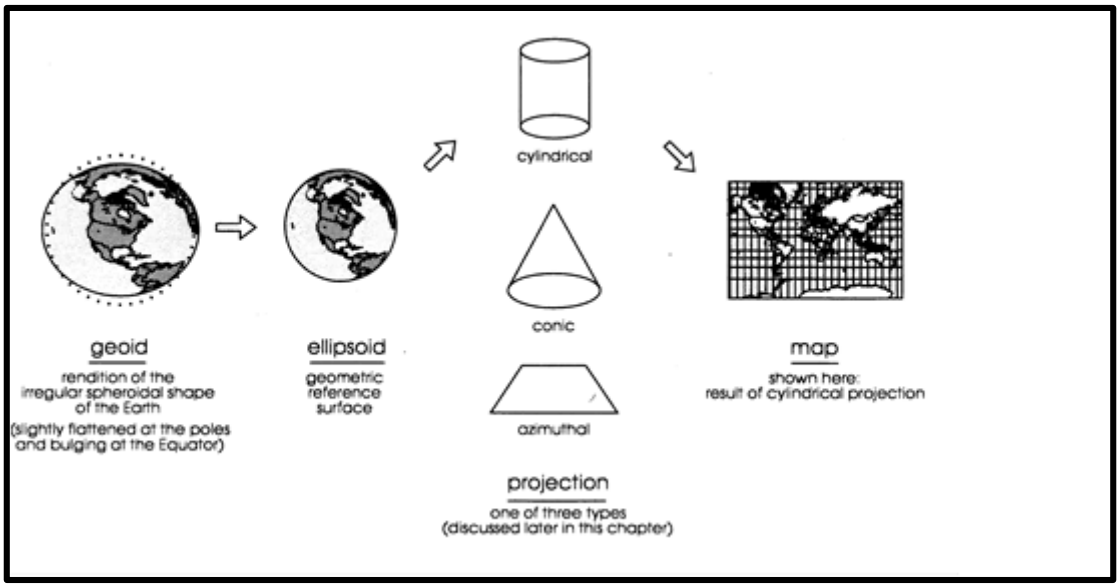


Figure 2.5: Geoid – Ellipsoid – Projection Relationship

In the present study, UTM projection along with WGS 84 model was used so as to prepare the map compatible with the SoI TOPO-sheets. UTM projection is used in SoI TOPO-sheets as it is best suited for small-scale mapping and larger area as well as for areas with North-South orientation (viz. India). Maps prepared using this projection is a compromise of many properties; it is neither conformal perspective nor equal area. Distances, areas and shapes are true only along central meridian. Distortion increases away from central meridian. Image transformation from generic co-ordinate system to a projected co-ordinate system was carried out using ERDAS Imagine 2022 digital image processing system.

2.6.2 Image enhancement

To improve the interpretability of the raw data, image enhancement is necessary. Most of the digital image enhancement techniques are categorised as either point or local operations. Point operations modify the value of each pixel in the image data independently. However, local operations modify the value of each pixel based on brightness value of neighbouring pixels. Contrast manipulations/stretching technique based on local operation were applied on the image data using ERDAS Imagine 2022 s/w.

2.6.3 Training set selection

The image data were 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. Based on the variability of land use/cover condition and terrain characteristics and accessibility, 90 points were selected to generate the training sets.

2.6.4 Signature generation and classification

Image classification was carried out using the minimum distance 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 was 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. The aerial extent of each land use class in the coalfield was determined using ERDAS Imagine 2022 s/w. The classified image for the year 2025 for Jharia Coalfields is shown in Drawing No. HQ/REM/A1/25/02.

2.6.5 Creation/overlay of vector database in GIS

Plan showing leasehold areas of mining projects supplied by BCCL are superimposed on the image as vector layer in the GIS database. Road network, rail network and drainage network are digitised on different vector layers in GIS database. Layer wise theme extraction was carried out using ArcGIS s/w and imported the same on GIS platform for further analysis.

2.6.6 Validation of classified image

Ground truth survey was carried out for validation of the interpreted results from the study area. Final Land Use/Vegetation cover maps (on 1:50,000 scale) were printed using HP DesignJet 7200 PS Colour Plotter.

Chapter-3

3. Land Use/Vegetation Cover Monitoring

3.1 Introduction

The need for information on land use/ vegetation cover has gained importance due to the all-round concern on environmental impact of mining. The information on land use/cover inventory that includes spatial distribution, aerial extent, location, rate and pattern of change of each category is of paramount importance for assessing the impact of coal mining on vegetation cover. Moreover, with passage of time, demand for coal has increased many folds and therefore production from the mines has also increased and hence the mining areas also kept on increasing. Therefore, it is important to know the existing land use pattern and the changes that have occurred during previous years, so as to predict the possible changes due to mining in future around the existing coal mines.

Remote sensing data with its various spectral and spatial resolutions, offers comprehensive and accurate information for mapping and monitoring of land use/cover over a period of time. By analysing the data of different cut-off dates, impact of coal mining on land use and vegetation cover is determined.

Realising the need of monitoring of land use/ vegetation cover and land reclamation; CIL requested the services of CMPDI to prepare land use/vegetation cover map of all major coalfields at an interval of 3 years, including Jharia coalfields for assessing the impact of coal mining on land use pattern and vegetation cover using remote sensing data which will help in formulating the mitigative measures, if any required for environmental protection in the coal mining area.

The present study incorporates the findings on Land use / Vegetation Cover pattern in the Jharia Coalfield, BCCL based on satellite data of the year 2025. Similar study has also been done previously in the year 2008, 2013, 2016, 2019 and 2022.

3.2 Vegetation Cover/Land Use Classification

The array of information available on land use/cover requires be arranging or grouping under a suitable framework in order to facilitate the creation of database. Further, to accommodate the changing land use/vegetation cover pattern, it becomes essential to develop a standardised classification system that is not only flexible in nomenclature and definition, but also capable of incorporating information obtained from the satellite data and other different sources.

The present framework of land use/cover classification has been primarily based on the 'Manual of Nationwide Land Use/ Land Cover Mapping Using Satellite Imagery' developed by National Remote Sensing Agency, Hyderabad, which has further been modified by CMPDI for coal mining areas. Land use/vegetation cover map was prepared on the basis of image interpretation carried out based on the satellite data for the year 2025. Following land use/cover classes are identified in the Jharia coalfield region (Table 3.1).

Table 3.1: Land use / Vegetation Cover classes

Land use / Vegetation Cover classes identified in Jharia Coalfields		
	LEVEL –I	**LEVEL-II**
1	**Settlements**	*1.1 Urban* *1.2 Rural* *1.3 Industrial*
2	**Vegetation Cover**	*2.1 Dense Forest* *2.2 Open Forest* *2.3 Scrub* *2.4 Plantation under Social Forestry* *2.5 Plantation on OB Dumps* *2.6 Plantation over Backfill*
3	**Agricultural Land**	*3.1 Crop Land* *3.2 Fallow Land*
4	**Wasteland**	*4.1 Waste upland with/without scrubs* *4.2 Sand Body*
5	**Mining Area**	*5.1 Coal Quarry* *5.2 Advance Quarry Site* *5.3 Barren OB Dump* *5.4 Coal Dump* *5.5 Area Under Backfilling* *5.6 Water Filled Quarry*
6	**Water Bodies**	*6.1 River / Streams / Reservoir*

3.3 Data Analysis

Satellite data of the year 2025 was processed using ERDAS Imagine v.2022 image processing s/w in order to interpret the various land use and vegetation cover classes present in Jharia coalfield covering 440.25 sq. kms. The details of the analysis are depicted in Table 3.3 whereas Table 3.4 shows the comparison of land use / cover classes in Jharia Coalfields. Table 3.2 depicts the name of clusters within Jharia Coalfield.

Table 3.2: List of Clusters within Jharia Coalfields

Name of Clusters	Mine Status
1. Cluster I	Operational(1)
2. Cluster II	Operational(2), Non-operational(2)
3. Cluster III	Operational(4), Discontinued (1)
4. Cluster IV	Operational(1), Non-operational(4)
5. Cluster V	Operational(6), Non-operational(1)
6. Cluster VI	Operational(2), Non-operational(2)
7. Cluster VII	Operational(4), Non-operational(4)
8. Cluster VIII	Operational(3), Non-operational(3)
9. Cluster IX	Operational(2), Non-operational(1)
10. Cluster X	Operational(3), Non-operational(1), Discontinued (1)
11. Cluster XI	Operational(2), Non-operational(1), Discontinued (2)
12. Cluster XII	-
13. Cluster XIII	Non-operational(1), Discontinued (6)
14. Cluster XIV	Non-operational(1)
15. Cluster XV	Operational(1), Non-operational(1)
16. Cluster XVI	Operational(2), Discontinued (1), Abandoned (1)
17. Cluster XVII	Operational(1), Discontinued (2)

Mine status was obtained from https://minecl.cmpdi.co.in/login.php website.

Table 3.3: Status of Land use & Vegetation Cover pattern

STATUS OF LAND USE & VEGETATION COVER PATTERN IN JHARIA COALFIELD IN THE YEAR 2025

(Area in Km^2)

LAND / VEGETATION COVER CLASSES	Area Statistics	
SETTLEMENTS		
Urban	32.32	7.34
Rural	8.28	1.88
Industrial	3.18	0.72
Sub Total	**43.78**	**9.94**
VEGETATION COVER	**Area**	**% of total**
Dense forest	0.00	0.00
Open Forest	4.33	0.98
Scrubs	113.84	25.86
Plantation under Social Forestry	20.91	4.75
Plantation on OB Dump	3.04	0.69
Plantation over Backfill	2.56	0.58
Sub Total	**144.68**	**32.86**
AGRICULTURAL LAND		
Crop Land	3.95	0.90
Fallow Land	113.29	25.73
Sub Total	**117.24**	**26.63**
WASTELAND		
Waste upland	69.14	15.71
Sand Body	3.01	0.68
Sub Total	**72.15**	**16.39**
MINING AREA		
Coal Quarry	13.06	2.97
Advance Quarry Site	0.00	0.00
Barren OB Dump	11.65	2.65
Coal Dump	0.48	0.11
Barren Backfill	22.44	5.10
Water filled Quarry	3.05	0.69
Sub Total	**50.68**	**11.52**
WATER BODIES	**11.72**	**2.66**
TOTAL	**440.25**	**100.00**

Table 3.4: Comparative status of Vegetation Cover & Land-Use pattern

COMPARATIVE STATUS OF VEGETATION COVER & LANDUSE PATTERN IN JHARIA COALFIELD DURING YEAR 2022 & 2025

Area in Sq. km

LAND USE / VEGETATION COVER CLASSES	Year 2022		Year 2025		Changes w.r.t 2022		Remarks
SETTLEMENTS							
Urban	32.23	7.32	32.32	7.34	0.09	0.02	Changes due to mining and associated industrialisation as well as other socio-economic reasons.
Rural	8.21	1.86	8.28	1.88	0.07	0.02	
Industrial	2.99	0.68	3.18	0.72	0.19	0.04	
Sub Total	**43.43**	**9.86**	**43.78**	**9.94**	**0.35**	**0.08**	
VEGETATION COVER	**Area**	**% of total**	**Area**	**% of total**	**Area**	**% of total**	
Dense forest	0.00	0.00	0.00	0.00	0.00	0.00	Overall decrease in plantation is due to increase in mining and related industrial activities.
Open Forest	4.39	1.00	4.33	0.98	-0.06	-0.02	
Scrubs	113.35	25.75	113.84	25.86	0.49	0.11	
Plantation under Social Forestry	20.99	4.77	20.91	4.75	-0.08	-0.02	
Plantation on OB Dump	3.53	0.80	3.04	0.69	-0.49	-0.11	
Plantation on Backfill	2.51	0.57	2.56	0.58	0.05	0.01	
Sub Total	**144.77**	**32.89**	**144.68**	**32.86**	**-0.09**	**-0.03**	
AGRICULTURAL LAND							
Crop Land	3.72	0.85	3.95	0.90	0.23	0.05	
Fallow Land	108.30	24.60	113.29	25.73	4.99	1.13	
Sub Total	**112.02**	**25.45**	**117.24**	**26.63**	**5.22**	**1.18**	
WASTELAND							
Waste upland	78.93	17.92	69.14	15.71	-9.79	-2.21	Overall decrease is due to wasteland classes being converted/utilised into other classes such as mining, agriculture, settlements etc.
Sand Body	2.83	0.64	3.01	0.68	0.18	0.04	
Sub Total	**81.76**	**18.56**	**72.15**	**16.39**	**-9.61**	**-2.17**	
MINING AREA							
Coal Quarry	10.91	2.48	13.06	2.97	2.15	0.49	Changes in mining area is due to expansion in both mining & reclamation activities.
Advance Quarry Site	0.02	0.01	0.00	0.00	-0.02	-0.01	
Barren OB Dump	13.12	2.98	11.65	2.65	-1.47	-0.33	
Coal Dump	0.45	0.10	0.48	0.11	0.03	0.01	
Area Under Backfilling	19.07	4.33	22.44	5.10	3.37	0.77	
Water Filled Quarry	2.83	0.64	3.05	0.69	0.22	0.05	
Sub Total	**46.40**	**10.54**	**50.68**	**11.52**	**4.28**	**0.98**	
WATER BODIES	**11.87**	**2.70**	**11.72**	**2.66**	**-0.15**	**-0.04**	
TOTAL	**440.25**	**100.00**	**440.25**	**100.00**			

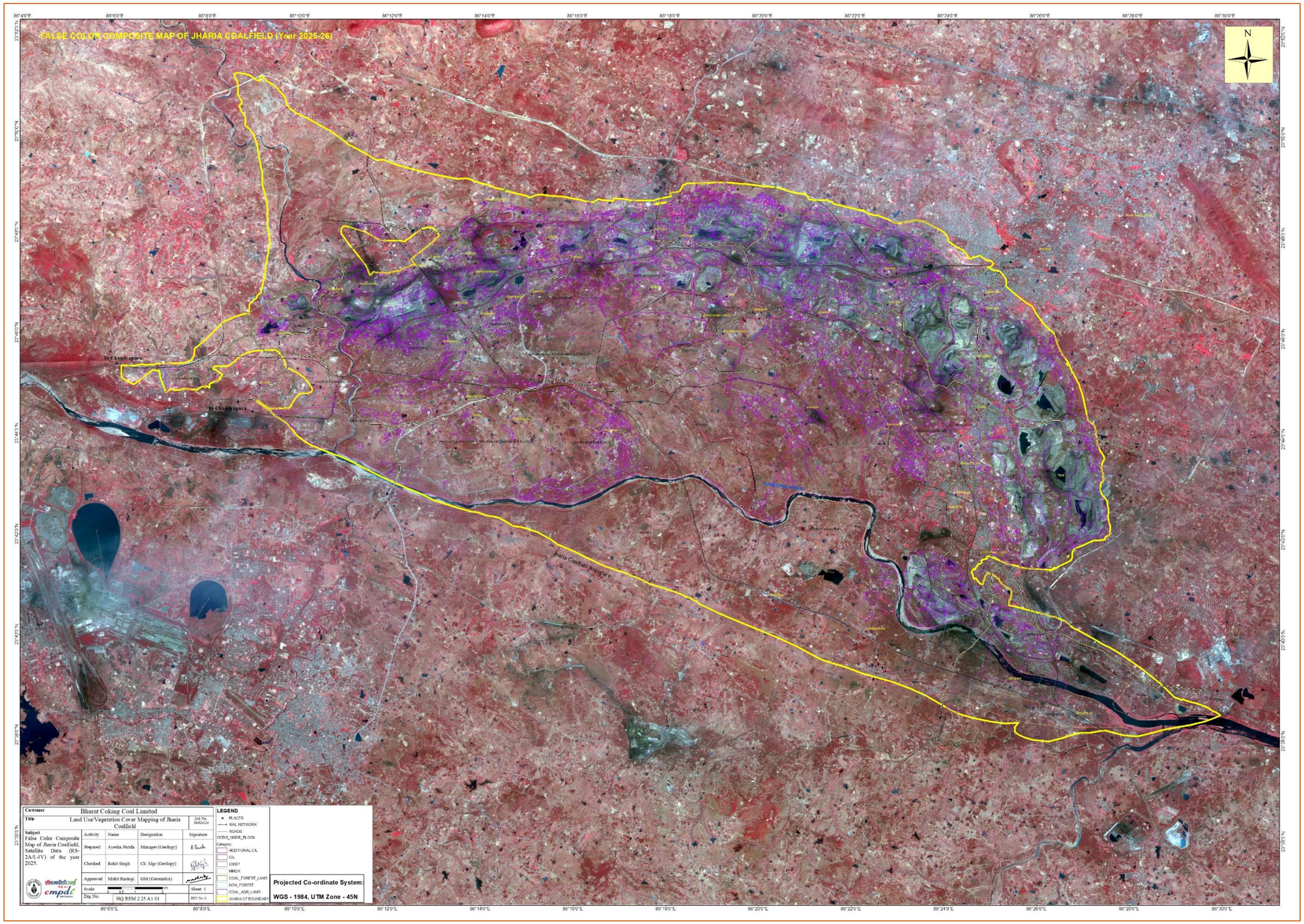
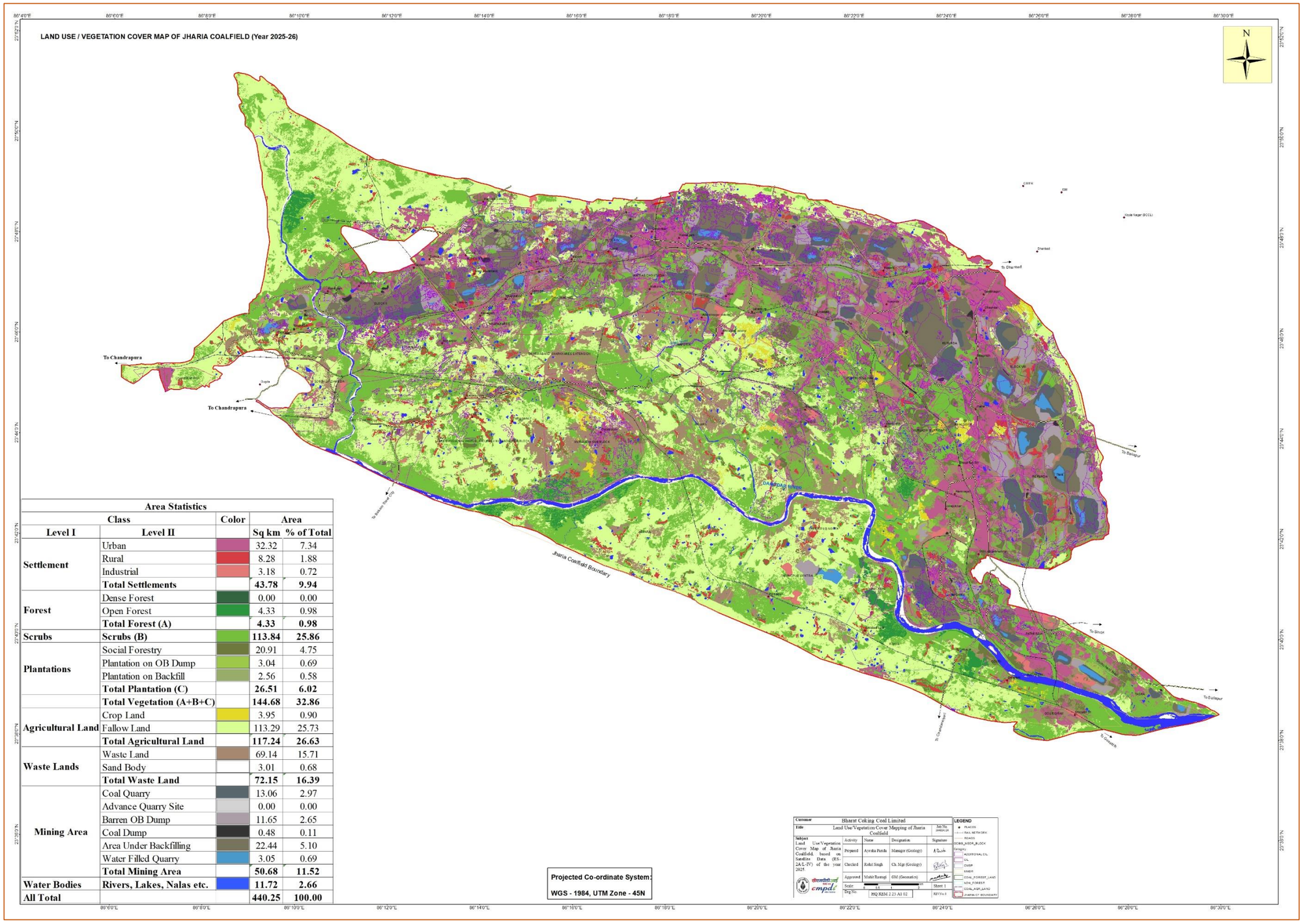


Plate 3.1: FCC Map of Jharia Coalfields *(Bands 3, 2, 1) of IRS-R2A-L4FX Satellite data of the Year 2025*



Area Statistics				
Class		Color	Area	
Level I	Level II		Sq km	% of Total
Settlement	Urban		32.32	7.34
	Rural		8.28	1.88
	Industrial		3.18	0.72
	Total Settlements		**43.78**	**9.94**
Forest	Dense Forest		0.00	0.00
	Open Forest		4.33	0.98
	Total Forest (A)		**4.33**	**0.98**
Scrubs	**Scrubs (B)**		**113.84**	**25.86**
Plantations	Social Forestry		20.91	4.75
	Plantation on OB Dump		3.04	0.69
	Plantation on Backfill		2.56	0.58
	Total Plantation (C)		**26.51**	**6.02**
	Total Vegetation (A+B+C)		**144.68**	**32.86**
Agricultural Land	Crop Land		3.95	0.90
	Fallow Land		113.29	25.73
	Total Agricultural Land		**117.24**	**26.63**
Waste Lands	Waste Land		69.14	15.71
	Sand Body		3.01	0.68
	Total Waste Land		**72.15**	**16.39**
Mining Area	Coal Quarry		13.06	2.97
	Advance Quarry Site		0.00	0.00
	Barren OB Dump		11.65	2.65
	Coal Dump		0.48	0.11
	Area Under Backfilling		22.44	5.10
	Water Filled Quarry		3.05	0.69
	Total Mining Area		**50.68**	**11.52**
Water Bodies	**Rivers, Lakes, Nalas etc.**		**11.72**	**2.66**
All Total			**440.25**	**100.00**

Plate 3.2: Classified Map of Jharia Coalfield (Bands 3, 2, 1) of IRS-R2A-L4FX Satellite data of the Year 2025

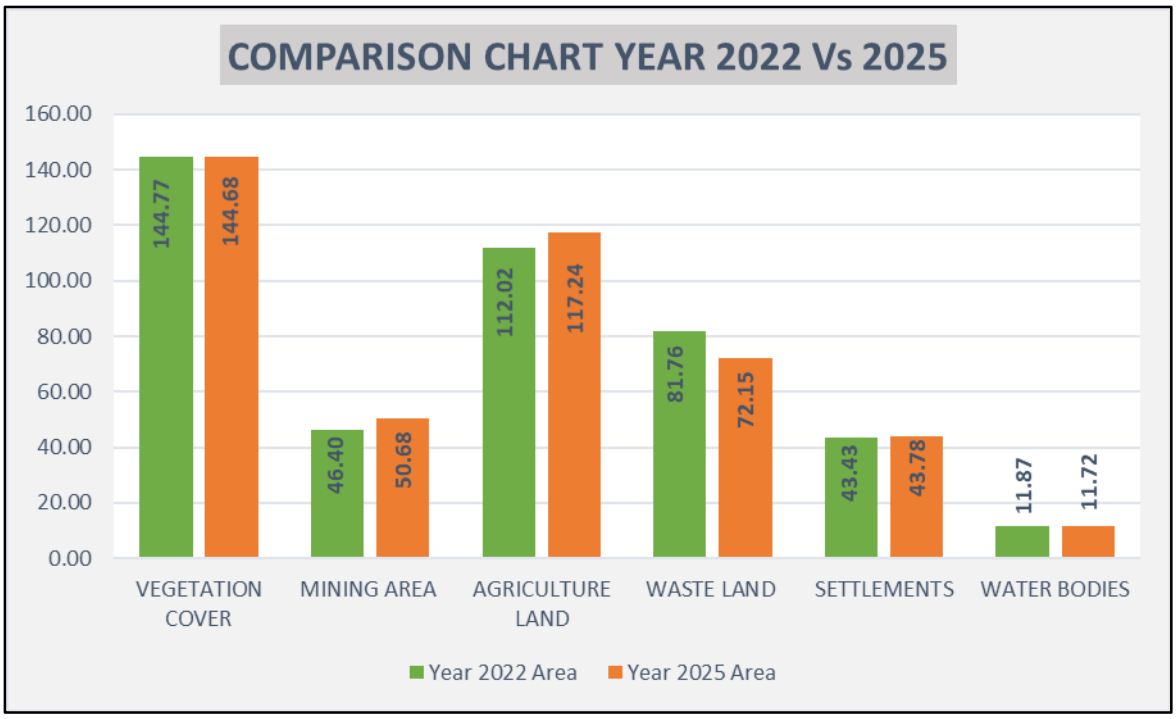


Chart 1: Bar Chart Showing Status of Land Use/ Cover Classes in Jharia Coalfields, BCCL

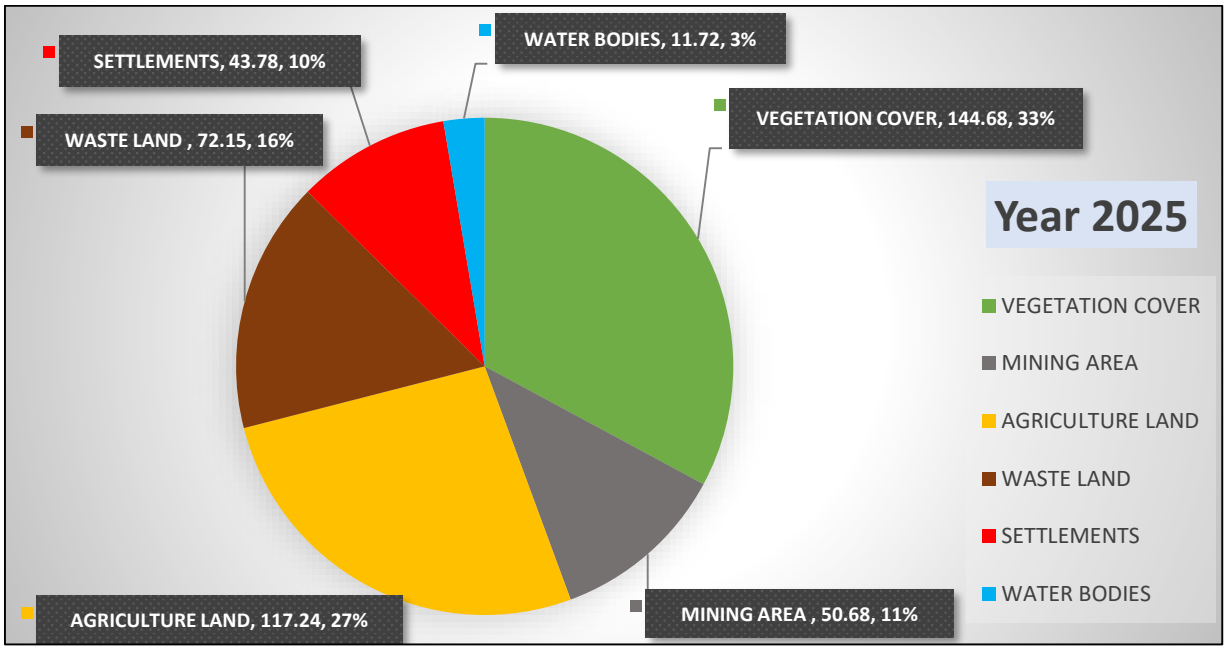


Chart 2: Pie Charts Showing Land use/cover Distribution Pattern in Jharia Coalfield in the Year 2025

3.3.1 Settlements/Built Up land

All the man-made constructions covering the land surface are included under this category. Built-up land has been further divided in to rural, urban and industrial classes. In the present study, industrial settlement indicates only industrial complexes excluding residential facilities.

It is observed that the settlements within the Jharia coalfield have increased by 0.35 km^2, which is about (0.08%) of the coalfield area. The urban settlement has increased by 0.09 km^2 (0.02%), rural settlement has increased by 0.07 km^2 (0.02%) and industrial settlement increased by 0.19 km^2 (0.04%) (Refer Table 3.4).

3.3.2 Vegetation Cover Analysis

Vegetation cover is an association of trees and other vegetation type capable of producing timber and other forest produce. It is also defined as the percentage of soil which is covered by green vegetation. Leaf area index (LAI) is an alternative expression of the term vegetation cover which gives the area of leaves in m^2 corresponding to an area of one m^2 of ground. Primarily vegetation cover is classified into the following three sub-classes based on crown density as per modified FAO-1963 (Food & Agricultural Organisation of United Nations) norms: (a) dense forest (crown density more than 40%), (b) open/degraded forest (crown density between 10% to 40%), and (c) scrubs (crown density less than 10%). The plantation that has been carried out on wasteland along the roadside and on the overburden dumps / Backfilled areas is also included under vegetation cover as social forestry and plantation on over-burden dumps / backfill respectively. The percentage of vegetation cover shown in the analysis here are in terms of total land use cover only.

Analysis of the satellite data of the year 2025 indicated that vegetation cover in Jharia Coalfield boundary occupies 144.68 km^2 (32.86%). Out of which, *open forest* covers area of 4.33 km^2 (0.98%); *Scrubs* has covered 113.84 km^2 (25.86%), *Plantation under social forestry* occupies 20.91 km^2 (4.75%), Plantation on OB dumps occupies 3.04 km^2 (0.69%) and *Plantation on backfilled areas* has 2.56 km^2 (0.58%) area under its influence in 2025. The vegetation

cover reduced by 0.09 Km^2 (0.03%) due to change under expansion in mining area and related industrial activities. *(Refer Table 3.4)*.

3.3.3 Agriculture

Land primarily used for farming and production of food, fibre and other commercial and horticultural crops falls under this category. It includes crop land (irrigated and unirrigated) and fallow land (land used for cultivation, but temporarily allowed to rest).

Total agricultural land in Jharia Coalfield which was 112.02 km^2 in year 2022 has increased to 117.24 km^2 in the year 2025. There is an increase of area 5.22 km^2 (1.18%) in agricultural land in the coalfield. (Refer Table 3.4).

3.3.4 Wastelands

Wasteland is degraded and unutilised class of land which is deteriorating on account of natural causes or due to lack of appropriate water and soil management. Wasteland can result from inherent/imposed constraints such as location, environment, chemical and physical properties of the soil or financial or management constraints. There are two types of wastelands predominant within the coalfield area, viz waste upland and fly ash pond.

There has been a decrease of 9.61 km^2, i.e., (2.17%) of the Jharia coalfield area. Overall decrease is due to wasteland classes being converted/utilised into other classes such as mining, agriculture, settlements etc. (Refer Table 3.4).

3.3.5 Mining Area

The mining area was primarily being categorized as follows:

- Coal Quarry
- Advance Quarry Site
- Barren OB Dump
- Coal Dumps
- Area Under Backfilling
- Water filled Quarry

Analysis of the data reveals that the mining area in Jharia Coalfield which was 46.40 km^2 in the year 2022 has increased to 50.68 km^2 in the year 2025. The

increase of 4.28 km^2, i.e., (0.98%) of the coalfield area is primarily due to the increase in coal production. (Refer Table 3.4).

3.3.6 Surface Water Bodies

It is the area of impounded water includes natural lakes, rivers/streams and man-made canal, reservoirs, tanks etc. The water bodies in the study area of Jharia coalfield have been found to be decreased from 11.87 km^2 (2.70%) in year 2022 to 11.72 km^2 (2.66%) in 2025. *(Refer Table 3.4)*.

Table 3.5: Details of CIL & other categories Coal Blocks falling in Jharia Coalfield

Sl No.	Block Name	Coalfield Name	Category	Area (SqKm)	Company	Status	Resources (mt)
1	AMLABAD	JHARIA	CIL	3.39	BCCL	EXPLORED	265.43
2	BHALGORA	JHARIA	CIL	2.92	BCCL	EXPLORED	173.67
3	BHOWRA	JHARIA	CIL	8.17	BCCL	EXPLORED	616.288
4	CHANDRAPURA	JHARIA	CIL	1.05	BCCL	EXPLORED	44.69
5	DHARMABAND KHARKHAREE EXTENSION	JHARIA	CIL	8.04	BCCL	EXPLORED	418.48
6	GOURI	JHARIA	CIL	1.16	BCCL	EXPLORED	12.41
7	HURLADIH BURRGARH	JHARIA	CIL	2.96	BCCL	EXPLORED	194.74
8	KHARKHAREE	JHARIA	CIL	2.68	BCCL	UNDER EXPLORATION	368.73
9	BHURUNGIA, KALYANPUR, AND KUNJI NUTANDIH SUB BLOCK	JHARIA	CIL	19.55	BCCL	EXPLORED	179.479
10	KUSTORE	JHARIA	CIL	2.89	BCCL	EXPLORED	273
11	KUSUNDA	JHARIA	CIL	6.44	BCCL	EXPLORED	483.3
12	MADHUBAND	JHARIA	CIL	7.72	BCCL	EXPLORED	671.96
13	MUKUNDA	JHARIA	CIL	22.35	BCCL	EXPLORED	1587.38
14	MURULIDIH SUB BLOCK	JHARIA	CIL	12.31	BCCL	EXPLORED	62.979
15	BLOCK II	JHARIA	CIL	7.81	BCCL	EXPLORED	386.618
16	BLOCK III	JHARIA	CIL	13.36	BCCL	EXPLORED	412.446
17	BLOCK IV	JHARIA	CIL	9.62	BCCL	EXPLORED	555.785
18	BLOCK VII	JHARIA	CIL	11.82	BCCL	EXPLORED	383.55
19	BLOCK VIII	JHARIA	CIL	10.30	BCCL	EXPLORED	477.322
20	PATHERDIH	JHARIA	CIL	2.67	BCCL	EXPLORED	261.63
21	SINGRA	JHARIA	CIL	25.03	BCCL	EXPLORED	421.98
22	SUDAMDIH	JHARIA	CIL	2.92	BCCL	EXPLORED	103.5
23	WEST MAHUDA	JHARIA	ADDITIONAL CIL	14.01	BCCL	EXPLORED	138.456
24	MAHAL	JHARIA	CMSP	5.52	Unallocated	EXPLORED	258.35
25	PARBATPUR CENTRAL	JHARIA	CMSP	8.95	JSW Steel Ltd.	EXPLORED	235.718

26	GOURIGRAM	JHARIA	MMDR	4.66	Unallocated	REGIONALLY EXPLORED	229
27	PARBATPUR NORTH	JHARIA	MMDR	5.72	Unallocated	REGIONALLY EXPLORED	425
28	SITANALA	JHARIA	CMSP	3.17	JSW Steel Ltd.	EXPLORED	108.85
29	ALUARA	JHARIA	MMDR	25.44	Unallocated	REGIONALLY EXPLORED	800
30	TASRA	JHARIA	MMDR	3.75	SAIL	EXPLORED	291.719
31	DHARMABAND	JHARIA	CIL	7.61	BCCL	EXPLORED	529.684
32	KAPURIA	JHARIA	CIL	6.91	BCCL	EXPLORED	826.46
33	KATRAS CHOUTUDIH	JHARIA	CIL	2.22	BCCL	EXPLORED	168.493
34	KUMARI	JHARIA	CIL	22.94	BCCL	EXPLORED	1489.245
35	POOTKI BULLIARY	JHARIA	CIL	17.50	BCCL	EXPLORED	1188.2
36	MOONIDIH	JHARIA	CIL	15.23	BCCL	EXPLORED	328.15
37	SOUTH OF DAMUDA	JHARIA	MMDR	2.90	Rungta Sons Pvt. Ltd.	REGIONALLY EXPLORED	296.36
38	DAMUDA	JHARIA	CIL	5.58	BCCL	EXPLORED	209.308

Chapter-4

4. Conclusion & Recommendations

4.1 Conclusion

In the present study, land use/vegetation cover map of Jharia coalfield is prepared based on Resourcesat–2A (IRS-R2A L4FX) Satellite data of the year 2025 in order to monitor the changes in vegetation cover and land use pattern for effective natural resource management and its planning. The Land use/vegetation cover analysis will help to analyse and monitor the impact of mining and other industrial activities in the area.

Study reveals that Jharia Coalfields covers an area of 440.25 km^2. Settlements coming under the coalfield boundary cover area of 43.78 km^2 which is 9.94% of the coalfield area. Vegetation cover constitutes 144.68 km^2 (32.86%), Mining activities is on 50.68 km^2 area which is 11.52% of the total Jharia Coalfield boundary area whereas agriculture and wasteland are on 117.24 km^2 (26.63%) and 72.15 km^2 (16.39%) respectively. Water bodies cover an area of 11.72 km^2 (2.66%) within the Jharia Coalfield Boundary.

4.2 Recommendations

Keeping in view the sustainable development together with coal mining in the area, it is recommended that;

a. To combat the effect of rapid mining and subsequent deforestation associated with it, BCCL should make the afforestation programme more comprehensive to balance the ecological changes.

b. Efforts should be made to protect the vegetated dumps. Fresh dumping should be avoided on the already stabilized and vegetated dumps.

Chapter-5

5. ACA Land Analysis

5.1 Introduction

Coal India Limited (CIL) subsidiaries have made significant progress in environmental sustainability through the implementation of Accredited Compensatory Afforestation (ACA) guidelines. These guidelines, issued by the Ministry of Environment, Forest and Climate Change (MoEF & CC) in January 2023, aim to streamline the Forest Clearance (FC) approval process, reduce costs, and enhance afforestation efforts. Some of the key points on ACA are listed as follows:

1) Proactive Afforestation: ACA involves raising afforestation in advance on Non-Forest Land. This afforestation can be used to obtain prior approval under Section 2 of the Forest (Conservation) Act, 1980.

2) Approval Process: The guidelines were developed based on recommendations from the Forest Advisory Committee (FAC) and were approved by the competent authority of the Ministry.

3) Implementation: Initially, the guidelines will be implemented offline until a dedicated web portal is developed.

The Van Sanrakshan Evam Samvardhan Adhiniyam, 1980, also known as the Forest (Conservation) Act, 1980, is a significant piece of legislation in India aimed at the conservation and protection of forests. This Act empowers the Central Government to regulate the use of forest land for non-forest purposes, ensuring that forest resources are preserved and managed sustainably.

The Act was recently amended in 2023 to include a preamble emphasizing India's commitment to preserving forests and addressing climate change. The amendment also renamed the Act to Van Sanrakshan Evam Samvardhan Adhiniyam to reflect a renewed focus on afforestation and reforestation activities. The ACA is well supported by this Van Sanrakshan Evam Samvardhan Rules, 2023 which come into force on 1st Day of December 2023.

Plantation in mining areas supports this Green Initiative activity of Accredited Compensatory Afforestation (ACA), which is a mechanism designed to mitigate the

environmental impact of coal mining operations. It requires coal companies to undertake afforestation or reforestation projects on Non-Forest Lands to compensate for the forest areas that are cleared or degraded due to mining activities.

In brief, ACA serves as a tool for the coal industry to balance its environmental impact and contribute to a more sustainable future. By ensuring that mining operations are accompanied by appropriate afforestation efforts, ACA helps to protect biodiversity, mitigate climate change, and promote responsible resource extraction.

5.1.1 Objective

The objective of this report is to identify suitable land for Accredited Compensatory Afforestation (ACA) purposes as per existing guidelines using geospatial analysis of suitable satellite data.

This study is a part of the work awarded to CMPDI vide CIL Work Order No. CIL/ENV/11463 Dtd. 03.07.2024 for Satellite Data based Land Reclamation Monitoring of CIL projects (168 Opencast & 27 Clusters of mines) along with Vegetation Cover Mapping of 19 major coalfields under different CIL subsidiaries for the period 2024-25 to 2026-27. The work has to be executed in phase wise manner spread over the period 2024-25 to 2026-27.

To identify the suitable ACA Land under different CIL subsidiaries, one primary tool used is Forest Canopy Density (FCD) analysis. This tool leverage remote sensing technology to provide valuable insights in suitability of plantation done on non-forest land as per MoEF & CC guidelines for ACA.

5.2 Canopy Density

Canopy Density refers to the proportion of the ground covered by the vertical projection of tree crowns. It is a critical indicator of plantation or forest health and ecological stability. Canopy Density studies involve the use of remote sensing data to estimate the percentage of ground covered by tree canopies.

5.2.1 Factors Affecting Canopy Density Estimation

Tree Species: Different tree species have varying crown shapes and densities.

Stand Age: Canopy density changes over time as trees grow and mature.

Image Resolution: Higher resolution imagery provides more accurate estimates.

Atmospheric Conditions: Cloud cover and haze can affect satellite image quality.

Terrain: Slope and aspect can influence canopy density measurements.

5.2.2 Analysis Methodology

Image Acquisition: Choosing appropriate satellite imagery with suitable spatial and temporal resolutions (e.g., Sentinel-2 / Landsat 8/ 9).

Pre-processing: Atmospheric and topographic correction effects to ensure accurate NDVI calculation.

NDVI Calculation: Compute NDVI using the NIR and Red bands of the imagery.

Canopy Density Estimation

Spatial Analysis: Analysing the spatial distribution of NDVI and canopy density to identify canopy density patterns and hotspots.

By effectively combining NDVI and Canopy Density analysis, plantation can be effectively monitored and informed decisions to improve sustainability, and resilience can be taken for mitigative measure required, if any.

Data used for the study:

Primary Data: Sentinel – 2A Satellite Data

Secondary Data: Forest Land Layer (Uploaded on PMGS-NMP portal), KML Files submitted by CIL subsidiaries etc.

Forest Land layer has been used to deduce the Non-Forest Land area in projects for which analysis has been done.

MoEF & CC Guidelines for identification of ACA Land

The MoEF & CC Guideline (Ref: FC-11/159/022-FC) dated 24.01.2023 for Identification of ACA Land are as follows:

1. Land on which the provisions of Forest (Conservation) Act, 1980 are not applicable and which is free from all encumbrances should be considered for ACA.
2. Non-Forest Land, including mined out and biologically reclaimed Non-Forest Land, ownership of which vests with the State PSU or Central PSU, may also be used for raising Accredited Compensatory Afforestation.
3. Land considered for raising such afforestation should be properly demarcated and fenced to ensure its protection from various biotic factors.

4. An afforestation shall be counted towards ACA if such land covers an area of minimum **ten hectares**.

5. Afforestation over land of any size situated in the continuity of land declared or notified as forest under any law, Protected Area, Tiger Reserve or within a designated or identified tiger or wildlife corridor, may be considered for ACA.

6. ACA shall be earned by developing afforestation of one-hectare area with 0.4 or more canopy density, but there shall be no Accredited Compensatory afforestation for developing an area below 0.4 canopy density or below one-hectare land.

7. An afforestation shall be counted towards ACA if such land has vegetation composed predominantly of trees having canopy density of 0.4 or more and the trees are at least five years old; and

8. Afforestation raised should preferably be heterogeneous in nature and shall consist of indigenous species. Afforestation of exotic species shall necessarily be avoided.

5.3 Methodology

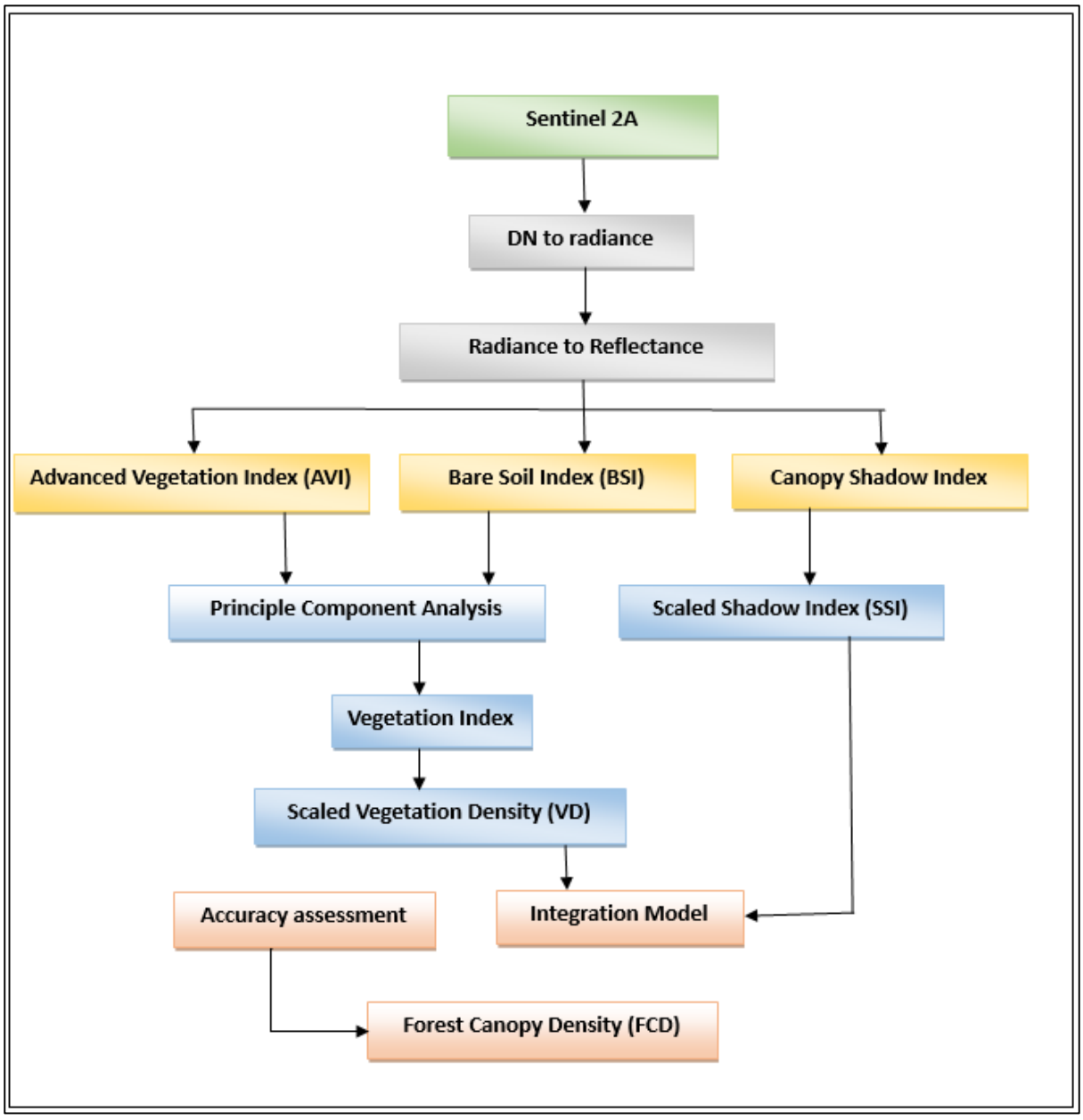


Figure 5.1: Process Flow Chart for deriving Forest Canopy Density for ACA Land identification

5.4 Results

As per the work order received from CIL, it is mentioned that plantation patches of all the clusters falling under BCCL coalfields are provided by subsidiary company for the evaluation of ACA land. In this respect plantation patches from 2015 onwards received as soft copy from concerned department of BCCL. For evaluation of ACA land suitable plantation should be 5 years in nature, hence patches up to 2020-21 and earliest are taken under consideration of ACA land analysis. (Clause 9.v of Work Order). The status of qualified patches are as follows.

Table 5.1: Qualified ACA Land as per Mine Plan submitted by BCCL (For Jharia Coalfield)										
Name	**Patch**	**Year**	**Area (in ha.)**	**FCD Mean**	**Forest/Non-Forest**	**Suitable for ACA**	**Forest Area (in ha.)**	**Non-Forest Area (in ha.)**	**Remarks**	**Effective Area (in ha.)**
CLUSTER II	**P1**	**2020-21**	**15.04**	**45.93**	**Non Forest Land**	**Yes**	**0.00**	**15.04**		**15.04**
CLUSTER IV	**P1**	**2020-21**	**11.53**	**44.71**	**Non Forest Land**	**Yes**	**0.00**	**11.53**		**11.53**
CLUSTER XVI	**P1**	**2019-20**	**10.06**	**45.15**	**Non Forest Land**	**Yes**	**0.00**	**10.06**		**10.06**
			36.63				**0.00**	**36.63**		**36.63**

Effective area for the ACA is **36.63 ha.**

The maps of all the clusters falling under BCCL command area are given below.

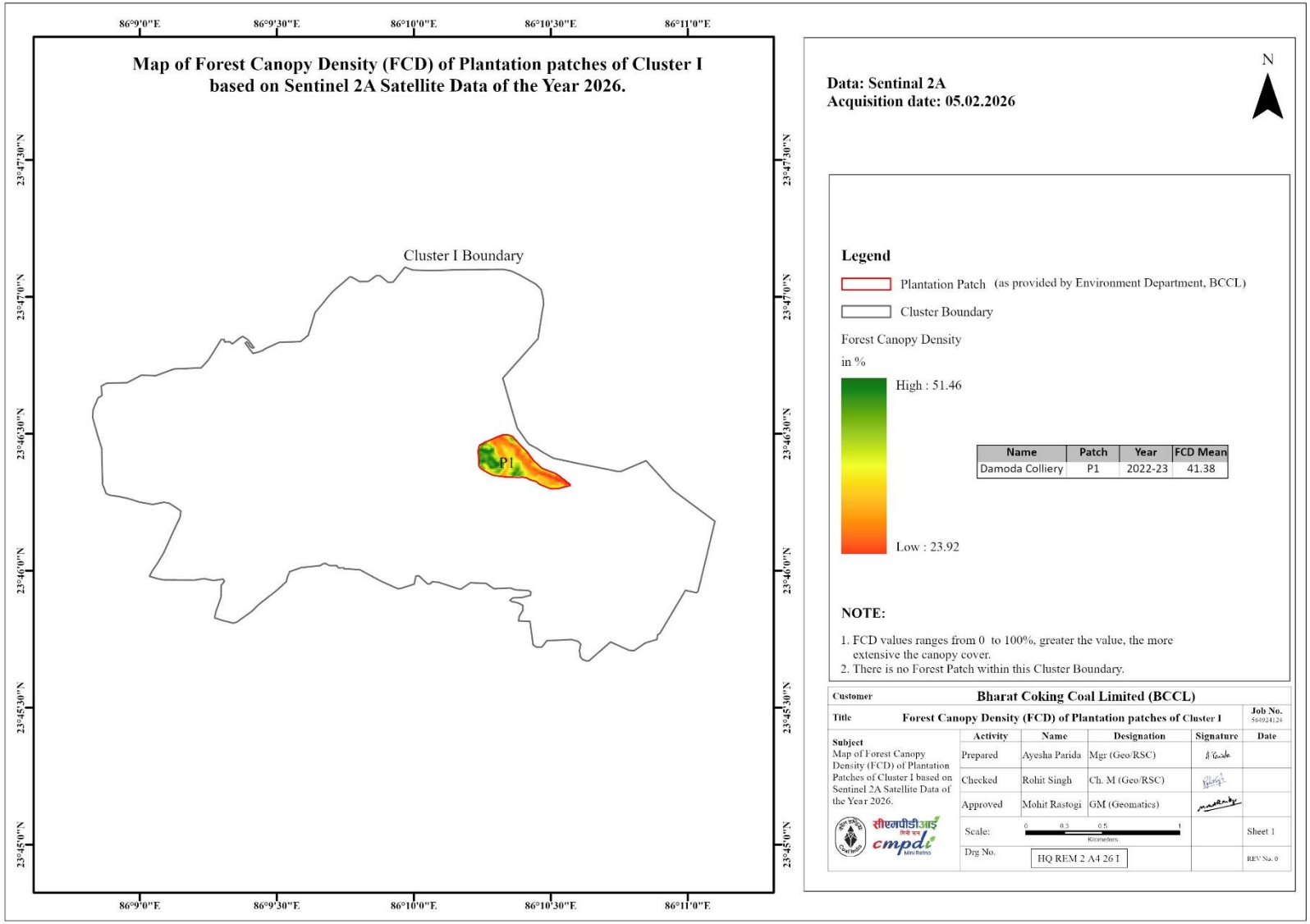


Plate 5.1: FCD Map of Cluster I

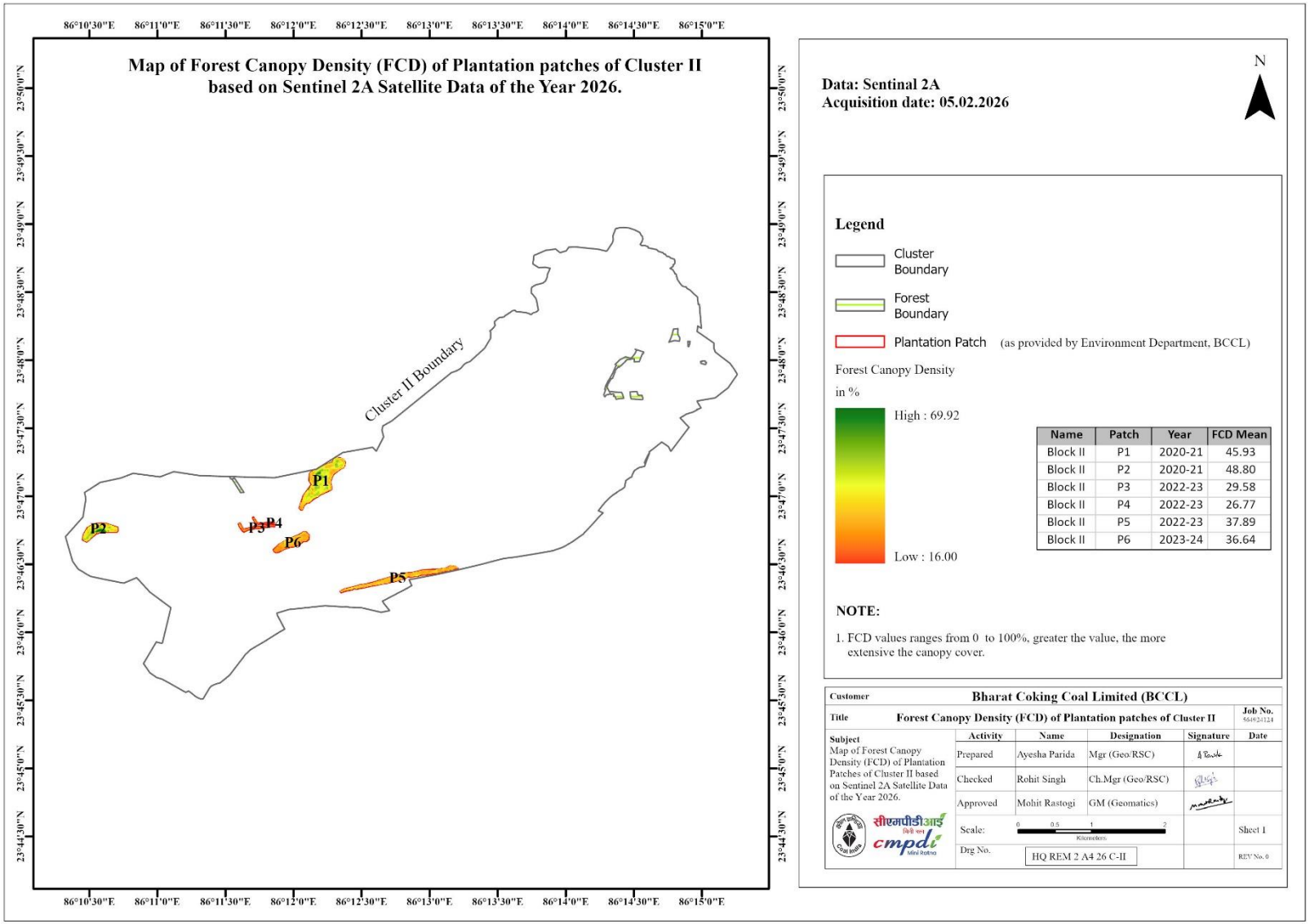


Plate 5.2: FCD Map of Cluster II

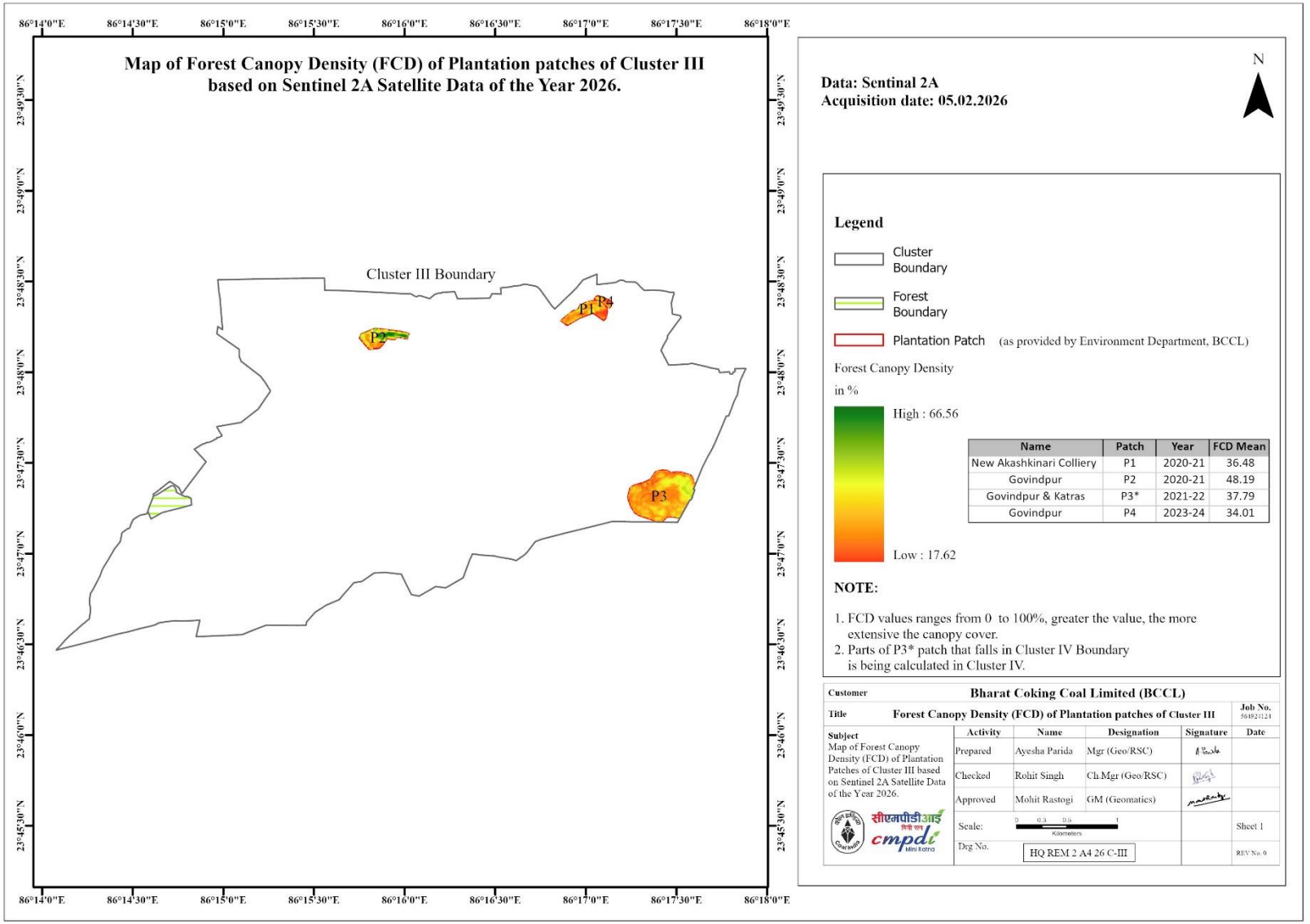


Plate 5.3: FCD Map of Cluster III

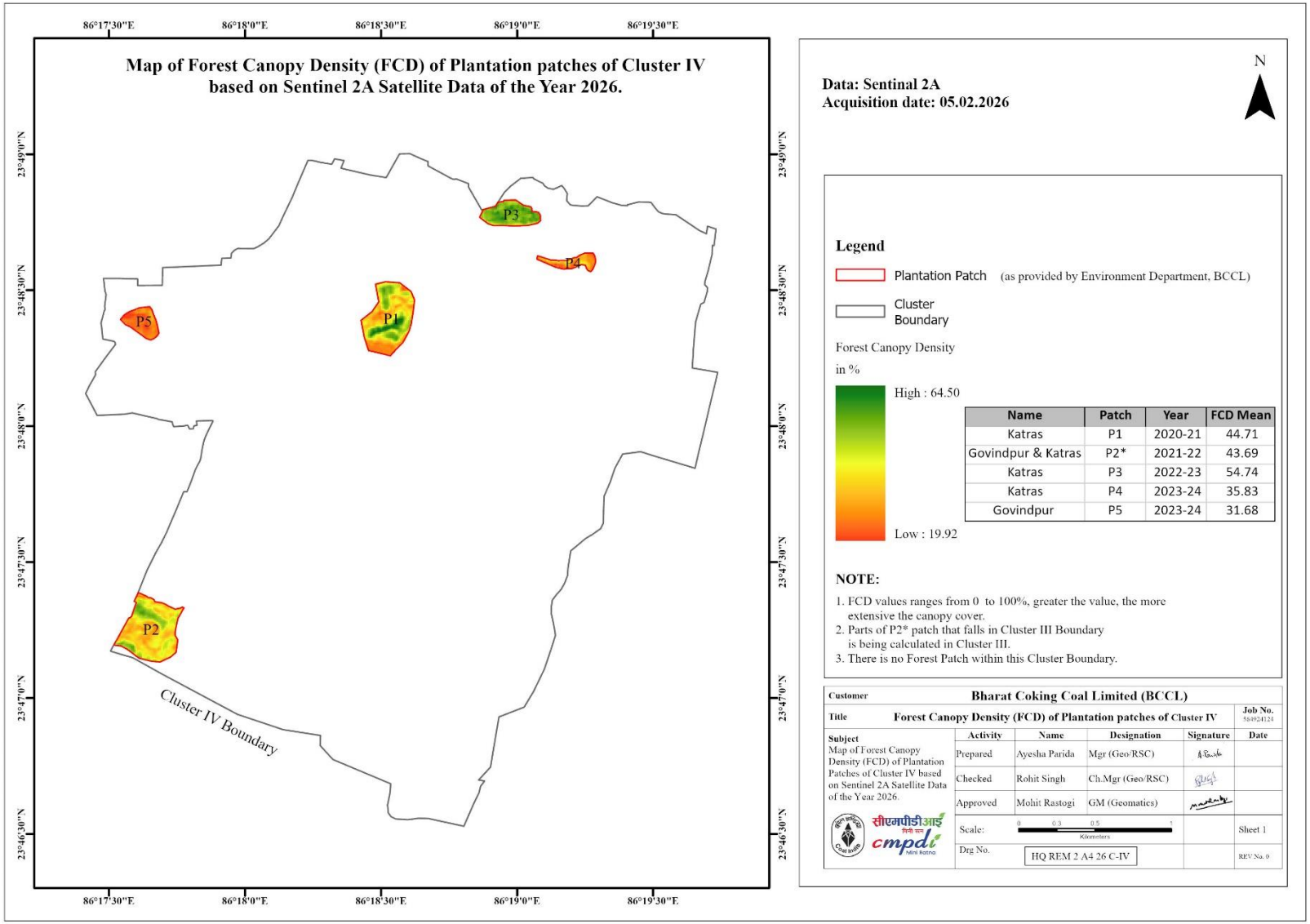


Plate 5.4 FCD Map of Cluster IV

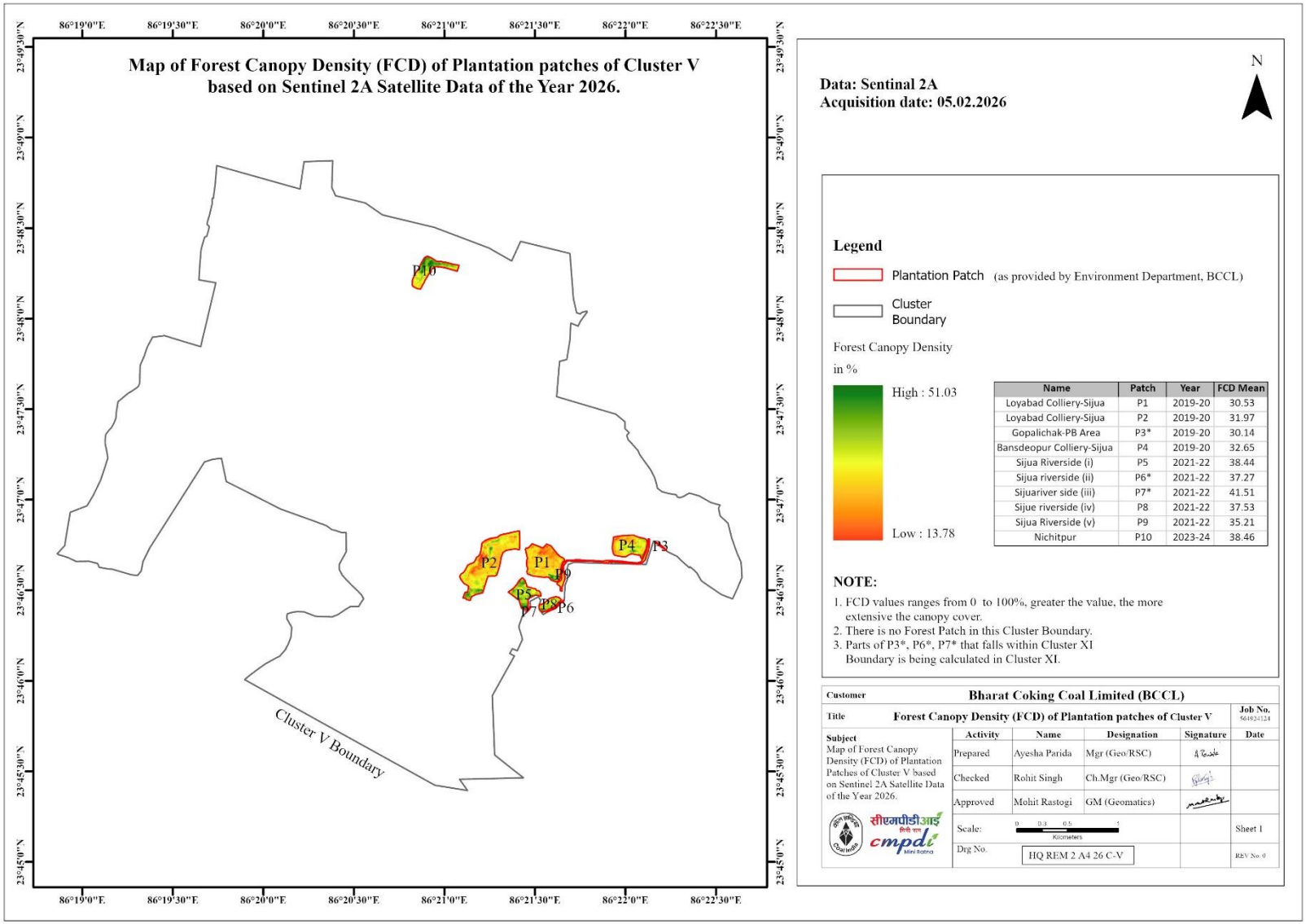


Plate 5.5 FCD Map of Cluster V

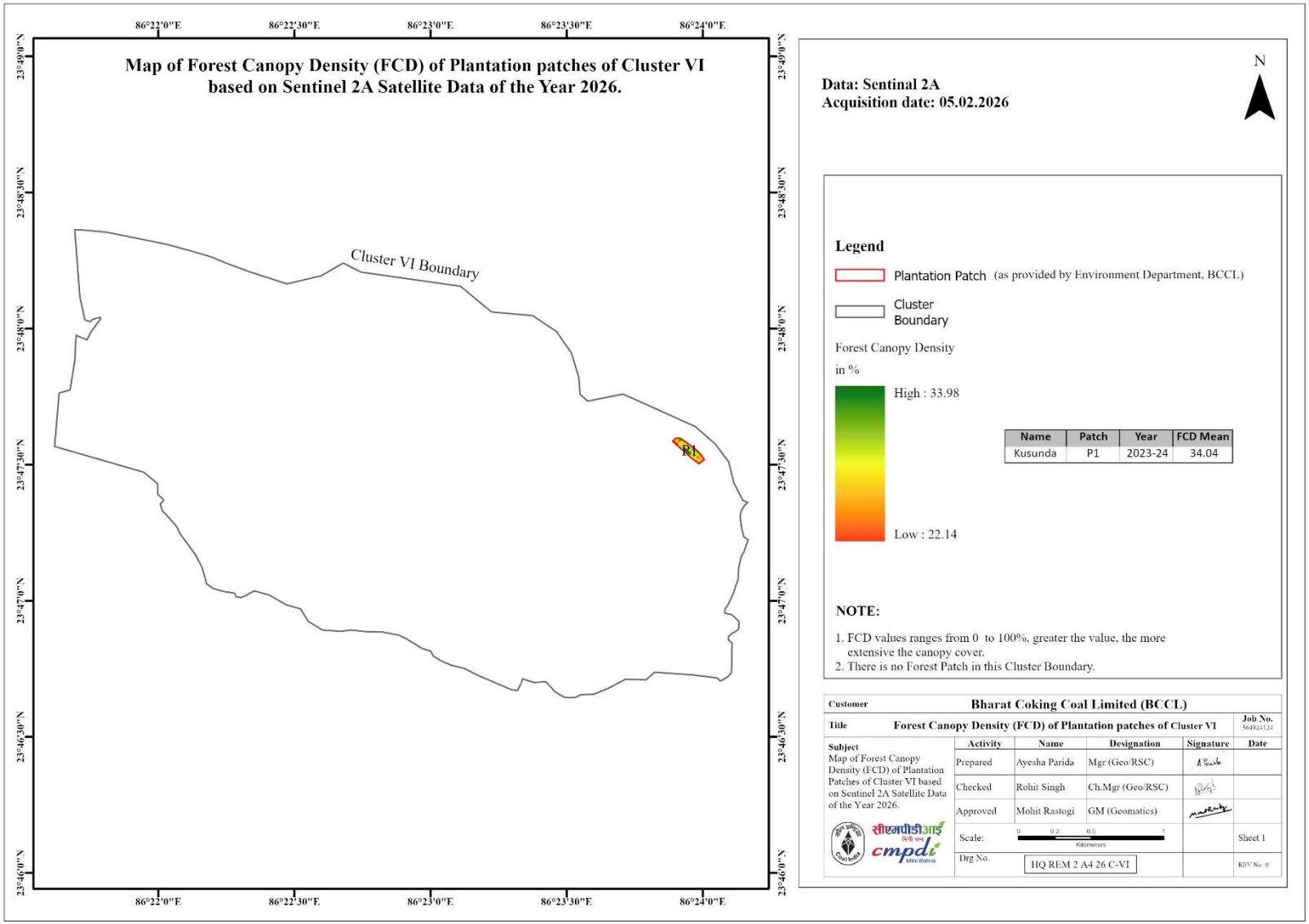


Plate 5.6 FCD Map of Cluster VI

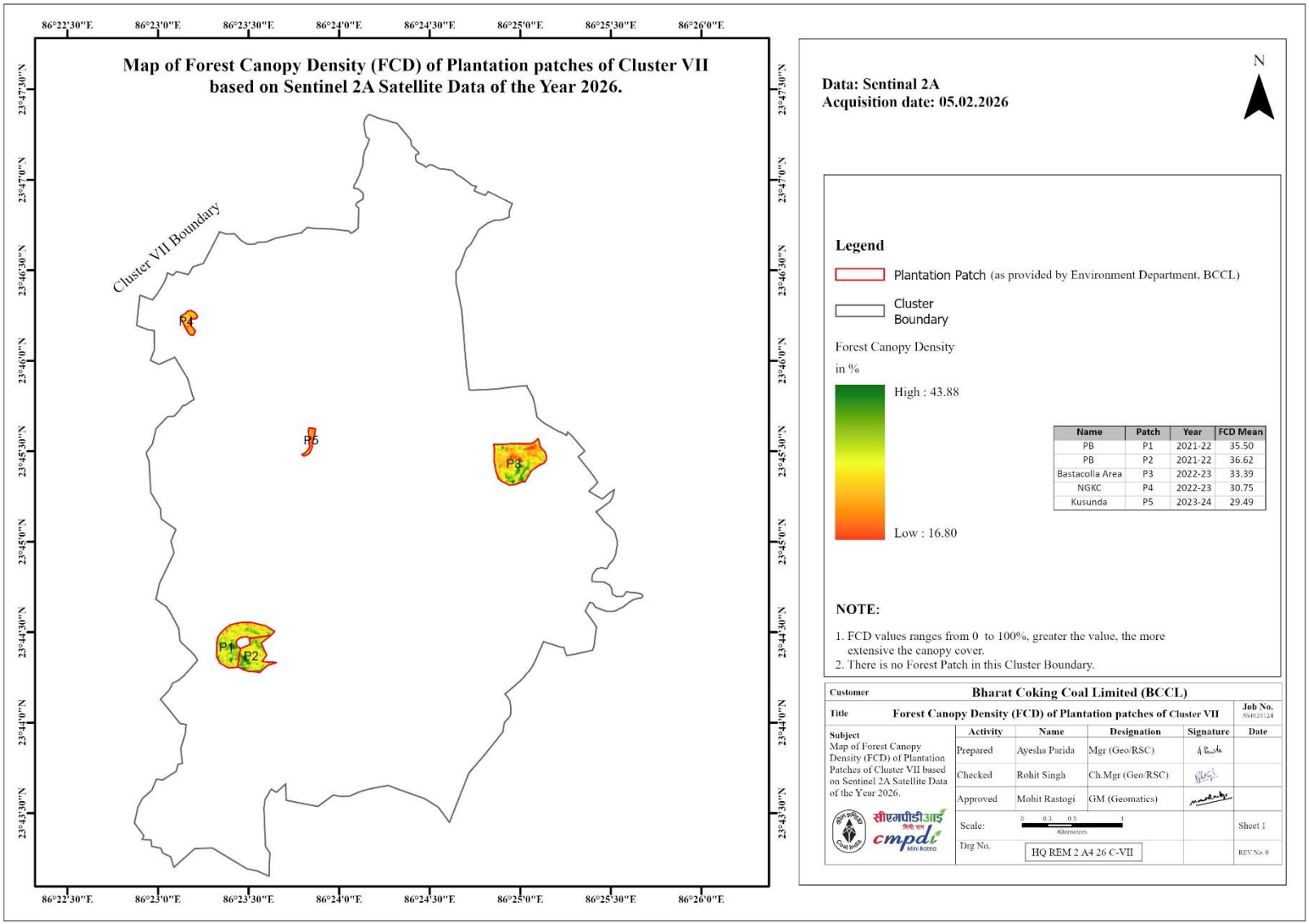


Plate 5.7 FCD Map of Cluster VII

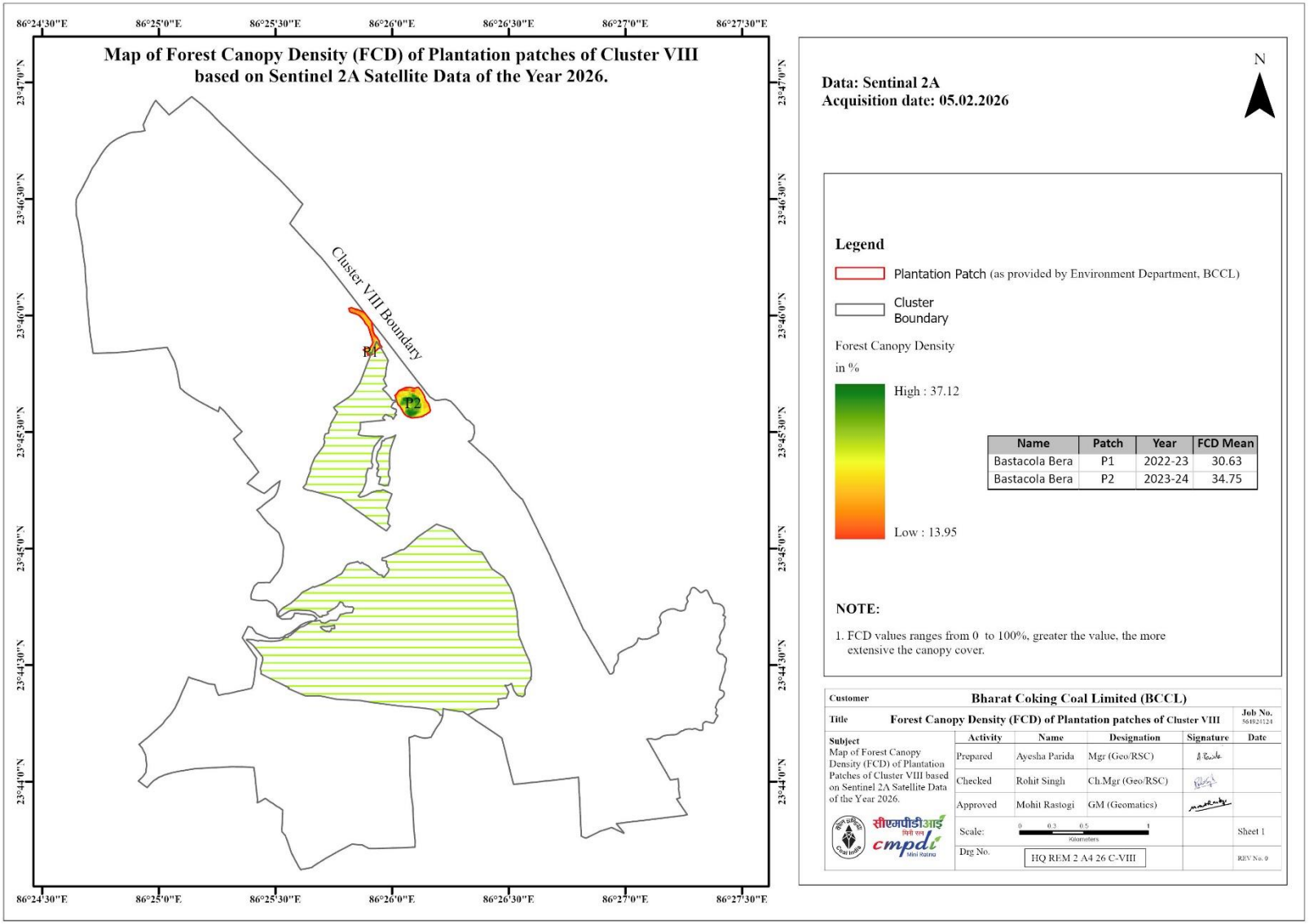


Plate 5.8 FCD Map of Cluster VIII

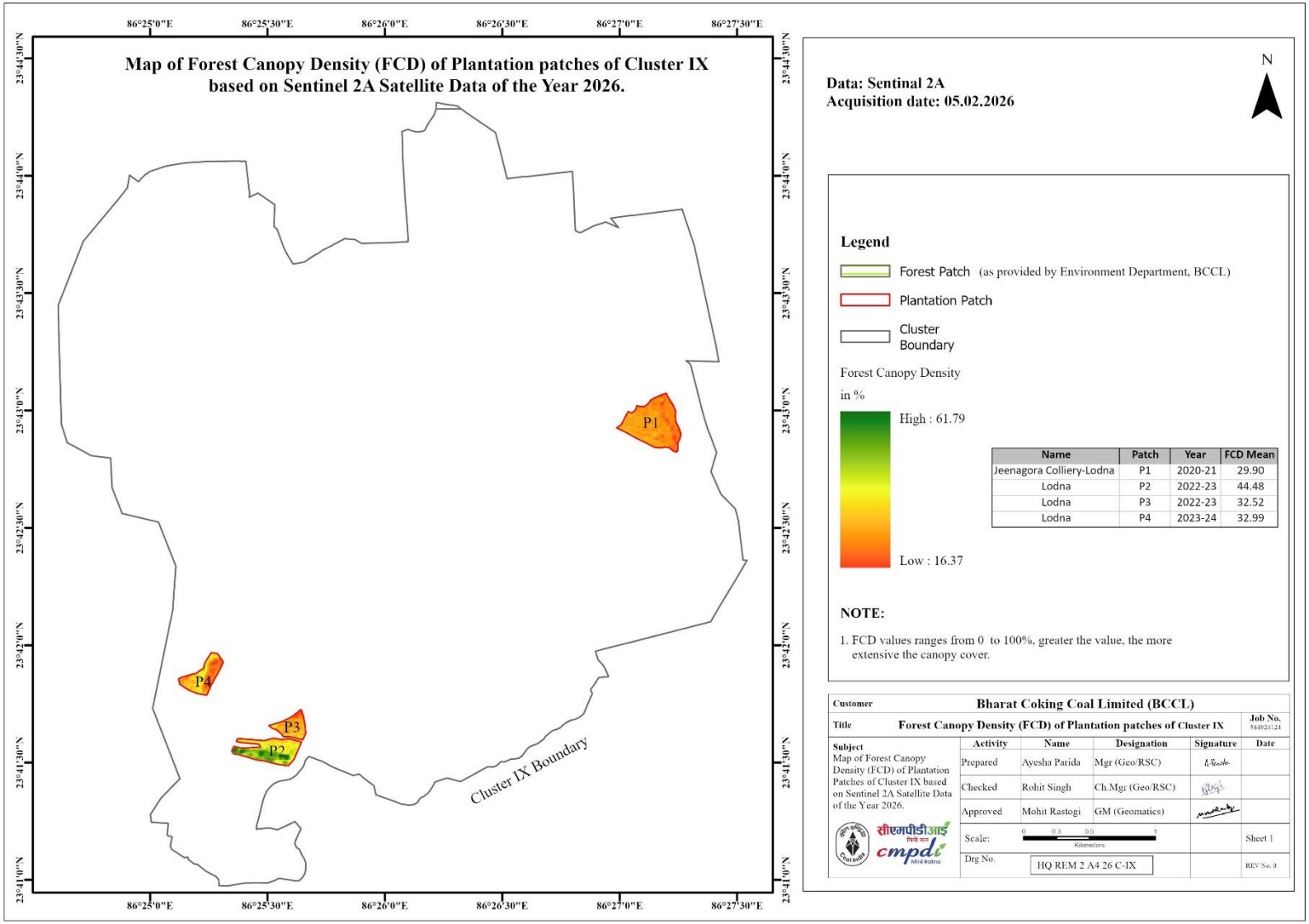


Plate 5.9 FCD Map of Cluster IX

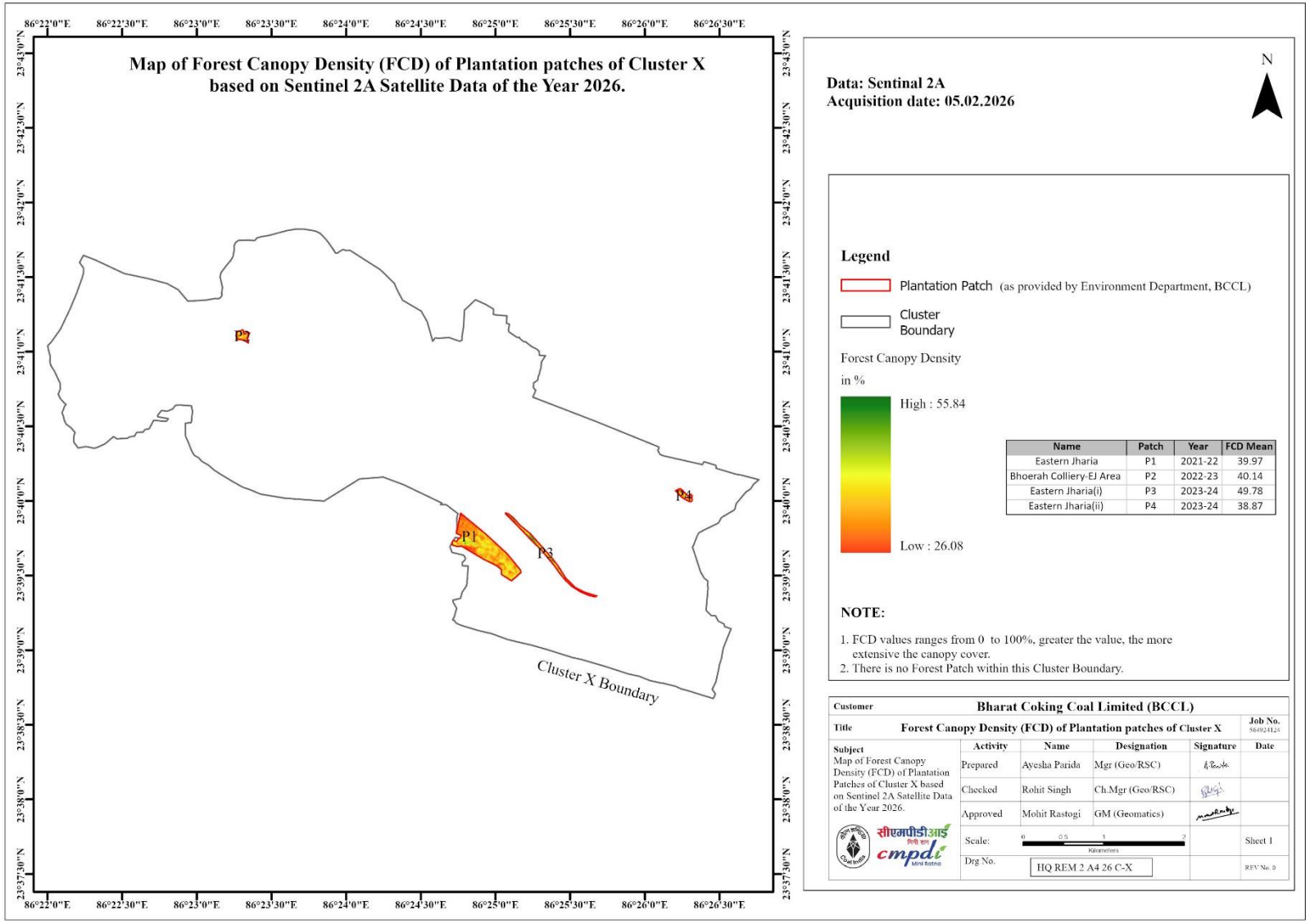


Plate 5.10 FCD Map of Cluster X

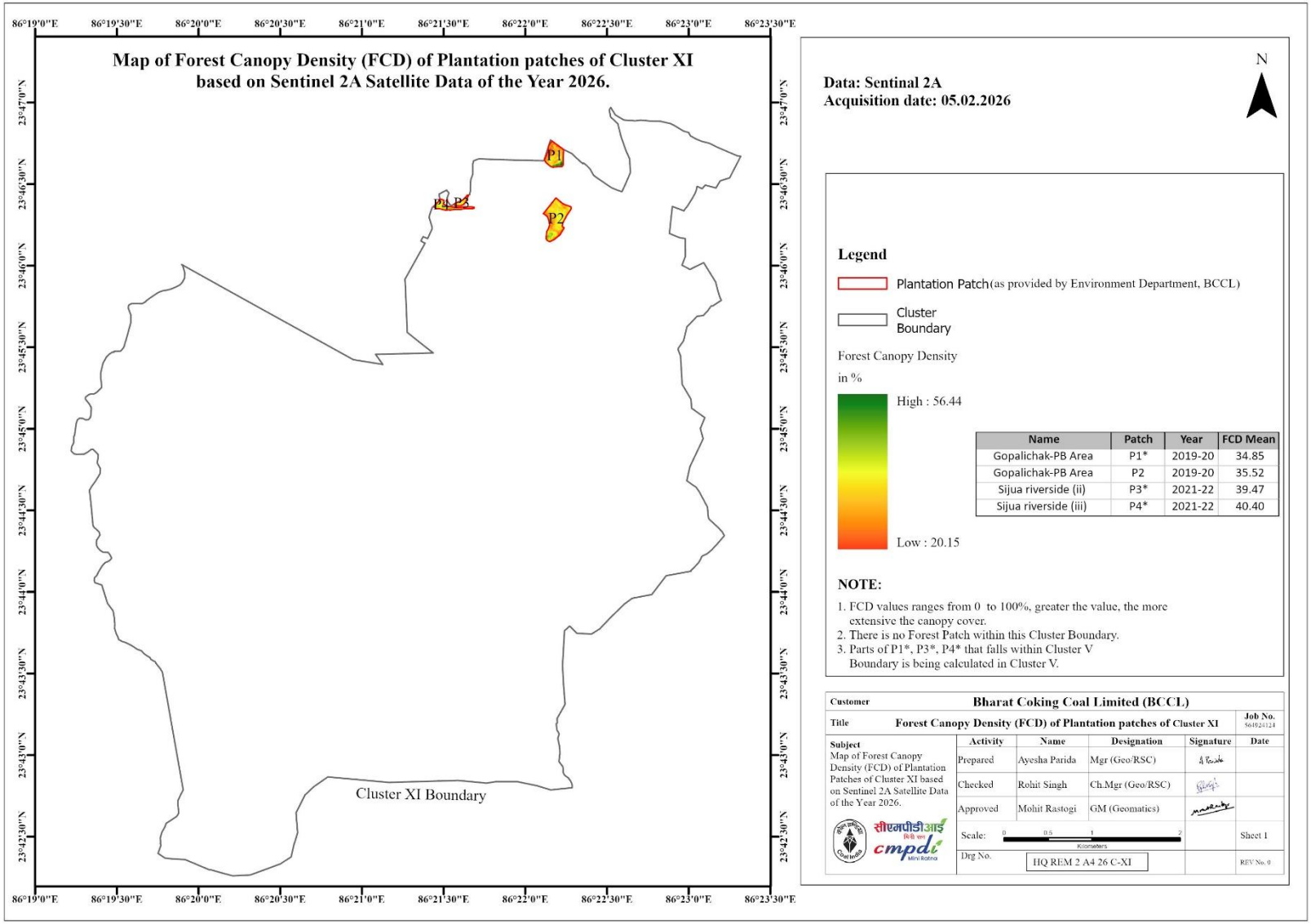


Plate 5.11 FCD Map of Cluster XI

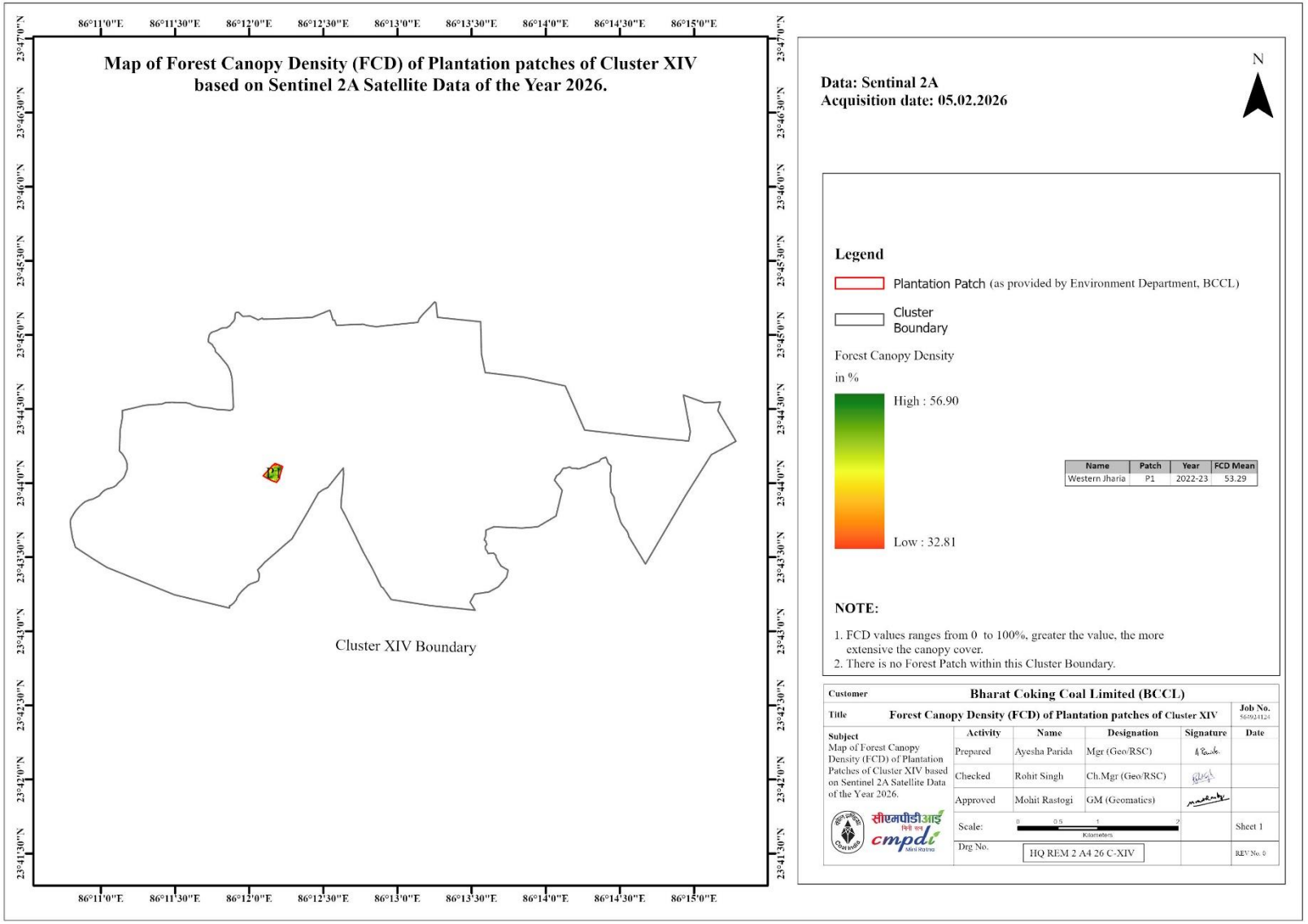


Plate 5.12 FCD Map of Cluster XIV

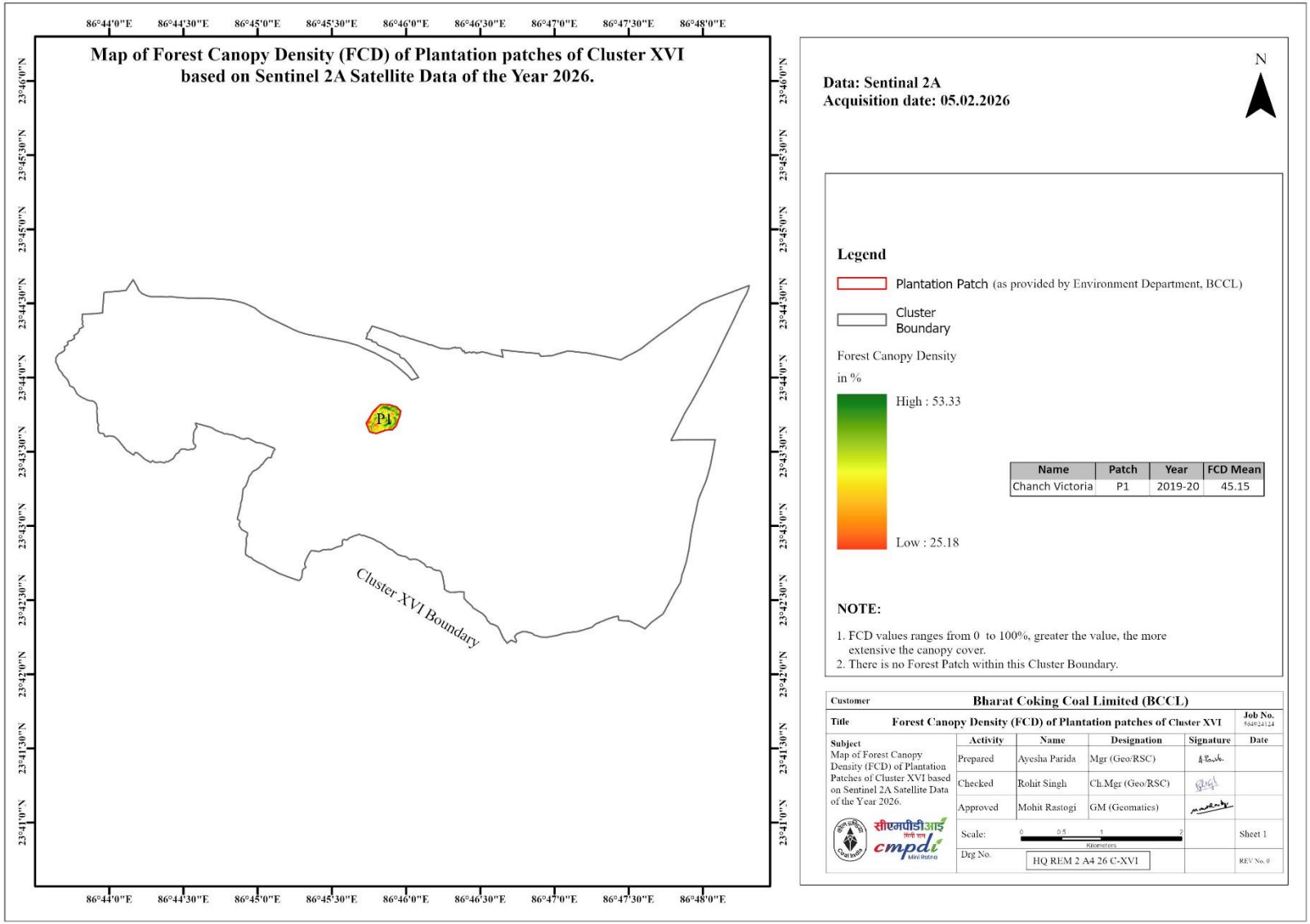


Plate 5.13 FCD Map of Cluster XVI

Table 5.2: Identification of suitable land in Jharia Coalfield of BCCL for accredited compensatory afforestation (ACA)

Name of Cluster	Patch	Year	Area (Ha)	Mean FCD	Forest/Non-Forest	Suitabilty for ACA	Forest Area	Non-Forest Area	Remark	Effective area for ACA
CLUSTER I	P1	2022-23	9.83	41.38	Non Forest Land	No	0.00	9.83		
CLUSTER II	P1	2020-21	15.04	45.93	Non Forest Land	Yes	0.00	15.04		15.04
CLUSTER II	P2	2020-21	5.48	48.80	Non Forest Land	No	0.00	5.48		
CLUSTER II	P3	2022-23	1.34	29.58	Non Forest Land	No	0.00	1.34		
CLUSTER II	P4	2022-23	0.53	26.77	Non Forest Land	No	0.00	0.53		
CLUSTER II	P5	2022-23	7.90	37.89	Non Forest Land	No	0.00	7.90		
CLUSTER II	P6	2023-24	4.99	36.64	Non Forest Land	No	0.00	4.99		
CLUSTER III	P1	2020-21	5.12	36.48	Non Forest Land	No	0.00	5.12		
CLUSTER III	P2	2020-21	5.36	48.19	Non Forest Land	No	0.00	5.36		
CLUSTER III	P3*	2021-22	23.73	37.79	Non Forest Land	No	0.00	23.73	P3* shows plantation patch of only Govindpur, Katras plantation patch falls within Cluster IV Boundary	
CLUSTER III	P4	2023-24	0.88	34.01	Non Forest Land	No	0.00	0.88		
CLUSTER IV	P1	2020-21	11.53	44.71	Non Forest Land	Yes	0.00	11.53		11.53
CLUSTER IV	P2*	2021-22	12.41	43.69	Non Forest Land	No	0.00	12.41	P2* shows plantation patch of only Katras, Govindpur plantation patch falls within Cluster III Boundary.	
CLUSTER IV	P3	2022-23	4.83	54.74	Non Forest Land	No	0.00	4.83		
CLUSTER IV	P4	2023-24	2.19	35.83	Non Forest Land	No	0.00	2.19		
CLUSTER IV	P5	2023-24	3.28	31.68	Non Forest Land	No	0.00	3.28		
CLUSTER V	P1	2019-20	9.95	30.53	Non Forest Land	No	0.00	9.95		
CLUSTER V	P2	2019-20	16.22	31.97	Non Forest Land	No	0.00	16.22		
CLUSTER V	P3*	2019-20	0.14	30.14	Non Forest Land	No	0.00	0.14		
CLUSTER V	P4	2019-20	6.04	32.65	Non Forest Land	No	0.00	6.04		
CLUSTER V	P5	2021-22	4.10	38.44	Non Forest Land	No	0.00	4.10		
CLUSTER V	P6*	2021-22	0.16	37.27	Non Forest Land	No	0.00	0.16	Parts of P3*, P6*, P7* that falls within Cluster XI Boundary is being calculated in Cluster XI.	

CLUSTER V	P7*	2021-22	0.06	41.51	Non Forest Land	No	0.00	0.06		
CLUSTER V	P8	2021-22	1.72	37.53	Non Forest Land	No	0.00	1.72		
CLUSTER V	P9	2021-22	2.08	35.21	Non Forest Land	No	0.00	2.08		
CLUSTER V	P10	2023-24	4.99	38.46	Non Forest Land	No	0.00	4.99		
CLUSTER VI	P1	2023-24	1.20	34.04	Non Forest Land	No	0.00	1.20		
CLUSTER VII	P1	2021-22	11.88	35.50	Non Forest Land	No	0.00	11.88		
CLUSTER VII	P2	2021-22	7.41	36.62	Non Forest Land	No	0.00	7.41		
CLUSTER VII	P3	2022-23	15.96	33.39	Non Forest Land	No	0.00	15.96		
CLUSTER VII	P4	2022-23	2.05	30.75	Non Forest Land	No	0.00	2.05		
CLUSTER VII	P5	2023-24	1.20	29.49	Non Forest Land	No	0.00	1.20		
CLUSTER VIII	P1*	2022-23	1.92	30.63	Partially in Forest Land	No	0.26	1.66	* Part of Patch (0.09 Ha.) falling outside the Cluster boundary.	
CLUSTER VIII	P2	2023-24	4.43	34.75	Non Forest Land	No	0.00	4.43		
CLUSTER IX	P1	2020-21	12.29	29.90	Non Forest Land	No	0.00	12.29		
CLUSTER IX	P2	2022-23	6.98	44.48	Non Forest Land	No	0.00	6.98		
CLUSTER IX	P3	2022-23	3.27	32.52	Non Forest Land	No	0.00	3.27		
CLUSTER IX	P4	2023-24	4.99	32.99	Non Forest Land	No	0.00	4.99		
CLUSTER X	P1	2021-22	21.87	39.97	Non Forest Land	No	0.00	21.87	* Part of Patch (0.21 Ha.) falling outside the Cluster boundary.	
CLUSTER X	P2	2022-23	1.41	40.14	Non Forest Land	No	0.00	1.41		
CLUSTER X	P3	2023-24	4.18	49.78	Non Forest Land	No	0.00	4.18		
CLUSTER X	P4	2023-24	1.31	38.87	Non Forest Land	No	0.00	1.31		
CLUSTER XI	P1*	2019-20	4.14	34.85	Non Forest Land	No	0.00	4.14	Parts of P1*, P3*, P4* that falls within Cluster V Boundary is being calculated in Cluster V.	
CLUSTER XI	P2	2019-20	7.55	35.52	Non Forest Land	No	0.00	7.55		
CLUSTER XI	P3*	2021-22	0.63	39.47	Non Forest Land	No	0.00	0.63		
CLUSTER XI	P4*	2021-22	1.70	40.40	Non Forest Land	No	0.00	1.70		
CLUSTER XIV	P1	2022-23	2.95	53.29	Non Forest Land	No	0.00	2.95		
CLUSTER XVI	P1	2019-20	10.06	45.15	Non Forest Land	Yes	0.00	10.06		10.06
			289.28				**0.26**	**289.02**		36.63

ABBREVIATIONS

SoI	Survey of India
MoEF & CC	Ministry of Environment, Forest & Climate Change
CIL	Coal India Limited
ECL	Eastern Coalfields Limited
BCCL	Bharat Coking Coal Limited
CCL	Central Coalfields Limited
WCL	Western Coalfields Limited
SECL	South Eastern Coalfields Limited
NCL	Northern Coalfields Limited
MCL	Mahanadi Coalfields Limited
NEC	North Eastern Coalfields
CMPDIL	Central Mine Planning & Design Institute Ltd
NRSC	National Remote Sensing Centre
R2/ R2A	ResourceSat Satellite
LISS - 4	Linear Imaging and Self Scanning Sensor
FCC	False Color Composite
OCP	Opencast Project
UGP	Underground Project
OB	Over Burden
GCP	Ground Control points
GIS	Geographic Information System
WGS-84	World Geodetic System
UTM	Universal Transverse Mercator

GLOSSARY

Sl.	Term	Definition
1.	Land Reclamation	To manage, reclaim and restore mined out/ degraded land as close as possible to its original stage.
2.	Over Burden	The material that lies above the coal seam/ deposit
3.	Monitoring	A process of evaluation to check or keep record for a period of time.
4.	Opencast Coal Mine	Open-pit mining, also known as opencast mining, is a surface mining technique that extracts minerals from an open pit in the ground.
5.	Social Forestry	Social forestry is the management and protection of forests and afforestation of barren and deforested lands with the purpose of helping environmental, social and rural development. Plantation (Social/ Avenue or other) carried out outside mining area.
6.	Biological Reclamation	Plantation on Backfilled areas (Stabilized Internal Dumps)
7.	Technical Reclamation	Area under backfilling (Over burden dumped inside the mine voids) in mining area.
8.	Green Cover Generated	Total Plantation carried out in the lease area of Project. This includes Plantation on Backfill, Plantation on OB and Social Forestry.
9.	Leasehold Area	The area, for which lease is granted for the purpose of undertaking mining and allied operations.
10.	Excavated area	Mined out area which includes active mining, area under backfilling and plantation on backfilled areas
11.	Active Mining	Mining areas which include Coal Quarry, Advance Quarry, Quarry Filled with Water etc.
12.	Environmental Protection	It is the practice of protecting the natural environment by individuals, organizations and governments. Its objectives are to conserve natural resources and the existing natural environment and, where possible, to mitigate damage and reverse trends.
13.	Remedial Measure	Any measure or action required or undertaken to investigate, monitor, clean up, remove, treat, prevent, contain or otherwise remediate the presence or release of any hazardous substance or activity.
14.	Systematic Error	Every measurement differing from the true measurement in the same direction, and even by the same amount in some cases.
15.	Geometric Distortion	It refers to the improper positioning of any image with respect to their true geographic position when viewed in a properly scaled common image display plane.

Sl.	Term	Definition
16.	Land Use/ Cover Class	Land cover is what covers the surface of the earth and land use describes how the land is used.
17.	Accuracy	The closeness of agreement between a measured quantity value and a true quantity value.
18.	Environmental Clearance	Environmental Clearance (EC) for any developmental projects like coal mining projects etc. has been made mandatory by the Ministry of Environment, Forests and Climate Change (MoEF & CC) through its Notification issued on 27.01.1994 under the provisions of Environment (Protection) Act, 1986.
19.	Rectification and Geo-referencing	Geo-referencing is the assigning of absolute location of a data point or data points. Geo-rectification refers to the removal of geometric distortions between sets of data points, most often the removal of terrain, platform, and sensor induced distortions from remote sensing imagery.
20.	Image Enhancement	It is the process of modifying digital images so that the results are more suitable for processing or further image analysis.
21.	Training set selection	It is a portion of a data set used to fit or train a model for prediction or classification of values that are known in the training set, but unknown in other (future) data.
22.	Image Classification	It refers to the task of extracting information classes from a multiband raster image. The resulting raster from image classification can be used to create thematic maps.
23.	Temporal Changes	The 'temporal change' means the change in any entity with a period of time.
24.	Ground Truthing	Collection of primary/ basic information from ground realities for satellite image interpretation and thematic mapping.
25.	Cluster	Group of opencast and/ or underground mines clubbed together for administrative purposes.
26.	Arc GIS	GIS Software used for Map preparation
27.	ERDAS IMAGINE	Satellite Image Data Classification Software

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DRAINAGE MAP OF THE CLUSTER-IV

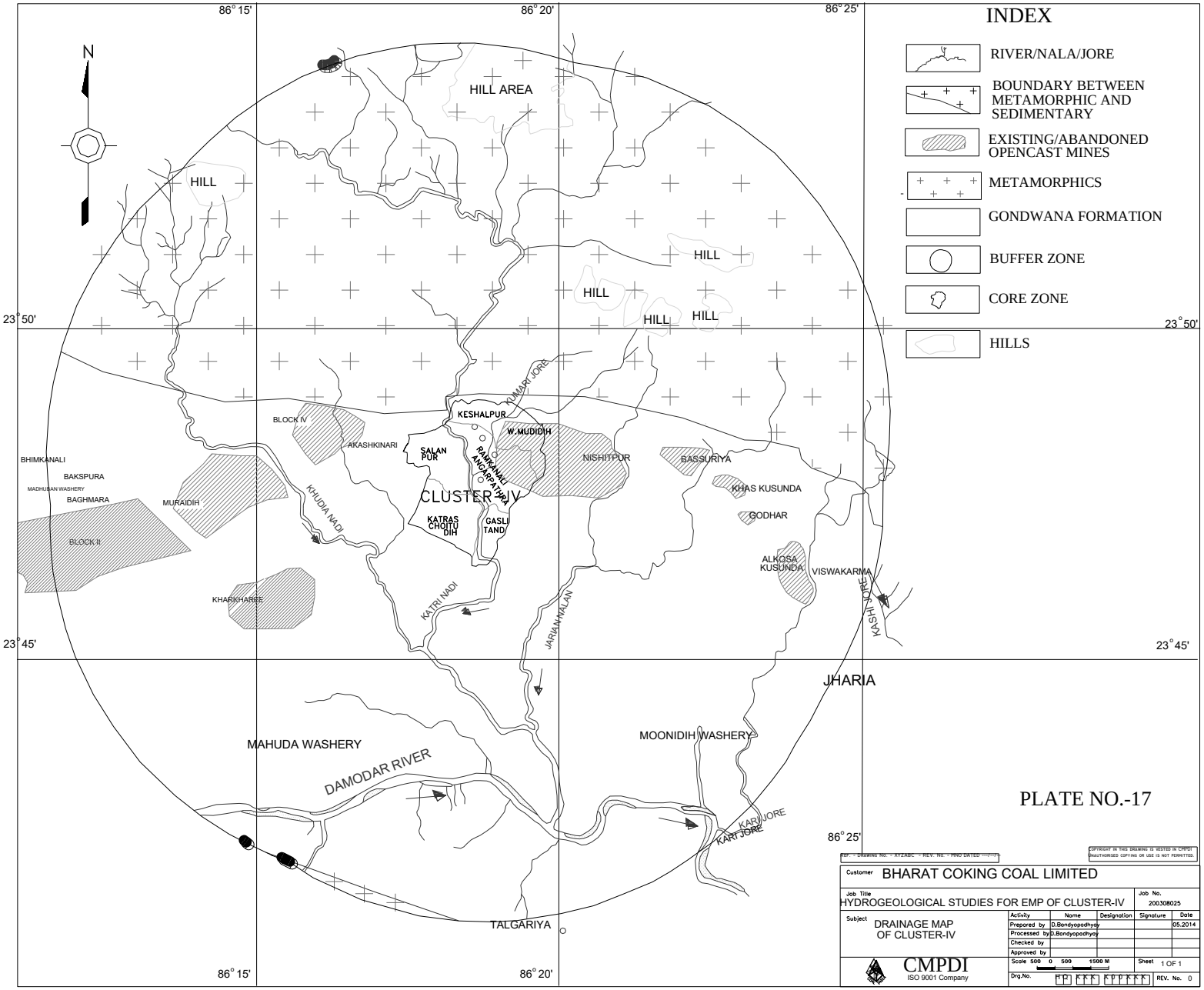

PLATE NO.-17

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Ref. - DRAWING No. - XYZABC - REV. No. - MNO DATED ----/--/--

Customer: BHARAT COKING COAL LIMITED

Job Title: HYDROGEOLOGICAL STUDIES FOR EMP OF CLUSTER-IV

Job No.: 200308025

Subject: DRAINAGE MAP OF CLUSTER-IV

Activity	Name	Designation	Signature	Date
Prepared by	D.Bandyopadhyay			05.2014
Processed by	D.Bandyopadhyay			
Checked by				
Approved by				

Scale 500 0 500 1500 M

Sheet 1 OF 1

Drg.No. [illegible] REV. No. 0

CMPDI
ISO 9001 Company

Top Soil Dump is demarcated
81400E
107200N
B6
B5
B4
B7
B8
AP15-45
AIR SHAFT
UP TO 10 SEAM
DEP=17.88
B.H NO.
A.P.-79
DIA =150mm
DIP= 288.00m
B.H NO. 4
SURFACE TO 10 SEAM
DIA =150mm
DIP= 34.67m
B.H
AP.-41
P. B. ROAD
H.T. LINE 11 KV
12 SEAM INC
FILLED UP
189.00 m
188.722
187.305
183.512
176.071
181.829
192.653
171.616
XI Seam
81800E
QUARTER
FLAT
BUNG
RLY QRT
RLY OFF
RLY GDS
RLY GDS
RLY QRT
RLY QRT
RLY QRT

Bharat Coking Coal Ltd.
(*A Subsidiary of Coal India Limited)*
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Phone/Fax No.: 0326-2371213
Email ID: cgmkatras@bccl.gov.in

Yearwise (2014-15 to 2025-26) 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 mriti 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	
2022-23	*4.5*	*AKWMC*	*Depatmentally*	
2023-24	*2.5*	*AKWMC*	*Departmentally*	

In FY 2024-25 total 2.4 Ha and Fy 2025-26 total 2.3Ha plantation has been done departmentally.Apart of that total 2285 nos of gabion plantation has also been done in the above mentioned 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) <u>Technical aspects:</u>

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 22^0-28^0. Vegetation cover will also be provided along the slopes to arrest any failure.

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 AKWMColliery

	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	***Enterpreneuship 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 Ruble 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	**Enterpreneuship 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	***Enterpreneuship 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 Ruble 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	***Enterpreneuship 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	**Enterpreneuship 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 22^0-28^0. 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.

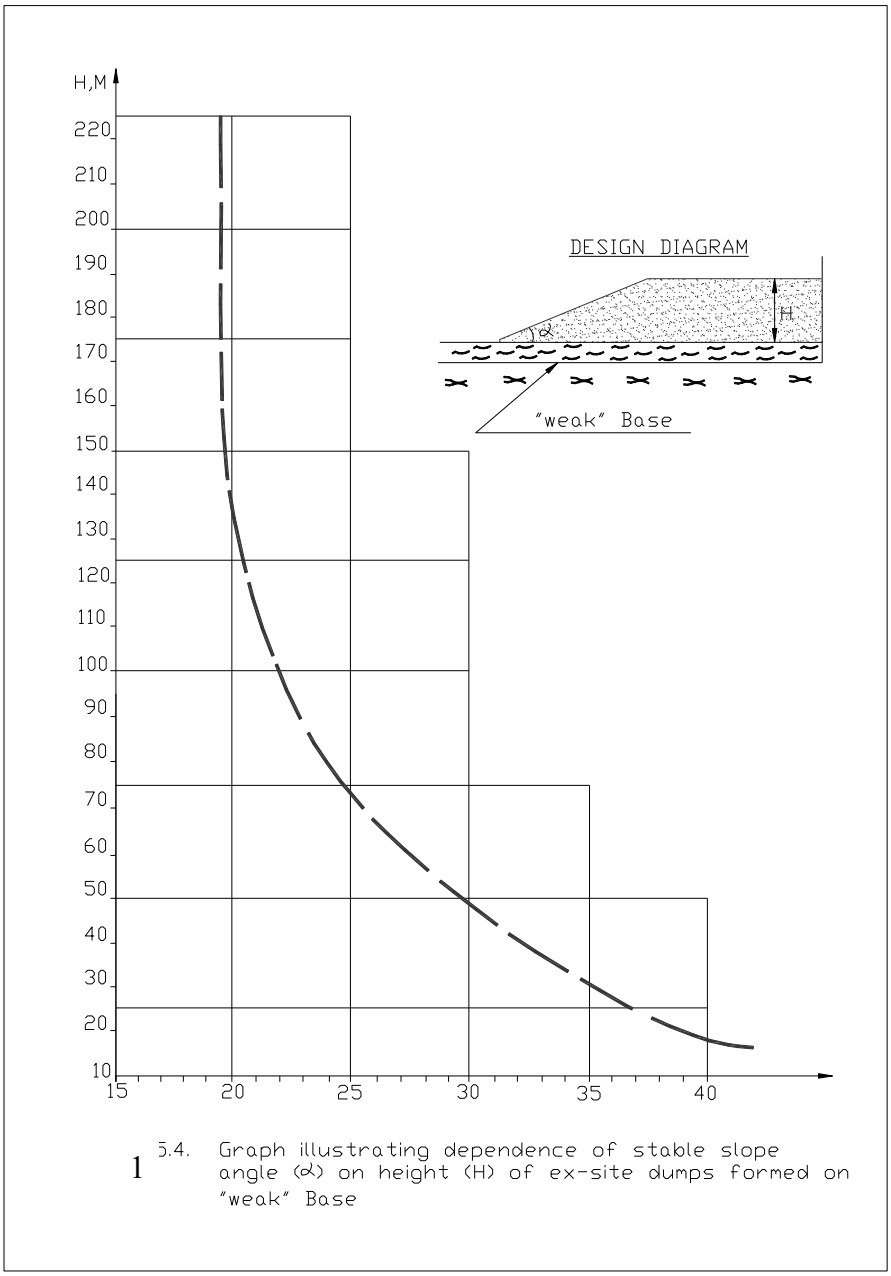

Fig. 5.4. Graph illustrating dependence of stable slope angle (α) on height (H) of ex-site dumps formed on "weak" Base

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, 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."*

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 Ruble 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 VIII

PROGRESSIVE AND FINAL MINE CLOSURE PLAN

- Mine Closure Plan has two components viz. i) Progressive or Concurrent Mine Closure Plan, and ii) Final Mine Closure Plan. Progressive mine Closure Plan would include various land use activities to be done concurrently and sequentially during the entire period of the mining operations, whereas the Final mine Closure activities would start towards the end of mine life, and may continue even after the reserves are exhausted and/or mining is discontinued till the mining area is restored to an acceptable level. The Mine Closure details of the Mining Plan should be oriented towards the restoration of land back to its original condition as far as practicable.

- Mining is to be carried out in a phased manner along with reclamation and afforestation work in the mined out area.

- This Progressive mine closure plans shall be reviewed after a period of every five years. These plans would be examined periodically in every five years period and to be subjected to the third party monitoring by the agencies approved by the Central Government, like Central Mine Planning and Design Institute Ltd. (CMPDIL), National Environmental Engineering Research Institute (NEERI), Indian Institute of technology (IIT-ISM) or any other institutes/organizations/agencies specified from time to time for the purpose.

- Various project specific activities viz. mined-out land details & their technical and biological restoration plan, water quality management, infrastructure to be retained and demolished, disposal of mining machinery, etc. have been furnished in the relevant paras. As the backfilling of the mine void is being carried out as part of regular mining operation, it shall not be included in the list of progressive mine closure activities. However, in case, if the backfilling of mine void is being carried out specifically for closure of the mine in future due any reason, the same shall be included in the list of activities to be taken up for mine closure.

	Parameters	*Details*
8.1	**Land Degradation and restoration Schedule**	

8.1.1 Land Degradation and Technical Reclamation (Commutative Area "Ha")

Stage/Year	Land Degraded				Technically Reclaimed Area			
	Excav	Dump (Extn+Top Soil)	Infra/others*	Total	Backfill	Dump (Extn+Top Soil)	Infra/others	Total
Up to Base year*	46.93	23.70						
Y-5	85.43		0.5					
Y-15	133.43				40.4			
Y-24	176.80				85.4			

8.1.2 Biological Reclamation (Cumulative in "Ha")

Stage/Year	Biologically Reclaimed Area					Forest land (Return)	Un Distrubed/To be left for Public/com Use	Total
	Agriculture	Plantation	Water Body	Public Company Use	Total			
Up to Base year*								
Y-1		0.54						
Y-2		0.54						
Y-3		0.54						
Y-4		0.54						
Y-5		0.54						
Y-6		0.54						
Y-7		0.54						
Y-8		0.54						
Y-9		0.54						
Y-10		0.54						
Y-11		0.54						
Y-12		0.54						
Y-13		0.6						
Y-14		0.6						
Y-15		0.6						
Y-16		0.6						
Y-17		0.6						
Y-18		0.6						
Y-19		0.6						
Y-20		0.6						

Y-21			0.6							
Y-22			0.6							
Y-23			0.6							
Y-24			0.6							
Post Closure										
Y-25			1.8	32.4						
Y-26			1.1							
Y-27			0.6							

8.2 Post Closure Water Quality management:

Routine Environmental Monitoring will be carried out for water quality analysis of following samples:

S. No.	Sample	Frequency
1	Mine Water	Fortnightly
		Half Yearly
2.	Surface Water	Quarterly
3.	Ground Water	Quarterly

If any discrepancy from statutory standards is observed, necessary corrective measures will be undertaken by the management.

8.3 Post Closure Air Quality management:

Fortnightly Air Quality Monitoring will be carried out at 03 Air Quality monitoring Stations during three years post closure period.

8.4 **Waste Management** (Figures in MM3)

Stage/Year		OB Removal (Cumulative)			External Dump (Cumulative)		Internal Backfilling (Cumulative)		Embankment (Cumulative)	
		Top Soil	OB	Total	Top Soil	OB	Top Soil	OB	Top Soil	OB
Up to Base year*		0.23	24.84	25.07						
Y-1		0.23	32.1	32.33						
Y-3		0.23	46.3	46.53						
Y-5		0.24	58.9	59.14						
Y-10		0.36	96.96	97.32						
Y-15		0.51	134.98	135.49			0.10			
Y-20		0.66	173.01	173.67	0.12		0.22			
Y-24		**0.68**	**202.82**	203.5	0.24	123.92	0.42	78.9		
Post Closure										

8.5

Top Soil Management – (Including Action Plan for Top Soil Management)

(All Figures are Cumulative and in MM3)

Stage/Year	Top Soil Removal Plan	Top Soil Used				
		Spreading Over Embankment	Spreading Over Backfill area	Spreading over External OB Dump area	Used in Green Belt Area	Total Utilised
Up to Base year*	0.23					
Y-1	0.23				0.001	
Y-3	0.23				0.003	
Y-5	0.24				0.005	
Y-10	0.36				0.008	
Y-15	0.51		0.10		0.01	
Y-20	0.66		0.22	0.12	0.015	
Y-24	**0.68**		0.42	0.24	0.02	
Post Closure						

Top Soil removed will be used in Plantation activities, Spreading over External OB Dump area, Spreading Over Backfill area and also in Green Belt Area.

8.6	Management of Coal Rejects.	There is no washery.

8.7 Restoration of Land used for Infrastructure

The other entire infrastructure related to the opencast coal mining operation will be dismantled, after end of the mineable reserve/ mine life. The list of infrastructure to be dismantled at the end of the mine life is given in the following table:

Sl. No.	Particulars
1.	Workshop, Mine Office & Stores

8.8 Disposal of Mining Machinery

After end of production life of Cluster IV group of mines, all mining machinery will be shifted to other mines of BCCL as per requirements.

8.9 Safety & Security

Fencing around Opencast Workings:

i) The top edge of the opencast working shall be kept fenced with wire rope strands or barbed wire, supported by posts of timber, iron or concrete (movable). The gap between the adjacent rope strand or wires shall not be more than 0.30 m and bottom most rope, strand or wire shall not be more than 0.25 m and the topmost rope, strand or wire shall not be less than 1.0 m from ground level.

ii) At the finishing stage, opencast working shall be fenced with a masonry wall using lime mortar not less than 0.40 m thick and not less than 1.2 m high, with a parapet top.

8.10 Abandonment Cost and Financial Assurance

8.10.1 Abandonment Cost: Cost of Activities to be taken up for closure of the mine**

Head	Parameters	Unit	Quantity	Escalated rate (in Rs. Crs.)	Escalated Amount (in Rs. Crs.)
Progressive Closure	Water Quality Management	LS	1	0.39	0.3893925
	Air Quality Management	LS	1	0.74	0.7417000
	Waste Management	MM3		-	-
	Barbed wire fencing around dump	m	1000	0.000332669	0.3326691
	Barbed wire fencing around the pit	m		0.000332669	-
	Filling of Void- Rehandling of Crown Dump	MM3		0	-
	Top Soil Management	MM3	0.5	7.42	3.7084999
	Technical and biological Reclamation of Mined cut of land and OB Dump	Ha	50	0.13	6.4898748
	Plantation over virgin area including green belt	Ha	14	0.06	0.8307040
	Manpower Cost and supervision	Year	24	0.19	4.4501999
	Toe wall around the dump	m	1000	0.001762865	1.7628651

Head	Parameters	Unit	Quantity	Escalated rate (in Rs. Crs.)	Escalated Amount (in Rs. Crs.)
	Garland Drain	m	1000	0.00	0.0927125
	Garland Drain around the dump	m		-	-
	Subsidence management	LS		0.55627	0.5562750
	Any other Activity(Avenue Plantation)	Nos.	1000	0.00046	0.4635625
Dismantling of Infrastructure & Disposal / rehabilitation of Mining Machinery	Dismantling of workshop and washery	sq m	12375	0.00002	0.2294634
	Rehabilitation of the Dismantled facilities	LS	15	0.01	0.1390687
	Dismantling of pumps /other facilities	No.	25	0.01	0.1390687
	Dismantling of pipes/other facilities	Km	10	0.01	0.1297975
	Dismantling of Stowing Bunker, provisioning of pumps for bore well pumping arrangement	CUM		0.00	-
	Dismantling of UG equipment	L.S.		-	-
	Rearranging water pipeline to dump top park / Agriculture land (Assumed Data)	Km	10	0.01	0.0834412
	Dismantling of power lines (33KV H.T. Line)	*km*	*7*	0.01	0.0778785
Safety and Security	Barbed wire fencing around dump	m		-	-
	Barbed wire fencing around the pit	m		0.000332669	-
	Barbed wire fencing with masonry pillar	m	1000	0.0007417	0.7417000
	Concrete wall with Masonry pillars around the pit	m		0.001162615	-
	Securing air shaft and installation of bore well pump	sqm	750	0.000463562	0.3476719
	Securing incline	sqm	750	0.000463562	0.3476719
	Concrete wall fencing around water body	m		-	-
	Boundary wall around the water body	m		-	-
	Stabilization (viz benching, pitching etc.) of side walls of the water body	sqm		-	-
	Toe wall around the dump	m		0.00	-
	Garland Drain	m		0.00	-
	Garland Drain around the dump	m	1000	9.27125E-05	0.0927125
	Drainage Channel from main OB Dump (Assumed Data)	m		-	-
Technical and Biological Reclamation of Mined Out of land and OB Dump	Filling of Void			-	-
	Top Soil Management	Ha		-	-
	OB Rehandling for backfilling			-	-
	Terracing, Blanketing with soil and vegetation of External OB Dump	sqm		0.00	-
	Peripheral road, gates, view point cemented steps on bank	m	1000	0.00185425	1.8542500
	Expenditure on development of Agricultural land	Ha		-	-
	Landscaping and Plantation	Ha	3.5	0.06	0.2076760
Post Closure management and supervision	Power Cost	LS	1	0.09	0.0927125
	Post Mining Water quality management		114	0.00	0.1220957
	Post Mining Air quality management		216	0.01	1.1503678
	Subsidence monitoring for 5 years	LS		-	-
	Waste Management		0	-	-
	Manpower Cost and supervision	Year	3	1.11	3.3376499
Others	Entrepreneurship development (Vocational/ Skill development training for sustainable income of affected people)	1.6684185			

Head	Parameters	Unit	Quantity	Escalated rate (in Rs. Crs.)	Escalated Amount (in Rs. Crs.)
	Golden Handshake/ Retrenching benefits to 100 employees of OC				
	Golden Handshake/ Retrenching benefits to 200 employees of UG				
	Onetime financial grant to societies/institutions/organizations which is dependent upon the project				
	Provide jobs in other mines of the Company				
	Continuation of other services like running of Schools etc.				
Total		**30.5801**			

Note: ** The cost shown above is only estimated and the exact cost for these activities can be established at the time of execution only. If the total cost at the time of execution of above mentioned activities exceed the total estimated cost, the shortfall shall be borne by the company.

8.10.2 Financial Assurance: Amount to be deposited in Escrow account as a security against the mine activities to be carried out of the closure of the mine

COST CALCULATION- KCC OC MINE			
WPI as on	Apr-19		121.1
WPI as on base date	Mar-22		148.9
Escalation rate of Closure cost			1.229562
	UG	OC	
Base Rate of Closure Cost "Rs . Crs/Ha"	0.015	0.09000	
Closure Cost "Rs. Crs/Ha"	0.0184434	0.11066	
Project Area	39.83	176.800	
Amount to be deposited into Escrow Account "Rs. in Crs.	0.734602	19.56480	
Amount already deposited into Escrow Account "Rs. in Crs.		7.53000	
Amount already released from Escrow Account "Rs. in Crs.			
Net Amount to be deposited into Escrow Account "Rs. in Crs.	0.734602	12.03480	
Rate of compounding of Annual Closure Cost		5.00%	
Balance Life of the project "in yrs"		24	

Amount to be deposited into escrow account annually				
Year	**OC**	**Year**	**UG**	**Total**
Y1	0.50145	Y-1	0.73460	1.23605
Y2	0.52652	Y-2		0.52652
Y3	0.55285	Y-3		0.55285
Y4	0.58049	Y-4		0.58049
Y5	0.60952	Y-5		0.60952
Y6	0.63999	Y-6		0.63999
Y7	0.67199	Y-7		0.67199
Y8	0.70559	Y-8		0.70559
Y9	0.74087	Y-9		0.74087
Y10	0.77791	Y-10		0.77791
Y11	0.81681	Y-11		0.81681
Y12	0.85765	Y-12		0.85765
Y13	0.90053	Y-13		0.90053
Y14	0.94556	Y-14		0.94556

Annual Closure Cost	0.73460	0.50145	
Amount to be deposited into Excrow Account after compounding @ of 5% "Rs. in Crs"		**23.05012**	

Y15	0.99284	Y-15		0.99284
Y16	1.04248	Y-16		1.04248
Y17	1.09460	Y-17		1.09460
Y18	1.14933	Y-18		1.14933
Y19	1.20680	Y-19		1.20680
Y20	1.26714	Y-20		1.26714
Y21	1.33050	Y-21		1.33050
Y22	1.39702	Y-22		1.39702
Y23	1.46687	Y-23		1.46687
Y24	1.54022	Y-24		1.54022
Total	22.31552		0.73460	23.05012

Mining and Mine Closure Plan of Katras Choitodih Colliery was prepared and approved by BCCL Board. And as per the approved Mine Closure Plan total deposited amount in the Escrow Account till **31.3.2022** was **Rs. 753.0 Lakhs**. The amount already accrued in account shall be adjusted against the new closure cost calculated.

The amount calculated above shall be deposited every year by BCCL in the Escrow Account in the name of Katras Chotudih OC Mine.

Thus, total amount that shall be deposited for final mine closure activities of **KCC Group of mines during the life of 24 years stands out to be Rs. 23.05012 Crores** as per the present status of the mine.

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.

	Amount (Rs. in Lakhs)	
	UG Section	**OC Section**
Amount Already Deposited in Escrow Account		**753.0**
Amount to be Deposited in the Escrow Account in the Future	**73.460**	**2231.552**
Total Amount available for Mine Closure Activities	**73.460**	**2984.552**
Grand Total	**3058.012**	

The amount deposited in Escrow Accounts is appended below:

Name of Mine: Katras Chatudihl OC Mine Escrow account no: 00150100010086			
S.No :	Year	Rs. in Lakhs	
		OC	Total
1	2013-2014	-	-
2	2014-2015	82.12	82.12
3	2015-2016	86.23	86.23
4	2016-2017	90.54	90.54
5	2017-2018	114.64	114.64
6	2018-2019	120.37	120.37
7	2019-2020	126.39	126.39
8	2020-2021	132.71	132.71
9	**2021-2022**	**-**	**-**
Total		**753.0**	**753.0**

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 final mine closure

Mine Closure Plan of following two mines have been approved by BCCL Board are mentioned below:

Name of Mine	BCCL Board No.	Date	Escrow A/c at Bank of Baroda, Dhanbad Branch
Katras Choitudih OC Mine	312th Board of BCCL	13.12.2014 02.02.2018	00150100010086

- **Implementation of the approved Mine Closure Plan shall be sole responsibility of the mine owner**. Mining is to be carried out in a phase manner i.e. continuation of mining activities from one phase to another indicating the sequence of operations depending on the geo-mining conditions of the mine. Up to 50% of the total deposited amount including interest accrued in the escrow account may be released after every five years in line

with the periodic examinations of the closure plan. The amount released should be equal to expenditure incurred on the progressive mine closure in past five years or 50% whichever is less. The balance amount shall be released to the mine owner//leaseholder at the end of the final mine closure on compliance of all provisions of Closure Plan. This compliance report should be duly signed by the lessee and certify that said closure of mine complied all statutory rules, regulations order made by the central or state government, statutory organizations, court etc. and certified by the coal controller.

Final Mine Closure would be considered to be completed only after acceptance of the third party audit report by the coal controller on the compliance of all provisions on Mine Closure Plan. Any institute/ Organization/ Agency as may be notified by the Government for this purpose may be engaged for third party audit.

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 drivage .

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 chorological 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 Ruble 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	***Enterpreneuship 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	**Enterpreneuship 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.
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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.

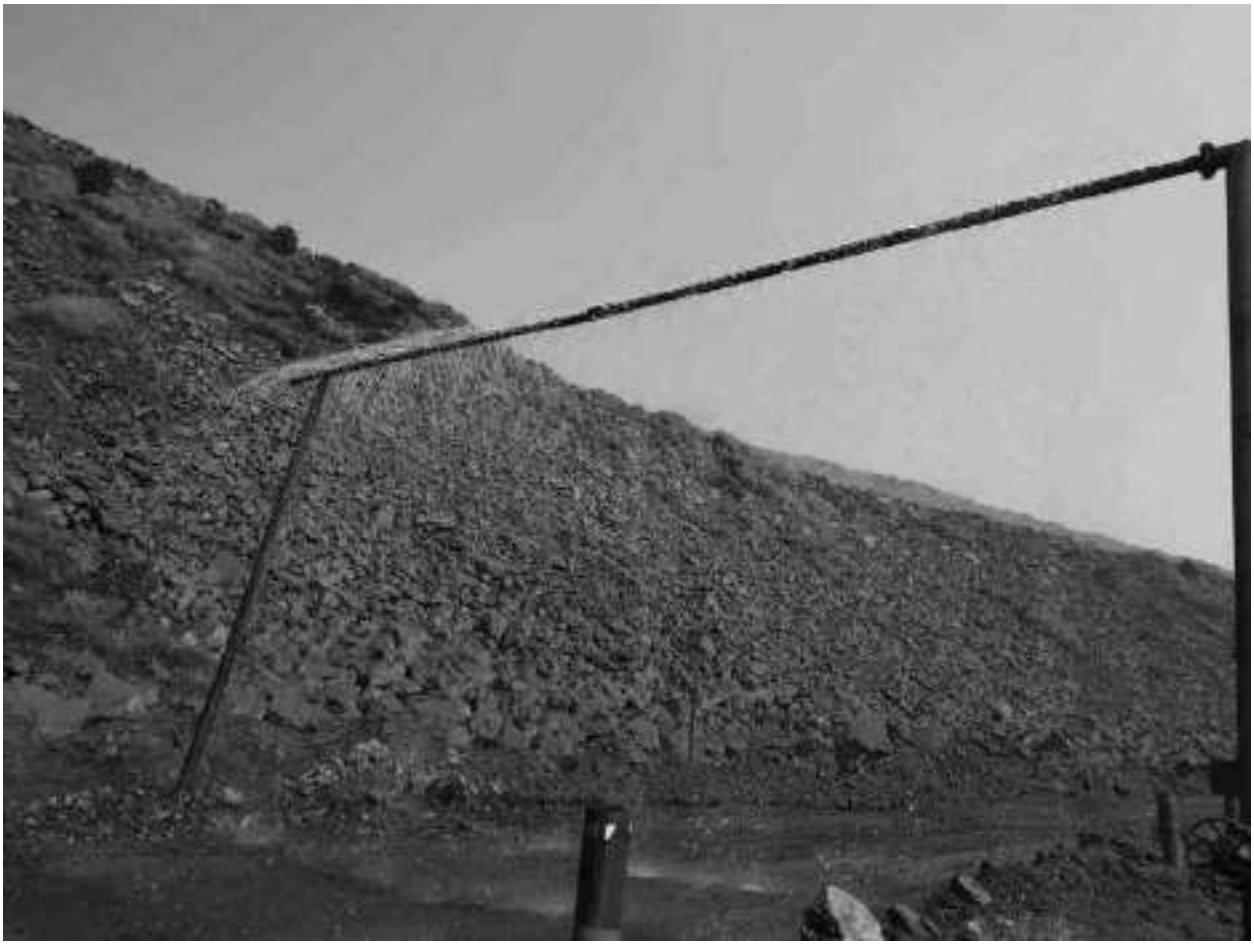
AM(Env)
Cluster IV

Scanned by CamScanner

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