



भारत कोकिंग कोल लिमिटेड
(कोल इण्डिया लिमिटेड की एक अनुषंगी कंपनी)
Bharat Coking Coal Limited
(A Subsidiary of Coal India Limited)
(एक मिनीरान कंपनी / A Miniratna Company)
(भारत सरकार का उपक्रम / A Government of India Undertaking)

Ref No.GM/B-II/ENV/2024-25/113

Date: 15.05.2024

To
The Director
Ministry of Environment, Forest & CC
2nd Floor, Headquarter- Jharkhand State Housing Board
Harmu Chowk
Ranchi, jharkhand-834002

Sub: Six monthly reports on implementation of Environmental measures for the period from Oct' 2023 to Mar' 2024 in respect of Cluster – II groups of mines.

Ref.:- EC Order No. J-11015/35/2011-IA.II (M) dated 06.02.2013

Dear Sir,

Kindly find enclosed herewith the six-monthly report on implementation of Environmental measures for the period from Oct' 2023 to Mar' 2024 in respect of Cluster –II groups of mines. Cluster- II groups of mines having leasehold area 2025.75 Ha is under mining operation.

This is for your kind information and doing needful, please.

Yours faithfully

General Manager
Block-II Area

Encl: as above

C.C to

1. HoD (Env.), BCCL, Koyla Bhawan, Dhanbad
2. Nodal Officer (Env.), Barora Area
3. Nodal Officer (Env.), Block-II Area

ENVIRONMENTAL CLEARANCE COMPLIANCE OF CLUSTER-II MINING AREA OF BCCL**(GRANTED VIDE: J-11015/35/2011-1A II (M) dated 06.02.13****(01.10.2023 to 31.03.2024)**

(01.10.2023 to 31.03.2024)

Sl. no.	A. Specific Conditions by MOEF:	Compliance				
i	The maximum production by opencast mining shall not exceed beyond that for which environmental clearance has been granted for the 5 mine of Cluster- II.	The production from the Cluster is within limit for which environment clearance has been granted.				
		Mine Cluster II	Coal (MTPA)	2021-22	2022-23	2023-24
				5.18	6.61	10.22
ii	The measure to identify in the Environmental Plan for Cluster- II groups of mine and the conditions given in this environmental clearance letter shall be dovetailed to the implementation of the Jharia Action Plan.	Master Plan is dovetailed with environmental clearance condition. Action like trench cutting & water flushing is being taken to control, mine fires including old OB dump & areas as specified in Jharia Master Plan				
iii	The proponent shall prepare time -series maps of the Jharia Coalfields through NRSA to monitor and prevent fire problems in the Jharia Coalfields by Isothermal mapping /imaging and monitoring temperatures of the coal seams (whether they are close to spontaneous ignition temperatures) and based on which, areas with potential fire problems shall be identified. Measures to prevent ingress of air (Ventilation) in such areas, to prevent restart fresh/spread fires in other areas including in mines of cluster II shall be undertaken. Expertise available internationally could also be utilized for control of fire in Jharia Coalfields and for their reclamation and to further minimize time for fire and subsidence control. Monitoring of fire should be carried out regularly.	Time -series maps of the Jharia Coalfields is prepared by NRSA for 2021 and will continue. As per study conducted by NRSA, Toward the western end of the mining area, the Benedih and Block II OCP are affected by smaller fires from isolated coal seams. An older fire patch is also seen in the Shatabdi mine. (Copy of NRSA report is enclosed as Annexure-I)				
iv	Underground mining should be taken up after completion of reclamation of Opencast mine area.	Agreed. Underground mining will be taken up after the completion of reclamation of Opencast mine area.				
v	The embankment constructed along the river boundary shall be of suitable dimensions and critical patches shall be strengthened by stone pitching on the river front side and stabilized with plantation so as to withstand the peak water flow and prevent mine inundation.	Strong stony embankment with plantation is present along river & nalla flowing nearby along.				
vi	The rejects of washeries in Cluster -II should be send to FBC based plant.	No washery is present in cluster.				
vii	No mining shall be undertaken where underground fires continue. Measure shall be taken to prevent/ check such fire including in old OB dump areas where the fire could start due to presence of coal /shale with sufficient carbon content.	Mining is being carried out as per the guidelines of DGMS. Sufficient precaution like trench cutting and water flushing is being taken to guard against fire.				
viii	There shall be no external OB dumps. OB produce from the whole cluster will be 484.89Mm ³ . OB from 3 OCP and 2 patches in mixed mine shall be backfilled. At the end of the mining there shall be no void and the entire mined out area shall be re-vegetated. Areas where opencast mining was carried out and completed shall be reclaimed immediately thereafter.	OB produced is being used in back-filling. Ecological restoration practices is being carried out at the stable OB dumps & decoalded area and grass seed balls are also spread on the slopes of the dumps for slope stability.				

ix	A detailed calendar plan of production with plan for OB dumping and backfilling (for OC mines) and reclamation and final mine closure plan for each mine of cluster-II shall be drawn up and implemented.	Calendar plan of production with plan for OB has been prepared. Mine closure plan as per the guidelines of Ministry of Coal have been prepared by CMPDI and is being implemented. Calendar plan for OC mines of Cluster -II for next 3 yrs. is:- <table><tr><td></td><td>2024-25</td><td>2025-26</td><td>2026-27</td></tr><tr><td>Coal(MTc)</td><td>10.55</td><td>10.88</td><td>11.30</td></tr><tr><td>OB (MM³)</td><td>16.66</td><td>18.51</td><td>18.54</td></tr></table>		2024-25	2025-26	2026-27	Coal(MTc)	10.55	10.88	11.30	OB (MM ³)	16.66	18.51	18.54
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x	Mining shall be carried out as per statute from the streams/nalas flowing within the lease and maintaining a safe distance from the Nalas flowing along the lease boundary. A safety barrier of a minimum 60m width shall be maintained along the nalas/water bodies. The small water bodies in OC shall be protected to the extent feasible and the embankment proposed along water body shall be strengthened with stone pitching taking into account the highest flood level, based on past data, so as to guard against mine inundation. The slope of the embankment shall at least 2:1 towards the ML. The height of the embankment shall be at least 3 m higher than the HFL. The embankment to be constructed by OB /solid waste shall be strengthened with stone pitching. Slope stability of the embankment shall be done by planting suitable grass and shrubs using native species selected from the study area.	It is being followed. More than 60 m distance is being maintained from nearby river/nalla. Strong stony embankment with plantation is present along river/Nalla.  The height of the embankment of Jamunia river is 8 m higher than the HFL												
xi	Active OB dumps near water bodies and rivers should be re-handled for backfilling abandoned mine voids. However, those which have been biologically reclaimed need not be disturbed.	There is no active OB dumps near water bodies and rivers.												
xii	Thick green belt shall be developed along undisturbed areas, mine boundary and in mine reclamation. A total area of 1237.48ha shall be reclaimed and afforested.	It is being complied. Total area of 207.5 ha has been planted. A total area of 21.5 ha & 500 gabion is taken for plantation in 2021-24 & being eco-restored.												
xiii	The road should be provided with avenue plantation on both side as trees act as sink of carbon and other pollutant.	500 no of sapling planted along connecting and transportation road. 2 nos. of Plantation sites are present along road (approx. 400 m) connecting mine to state govt road and also there are 2-3 plantation site along permanent road in mines. Most of the coal is being transported through railway siding .Road transport is being carried out through existing network of NH/SH where avenue Plantation already exist. 												
xiv	Specific mitigative measures identified for the Jharia Coalfields in the Environmental Action Plan prepared for Dhanbad as a critically polluted area and relevant for	Dhanbad Action Plan is being implemented. The salient actions of this area: 1. Covered transportation of Coal.												

	Cluster- II shall be implemented.	2. Water sprinkling. 3. Plantation. 4. Utilization of surplus mine water.																																														
xv	The locations of monitoring stations in the Jharia Coalfields should be finalized in consultation with the Jharkhand State Pollution Control Board. The Committee stated that smoke/dust emission vary from source to source (fuel wood, coal, fly ash from TPPs, silica from natural dust, etc.) and a Source Apportionment Study should be got carried out for the entire Jharia Coalfields. Mineralogical composition study should be undertaken on the composition of the suspended particulate matter (PM ₁₀ and PM _{2.5}) in Jharia Coalfields and also quantified. These studies would help ascertain source and extent of the air pollution, based on which appropriate mitigative measures could be taken.	Establishment of ambient environment quality monitoring stations has been finalized in consultation with the JSPCB. The work of source apportionment was awarded to NEERI, Nagpur on 12.05.2018. NEERI Nagpur has submitted the final report as on 27.04.2022 The result report is attached.																																														
xvi	The Transportation Plan for conveyor-cum-rail for Cluster-II should be dovetailed with Jharia Action Plan. Road transportation of coal during Phase-I should be by mechanically covered trucks, which should be introduced at the earliest.	CMPDIL RI-II has been requested to conduct study and prepare the plan in this regarding. No OEM is provided for mechanically covered trucks, transportation is being done by covering vehicle with Tarpaulin.																																														
xvii	R&R of 1137 nos. of PAF's involved. They should be rehabilitated at cost of Rs 45.08 Crores as per the approved Jharia Action Plan.	Implementation of master plan has already been started through Jharkhand Rehabilitation and Development Authority, Dhanbad. Survey of affected site by JRDA has done.																																														
xviii	Regular monitoring of groundwater level and quality of the study area shall be carried out by establishing a network of existing wells and construction of new piezometers. The monitoring for quantity shall be done four times a year in pre-monsoon (May), monsoon (August), post-monsoon (November) and winter (January) seasons and for quality including Arsenic and Fluoride during the month of May. Data thus collected shall be submitted to the Ministry of Environment & Forest and to the Central Pollution Control Board/SPCB quarterly within one month of monitoring. Rainwater harvesting measures shall be undertaken in case monitoring of water table indicates a declining trend.	Groundwater level and quality is being regularly monitored by CMPDIL. Tender has been cancelled thrice. The estimate is being revised in association with CMPDI for re-tendering. Monitoring stations (B001, B059, B060 and B062) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'23, August'23, Nov'23 and January'24. The Ground water level data is presented in the table below: <table><tr><th rowspan="2">Sl. No.</th><th rowspan="2">Well No.</th><th rowspan="2">Location</th><th colspan="4">Water level (bgl in meters)</th></tr><tr><th>May '23</th><th>Aug '23</th><th>Nov '23</th><th>Jan '24</th></tr><tr><td>1</td><td>B001</td><td>Muraidih</td><td>3.22</td><td>1.25</td><td>2.45</td><td>2.70</td></tr><tr><td>2</td><td>B059</td><td>Khodovaly</td><td>1.88</td><td>0.50</td><td>0.70</td><td>1.12</td></tr><tr><td>3</td><td>B060</td><td>Bahiyardih</td><td>10.73</td><td>5.31</td><td>5.73</td><td>9.51</td></tr><tr><td>4</td><td>B062</td><td>Sadiyardih</td><td>4.80</td><td>2.35</td><td>3.10</td><td>4.00</td></tr><tr><td colspan="3">Average WL (bgl)</td><td>5.16</td><td>2.35</td><td>3.00</td><td>4.33</td></tr></table> (Soft copy of report is enclosed as Annexure II)	Sl. No.	Well No.	Location	Water level (bgl in meters)				May '23	Aug '23	Nov '23	Jan '24	1	B001	Muraidih	3.22	1.25	2.45	2.70	2	B059	Khodovaly	1.88	0.50	0.70	1.12	3	B060	Bahiyardih	10.73	5.31	5.73	9.51	4	B062	Sadiyardih	4.80	2.35	3.10	4.00	Average WL (bgl)			5.16	2.35	3.00	4.33
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xix	Regular monitoring of subsidence movement on the surface over and around the working area and 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 movement, appropriate effective corrective measures shall be taken to avoid loss of life and material. Cracks shall be effectively plugged with ballast and clayey soil/suitable material.	As the area is having O/C mines, hence no subsidence is there.
xx	Sufficient coal pillars shall be left unextracted around the air shaft (within the subsidence influence area) to protect from any damage from subsidence, if any.	Presently only OCP working exist.
xxi	High root density tree species shall be selected and planted over areas likely to be affected by subsidence.	As the area is having O/C mines, hence no subsidence is there.
xxii	Depression due to subsidence resulting in water accumulating within the low lying areas shall be filled up or drained out by cutting drains.	As the area is having O/C mines, hence no subsidence is there.
xxiii	Solid barriers shall be left below the roads falling within the blocks to avoid any damage to the roads.	As the area is having O/C mines, hence no subsidence is there.
xxiv	No depillaring operation shall be carried out below the township/colony.	Presently only OCP working exist in this cluster.
xxv	A detailed CSR Action Plan shall be prepared for Cluster II group of mines. Specific activities shall be identified for CSR for the budget of Rs 77.50 Lakhs per year @ Rs 5/T of coal provided for CSR for 2012-2013 and Rs. 5/T of coal as recurring expenditure. The 416.98 ha of area within Cluster II ML existing as waste land and not being acquired shall be put to productive use under CSR and developed with fruit bearing and other useful species for the local communities. In addition to afforesting 1237.48 ha of area at the post-mining stage, the 122.18ha of fallow/abandoned land and 416.98 ha waste land /barren land within Cluster- II mining lease area shall be rehabilitated/reclaimed as forest/agricultural land under CSR Plan in consultation with local communities. Third party evaluation shall be got carried out regularly for the proper implementation of activities undertaken in the project area under CSR. Issue raised in the Public Hearing shall also be integrated with activities being taken up under CSR. The details of CSR undertaken along with budgetary provisions for the village-wise various activities and expenditure thereon shall be uploaded on the company website every year. The company must give priority to capacity building both within the company and to the local youth, who are motivated to carry out the work in future.	BCCL is implementing CSR activities, as per Govt. norms with a CSR Committee being evaluated by Tata Institute of Social Science. Rs. 191.67 lakhs spend for Construction and maintenance of toilets for 5years in Government schools in Gumla District under Swachh Vidyalaya Abhiyan. 125 toilets in 69 schools were constructed. All welfare/ CSR activities are also uploaded in Company web site. Work undertaken as per issue raised (Road, electricity, water availability, pond creation & cleaning etc) is given in Annexure III A In FY2023-24, Construction of Community hall under Harina Panchayat benefiting approx. 250person & Water supply arrangement in Harsudih Village benefiting approx. 300 person. (Expenditure under CSR is given in CSR Booklet enclosed as Annexure III)
xxvi	Details of transportation, CSR, R&R and implementation of environmental action plan for the clusters-II should be brought out in a booklet form within a year and regularly updated.	Booklet form is being maintained. (Soft copy of booklet is enclosed as Annexure III.) Environmental action plan is formulated and implementation is initiated.

xxvii	Mine discharge water shall be treated to meet standards prescribed standards before discharge into natural water courses/agriculture. The quality of the water discharged shall be monitored at the outlet points and proper records maintained thereof and uploaded regularly on the company website.	Mine discharge water is being allowed to settle down in the mine sumps and is being used for domestic purpose after treatment through Pressure Filter. Regular monitoring of Water Quality Parameters is being carried out by CMPDIL and reports are being uploaded regularly on company website. Max. value of parameters of mine discharge is given in the table below: <table><tr><td>Total Suspended Solids</td><td>48</td></tr><tr><td>pH</td><td>8.06</td></tr><tr><td>Oil & Grease</td><td><2</td></tr><tr><td>COD</td><td>48</td></tr></table> (Soft copy of monitoring report is enclosed as Annexure IV)	Total Suspended Solids	48	pH	8.06	Oil & Grease	<2	COD	48																																						
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xxviii	No groundwater shall be used for the mining activities. Additional water required, if any, shall be met from mine water or by recycling/reuse of the water from the existing activities and from rainwater harvesting measures. The project authorities shall meet water requirement of nearby village(s) in case the village wells go dry to dewatering of mine.	It is being complied and mine water is being used for the industrial purpose. Further mine water after treatment is also utilized for the community and irrigation purposes. Following action has been taken by the Company: 1. Utilization of surplus mine water for irrigation, pisciculture purpose.																																														
xxix	The void shall be converted into a water reservoir of a maximum depth of 15-20 m and shall be gently sloped and the upper benches of the reservoir shall be stabilized with plantation and the periphery of the reservoir fenced. The abandoned pits and voids should be backfilled with OB and reclaimed with plantation and or may be used for pisciculture.	The void will be converted into the water body as specified in EMP at the end of the mining.																																														
xxx	Regular monitoring of groundwater level and quality of the study area shall be carried out by establishing a network of existing wells and construction of new piezometers. The monitoring for quantity shall be done four times a year in pre-monsoon (May), monsoon (August), post-monsoon (November) and winter (January) seasons and for quality including Arsenic and Fluoride during the month of May. Data thus collected shall be submitted to the Ministry of Environment & Forest and to the Central Pollution Control Board/SPCB quarterly within one month of monitoring. Rainwater harvesting measures shall be undertaken in case monitoring of water table indicates a declining trend.	Groundwater level and quality is being regularly monitored by CMPDIL. Monitoring stations (B001, B059, B060 and B062) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'23, August'23, Nov'23 and January'24. The Ground water level data is presented in the table below: <table><tr><th rowspan="2">Sl. No.</th><th rowspan="2">Well No.</th><th rowspan="2">Location</th><th colspan="4">Water level (bgl in meters)</th></tr><tr><th>May '23</th><th>Aug '23</th><th>Nov '23</th><th>Jan '24</th></tr><tr><td>1</td><td>B001</td><td>Muraidih</td><td>3.22</td><td>1.25</td><td>2.45</td><td>2.70</td></tr><tr><td>2</td><td>B059</td><td>Khodovaly</td><td>1.88</td><td>0.50</td><td>0.70</td><td>1.12</td></tr><tr><td>3</td><td>B060</td><td>Bahiyardih</td><td>10.73</td><td>5.31</td><td>5.73</td><td>9.51</td></tr><tr><td>4</td><td>B062</td><td>Sadiyardih</td><td>4.80</td><td>2.35</td><td>3.10</td><td>4.00</td></tr><tr><td colspan="3">Average WL (bgl)</td><td>5.16</td><td>2.35</td><td>3.00</td><td>4.33</td></tr></table> (Soft copy of report is enclosed as Annexure II)	Sl. No.	Well No.	Location	Water level (bgl in meters)				May '23	Aug '23	Nov '23	Jan '24	1	B001	Muraidih	3.22	1.25	2.45	2.70	2	B059	Khodovaly	1.88	0.50	0.70	1.12	3	B060	Bahiyardih	10.73	5.31	5.73	9.51	4	B062	Sadiyardih	4.80	2.35	3.10	4.00	Average WL (bgl)			5.16	2.35	3.00	4.33
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xxxi	ETP shall also be provided for workshop, and CHP, if any. Effluents shall be treated to conform to prescribe standards in case discharge into the natural water course.	Oil & grease Trap for workshop is provided																																														

		
xxxii	The location of monitoring stations in the Jharia coalfield should be finalized in consultation with Jharkhand State Pollution Control Board.	The location of monitoring stations in the Jharia Coalfield has been finalized with the Jharkhand State pollution Control Board.
xxxiii	For monitoring land use pattern and for post mining land use, a time series of land use maps, based on satellite imagery (on a scale of 1: 50000) of the core zone and buffer zone, from the start of the project until end of mine life shall be prepared once in 3 years (for any one particular season which is consistent in the time series), and the report submitted to MOEF and its Regional office at Bhubaneswar.	Presently a time series map of vegetation cover in the Jharia Coal Field is being carried out through CMPDI, Ranchi using satellite imagery for every 3 years & it has been uploaded on the official website of company. Also CIL issued a work order to CMPDI for monitoring of land reclamation status of all the OC coal mines having production capacity of more than 5MM ³ /Annum(coal+ OB) regularly on annual basis and for monitoring of less than 5 MM ³ /Annum at an interval of 3 years. With a total leasehold area of 2025.71Ha, Cluster II (Block II Colliery, Jamunia OCP, Shatabdi OCP, Muraidih OCP, Phularitand OCP) were considered for land Reclamation monitoring based on satellite data during 2022-23. Total excavated area is only 658.27 Ha, of which 87.42 Ha area (13.28%) has been planted, 422.00 Ha area (64.11%) is under backfilling and 148.85 Ha area (22.61%) is under active mining. It is evident from the analysis that 77.39% of total area of Cluster II (Block II Colliery, Jamunia OCP, Shatabdi OCP, Muraidih OCP, Phularitand OCP) projects has come under reclamation and balance 22.61% area is under active mining. (Soft copy of land reclamation report is enclosed as Annexure V)
xxxiv	A Final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment & Forests five year before mine closure for approval. Habitat Restoration Plan of the mine area shall be carried out using a mix of native species found in the original ecosystem, which were conserved in-situ and ex-situ in an identified area within the lease for reintroduction in the mine during mine reclamation and at the post mining stage for habitat restoration.	BCCL is being depositing the amount in ESCROW account as specified in the progressive mine closure Plan. A Final Mine Closure Plan along with details of Corpus Fund will be submitted to the Ministry of Environment & Forests five year before mine closure for approval. Native species (Sheesham, sirish, Arjuna, grass etc.) are being used in mine reclamation. (Details of amount deposited enclosed as Annexure VI)
xxxv	A separate management structure for implementing environment policy and socio-economic issues and the capacity building required in this regard.	A full-fledged Environment cell, with a suitable qualified multidisciplinary team of executives has been established. GM (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.

xxxvi	(A) Corporate Environment Responsibility:	
	a) The Company shall have a well laid down Environment Policy approved by the Board of Directors. b) The Environment Policy shall prescribe for standard operating process/procedures to bring into focus any infringements/deviation/violation of the environmental or forest norms/conditions. c) The hierarchical system or Administrative Order of the company to deal with environmental issues and for ensuring compliance with the environmental clearance conditions shall be furnished. d) To have proper checks and balances, the company shall have a well laid down system of reporting of non-compliances/violations of environmental norms to the Board of Directors of the company and/or shareholders or stakeholders at large.	A well-defined Corporate Environment Policy has already been laid down and approved by the Board of Directors. This is also posted on BCCL website. Complied. A hierarchical system of the company to deal with environmental issues from corporate level to mine level already exists. Being complied.
B	General Conditions by MOEF:	
i	No change in mining technology and scope of working shall be made without prior approval of the Ministry of Environment and Forests.	Mining is being done by shovel-dumper combination.
ii	No change in the calendar plan of production for quantum of mineral coal shall be made.	The coal production as planned is maintained to be within approved limits.
iii	Four ambient air quality monitoring stations shall be established in the core zone as well as in the buffer zone for PM ₁₀ , PM _{2.5} , SO ₂ and NO _x monitoring. 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. Monitoring of heavy metals such as Hg, As, Ni, Cd, Cr, etc. carried out at least once in six months.	The location of monitoring stations in Jharia Coal Field has been finalized in consultation with the Jharkhand State Pollution Control Board. Ambient air quality along with heavy metals such as Hg, As, Ni, Cd, Cr, etc., is carried out at least once in six months by CMPDIL. (Soft copy of monitoring report is enclosed as Annexure IV)
iv	Data on ambient air quality (PM ₁₀ , PM _{2.5} , SO ₂ and NO _x Hg, As, Ni, Cd, Cr and other monitoring data shall be regularly submitted to the Ministry including its Regional Office at Bhubaneswar and to the State Pollution Control Board and the Central Pollution Control Board once in six months. Random verification of samples through analysis from independent laboratories recognized under the EPA rules, 1986 shall be furnished as part of compliance report.	Data on ambient air and other monitoring data is being regularly submitted to the Ministry & Pollution Control Board along with compliance report. (Soft copy of report is enclosed as Annexure IV)
v	Adequate measures shall be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in blasting and drilling operations, operation of HEMM, etc. shall be provided with ear plugs/muffs.	Noise level varies from 39.9 dBA (Muraidih OCP) to 66.0 dBA (Madhuband Washery). Regular maintenance of vehicles and other machineries are being practiced for control of noise level. Ear plugs/muffs are provided (200 Nos in 2023-24) to the persons engaged in blasting and drilling operations, operation of HEMM, etc. . (Soft copy of monitoring report is enclosed. as

		Annexure IV)
vi	Industrial waste water (workshop and waste water from the mine) shall be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19 th May 1993 and 31 st December 1993 or as amended from time to time before discharge. Oil and grease trap shall be installed before discharge of workshop effluents.	Oil and grease trap is installed for treatment of Workshop effluents.  (Oil & Grease trap) Excess mine water is being stored at old quarries and ponds for community use. This will help to recharge the ground water.
vii	Vehicular emissions shall be kept under control and regularly monitored. Vehicles used for transporting the mineral shall be covered with tarpaulins and optimally loaded.	Regular pollution under control check-up is being done. Regular maintenance of vehicle is being practiced to kept vehicular emission under control. Coal is being transported in tarpaulin covered trucks. (Pollution under control certificate of vehicles are enclosed as Annexure VII)
viii	Monitoring of environmental quality parameters shall be carried out through establishment of adequate number and type of pollution monitoring and analysis equipment in consultation with the State Pollution Control Board and data got analyzed through a laboratory recognized under EPA Rules, 1986.	It is being done by CMPDIL, Ranchi having NABL accreditation.
ix	Personnel working in dusty areas shall wear protective respiratory devices and they shall also be provided with adequate training and information on safety and health aspects.	Dust masks are provided (1000 Nos in 2023-24) to personnel working in dusty areas. Vocational training center under separate Human Resource Development Dept. is conducting regular training programme on these issues. More than 500 nos of employee got training at VTC Barora in FY 2023-24. (Training list enclosed as Annexure VIII)
x	Occupational health surveillance programme of the workers shall be undertaken periodically to observe any contractions due to exposure to dust and to take corrective measures, if needed and records maintained thereof. The quality of environment due to outsourcing	Initial Medical Examination (IME) and Periodical Medical Examination (PME) of all the personnel are carried out as per the Statutes and Director General of Mines Safety (DGMS) guideline.

	and the health and safety issues of the outsourced manpower should be addressed by the company while outsourcing.	Medical examination of outsourcing Manpower is also being done.
xi	A separate environmental management cell with suitable qualified personnel shall be set up under the control of a Senior Executive, who will report directly to the Head of the company.	A full-fledged Environment cell, with a suitable qualified multidisciplinary team of executives has been established. GM (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. Socio economic issues and capacity building are being evaluated by Tata Institute of Social Science.
xii	The funds earmarked for environmental protection measures shall be kept in separate account and shall not be diverted for other purpose. Year-wise expenditure shall be reported to this Ministry and its Regional Office at Bhubaneswar.	Separate head "plantation" & "environment" is there for recurring expenditure and used for eco-restoration, environmental protection measures, statutory payments etc. In 2023-24 approx. Rs.3.0 crore expenditure incurred on plantation, eco-restoration, water sprinkling & environmental monitoring. (Including the cost of manpower & Diesel consumed in water spraying tanker)
xiii	The project authorities shall advertise at least in two local newspapers widely circulated around the project, one of which shall be in the vernacular language of the locality concerned within seven days 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 may also be seen at the website of the ministry of Environment & Forests at http://envfor.nic.in .	It has been complied. Advertisement in local newspaper has been given. 
xiv	A copy of the environmental clearance letter shall be marked to concern Panchayat/Zila Parishad, Municipal corporation or Urban local body and local NGO, if any, from whom any suggestion /representation has been received while processing the proposal. A copy of the clearance letter shall also be displayed on company's website.	Being complied. Clearance letter has been displayed on Company web site. Also Clearance letter has been sent to Mukhiya of different Panchayat. (Soft copy of letters are enclosed as Annexure IX)
xv	A copy of the environmental clearance letter shall also be displayed on the website of the concerned State Pollution Control Board. The EC letter shall also be displayed at the Regional Office, District Industry Sector and Collector's Office/Tehsildar's Office for 30 days.	Complied.
xvi	The clearance letter shall be uploaded on the company's website. The compliance status of the stipulated environmental clearance 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. The monitoring data of environmental quality parameter (air, water, noise and soil) and critical pollutant such as PM ₁₀ , PM _{2.5} , SO ₂ and NO _x (ambient) and critical sectoral parameters shall also	Clearance letter has been displayed on Company web site and updated regularly. The monitoring data of environmental quality parameter (air, water, noise and soil) and critical pollutant such as PM ₁₀ , PM _{2.5} , SO ₂ and NO _x (ambient) and critical sectoral parameters is being displayed at the entrance of the project premises and Area office.

	be displayed at the entrance of the project premises and mine office and in corporate office and on company's website.	
xvii	The project proponent shall submit six monthly compliance reports on status of compliance of the stipulated environmental clearance conditions (both in hard copy and in e-mail) to the respective Regional Office of the Ministry, respective Zonal Offices of CPCB and the SPCB.	Being submitted.
xviii	The Regional Office of this Ministry located at Bhubaneswar shall monitor compliance of the stipulated conditions. The Project authorities shall extend full cooperation to the office(s) of the Regional Office by furnishing the requisite data/ information/monitoring reports.	Full cooperation will be extended from project end.
xix	The Environmental statement for each financial year ending 31 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 by E-mail	Being submitted on time.

[Signature]
11.5.24
General Manager
Barora Area

[Signature]
11.5.24
Area Manager (Env)
Barora Area

[Signature]
11.5.2024
Project Officer
Muraidih UG, Shatabdi & Phularitand Colliery

[Signature]
15/5/24
General Manager
Block-II Area

[Signature]
15/5/24
Area Manager (Env)
Block-II Area

[Signature]
15/05/24
Project Officer
ABOCP Mine

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



**GEODYNAMICS AND GEOHAZARDS DIVISION
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DEPT. OF SPACE, GOVT. OF INDIA
HYDERABAD-500 037**

AUGUST, 2021

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

Report for

BHARAT COKING COAL LIMITED (BCCL)

(A SUBSIDIARY OF COAL INDIA LTD.)

ENVIRONMENT DEPARTMENT, KOYLA BHAWAN

KOYLA NAGAR, DHANBAD – 826 005, JHARKHAND

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AUGUST, 2021



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15	Abstract (with Keywords): Coal fire is a serious problem in Jharia coal field, where high grade coals are gradually burnt due to these fires. The combined effect of surface and sub-surface fires and mining related subsidence has affected the environmental stability of Jharia coal field. Coupled with the ecological changes instigated by open cast mining, the landscape in and around Jharia have changed drastically over the years. In the present study, delineation of coal fire and mining related land subsidence have been addressed. Thermal band data of Landsat-8 (100m resolution) have been used to demarcate the coal mine fire areas from non fire areas. For this study, Landsat-8 data of May, 2021 have been used. The band 10 (10.60-11.19 μm) of Landsat-8 data are used to derive the relative radiant temperature. Further ALOS-PALSAR 2, L band microwave data have been used to delineate zone of probable land subsidence (using differential interferometry) due to mining. The study reflects that, compared to 2017, the eastern flanks (Lodna and Tisra etc) show a significant reduction in total fire area. The western flank (Block II and Shatabdi) and the northern flank (Katras and Gaslitand) show isolated fire pockets in active mines as well as in OB dumps. The current total fire area mapped is 1.8 sq.km. Apart from this, one distinctive area of land subsidence has been identified using interferometric method. These are primarily caused by older or active underground mining in the Moonidih Project. The coal mine fire and subsidence areas are further verified on the ground. The final coal mine fire and subsidence maps of Jharia coal field are prepared by using remote sensing data analysis with field validation.				

PROJECT TEAM

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Project formulation and co-ordination
2. **Dr. Tapas R. Martha**, Head, Geodynamics and Geohazards Division
Review and report preparation
3. **Shri Priyom Roy**, Scientist 'SE'
Image processing, interpretation, field survey, maps and report preparation

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EXECUTIVE SUMMARY

Coal fire is a serious problem in Jharia coal field, where high grade coals are gradually burnt due to these fires. The combined effect of surface and sub-surface fires and mining related subsidence has affected the environmental stability of Jharia coal field. Coupled with the ecological changes instigated by open cast mining, the landscape in and around Jharia have changed drastically over the years. In the present study, delineation of coal fire and mining related land subsidence has been addressed. Thermal band data of Landsat-8 (100m resolution) have been used to demarcate the coal mine fire areas from non fire areas. For this study, Landsat-8 data of May, 2021 have been used. The band 10 (10.60-11.19 μm) of Landsat-8 data are used to derive the relative radiant temperature. Further ALOS-PALSAR 2, L band microwave data have been used to delineate zone of probable land subsidence (using differential interferometry) due to mining. The study reflects that, compared to 2017, the eastern flanks (Lodna and Tisra etc) show a significant reduction in total fire area. The western flank (Block II and Shatabdi) and the northern flank (Katras and Gaslitand) show isolated fire pockets in active mines as well as in OB dumps. The current total fire area mapped is 1.8 sq.km. Apart from this, one distinctive area of land subsidence has been identified using interferometric method. These are primarily caused by older or active underground mining in the Moonidih Project. The coal mine fire and subsidence areas are further verified on the ground. The final coal mine fire and subsidence maps of Jharia coal field are prepared by using remote sensing data analysis with field validation.

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CHAPTER I

INTRODUCTION

Coal fire is a perennial problem in Jharia coal field (JCF) covering 447 sq. km. area in the Dhanbad district of Jharkhand state. Subsurface and surface coal fires are a serious problem in many coal-producing countries. The severity and extent of mine fires in some of the Indian coalfields, particularly Jharia and Raniganj coalfields, are quite alarming. Combustion can occur either within coal or in coal dumps on the surface. Considerable economic loss and environmental problem arises due to the coal fire. Coal fire burns valuable coal and also creates difficulties in mining by increasing the cost of production or making existing operations difficult. Noxious gases like sulphur dioxide, nitrogen oxide, carbon monoxide, carbon dioxides, which are the result of coal burning processes, often affect the immediate surroundings of an active coal fire area (Gangopadhyay, 2003). These greenhouse gases not only affect local atmosphere but also play a crucial role in the damages, found associated with coal fire such as land surface subsidence and surface cracking. Coal fires are caused by oxidation of coal but the reaction involved in oxidation of coal is not understood till date. Broadly, the potential for spontaneous combustion lies in its ability to react with oxygen at ambient temperature. This occurs through the reaction of oxygen at the surface of the coal resulting in an exothermic reaction. As a consequence, the temperature of coal rises and if temperature reaches the threshold temperature, ranging between 80⁰ to 120⁰C, a steady reaction starts, which produces carbon dioxide. Temperature keeps on increasing once CO₂ started to form and at 2300°C, the exothermic reaction becomes rapid. It is known that high grade coals (high carbon content) are more fire prone, though the reason behind this is not well understood. Another important parameter, which controls fire, is the size of the particles. Larger the effective area of coal (fire particles), more rapidly the reaction proceeds. Cracks, fissures play a role like positive catalysts to coal oxidation by slowly supplying oxygen / air through their conduits.

Coal mining in Jharia Coal Field (JCF) started way back in 1895. History of fire in Jharia Coal Field date back to 1916 when the first incidence of fire was reported from XIV seam of Bhowrah colliery. JCF was nationalised in 1972 and over the decades, the fire has spread or been contained but never extinguished. The combination of underground fire and subsidence have affected vast areas of JCF.

1.1 Background

Remote sensing technique in thermal band offers a cost-effective and time-saving technology for mapping various geoenvironmental / hazardous features such as coal fires, forest fires, oil well fires, volcanic eruptions etc. NRSC has carried out coal fire mapping projects in the past; conducting an airborne campaign in 1989 and using Landsat-5 TM data in 1995 (Bhattacharya *et. al.*, 1995), over Jharia coalfield, Jharkhand and using Landsat-5 TM data for 2001 over Raniganj coalfield, West Bengal. Further, projects were executed in 2006 and 2012 in which coal fires of the JCF were mapped using Landsat-7 ETM+ and ASTER data, respectively. Additionally, a R&D study was taken up in 2013 to delineate subsidence areas using differential interferometric (DInSAR) technique. An operational fire and subsidence mapping activity was taken up in 2017. In view of the past experiences, based on the letter (Ref. no. MP/19/270) from General manager (JMP), BCCL addressed to Director, NRSC on 24-10-2019, a project was formulated to take up Coal fire and Land Subsidence study of the Jharia Coal Field using space-borne remote sensing technique. The formal Memorandum of Understanding between BCCL and NRSC was signed on 7th August, 2020.

1.2 Objectives

The following objectives are formulated on the basis of the above mentioned background:

- I. To map Coal fire in the study area based on pixel integrated relative radiant temperature derived from latest available Landsat-8 data of 2020 time period.
- II. To compare the change in the coal fire distribution in the Jharia coalfield between the period of 2017 and 2020.
- III. To delineate probable subsidence areas in the region using differential interferometry method.

1.3 Study Area

Jharia Coalfield is located in the Dhanbad district of Jharkhand state (Figure 1) and it is named after the main coal mining town of Jharia. It is situated in the Damodar River valley and is about 250 km NW of Kolkata. The coalfield is contained approximately within latitudes $23^{\circ} 42' N$ and $23^{\circ} 50' N$ and longitudes $86^{\circ} 09' E$ and $86^{\circ} 30' E$.

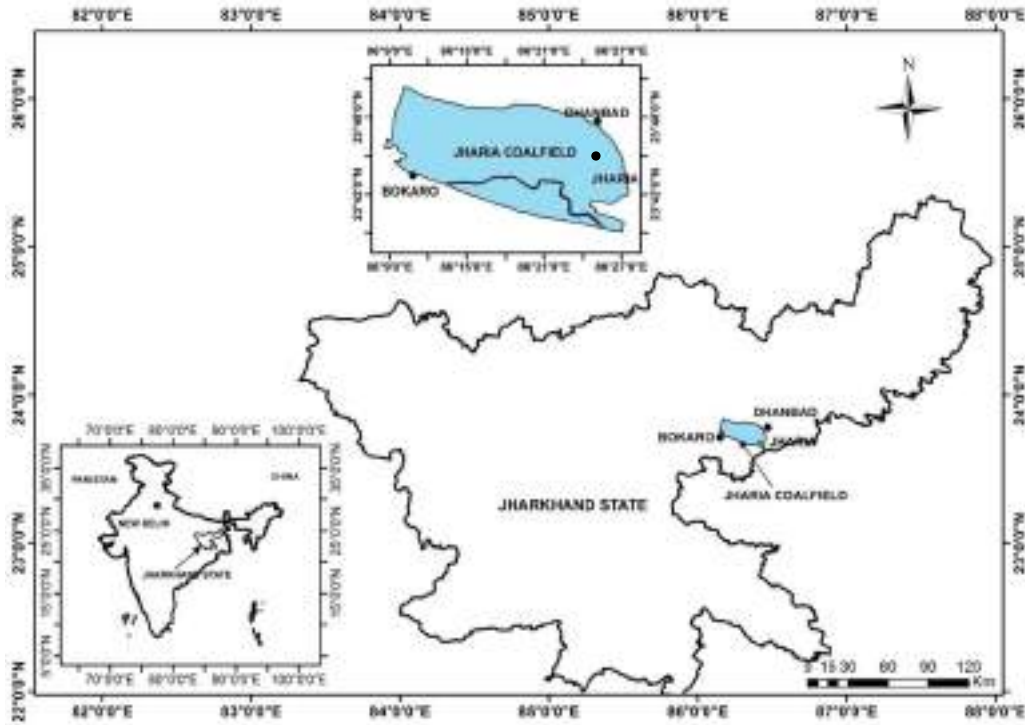


Figure 1: Study area map of Jharia Coalfield, Jharkhand

CHAPTER II

GENERAL DESCRIPTION OF THE STUDY AREA

2.1 Location and Accessibility

Jharia is an old mining town in the Dhanbad district of Jharkhand. This town is famous for its surrounding mines producing high grade coal and supplying mainly to the neighbouring industrial areas. Jharia is approximately 6 km in south western direction from Dhanbad town and connected by metal road. Dhanbad is well connected to Kolkata by road and rail.

2.2 Physiography, Drainage and Climate

Jharia coalfield is characterised by undulatory topography with very low rolling slope towards the eastern part of the area. The average height of the area is around 200 meters above the mean sea level. Damodar is the major river in the study area. The other tributaries to the Damodar River in this area are Jamuniya Nadi, Khudia Nadi, Khatri Nadi, Jarian Nala, Kari Jora and Domohani Nadi. Damodar River flows from west to east in this area. The minimum temperature is $\sim 10^{\circ}$ C in the month of December – January and maximum temperature is $\sim 50^{\circ}$ C in the month of May – June.

2.3 General Geology

Gondwana Super Groups of rocks of Up. Carboniferous to Lr. Cretaceous age (i.e. from 320 MY to 98 MY) are exposed here. Gondwana Super Group rocks unconformably overlie Archaean rocks. In Gondwana Rocks, Raniganj and Barakar Formations of Permian age have more potential as far as the coal production is concerned. Barakar Formation is exposed in north and north eastern part of the basin (Figure 2). Most of the coal mines are confined to the Barakar Formation in JCF. Barakars consists of coarse, medium grey and white sandstones, shales and coal seams. Raniganj consists of grey and greenish soft feldspathic sandstones, shales and coal seams. Faults are prevalent in this portion of basins (Figure 2). NW trending faults are conspicuous north to Jharia. Many lamprophyre and dolerite dykes are also exposed in this area in a criss-cross manner. The Raniganj Formation though coal bearing, has suffered much deformation due to faulting, thus causing difficulty for

mining in the area. The generalised stratigraphy of JCF is mentioned below (after Saraf, et al., 1995).

FORMATION	LITHOLOGY	MAXIMUM THICKNESS
Supra Panchet	Red and Grey sandstones and shales	300m
Panchet	Micaceous Yellow and Grey sandstones, Red and Greenish shales	600m
Raniganj	Grey and Greenish soft feldspathic sandstones, shales and coal seams	1050m
Ironstone Shales	Dark carbonaceous shales with ironstone bands	360m
Barakar	Coarse and medium Grey and white sandstones, shales and coal seams	630m
Talchir Boulder Bed	Coarse sandstones above and Greenish shales below	300m

Table 1: Generalised stratigraphy of JCF.

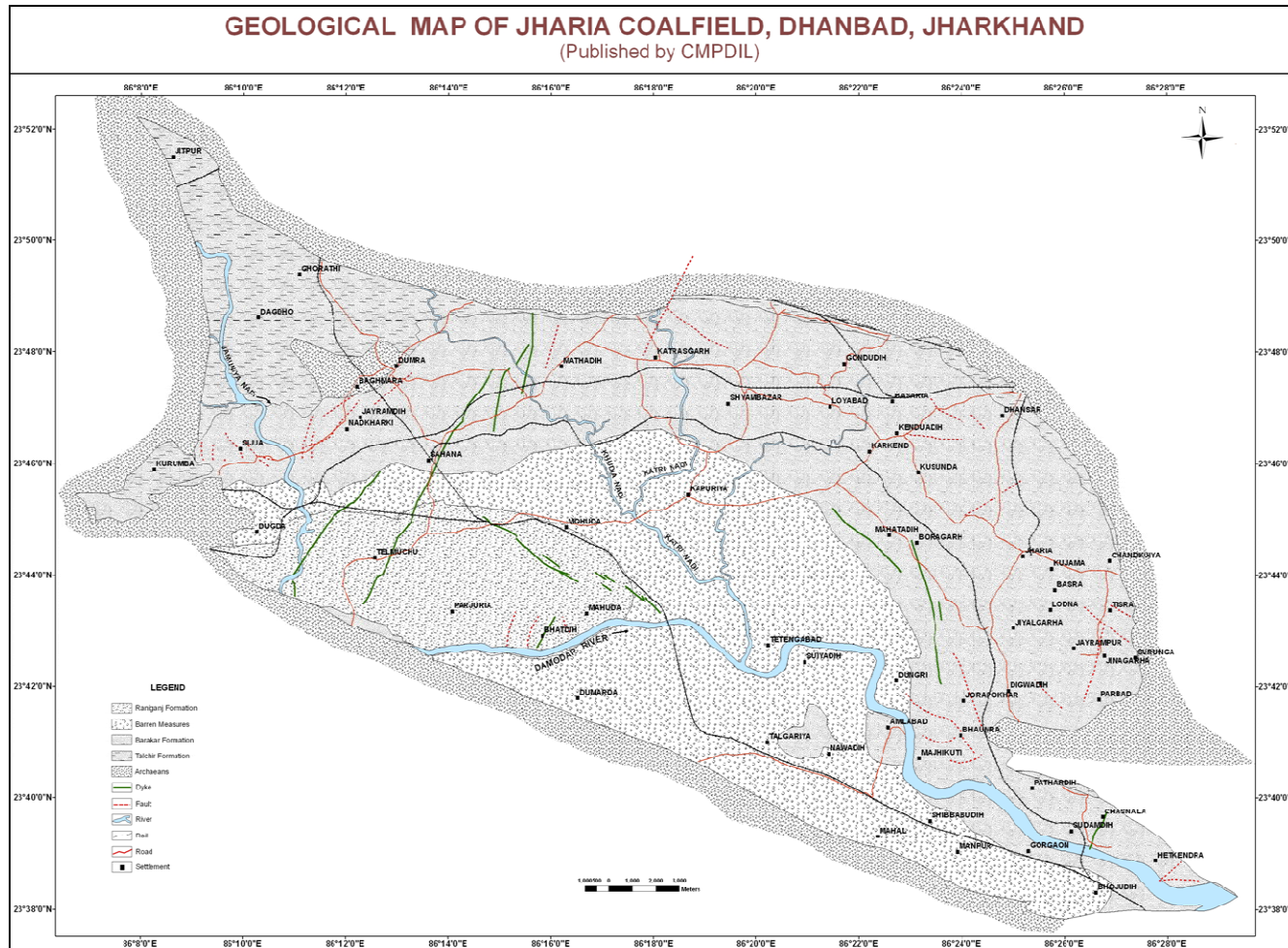


Figure 2 : Geological map of Jharia coal field, Dhanbad, Jharkhand (published by CMPDIL.)

CHAPTER III

DATA REQUIREMENTS

3.1 Remote Sensing Data

Coal fire map was created from LANDSAT 8 TIRS data of 22 May 2020. Further, the coal fire map of 2017 prepared by NRSC (NRSC, 2017) from LANDSAT 8 data (of 14 May 2017), was used as a reference to identify the changes that has occurred in the extent and disposition of the fires from 2017 to 2020.

For the land subsidence study, L-band microwave data from ALOS-PALSAR satellite (JAXA) were used. Five scenes of "Fine Beam mode" SLC data were taken from PALSAR-2 archives over a period from September, 2017 to February, 2020. This was done to identify long term terrain changes and differentiate the same from short term changes due to mining excavations and overburden dumping.

Table 2: List of satellite data used in the present study.

Satellite	Sensor	Resolution	Time	Date	Data source
LANDSAT-8	TIRS	100m resampled to 30m	Daytime	22 May 2020	USGS, USA
ALOS	PALSAR-2 (Fine Beam mode)	10 m	NA	30 September 2017	JAXA, Japan
				3 March 2018	
				19 January 2019	
				02 March, 2019	
				29 February. 2020	

3.2 Ancillary data

1. Geological map of Jharia coal field.
2. Mine surface plans as provided by BCCL.

CHAPTER IV

REMOTE SENSING DATA ANALYSIS

4.1 Methodology

4.1.1 Processing of Landsat 8 Data

With the launch of the LANDSAT-8 mission in February, 2013; thermal space borne data are available from its thermal infrared sensor (TIRS). This has enabled monitoring of the earth with a spatial resolution of 100 m in the thermal domain with a repeat cycle of 16 days. The LANDSAT-8 has two channels (Band 10 and Band 11) in the thermal infrared region (Table 1) which ranges from 10.4 micrometer to 12.5 micrometer (Gangopadhyay et al. 2012). In present study, band 10 of TIRS sensor (acquired on 22 May, 2020) has been used coal fire mapping. The spectral domain of the band is known for its maximum transmittance (Chatterjee et al. 2007; Martha et al. 2010). The data are freely accessible through USGS portal (Landsat 8 download source: <http://landsatlook.usgs.gov>).

Landsat-8 data are available in GeoTiff format and the data are converted to top of the atmosphere spectral radiance using the radiance rescaling factors provided in the metadata file, using equation 1.

$$L_{\lambda} = M_L Q_{cal} + A_L \dots\dots\dots (1)$$

Where:

L_{λ} = Spectral radiance (Watts/ (m² * srad * μm)).

M_L = Band-specific multiplicative rescaling factor from the metadata.

A_L = Band-specific additive rescaling factor from the metadata.

Q_{cal} = Quantized and calibrated standard product pixel values (DN).

Once the spectral radiance (L_{λ}) for Landsat-8 band 10 data is generated, it is possible to calculate radiant (brightness) temperature directly using equation 2. Planck's radiation function (Planck, 1914) forms the basis of radiant temperature derivation from spectral radiances and the theory is discussed in detail in existing literature (Gupta, 2003).

$$T_R = K_2 / \ln ((K_1 / L_{\lambda}) + 1) \dots\dots\dots (2)$$

T_R = Radiant (brightness) temperature,

K_1 = Calibration constant (1260.56 K),

K_2 = Calibration constant (666.09 watts/ (m² *srad* μ m)),

L_λ = Spectral radiance

4.1.2 Thresholding of radiant temperature image

Once the Landsat-8 data are converted to radiant temperature image, the next step was to segregate fire pixels from the background, which requires the estimation of the cut-off temperature. This has been attempted by the statistical analysis of sensor derived radiant temperature to delineate clusters (in the scatter-plot) indicative for fire and non-fire pixels. Mean and maximum radiant temperatures are derived from randomly sampled uniform sized pixel blocks distributed in entire spatial extent of Barakar Formation (Figure 3) known for fire bearing coal seams. The pixel block sizes are chosen to adequately represent the overall areal extent of the coalfield and homogeneously encompass all the mining blocks (27x27 pixels for Landsat-8, Figure 3). The maximum temperature value recorded in each representative area, derived from each of the datasets, is plotted against the mean temperature. The maximum temperature represents that of fire (wherever present), whereas the mean temperature represents the average background temperature, for normalization. The fire and background populations show considerable variance, separating coal fire and background radiant temperatures. The cut-off temperature derived is the maximum temperature of the background cluster, above which all temperatures represent coal fires. In the case of the Landsat-8 data used in this study, the cut-off temperature was determined around 36.5°C (Figure 4). Based on this cut-offs, regional coal fire map was prepared (Figure 5).

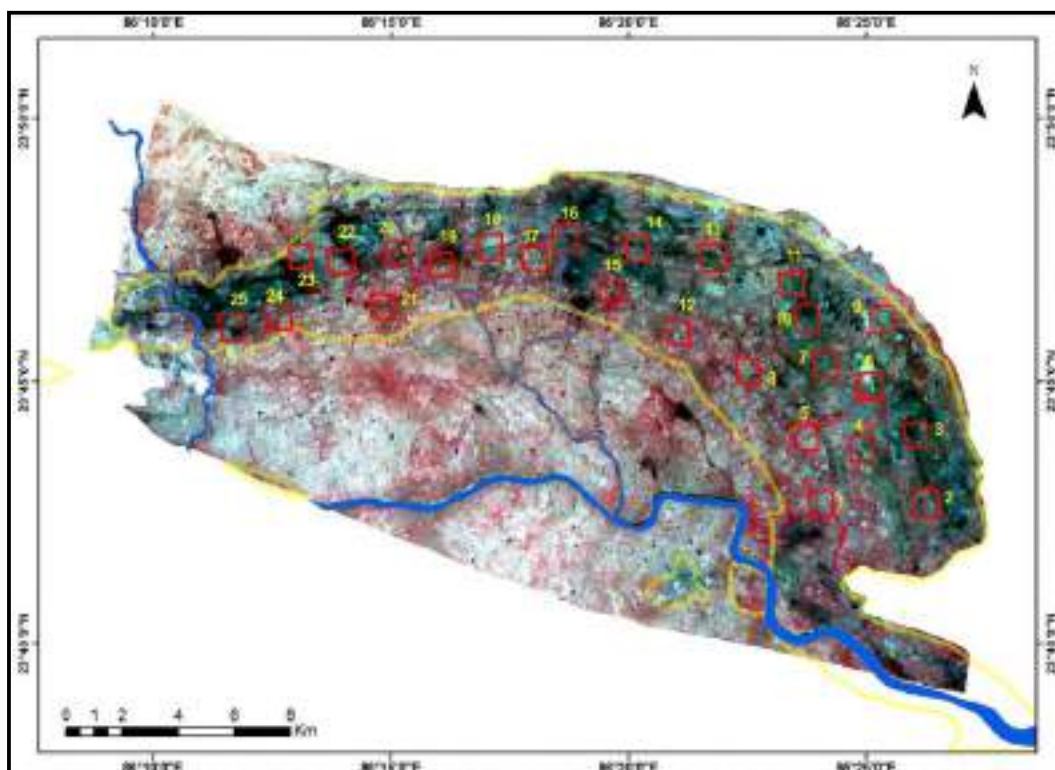


Figure 3. False colour composite image of Jharia Coalfield, with subset blocks (in red boxes) to obtain temperature values (from radiant temperature image) within the Barakar formation across the Jharia coalfield.

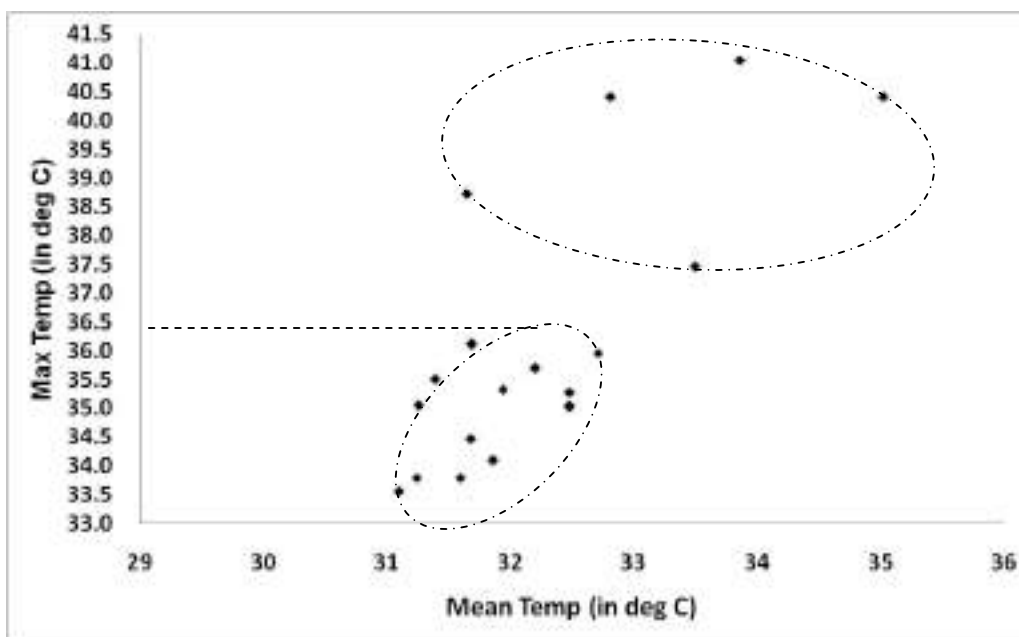


Figure 4. Maximum temperature plotted against mean temperature for various locations; cluster separation observed around 36.5 °C (marked with arrow)

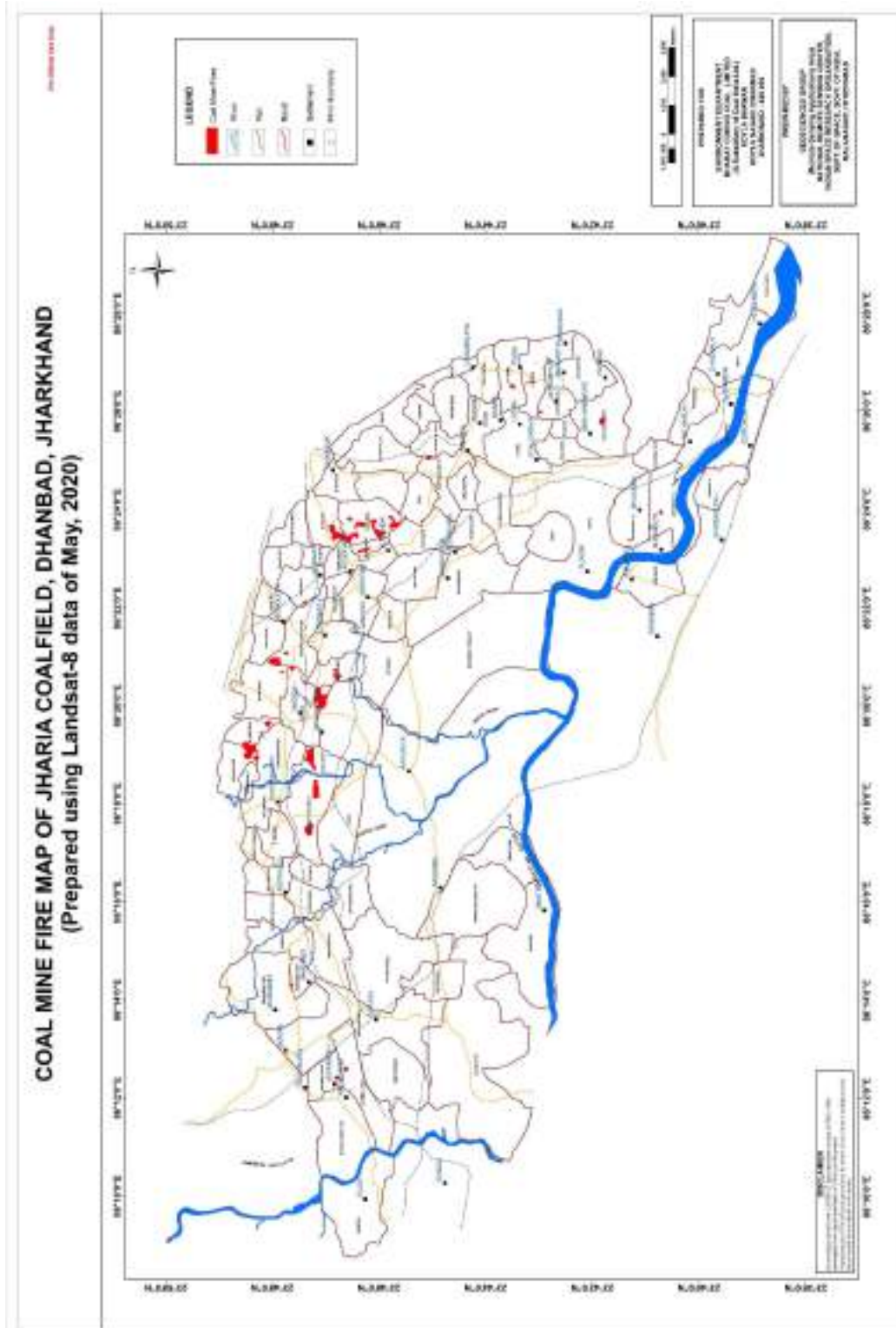


Figure 5: Coal mine fire map (May, 2020) of Jharia coal field, Dhanbad. The fire areas shown in this map have been verified in the field as per field points in figure 12.

4.2 Methodology For Subsidence Detection

4.2.1 Processing of ALOS-PALSAR 2 Data

Differential Interferometric SAR (DInSAR) techniques consist of combination of two SAR images of the same area acquired from slightly different positions (Figure 6).

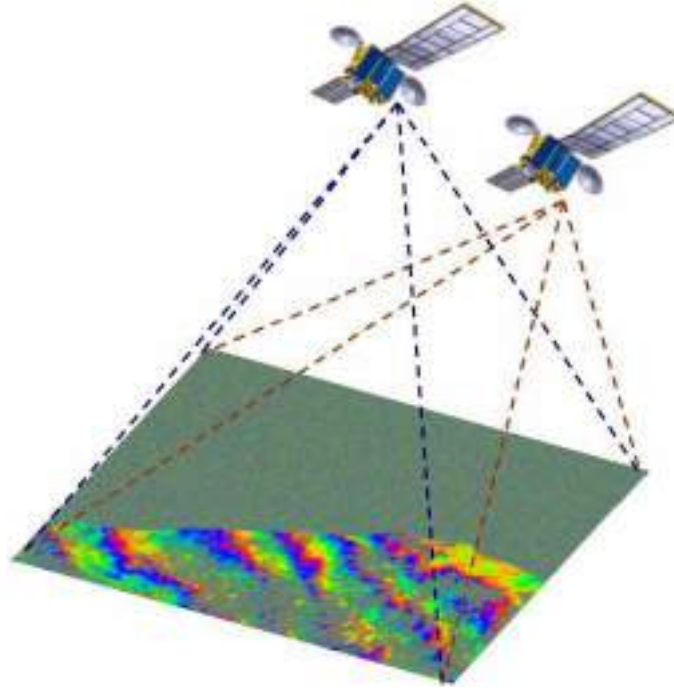


Figure 6. DInSAR acquisition scheme.

The result of this combination provides a new image, known as 'interferogram', whose phase component is formed by the following term:

$$\Delta\Phi_{Int} = \Phi_{Topo} + \Phi_{Mov} + \Phi_{Atm} + \Phi_{Noise} \quad (3)$$

where, Φ_{Topo} denotes the topographic component, Φ_{Mov} denotes the terrain deformation/ displacement component, Φ_{Atm} is the noise component and Φ_{Noise} is the thermal noise.

Topography, atmospheric effects and thermal noise needs to be removed or optimized to obtain precise measurements of terrain movement. When working with classical DInSAR interferograms (combination of two SAR images) the main problem is the presence of atmospheric artefacts, since there is no way to cancel them without a priori information. On the other hand, the term related with topography can be cancelled out using an external Digital Elevation Model (DEM) and the orbital ephemeris from the SAR acquisitions, considering no height errors on the DEM.

$$\Delta\Phi_{dif} = \Phi_{ErrorTopo} + \Phi_{Mov} + \Phi_{Atm} + \Phi_{Noise} \quad (4)$$

Since the coal mine area is very dynamic in terms of its surfacial changes (open cast mine, abandoned mine, fire affected waste/reclaimed land, over burden dumps) over time, it is proposed to utilize an advanced DInSAR technique. It is a recent remarkable improvements in SAR differential interferometry that has led to an innovative approach based on the use of a large dataset of SAR images over the same area to overcome the intrinsic limitations of conventional DInSAR in terms of temporal and geometrical decorrelation as well as atmospheric disturbances (Carnec et al., 1996; Bürgmann et al., 2000).

Broad work flow diagram for generating land subsidence map using satellite based DInSAR technique is shown in Figure 7.

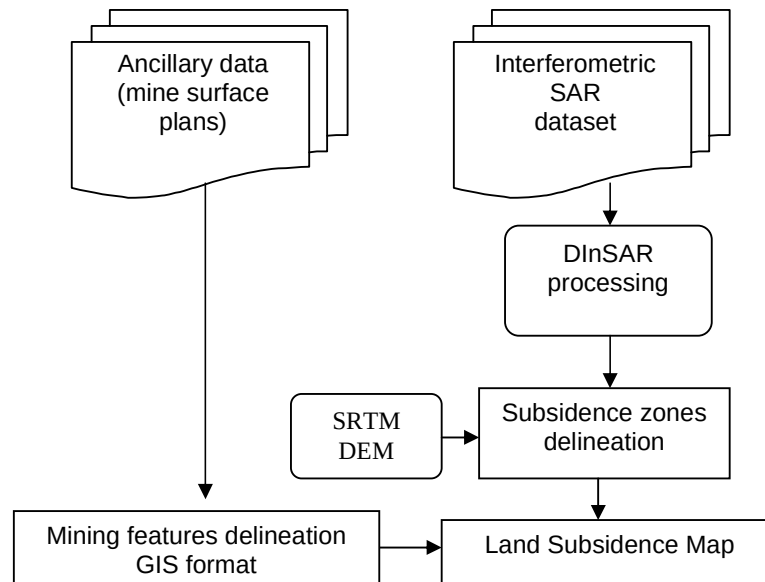


Figure 7. Work flow diagram for generating land subsidence map using DInSAR technique.

In the present study, 5 sets of ALOS-PALSAR L-band microwave data (as mentioned in table 1) were procured. The datasets were paired into master-slave pairs as per short and long temporal baselines. The short temporal base lines include master slave pairs of time difference of six months to one year, whereas long temporal baselines include data pairs of time difference of $\sim$ one year.

This has been illustrated in figure 8.

		SLAVE IMAGE				
		30 September 2017	03 March 2018	19 January 2019	02 March 2019	29 February 2020
MASTER IMAGE	30 September 2017					
	03 March 2018					
	19 January 2019					
	02 March 2019					
	29 February 2020					
		Short Temporal Baseline Pair (less than 1 year)				
		Long Temporal Baseline Pair ($\sim$ 1 year)				

Figure 8. ALOS-PALSAR - 2 Master-Slave pairs for short and long temporal baseline processing

The interferometric fringes generating from short baseline pairs will generally indicate terrain changes due to mining activity happening over a short period of time. This will include mining excavations and creation of new OB dumps adjacent to the mining area. Any incidences of slow land subsidence will not be demarcated in the results (figure 9).

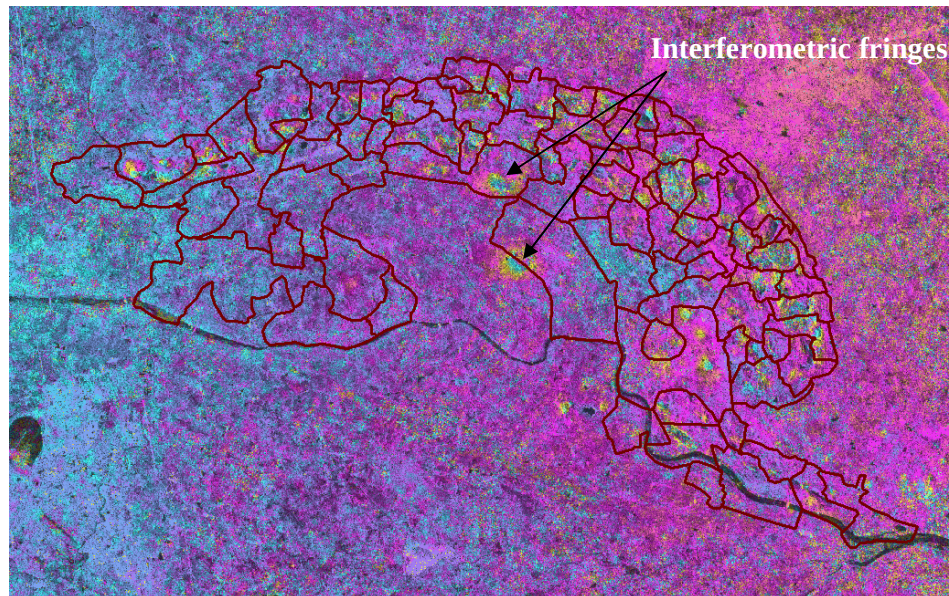


Figure 9. Fringe patterns generated from short baseline processing (e.g. Master: Oct, 19, Slave: Feb, 20).

On the other hand, master-slave pairs of long temporal baseline (approximately one year as shown in figure 8) will incorporate terrain changes due to mining activities as well, as long term ground subsidence from underground mining where ever present (figure10)

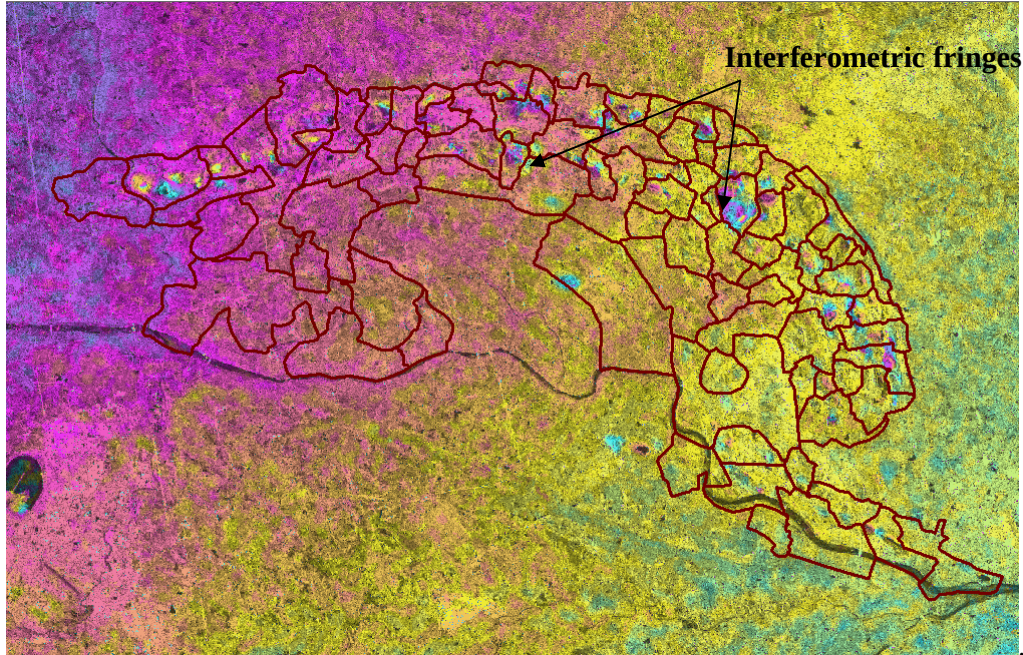


Figure 10. Fringe patterns generated from long baseline processing (e.g. Master: Sept, 17, Slave: Feb, 2020).

The results from the long and short baseline processing can be compared and zone where fringes have been developed due to terrain changes due to mining excavation and dumping, can be systematically identified and demarcated. The remaining fringes from the long temporal baseline processing will then indicated towards zones where subsidence has taken place due to underground mining. Using this, a subsidence map of the Jharia Coalfield was generated due to mining activities and subsidence areas (Figure 11).

LAND SUBSIDENCE MAP OF THE JHARIA COALFIELD, DHANBAD, JHARKHAND (Prepared using Palsar-2 data)

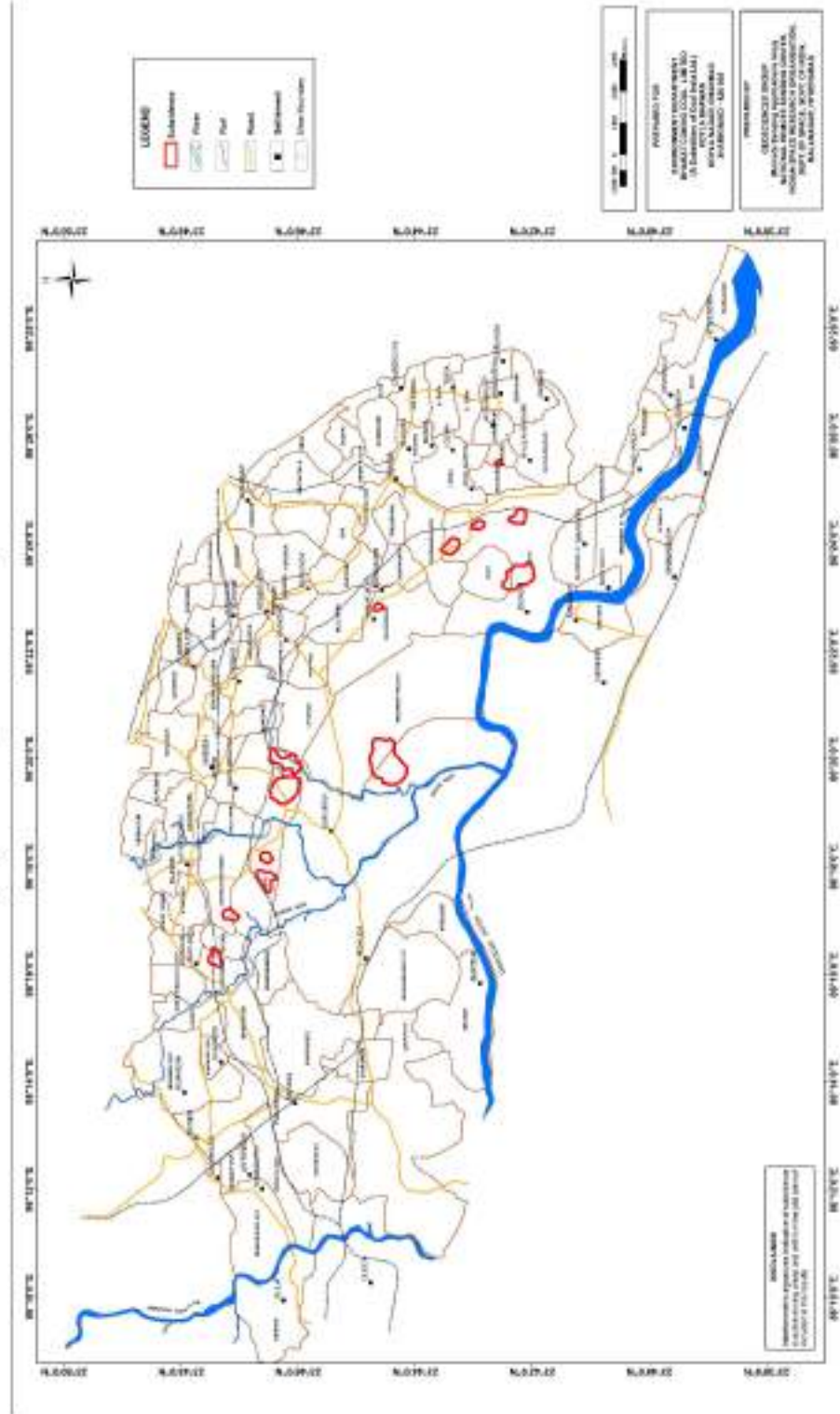


Figure 11: Subsidence map (2017-2020) of the Jharia coal field, Dhanbad.

CHAPTER V

FIELD WORK

A field work for verification of the coal fire locations and the subsidence zones as identified by the satellite data were taken up during 2nd to 8th August, 2021. Both the coal fire and the subsidence locations were further independently verified by NRSC during the fieldwork. A total of 39 coal fire points and 13 land subsidence locations were identified from the satellite data analysis (figure 12). All 39 points were confirmed to be fire bearing as per the present status of fire in Jharia coalfield. The field observations of coal fire at each location are provided in table 3.

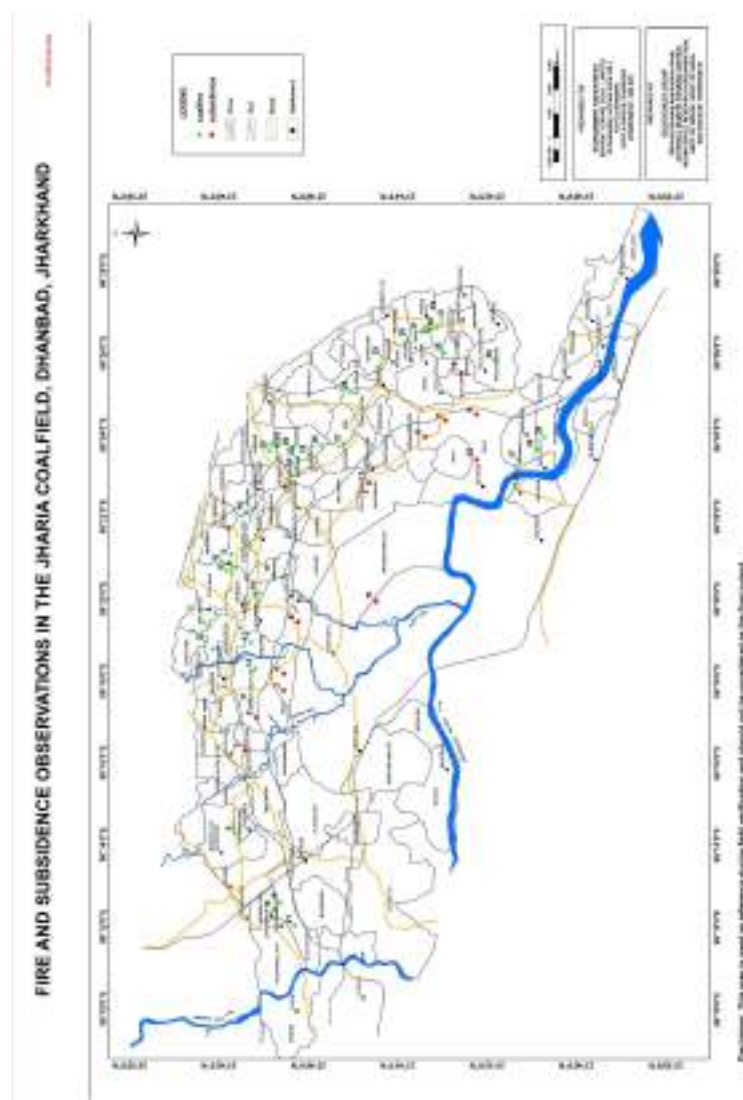


Figure 12. Field data points for coal fire and subsidence verification

Table 3: Summary of field observations (refer figure 12)

Field observation Point	Mine	Status of Fire (comments)*
1	Keshalpur	Active mine fire
2	Keshalpur	Active mine fire
3	W. Mudidih	Active mine fire
4	W. Mudidih	Active mine fire
5	Sendra Bansjora	Active mine fire
6	Tetulmari	Active mine fire
7	Sendra Bansjora	Active mine fire
8	Shatabdhi	Old Fire patch (minor fires)
9	Sendra Bansjora	Active mine fire
10	Sendra Bansjora	OB dump fire
11	Katras-Chotudih	Active mine fire (Confirmed by BCCL)
12	Gaslitand	Active mine fire
13	Katras-Chotudih	Active mine fire (Confirmed by BCCL)
14	Mudidih	Active mine fire
15	Godhar	Active mine fire
16	Benedih OCP	Active mine fire
17	Kankanee	Active mine fire
18	Block II OCP	Active mine fire
19	Kusunda	Active mine fire
20	Godhar	Active mine fire (High Risk)
21	Block II OCP	Active mine fire
22	Kusunda	Active mine fire
23	Kusunda	Active mine fire
24	Alkusha	Active mine fire
25	Kusunda	Active mine fire
26	Kusunda	Active mine fire
27	Ena	OB dump fire (small pockets of active mine fire)
28	R -OCP	Active mine fire
29	Goonhodih	Abandoned mine Fire(Fire cutting planned)
30	NT-ST	OB dump fire (small pockets)
31	NT-ST	Active mine fire (Ongoing mitigation measures)
32	NT-ST	Active mine fire (Ongoing mitigation measures)
33	NT-ST	Active mine fire (Ongoing mitigation measures)
34	NT-ST	Active mine fire (Ongoing mitigation measures)
35	Jayrampur	Abandoned mine Fire
36	Bhulanbarari	OB dump fire
37	Bhaura	OB dump fire (small pockets of active mine fire)
38	Bhaura	OB dump fire (small pockets of active mine fire)
39	Bhaura	OB dump fire (small pockets of active mine fire)

* Fire Temperature reading from hand held IR thermometer were seen to be inconsistent due to rains and wet ground condition and hence are not reported.

Subsidence location observations:

1. Subsidence locations as identified by the data are difficult to verify in the field, unless there are tell-tale signatures like large cracks or fissures on the ground or damage to anthropogenic constructions like vertical cracks on building cracks etc.
2. Out of the 13 identified subsidence locations from the microwave data, the main area where subsidence is occurring in a pervasive scale is that in the Moonidih Underground Project. The Moonidih Project is an underground long wall mine where excavations are going on for over decades. This may have resulted in pervasive subsidence in the region. The signatures of subsidence such as sagged ground are observed in the area.
3. Three other minor subsidence areas are identified within the South Govindpur, Bhagaband and Bagdigi mines, where old underground workings are present. However, there was no clear evidence of subsidence from the field based observations.
4. The 9 other locations where subsidence is seen from microwave data, falls within the mining lease of TISCO and IISCO, hence are not under the purview of BCCL mining authorities.

DISCUSSIONS AND CONCLUSIONS

CHAPTER VII

7.1 Discussions

7.1.1 Coal fire analysis

The present study is aimed to provide the status of coal fire in the Jharia coal field for the period of 2020. Landsat-8 data of 22 May, 2020 was used to prepare the coal mine fire map (Figure 5) for the year 2020. The data have 100 m spatial resolution in the thermal bands and is as on study date, the best thermal satellite data available. The Coal fire maps of 2020 when compared to map of 2017 (NRSC, 2017) depicts the dynamics of coal fire. Coal fire is difficult to mitigate because of its dynamic nature. But the understanding the trend in the shift of coal fire zones and over all distribution of coal fire will help in environmental and risk management related to coal mining activities.

The coal mine fire map for the year 2020 (Figure 5) illustrates the overall fire distribution in the area. The maps reveal that the coal fires are distributed across the Jharia coal field in pockets associated with major open cast mining activities. All most all the coal mine fires are restricted to the Barakar Formation where coal seams are exposed. In the eastern flank of the arcuate shaped mining extent, the collieries in Tisra (North and South) and Bhaura, Bhulanbarari and R-OCP are affected by multiple small fire pockets. In Bhaura, the fire is seen mostly in OB dumps with minor presence of active mine fires. Similarly in Bhulanbarari, fire is seen in the OB dump only. The North and South Tisra mines have visible presence of fire, mostly manifested by high temperature fume cracks. Active fires are also seen in the R-OCP. Further, towards the north east, in Ena, Alkusha and Kusunda active fires are more prevalent and the area is extensively affected. The highest radiant temperatures (in order of $\sim 50^{\circ}\text{C}$) are recorded by the satellite sensors in these areas. In the north, a large number of moderate to small fire pockets are seen in the areas around the related to the mining areas of Katras, Gaslitand, Mudidih and Sendra Bansjora. In the western flank, three distinguishable fire affected zones are seen. Toward the western end of the mining area, the Benedih and Block II OCP are affected by smaller fires from isolated coal seams. An older fire patch is also seen in the Shatabdi mine.

Comparison of the 2020 coal fire map with that of 2017 (NRSC, 2017) indicated the dynamism in the spatial extent and distribution of the coal fires. The changes are highlighted as follows:

- i. In reference to the map generated in 2017, the 2020 map shows that the significant decrease of fires in the eastern flank, namely Bhaura, Tisra (North and Soth), Lodna and R-OCP etc. Similar decrease is also observed in Bastacolla and Bhulanbarari.
- ii. The areal extent of major fire zone around Kusunda and Ena also appears to have decreased with change in the spatial location of the anomalies. This is probably due to the mitigation and active fire mining in this region.
- iii. The fire zones in Benedih/Block II OCP and Shatabdi OCP have also changed/diminished in areal extent with presence of isolated smaller anomalies.
- iv. The spatial disposition of fire areas around Katras, Keshalpur, Gaslitand and Mudidih show minor increase. The fire pockets observed in 2017, have given away to a few fire zones of moderate disposition.

In summary, there is a change in the areal disposition of the fires from 2017 to 2020. Satellite and field observations both suggest that there has been an overall decrease in the extent of fire in the JCF. A quantitative comparison of the 2017 and 2020 data was carried out. As compared 2017, when the total fire affected extent of the JCF was about 3.28 km²; in 2020 total fire affected extent is about 1.89 km² (including TISCO mines). Within the mining lease of BCCL (excluding TISCO) in comparison 2017, when the total fire affected extent of the JCF was about 3.27 km²; in 2020 total fire affected extent is about 1.86 km². The colliery wise break-up of change in fire area from 2017 to 2020 is given in Annexure-I. Herein, it should be noted that the minimum mapable unit from satellite image is 30m by 30m or 0.0009 km².

7.1.2 Subsidence analysis

An attempt to identify subsidence zones in the Jharia Coalfield was also carried out using ALOS-PALSAR-2 L band microwave data using differential interferometric technique. 5 scenes of PALSAR-2 data spanning over a period of 2017 to 2020 were used to delineate the subsidence if any in the region and separately identify them from the terrain changes due to mining. Verification of the subsidence zones as seen from

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

7.2 Conclusions

The following conclusions can be made:

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

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

CHAPTER VIII

LIMITATIONS

Delineation and mapping of coal fire from thermal data of remote sensing platforms carries with it some inherent limitations which needs to be understood in order to decipher the results obtained from it. This will assist in deducing the correct information and remove any ambiguity associated with the results. The key limitations of the data and the results obtained are as follows:

- 1) An anomalous pixel from LANDSAT data represents an area of 30m x 30m (resampled from spatial resolution of 100m) on the ground whose temperature is considerably higher than its surroundings. This can be attributed to two circumstances, namely the area has a very high intensity fire located within a smaller pocket or there are a number of low intensity fires spread across it. In both the mentioned cases the actual areal extent of the fire on the surface differs, but appears as a single anomalous pixel in the data. Hence, representation of fire affected ground area by means of pixel area is ambiguous and hence should be considered with caution.
- 2) There are locations as observed during the fieldwork, where coal seams are affected by active fires along vertical/semi-vertical sections of open cast mines (see cover page). In such cases, the actual areal expression of the fire affected area as seen by the sensor changes considerably and the representation from the same is not accurate.
- 3) As discussed in section 4.1.2, thresholding the data to separate the fires from the non fire areas, is a statistical technique. However, this method is dependent on how the temperature of non-fire background area is distinctive from the fire temperature.
- 4) The background temperatures vary with the time of the day when the data are collected, topography, and season of the year when the data is acquired. Night-time data has lower background temperature as compared to day-time. Similarly a data collected in October-November will have a considerably lower background temperature than that collected in May-June due to seasonal temperature variations. Hence, identification of the background temperature range becomes essential in

estimation of threshold temperature and the same varies depending upon the discussed controlling factors.

6) Due to the mitigation measures taking place in various mines, it is seen that in a number of places the fire affected seam is excavated and dumped as overburden. However, these overburden dumps retains the excavated burning coals and thus are seen to have active fires occasionally. There lies a possibility that the same will be identified as anomalous pixels and hence, although the fire is not a part of any active coal seam, it will be included as a fire affected area in the final map.

7) Considering the precision of DInSAR data for different wavelengths, topographic and atmospheric errors, slow subsidence rates may not be detected. Further, the displacement measured is along the line of sight of the sensor and not vertical displacement.

8) Temporal decorrelation and noise due to adverse land use and land cover may affect DInSAR based detection and monitoring of land subsidence. Changes vegetation pattern over time can cause significant decorrelation between the master and slave image, thus producing a very low coherent output. Under such conditions, subsidence information may not be retrieved

9) Verification of the subsidence zones as detected from the interferometric technique is sometimes difficult due to lack in observable signatures of subsidence such as cracks on the ground and damage to anthropogenic structures.

Therefore, in quantitative estimation of fire affected areas and areas denoted as subsidence, the above mentioned limitations needs to be taken into account diligently, as it is inevitable that the area estimate will not define the actual fire/subsidence affected area on the ground. However, the areal extent estimated from the data can be "like to like" compared to earlier estimates of similar studies to understand the change and dynamism of the fire in terms of area affected and spatial disposition.

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Annexure –I**Colliery wise break-up of change in fire area from 2017 to 2020**

COLLIERY AREA NAME	FIRE AREA 2017 (SQ. KM.)	FIRE AREA 2020 (SQ. KM.)	AREA CHANGE (SQ. KM.)	Increase/Decrease
BENEDIH OCP	0.045	0.020	-0.026	DECREASE
BLOCK-II OCP	0.135	0.034	-0.101	DECREASE
MURAIIDH OCP	0.002	0.006	0.004	INCREASE
SHATABDI OCP	0.036	0.005	-0.031	DECREASE
PHULARITAND	0.021	0.000	-0.021	DECREASE
KATRAS-CHOITUDIH	0.137	0.214	0.077	INCREASE
KESHALPUR	0.001	0.134	0.132	INCREASE
BASURIA	0.000	0.012	0.012	INCREASE
TETULMARI	0.022	0.011	-0.011	DECREASE
GODHAR	0.000	0.132	0.132	INCREASE
INDUSTRY	0.051	0.000	-0.051	DECREASE
KUSUNDA	0.740	0.399	-0.340	DECREASE
SENDRA-BANSJORA	0.027	0.110	0.083	INCREASE
BASTACOLLA	0.081	0.000	-0.081	DECREASE
GOLUCKDIH	0.112	0.000	-0.112	DECREASE
KUJAMA	0.240	0.000	-0.240	DECREASE
S. JHARIA-R. OCP	0.112	0.010	-0.102	DECREASE
GONHOODIH	0.032	0.001	-0.031	DECREASE
ENA	0.043	0.004	-0.040	DECREASE
N. TISRA	0.180	0.031	-0.149	DECREASE
LODNA	0.353	0.000	-0.353	DECREASE
S. TISRA	0.102	0.021	-0.081	DECREASE
BARAREE	0.107	0.040	-0.068	DECREASE
KENDUADIH	0.000	0.001	0.001	INCREASE
GASLITAND	0.122	0.156	0.034	INCREASE
KANKANEE	0.052	0.057	0.004	INCREASE
MUDIDIH	0.110	0.220	0.110	INCREASE
LOYABAD	0.006	0.000	0.079	DECREASE
E.BHUGGATDIH	0.021	0.020	-0.001	DECREASE
ALKUSHA	0.029	0.046	0.016	INCREASE
KUSTORE	0.046	0.014	-0.032	DECREASE
ANGARAPATRA	0.015	0.036	0.021	INCREASE
BHOWRAH. N	0.098	0.006	-0.092	DECREASE
BAGDIGI	0.021	0.000	-0.021	DECREASE
JEALGORA	0.007	0.000	-0.007	DECREASE
JEENAGORA	0.047	0.000	-0.047	DECREASE
JOYRAMPUR	0.104	0.011	-0.093	DECREASE

TOTAL AREA	3.3	1.8	1.5	DECREASE
Note:				
1) The minimum mapable unit from satellite image is 30m by 30m or 0.0009 km ²				
2) "INCREASE" implies, increase in fire area OR emergence of fire areas not identified in 2017 study				
3) "DECREASE" implies, decrease in fire area OR fire areas in 2017 not identified in present study (either absent or below sensor resolution)				
4) Values marked in "blue" are collieries where fire has been reported in 2017 study but presently shows no such signatures.				

Annexure –II



Figure 13: Active fires in Keshalpur-West Mudidih. (Points 1, 2, 3 & 4 in figure 12)



Figure 14: Active fires in Sendra-Bansjora Mines (Points 5, 6, 7 & 9 in figure 12)



Figure 15: OB dump fires in Sendra Bansjora (Points 10 in figure 12)



Figure 16: Active fires in Godhar-Kusunda Mines (Points 20 to 24 in figure 12)



Figure 17: Fire in R-OCP. (Point 28 in figure 12)



Figure 18: Active fires in N-S Tisra mines (Points 31-33 in figure 12).



Figure 19: Subsidence area in Bagdigi Mines



Figure 20: Subsidence (sag ponds) around Moonidih mine area

Annexure –III

Coordinates of Fire locations.

Mine	UTM_X	UTM_Y	Longitude	Latitude
Keshalpur	430560.28	2633068.44	86.3183	23.8074
Keshalpur	430287.86	2632817.14	86.3156	23.8051
W. Mudidih	430935.00	2632710.00	86.3220	23.8042
W. Mudidih	431468.57	2632417.14	86.3273	23.8015
Kendra Bansjora	433626.56	2632140.94	86.3484	23.7991
Tetulmari	433245.00	2631915.00	86.3447	23.7971
Kendra Bansjora	433899.00	2631765.00	86.3511	23.7958
Shatabdhi	422415.00	2631645.00	86.2384	23.7942
Kendra Bansjora	433383.75	2631563.75	86.3461	23.7939
Kendra Bansjora	435666.92	2631113.08	86.3685	23.7899
Katras-Chotudih	427797.06	2630997.35	86.2913	23.7886
Gaslitand	430270.06	2630936.18	86.3156	23.7881
Katras-Chotudih	429170.29	2630763.09	86.3048	23.7865
Mudidih	432313.36	2630596.98	86.3356	23.7851
Godhar	438450.00	2630085.00	86.3959	23.7808
Benedih OCP	419198.18	2630070.00	86.2069	23.7798
Kankanee	433072.50	2629995.00	86.3431	23.7797
Block II OCP	419491.36	2629772.73	86.2098	23.7771
Kusunda	438532.86	2629547.14	86.3967	23.7759
Godhar	438187.50	2630145.00	86.3933	23.7813
Block II OCP	418545.00	2629200.00	86.2006	23.7719
Kusunda	437910.00	2629005.00	86.3906	23.7710
Kusunda	438335.37	2629195.97	86.3948	23.7727
Alkusha	437452.80	2629068.00	86.3861	23.7715
Kusunda	438007.50	2628495.00	86.3916	23.7664
Kusunda	438392.33	2628011.36	86.3954	23.7620
Ena	438465.00	2627070.00	86.3962	23.7535
R -OCP	440644.55	2626785.45	86.4176	23.7510
Goonhodih	442050.00	2625480.00	86.4314	23.7393
NT-ST	442815.00	2624385.00	86.4389	23.7294
NT-ST	443100.00	2623890.00	86.4418	23.7250
NT-ST	443205.00	2623410.00	86.4428	23.7206
NT-ST	443253.33	2623211.67	86.4433	23.7189
NT-ST	443910.00	2623110.00	86.4497	23.7180
Jayrampur	442200.00	2622915.00	86.4330	23.7161
Bhulanbarari	441898.64	2620804.77	86.4301	23.6971
Bhaura	437768.57	2619865.71	86.3896	23.6884
Bhaura	438202.50	2619131.25	86.3939	23.6818
Bhaura	438720.00	2618775.00	86.3990	23.6786



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GROUNDWATER LEVEL & QUALITY REPORT

FOR CLUSTERS OF MINES, BCCL

(Assessment year – 2023-24)

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

JHARIA COALFIELD AND RANIGANJ COALFIELD (PART)

**For
(BHARAT COKING COAL LIMITED)**

(A Subsidiary of Coal India Limited)

KOYLA BHAWAN (DHANBAD)

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MARCH – 2024

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DETAILS OF THE REPORT

SI No.	ITEMS	INFORMATIONS
1	Geographical Area	Jharia Coalfield (JCF): 453.0 sq. km. Raniganj Coalfield (BCCL area): 19.64 sq. km.
2	Major Physiographic Units	Dissected Pediplain with surface Reduced Level (RL) varies from 160 m to 220 m above mean sea level (AMSL) in JCF and 100 m to 140 m AMSL in RCF part
3	Drainage System	Damodar River is the master drainage flowing along western boundary of the JCF. Jamunia River, Khudia River, Katri River, Jarian Nala, Ekra Jore, Kari Jore, Kashi Jore, Chatkari Jore and their tributaries are flowing through the JCF area. Damodar River, Barakar River is the master drainage of the part of RCF area (CV Area).
4	Annual Rainfall (IMD-report)	Jharkhand State: 1264.10 mm Rainfall data given in Annexure-IV .
5	Geological Formations	Gondwana Formation (Talchir Formation, Barakar Formation, Barren Measure Formation & Raniganj Formation)
6	Aquifer System	Unconfined/Phreatic Aquifer – thickness 25 m (Avg.) Semi-confined to confined Aquifer – thickness from 50 m upto 650 m
7	Hydrogeological properties (Aquifer Pump Test)	Unconfined Aquifer: Hydraulic Conductivity – 0.50 - 0.90 m/day Transmissivity – 10 - 42 m ² /day Semi-confined to confined Aquifer: Hydraulic Conductivity – 0.0006-1.44 (0.05 avg.) m/day Transmissivity – 0.06 – 15.0 m ² /day
8	Groundwater Level Monitoring Network	Out of total 140 nos. of monitoring stations 48 nos located within core mining area and rest comes within Buffers zone. 44 Nos. of Groundwater monitoring well (Dug Wells) network established by CMPDI to record groundwater level data in and around the Core Zone of JCF and 4 Nos. of Groundwater monitoring well (Dug Wells) in RCF (CV Area).
9	Groundwater Levels Below Ground Level (bgl)	JCF area: Pre-monsoon – 1.70 to 11.38 m (Avg. 6.33 m bgl) in '2023-24 Post-monsoon – 0.60 to 8.03 m (Avg. 3.77 m bgl) in '2023-24 RCF area (part): Pre-monsoon – 2.10 to 9.50 m (Avg. 5.22 m bgl) in '2023-24 Post-monsoon – 1.50 to 5.18 m (Avg. 3.06 m bgl) in '2023-24
10	Groundwater Quality	Potable as per BIS (Annexure- VIII)
11	Piezometers	Piezometers (23 nos.) to monitor impact of coal mining on groundwater regime within the coalfield area (JCF & part of RCF)
12	Stage of Groundwater Development (CGWB)	Dhanbad District-Safe to Over-exploited category (GWRA-2022)

GROUNDWATER LEVEL & QUALITY REPORT FOR CLUSTER OF MINES OF BCCL

1.0 INTRODUCTION

1.1 LOCATION DETAILS AND BRIEF ABOUT THE PROJECT

The 16 nos. Cluster of mines (Cluster-I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XIII, XIV, XV XVI and XVII) of BCCL is located in the Jharia coalfield in Bokaro and Dhanbad districts of Jharkhand and part of Raniganj coalfield in Dhanbad district of Jharkhand.

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

1.2 OBJECTIVE OF THE STUDY:

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

1.3 SCOPE OF THE STUDY:

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

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

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

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



Bharat Coking Coal Limited

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

CIN: U10101JH1972GOI000918
Environment Department

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

सेवा में,
महाप्रबंधक
व्यापार विकास

सीएमपीडीआई - कांके रोड रांची ८३४०३१-

Sub: For work of Ground water level and quality monitoring

महोदय,

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

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

This is for your kind information and further necessary action

भवदीय

14/6/18
उप-महाप्रबंधक (पर्यावरण)

Copy To:

१ महाप्रबंधक (गवेषण), कांके रोड रांची ८३४०३१-

1.4 TOPOGRAPHY AND DRAINAGE

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

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

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

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

1.5 DETAILS REGARDING WETLANDS

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

1.6 CLIMATE & RAINFALL

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

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

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

Daily station rainfall data is utilized for identification of the mean spatial patterns and rainfall intensity trends. From mean and standard deviation (SD), the coefficient of variation (CV) is calculated using following equation:

$$\text{Coefficient of variation (CV)} = [\text{Standard Deviation} / \text{Mean}] \times 100$$

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

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

Jharkhand State

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

Dhanbad District

	June	July	August	September	Sub-total	Annual
Mean	203.9	327.7	302.5	271.5	1105.6	1332.2
CV	41.0	35.0	33.5	48.7	20.8	19.4

Fig. 1 and 2 show the time series of rainfall in mm for the months of June, July, August and September along with southwest monsoon season and annual rainfall. The trend lines are displayed for each of the series. Neither monthly rainfall nor seasonal rainfall shows any significant increasing/decreasing trend while annual rainfall shows significant decreasing trend. The monthly rainfall during June, July, August and September as well as seasonal rainfall show decreasing trend. During the last 30 years, highest rainfall of 390.3 mm was received in June in the year 1994, 492.1 mm was received in July in the year 2017, 431.5 mm was received in August in the year 1997, while highest rainfall of 395.2 in September was received in the year 1995. Highest annual rainfall of 1587.9 mm was received in the year 1999 and highest southwest monsoon rainfall of 1364.6 mm was received in the year 1994 (Climate Research and Services, IMD, Ministry of Earth Sciences, Pune, Jan'2020).

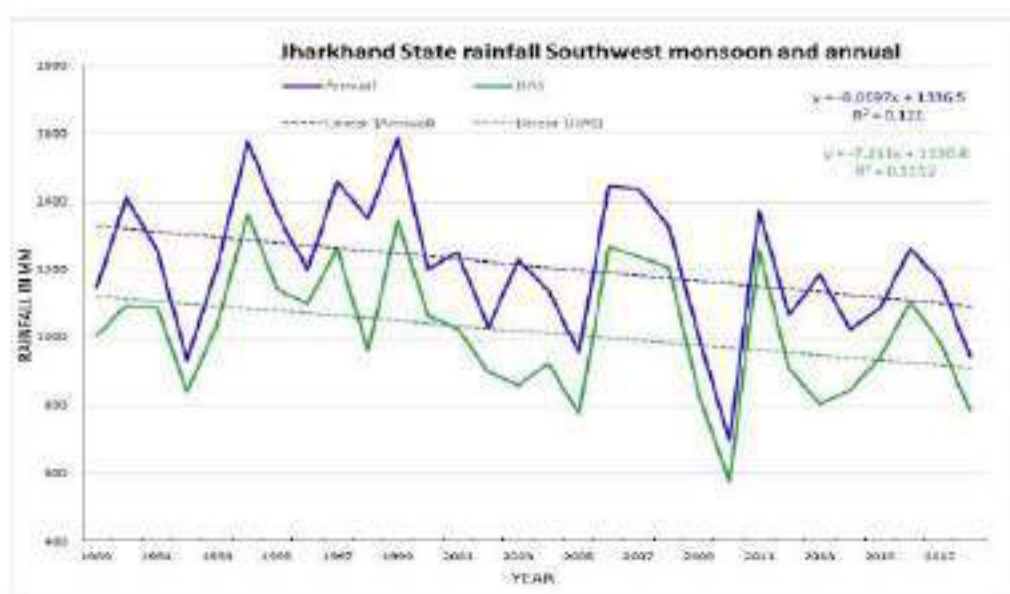


Fig-1.

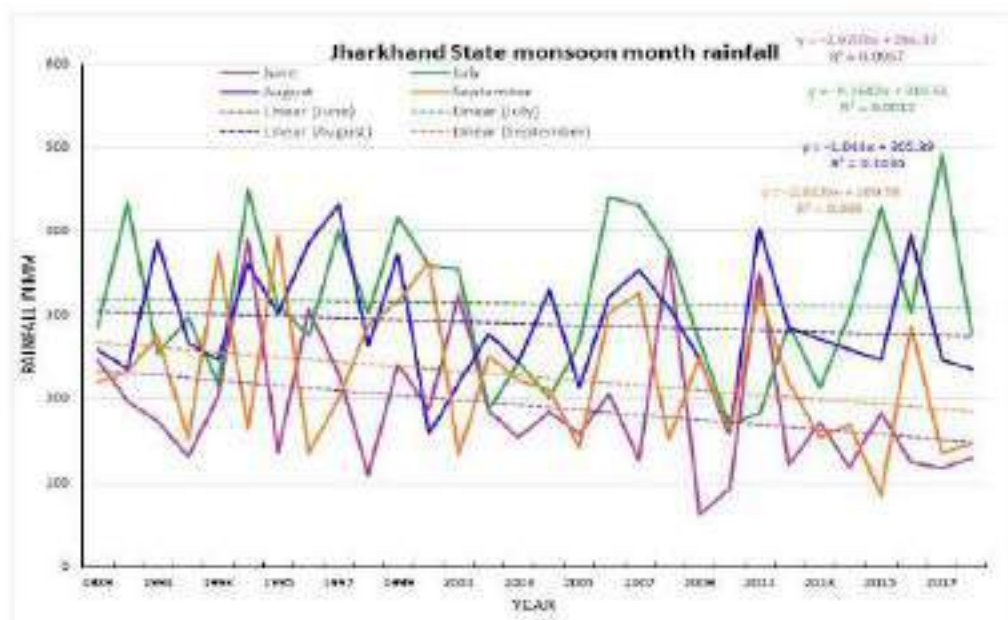


Fig-2.

2.0 GEOLOGY AND HYDROGEOLOGICAL SETUP OF THE AREA

2.1 REGIONAL GEOLOGY

The Jharia Coalfield covering an area of 453 sq. km. is located in Dhanbad District, Jharkhand. The non-coal bearing Talchir Formation is exposed in patches along the northern fringe of the Coalfield. The Barakar Formation (Coal Bearing horizon) overlies the Talchir and covers the most part of the Jharia Coalfield and have an area of 218 sq. km. This is successively overlain by the non-coal bearing Barren Measures Formation which is mainly exposed in the central part of the Coalfield. This, in turn, is overlain by the Raniganj Formation (Coal Bearing horizon) in the south-west part of the Coalfield and covers an area of 54 sq. km.

Chanch-Victoria Area is located in the western part of Raniganj Coalfield. The Raniganj coalfield represents the eastern most coal basin in the Damodar Valley Region, located at the border of Dhanbad District of Jharkhand and Bardhaman District of West Bengal. The Coalfield is almost elliptical in shape and covers an area of about 1530 sq. km. Out of this, only 35 sq. km. comes under leasehold area of BCCL within which 19.64 sq. km is the study area (Cluster-XVI only). The coal bearing formations of the area belongs to Barakar Formation of the Lower Gondwana in **Table-1**.

Table – 1: Regional Geological Succession of Jharia Coalfield

Geological Formations		Age
Quaternary/Recent	Soil cover/Weathered mantle	Recent
Post-Gondwana	Dolerite	Upper Cretaceous
	Lamprophyres	Jurassic
Damoda Group	Raniganj Formation	Upper Permian
	Barren Measures Formation	Middle Permian
	Barakar Formation	Lower Permian
	Karharbari	
	Talchir Formaton	Upper Carboniferous
-----Unconformity-----		
Metamorphics		Proterozoic

2.2 HYDROGEOLOGICAL SET- UP

The permeable formations, mainly composed of sandstone, behave as aquifer units. The coal seam and shales developed in the area act as impermeable beds i.e. aquiclude. The aquifer materials of Gondwana Formation constitute of fine to coarse grain sandstone having primary porosity of inter-granular void space. The secondary porosity formed due to presence of faults, fracture, joints, etc. Sandstones of Gondwana formation in JCF and RCF are very hard, compact and cemented and form less potential aquifer, particularly in deeper aquifer system. The secondary porosity along with primary porosity forms a conduit system making these formations good aquifers for movement and storage of ground water.

2.3 AQUIFERS DESCRIPTION

The aquifer system for shallow and deeper aquifer has been established through hydrogeological studies, exploration, surface and subsurface geophysical studies in the JCF and RCF (part) covering all geological formations. The aquifer can be divided into two zones – Un-confined/Phreatic (shallow) and Semi-confined to confined (deeper) aquifer.

PHREATIC/UN-CONFINED AQUIFER

The top aquifer occurred above the top most coal seam/shale bed is called un-confined or water table aquifer and it consists of relatively permeable formation such as weathered sandstone and loose soil. The thickness of the un-confined aquifer is varying from few meters to 50 m. This un-confined aquifer is more potential than semi-confined to confined aquifer.

SEMI-CONFINED TO CONFINED AQUIFER

The semi-confined to confined aquifer consisting of sandstone bed is sandwiched between coal seams/shale beds and thus, multiple aquifer system developed due to presence of multiple number of coal seams/shale beds. With the presence of intercalated shale and carbonaceous shale beds and reduction in permeability with depth, the lower aquifers are poor in potentiality.

Table –2: Generalized Hydrogeological Units developed in the study Area

Sl. No.	Type of Aquifer	Depth range (m)	Core zone (within 2 km)	Buffer zone (within 10 km)
1.	Unconfined	0 – 50 (Avg. 25)	Alluvium, weathered sandstone	Alluvium, weathered sandstone
2.	Semiconfined/ confined	50 to 650 m	Multiple Sandstone horizons in Barakar formation	Multiple Barakar sandstone, Barren Measure, Raniganj sandstone, Talchir shale and Metamorphics

2.4 GENERAL AQUIFER PARAMETERS

PHREATIC/UN-CONFINED AQUIFER

The wells tested by CMPDI for determination of aquifer parameters in Damuda (BJ Section) and Block-III area of JCF. The hydraulic conductivity of the un-confined aquifer is 0.50 to 0.90 m/day as computed from pumping tests on the wells. The transmissivity of the unconfined aquifer ranges from 10.68 m²/day to 41.48 m²/day.

SEMI-CONFINED TO CONFINED AQUIFER

The sandstone partings in-between impervious layers of shale and coal seams is designated as semi-confined / confined aquifers. The sandstones in these aquifers are fine to coarse grained, hard and compact with very low porosity. Mostly groundwater occurs in the weak zones formed due to weathering, fracture, faults, which create the secondary porosity. The hydrogeological parameter has determined by CMPDI in Sitanala Block by conducting aquifer performance test (APT) and also various piezometers within Cluster of mines BCCL during 2022-23. The hydraulic conductivity (K) of semi-confined aquifer in Barakar Formation ranges from 0.0006 m/day to 1.44 m/day. The hydrogeological parameter has also been determined at Kumari OCP Block in the central JCF by conducting aquifer performance test. The hydraulic conductivity (K) of semi-confined aquifer in Barakar Formation in this area ranges from 0.0027 m/day to 0.05 m/day.

Table – 3: Aquifer parameters determined from piezometers constructed in BCCL

Sl no	Piezometer No.	Aquifer / Formation	Depth of the well (Meters)	Aquifer thickness (Meters)	Static Water Level (Meters)	Discharge (LPS)	Test duration (Minutes)	K (m/day)	T (m ² /day)
1	PZ-1A	Phreatic Aquifer	40	15	12.15	4.70	275	9.71×10^{-1}	14.6
2	PZ-1B	Barakar Formation (JCF)	115	30	27	2.85	275	6.33×10^{-2}	1.9
3	PZ-2A		87	15	28.1	1.5	960	5.88×10^{-2}	0.88
4	PZ-3A		172	42	17.55	3.0	157	4.04×10^{-2}	1.70
5	PZ-4A		70	18	15.55	1.65	167	5.00×10^{-2}	0.89
6	PZ-8A		140	24	68.72	1.05	275	6.53×10^{-2}	1.57
7	PZ-9B		100	30	34.68	2.45	390	6.68×10^{-2}	2.00
8	PZ-10A		135	30	5	4.7	865	1.52×10^{-1}	4.55
9	PZ-11A	Barren Measure Formation (JCF)	300	66	60.60	3.05	300	3.9×10^{-2}	2.57
10	PZ-13A	Ranigunj Formation (JCF)	80	24	30.9	1.75	400	6.37×10^{-2}	1.53
11	PZ-14B		162	24	12.15	2.75	475	7.48×10^{-2}	1.80
12	PZ-16A	Barakar Formation (part of RCF)	90	18	31.5	2.0	385	5.59×10^{-2}	1.01

3.0 GROUND WATER LEVEL MONITORING

To collect the representative groundwater levels in the study area, CMPDI has established a monitoring network of total 140 monitoring stations out of which 48 located within core zone and rest falls in Buffer zone. Total 44 nos. dug well within JCF and 04 nos. dug well within RCF (part) area (Details of the Hydrograph stations & water level given in **Annexure-V, VA & VB**) spread over the entire BCCL leasehold area, **Plate-I**. Water level data collection in all monitoring stations has been done on quarterly basis (May'23, Aug'23, Nov'23 and Jan'24).

Depth to water level of the water table depict the inequalities in the position of water table with respect to ground surface and is useful in delineating recharge / discharge areas, planning of artificial recharge structure and shows the overall status of the groundwater level in the area. Historical groundwater level (GWL) of entire JCF and part of RCF with fluctuation, GWL of Non-mining / Mining areas and GWL of the Cluster of Mines of BCCL are shown in this report to assess the effect of Coal mining activity on the groundwater regime in and around the Coalfield area.

Mining is a dynamic phenomenon. The mining activity creates dis-equilibrium in environmental scenario of the area and disturbs the groundwater conditions/regime in particular. The impact on shallow water regime due to mining activity can be broadly viewed as under:

- Historical GWL with annual fluctuation over the years
- GWL scenario in Non-mining and Mining area (OC/UG mines)
- GWL scenario of Cluster of mines of BCCL

3.1 HISTORICAL GROUNDWATER LEVEL (GWL)

Historical GWL of JCF and part of RCF of CMPDI monitoring stations given from 2005 to 2023 (total 64 stations within Coalfield area). Pre-monsoon and Post-monsoon GWL with Fluctuation has been mentioned below in the table.

Table – 4: Historical Groundwater Level

Period		(Water level in metre below ground level)								
		Pre-Monsoon (April/May)			Post-Monsoon (Nov/Dec)			Fluctuation		
		From	To	Average	From	To	Average	From	To	Average
JCF	2005	0.07	19.08	6.29	0.84	12.13	3.20	0.12	12.45	3.21
	2007	0.40	19.27	5.66	0.35	8.21	2.87	0.02	16.15	2.96
	2008	0.45	18.35	5.42	0.35	14.20	3.62	0.03	9.22	2.45
	2010	0.85	14.47	5.24	0.10	15.88	4.48	0.02	5.55	1.54
	2012	1.27	18.68	5.58	0.15	7.80	2.72	0.08	13.45	2.96
	2013	0.70	19.20	5.65	0.45	8.35	2.77	0.29	15.88	3.17
	2014	0.70	16.28	4.92	0.75	14.98	3.27	0.25	10.15	2.17
	2015	1.38	17.20	6.00	0.45	14.58	3.92	0.28	7.62	2.15
	2016	0.78	16.73	5.64	0.30	12.43	3.19	0.23	6.35	2.88
	2017	0.67	16.28	5.61	0.15	6.97	2.41	0.10	12.10	3.25
	2018	1.20	14.58	5.55	0.40	7.17	2.83	0.20	9.45	2.68
	2019	0.95	15.88	5.46	0.45	5.95	2.34	0.20	13.40	3.05
	2020	0.80	16.25	4.95	0.75	10.10	3.26	0.25	11.05	2.15
	2021	0.62	11.26	5.23	0.05	7.62	2.28	0.15	9.03	2.94
	2022	0.42	11.90	5.12	0.29	11.12	3.32	0.03	7.2	1.80
	2023	1.70	11.38	6.33	0.60	8.03	3.77	0.10	6.55	2.56
RCF (part)	2008	5.02	10.50	7.59	2.85	4.90	3.71	1.82	6.60	3.87
	2010	2.20	8.85	4.74	2.78	9.58	4.63	0.68	1.10	0.89
	2011	3.57	8.02	4.98	2.50	6.21	3.75	0.55	1.90	1.23
	2012	3.10	7.34	4.59	1.55	7.00	3.66	0.05	2.78	0.94
	2013	1.70	9.87	6.54	2.90	8.85	4.71	1.02	5.54	2.84
	2014	3.27	6.48	4.57	2.13	3.03	2.63	0.54	3.45	1.94
	2015	3.38	9.52	5.33	2.68	8.20	5.11	1.06	1.32	1.81
	2016	3.61	10.65	6.24	0.90	6.50	3.18	1.63	4.40	3.06
	2017	1.93	5.80	3.25	1.63	3.78	2.47	1.63	3.78	0.78
	2018	2.34	8.70	4.35	1.75	5.70	2.75	0.41	2.55	1.59
	2019	1.60	9.35	5.29	0.80	3.88	2.10	0.80	5.47	3.20
	2020	2.30	9.70	4.30	1.75	5.50	2.70	0.40	2.75	1.60
	2021	2.00	6.20	3.34	1.10	5.25	2.44	0.80	0.95	0.90
	2022	1.73	2.68	2.20	1.63	2.2	1.91	0.10	0.48	0.29
	2023	2.10	9.50	5.22	1.50	5.18	3.06	0.60	4.32	2.16

3.2 DEPTH TO WATER LEVEL & HYDRAULIC GRADIENT

Depth to water level (DTW) range in different formations with respect to mining and non-mining areas is summarized in the Table-5.

Table – 5: Avg. Depth to water table

Formation	Area	DTW (bgl, m) [Year-2023-24]	
		Pre-monsoon (May'23)	Post-monsoon (Nov'23)
Sedimentary (Gondwana Formation / Core Zone)	Non-mining	3.0-12.0	1.0-8.0
	Mining	1.0-10.0	0.50-6.50
Metamorphics (Hard rock)	Peripheral part of the Coalfield	3.0-12.0	1.0-8.0

The study revealed that water table is in shallow depth and there is no significant stress in the water table due to coal mining activity. Mining and Non-mining areas shows barely any difference in water table condition in JCF and RCF (part) area. The average hydraulic gradient of the water table within mining and non-mining areas is given in Table-6. No significant change in hydraulic gradient is observed. Relatively steep gradient near active opencast mining areas w.r.t., non-mining, underground mines and Metamorphics areas is observed.

Table – 6: Average hydraulic gradient

Sl. No	Formation	Area	Average hydraulic gradient
1	Sedimentary (Gondwana Formation / Core Zone)	Non-Mining	1.0×10^{-3} to 2×10^{-3}
		Mining	1.0×10^{-2} to 1.5×10^{-3}
2	Metamorphics (Buffer Zone)	Peripheral part of the Coalfield	1.0×10^{-3} to 3.5×10^{-3}

3.3 GROUND WATER LEVEL DATA OF THE CLUSTER OF MINES OF BCCL

A GROUND WATER LEVEL OF CLUSTER-I

Cluster-I (Damuda Group of Mines consisting of Damuda UG, Albion OCP, Proposed BJ Section OCP and Abandoned Gutway OCP) of Barora area, BCCL is located in the western most part of Jharia coalfield in Bokaro district of Jharkhand. The life of the project has been worked out to be up to 15 years considering annual target production of 1.17 MTPA. It is located in the extreme western part of JCF in Bokaro district of Jharkhand (Toposheet no – 73 I/1).

The present leasehold area of Cluster-I is 575.0 Ha. The Damuda block area marked by more or less flat and gently undulating topography. The RL varies from 179 m to 208 m AMSL and the general slope of topography is towards east. Jamuniya River, Kari Jore, Podo Jore and its tributaries are controlling the drainage system of the area. The area comes under the watershed of Jamuniya River.

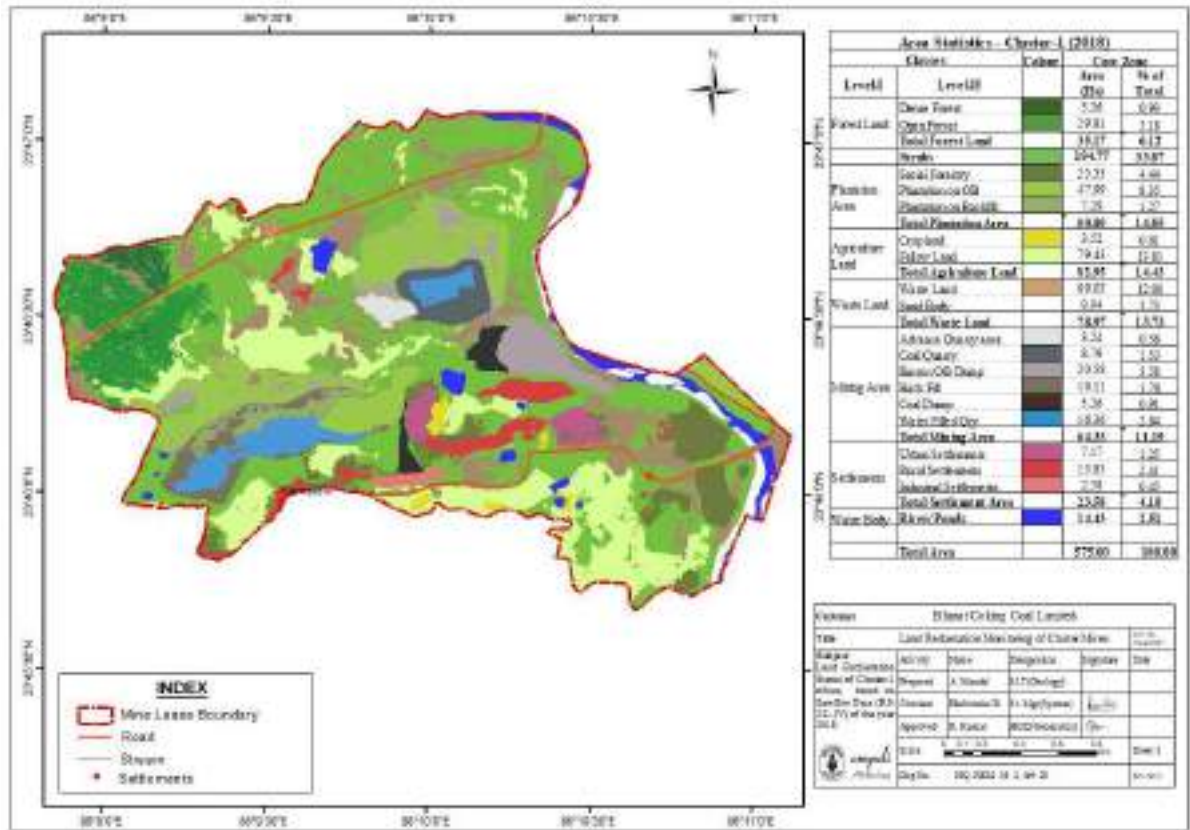
Monitoring stations (**B015, B051 and B053**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'23, August'23, and Nov'23 and January'24. The Ground water level data is presented in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2023-24				2022-23				2021-22			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	B015	Bera Basti	3.20	0.80	1.00	2.72	3.67	0.45	1.02	2.30	1.46	0.25	0.35	1.01
2	B051	Taranga	5.20	2.51	4.45	4.95	5.06	0.00	4.57	2.87	5.70	0.90	1.00	4.88
3	B053	Karmatanr	2.62	1.33	1.13	1.66	4.42	1.78	3.54	1.68	4.85	1.52	1.87	2.87
Average WL (bgl)			3.67	1.55	2.19	3.11	4.38	0.74	3.04	2.28	4.00	0.89	1.07	2.92

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 1.46 m Max –5.70 m
Post-monsoon GW Level (m): Min – 0.35 m Max – 4.57 m

LAND USE / LAND COVER MAP OF THE CLUSTER-I MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	393.69 x 10 ⁴	0.0	393.69 x 10 ⁴
2	Open Land	204.89 x 10 ⁴	0.0	204.89 x 10 ⁴
3	Road/ Paved Area	09.0 x 10 ⁴	0.0	09.0 x 10 ⁴
4	Rooftop area of building/ sheds	14.58 x 10 ⁴	0.0	14.58 x 10 ⁴
5	Total	575.00 x 10 ⁴	0.0	575.00 x 10 ⁴

B. GROUND WATER LEVEL OF CLUSTER-II

Cluster-II consists of seven mines namely; Block II Mixed mines (OCP & UGP), Jamunia OCP, Shatabdi OCP, Muraidih Mixed mines (OCP & UGP), and Phularitand OCP of BCCL is located in the western most part of Jharia coalfield in Bokaro district and Dhanbad district of Jharkhand. The life of the project has been worked out to be up to 30 years considering annual target production of 20.215 MTPA. It is located in the extreme western part of Jharia Coalfield in Dhanbad district of Jharkhand (Toposheet no- 73 I/1 and I/5).

The present leasehold area of Cluster-II is 2260.54 Ha. The Damuda block area marked by more or less flat and gently undulating topography. The RL varies from 176 m to 235 m AMSL. Jamuniya River, Khudia River and its tributaries are controlling the drainage system of the area. The area comes under the watershed of Jamuniya River and Khudia River.

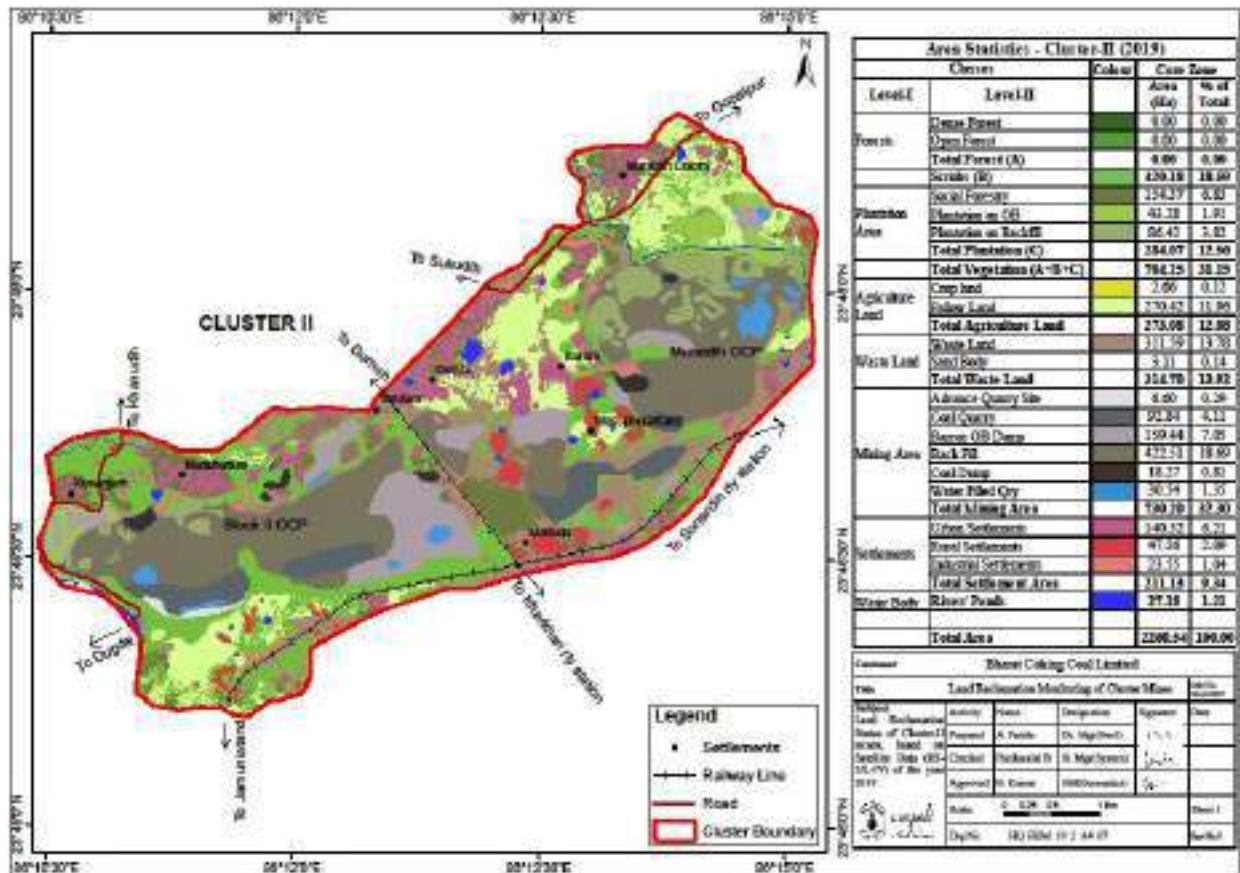
Monitoring stations (**B001, B059, B060 and B062**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'23, August'23, and Nov'23 and January'24. The Ground water level data is presented in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2023-24				2022-23				2021-22			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	B001	Muraidih	3.22	1.25	2.45	2.70	2.10	1.65	1.81	2.73	2.58	0.58	1.91	2.03
2	B059	Khodovaly	1.88	0.50	0.70	1.12	4.50	0.44	1.14	1.04	5.49	0.30	0.90	0.95
3	B060	Bahiyardih	10.73	5.31	5.73	9.51	10.53	1.08	5.80	9.38	11.26	1.33	2.23	6.53
4	B062	Sadiyardih	4.80	2.35	3.10	4.00	6.45	1.77	4.91	5.15	6.87	1.35	4.50	4.60
Average WL (bgl)			5.16	2.35	3.00	4.33	5.90	1.24	3.42	4.58	6.55	0.89	2.39	3.53

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 1.88m Max – 11.26 m
Post-monsoon GW Level (m): Min – 0.70 m Max – 5.80 m

LAND USE / LAND COVER MAP OF THE CLUSTER-II MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	977.33 x 10 ⁴	0.0	977.33 x 10 ⁴
2	Open Land	1072.08 x 10 ⁴	0.0	1072.08 x 10 ⁴
3	Road/ Paved Area	140.32 x 10 ⁴	0.0	140.32 x 10 ⁴
4	Rooftop area of building/ sheds	70.81 x 10 ⁴	0.0	70.81 x 10 ⁴
5	Total	2260.54 x 10 ⁴	0.0	2260.54 x 10 ⁴

C. GROUND WATER LEVEL OF CLUSTER-III

Cluster-III consists of nine mines namely, Jogidih UG, Govindpur UG, Maheshpur UG, Kooridih/Block-IV Mixed Mine, New Akashkinaree Mixed Mine, South Govindpur UG (closed), and Teturiya UG (closed) mines. The life of the project has been worked out to be up to 60 years considering annual production target of 3.60 MTPA. This Cluster of mines is located in western part of Jharia Coalfield in Dhanbad district of Jharkhand (Toposheet no – 73 I/5).

The present leasehold area of Cluster-III is 1552.53 Ha. The area is plain with gentle undulation with RL varying from 160 m to 208.80 m AMSL. The general slope of the area is towards south. Khudia River, Baghdigi Jore, Katri River and its tributaries are controlling the drainage system of the area. The area comes under the watershed of Khudia River.

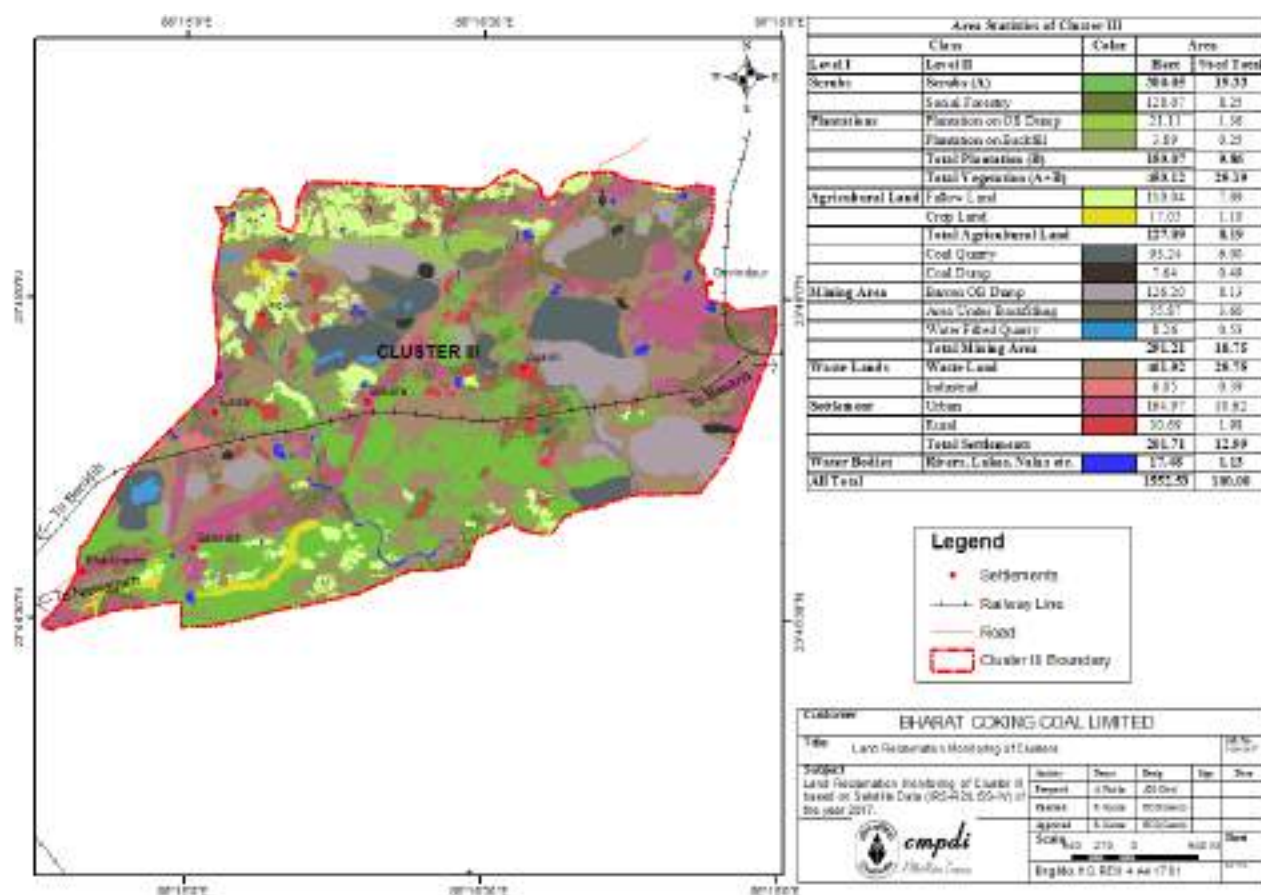
Monitoring stations (**A025, A029, B014 and B060**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has been done in the months of May'23, August'23, and Nov'23 and January'24. The Ground water level data is presented in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2023-24				2022-23				2021-22			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	A025	Sinidih	2.93	1.09	2.60	2.70	3.31	1.33	2.08	2.51	5.78	1.73	2.43	2.53
2	A029	Dharmaband	5.60	2.10	3.20	4.08	4.60	1.20	1.15	1.12	6.49	2.90	5.90	6.65
3	B014	Mathadih	2.84	1.12	2.34	2.42	3.24	0.09	2.60	2.55	2.84	0.24	2.04	2.10
4	B060	Sonardih	10.73	5.31	5.73	9.51	10.53	1.08	5.80	9.38	11.26	1.33	2.23	6.53
Average WL (bgl)			5.53	2.41	3.47	4.68	5.42	0.93	2.91	3.89	6.59	1.55	3.15	4.45

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 2.84 m Max – 11.26 m
Post-monsoon GW Level (m): Min – 1.15 m Max – 5.90 m

LAND USE / LAND COVER MAP OF THE CLUSTER-III MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	580.21 x 10 ⁴	0.0	580.21 x 10 ⁴
2	Open Land	770.61 x 10 ⁴	0.0	770.61 x 10 ⁴
3	Road/ Paved Area	164.97 x 10 ⁴	0.0	164.97 x 10 ⁴
4	Rooftop area of building/ sheds	36.74 x 10 ⁴	0.0	36.74 x 10 ⁴
5	Total	1552.53 x 10 ⁴	0.0	1552.53 x 10 ⁴

D. GROUND WATER LEVEL OF CLUSTER-IV

Cluster-IV consists of six mines namely, Amalgamated Keshalpur & West Mudidih colliery, Amalgamated Angarpathra & Ramkanali colliery, Katras-Choitudih Colliery, Salanpur colliery and Gaslitand colliery of Katras area, BCCL. It is located in the north-central part of Jharia Coalfield in Dhanbad district of Jharkhand. The life of the project has been worked out to be more than 30 years considering annual target production of 9.55 MTPA (Toposheet no – 73 I/5).

The present leasehold area of Cluster-IV is 1123.79 Ha. The area has a general undulating topography, with an overall gentle south-west slope. The RL varies from 182 m to 216 m AMSL. Katri River, Kumari Jore and their tributaries are controlling the drainage pattern of the area. The area comes under the watershed of Katri River.

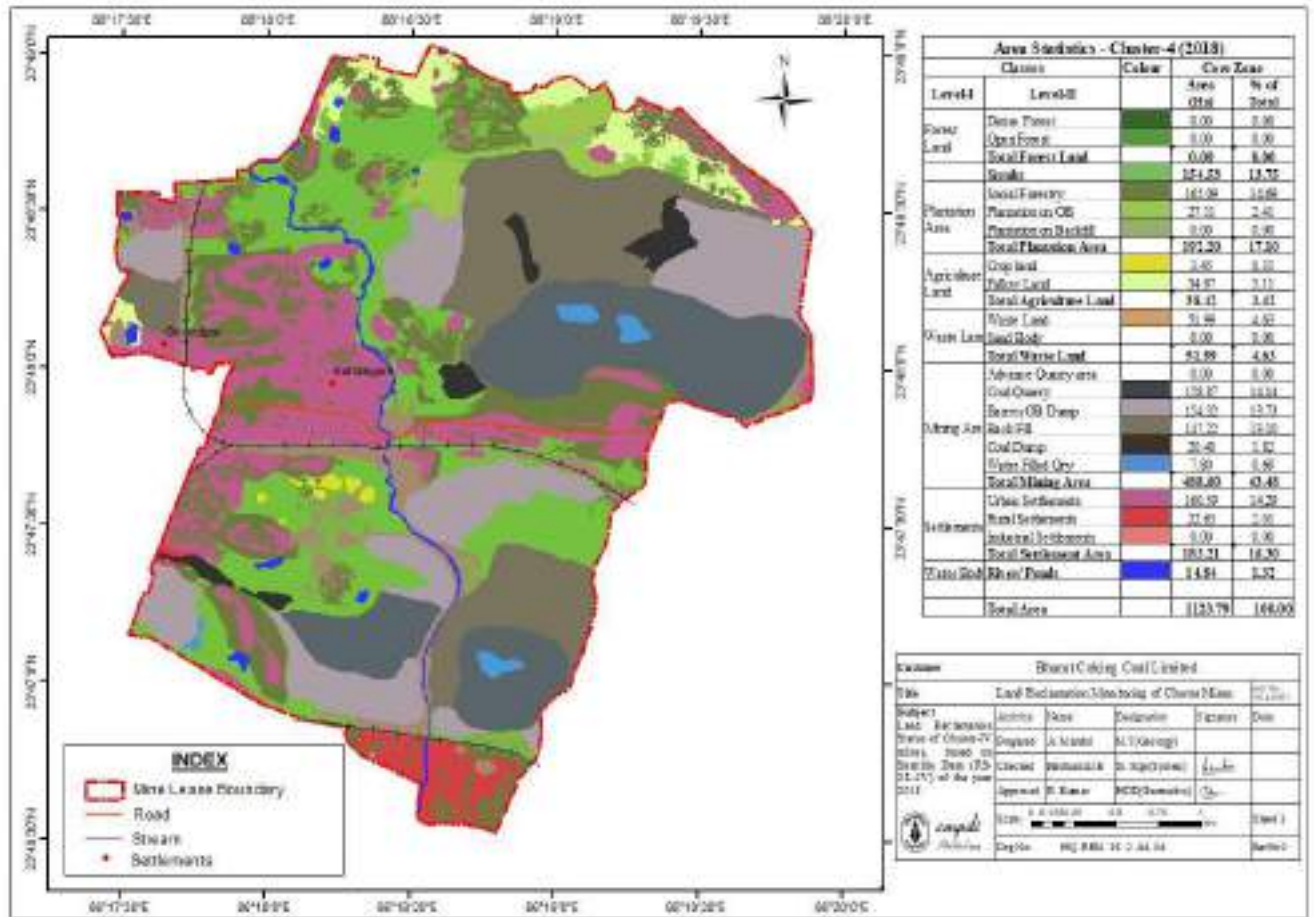
Monitoring stations (**A026, A028 and B065**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has been done in the months of May'23, August'23, and Nov'23 and January'24. The Ground water level data is presented in the table below:

SI No.	Well No.	Location	Water level (bgl in meters)											
			2023-24				2022-23				2021-22			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	A026	Malkhera	8.40	3.87	3.83	5.50	6.42	2.83	4.31	3.62	6.70	2.10	2.73	3.63
2	A028	Lakarka	3.45	3.13	3.35	3.40	4.23	2.85	3.30	3.57	6.23	0.53	3.75	4.47
3	B065	Jhinjipahari	8.45	1.95	2.35	4.93	7.45	0.50	2.27	3.45	9.03	0.45	1.42	2.80
Average WL (bgl)			6.77	2.98	3.18	4.61	6.03	2.06	3.29	3.55	7.32	1.03	2.63	3.63

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 3.45 m Max – 9.03 m
Post-monsoon GW Level (m): Min – 1.42 m Max – 4.31 m

LAND USE / LAND COVER MAP OF THE CLUSTER-IV MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	385.15 x 10 ⁴	0.0	385.15 x 10 ⁴
2	Open Land	555.43 x 10 ⁴	0.0	555.43 x 10 ⁴
3	Road/ Paved Area	160.59 x 10 ⁴	0.0	160.59 x 10 ⁴
4	Rooftop area of building/ sheds	22.63 x 10 ⁴	0.0	22.63 x 10 ⁴
5	Total	1123.79 x 10 ⁴	0.0	1123.79 x 10 ⁴

E. GROUND WATER LEVEL OF CLUSTER-V

Cluster-V consists of twelve mines namely; Tetulmari OC & UG mines, Mudidih OC & UG mines, Nichitpur OC mine, Sendra Bansjora OC & UG mines, Bansdeopur OCP (proposed) & UG Mines, Kankanee OC & UG mines and Loyabad UG mine (closed) of Sijua area, BCCL. This Cluster of mines is located in northern part of Jharia Coalfield in Dhanbad district of Jharkhand. The life of the project has been worked out to be more than 30 years considering annual production target of 6.311 MTPA (Toposheet no – 73 I/6).

The present leasehold area of Cluster-V is 1724.52 Ha. The area has a general undulating topography, with an overall gentle south-west slope. The RL varies from 210 m to 170 m AMSL. Jarian Nala, Nagri Jore, Ekra Jore and their tributaries are controlling the drainage pattern of the area. The area comes under the watershed of Jarian Nala and Ekra Jore.

Monitoring stations (**A016 and A027**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has been done in the months of May'23, August'23, and Nov'23 and January'24. The Ground water level data is presented in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2023-24				2022-23				2021-22			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	A016	Ekra	5.55	1.35	3.52	4.30	5.80	1.35	3.08	2.99	3.45	1.90	2.00	3.00
2	A027	Tetulmari	1.70	0.55	1.60	1.80	1.90	0.10	1.33	1.50	1.67	0.80	0.90	1.13
Average WL (bgl)			3.63	0.95	2.56	3.05	3.85	0.73	2.21	2.25	2.56	1.35	1.45	2.07

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 1.67 m Max – 5.80 m
Post-monsoon GW Level (m): Min – 0.90 m Max – 3.52 m

Area Statistics of Cluster V				
	Class	Color	Area	
Level I	Level II		Haar	% of Total
Scrubs	Scrubs (A)		344.78	19.88
	Social Forestry		107.59	6.10
Plantations	Plantations on Old Dump		31.85	1.58
	Plantations on Backfill		7.05	0.43
	Total Plantations (B)		156.55	7.90
	Total Vegetation (A+B)		481.11	27.88
Agricultural Land	Crop Land		8.41	0.49
	Fallow Land		31.74	2.18
	Total Agricultural Land		46.15	2.68
	Coal Quarry		102.79	5.96
Mining Area	Coal Dump		5.35	0.33
	Barren Old Dump		151.20	8.77
	Area Under Backfilling		162.09	9.40
	Water Filled Quarry		9.45	0.55
	Total Mining Area		478.08	24.83
Waste Lands	Waste Land		517.23	29.89
	Industrial		18.40	0.61
Settlement	Rural		11.78	0.80
	Urban		217.50	12.81
	Total Settlements		241.74	14.82
Water Bodies	Rivers, Lakes, Nalas etc.		16.31	0.59
All Total			1724.52	100.00

 Road
 Railway Line
 Cluster V Boundary

Customer BHARAT COKING COAL LIMITED					
Title Land Reclamation Monitoring of Closures					Date 14/07/2017
Subject Land Reclamation Status of Closure 'A' based on Satellite Data (IRS FSI/GS-N) of Feb 2007 2017.					
 cmpdi <i>The Coal Engineers</i>	Location	Block	Block	Area	Scale
	Proposed	A. Fields	600 (Gm)		
	Abandoned	B. Fields	600 (Gm)		
	Age of mine	B. Fields	600 (Gm)		
	Age of mine	B. Fields	600 (Gm)		
Scale 1:5000					Sheet 14/07/2017
Drawn By H. G. Rishi					

Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	527.26 x 10 ⁴	0.0	527.26 x 10 ⁴
2	Open Land	973.52 x 10 ⁴	0.0	973.52 x 10 ⁴
3	Road/ Paved Area	217.50 x 10 ⁴	0.0	217.50 x 10 ⁴
4	Rooftop area of building/ sheds	24.24 x 10 ⁴	0.0	24.24 x 10 ⁴
5	Total	1724.52 x 10 ⁴	0.0	1724.52 x 10 ⁴

F. GROUND WATER LEVEL OF CLUSTER-VI

Cluster-VI consists of four coal mines namely, East Bassuriya opencast (OC), Bassuriya underground (UG), Gondudih Khas-Kusunda OC and Godhur Mixed Mines (OC and UG) of BCCL. This Cluster of mines is located in central part of Jharia Coalfield in Dhanbad district of Jharkhand. The life of the project has been worked out to be more than 30 years considering annual production target of 7.631 MTPA (Toposheet no – 73 I/6).

The present leasehold area of Cluster-VI is 831.83 Ha. The area has a general undulating topography with general slope towards south. The RL varies from 180 m to 240 m AMSL. Ekra Jore, Kari Jore and their tributaries are controlling the drainage pattern of the area. The area comes under the watershed of Ekra Jore and Kari Jore.

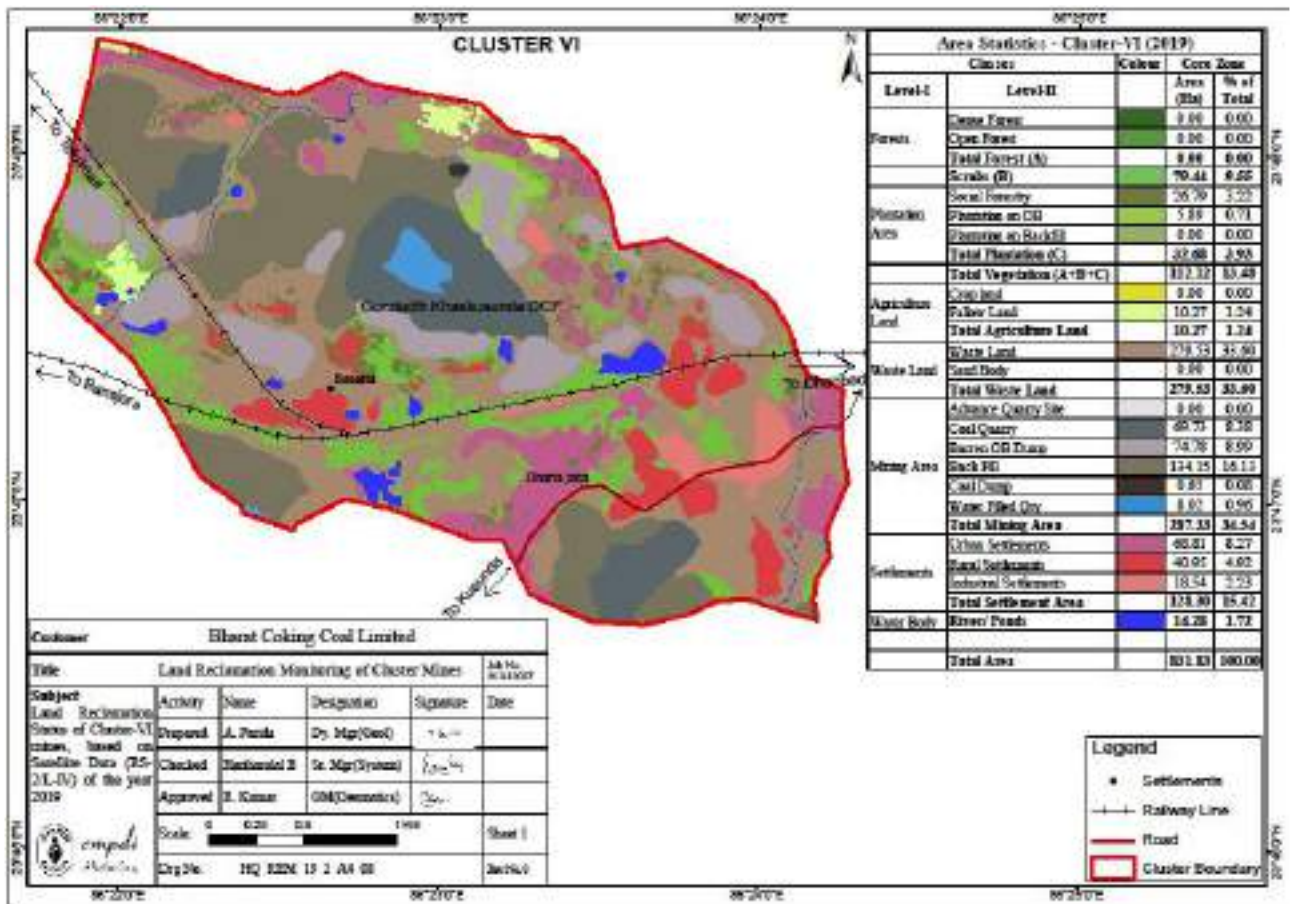
Monitoring stations (**D025, D030 and D034**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has been done in the months of May'23, August'23, and Nov'23 and January'24. The Ground water level data is presented in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2023-24				2022-23				2021-22			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	D025	Godhur	4.40	1.80	3.40	4.20	11.9	2.58	4.70	5.30	10.50	2.90	3.80	4.40
2	D030	Borkiboa	4.08	2.10	2.20	3.44	4.37	1.80	2.29	4.15	4.23	0.60	0.84	1.80
3	D034	Kusunda	3.80	1.80	2.50	2.89	5.00	2.15	3.15	3.22	3.78	2.05	2.90	2.95
Average WL (bgl)			4.09	1.90	2.70	3.51	7.09	2.18	3.38	4.22	6.17	1.85	2.51	3.05

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 3.78 m Max – 11.90 m
Post-monsoon GW Level (m): Min – 0.84m Max – 4.70 m

LAND USE / LAND COVER MAP OF THE CLUSTER-VI MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	122.39 X 10 ⁴	0.0	122.39 X 10 ⁴
2	Open Land	581.14 X 10 ⁴	0.0	581.14 X 10 ⁴
3	Road/ Paved Area	68.81 X 10 ⁴	0.0	68.81 X 10 ⁴
4	Rooftop area of building/ sheds	59.49 X 10 ⁴	0.0	59.49 X 10 ⁴
5	Total	831.83 X 10 ⁴	0.0	831.83 X 10 ⁴

G. GROUND WATER LEVEL OF CLUSTER-VII

Cluster-VII consists of fourteen mines within Kusunda Area, Bastacolla Area and PB Area, B.C.C.L, Jharia Coalfield. Coal mines namely Dhansar UG, Dhansar OCP, Kusunda OCP and Viswakarma OCP (proposed) are under the administrative control of Kusunda Area and Industry UG (closed), Alkusa UG, Ena OCP, S.Jharia/Rajapur OCP, Burragarh UG, Simlabahal UG, Huriladih UG, Bhutgoria UG (Re-opening), Kustore UG (closed) and E.Bhuggatdih UG (closed) are under Bastacolla and PB Area. This Cluster of mines is located in east central part of Jharia Coalfield in Dhanbad district of Jharkhand. The life of the project has been worked out to be more than 30 years considering annual production target of 8.226 MTPA (Toposheet no – 73 I/6).

The present leasehold area of Cluster-VII is 2127.70 Ha. The area has a general undulating topography with general slope towards south. The RL varies from 172 m to 221 m above M.S.L. Kari Jore, Chatkari Jore and their tributaries are controlling the drainage pattern of the area. The area comes under the watershed of Kari Jore and Chatkari Jore.

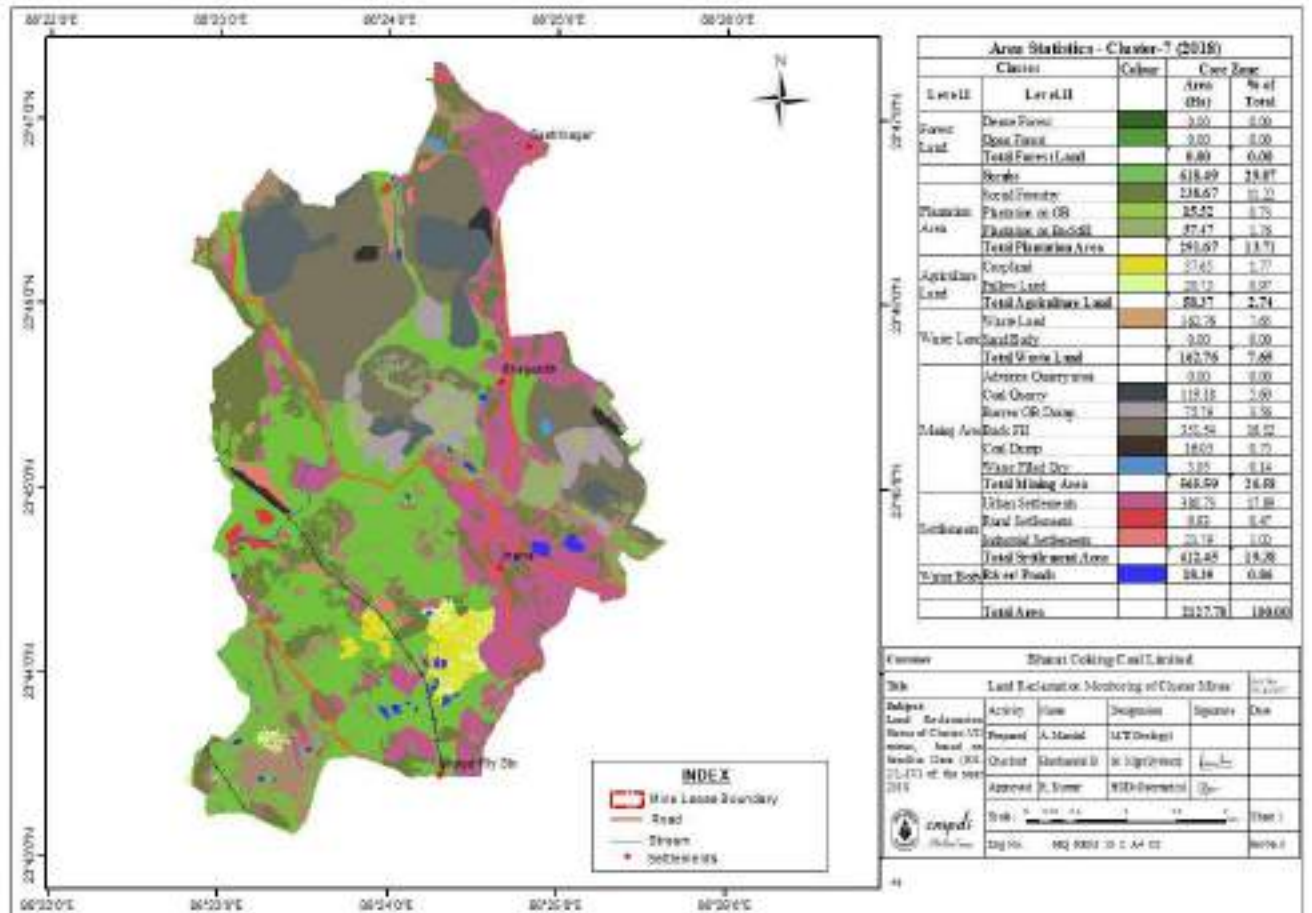
Monitoring stations (**D003, D034, D047 and D080**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has been done in the months of May'23, August'23, and Nov'23 and January'24. The Ground water level data is presented in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2023-24				2022-23				2021-22			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	D003	Dhansar	3.15	1.22	1.85	2.28	5.96	0.55	1.32	1.34	3.41	0.80	0.85	1.30
2	D034	Kusunda	3.80	1.80	2.50	2.89	5.00	2.15	3.15	3.22	3.78	2.05	2.90	2.95
3	D047	Parastanr	4.45	2.57	3.27	3.85	6.55	5.32	5.85	11.40	4.05	3.22	2.45	4.88
4	D080	Bastacolla	4.75	1.75	2.60	3.42	3.30	2.40	3.08	1.80	7.10	2.17	2.55	3.10
Average WL (bgl)			4.04	1.84	2.56	3.11	5.20	2.61	3.35	4.44	4.59	2.06	2.19	3.06

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 3.15 m Max – 7.10 m
Post-monsoon GW Level (m): Min – 0.85 m Max – 5.85 m

LAND USE / LAND COVER MAP OF THE CLUSTER-VII MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	968.53 x 10 ⁴	0.0	968.53 x 10 ⁴
2	Open Land	746.72 x 10 ⁴	0.0	746.72 x 10 ⁴
3	Road/ Paved Area	380.73 x 10 ⁴	0.0	380.73 x 10 ⁴
4	Rooftop area of building/ sheds	31.71 x 10 ⁴	0.0	31.71 x 10 ⁴
5	Total	2127.70 x 10 ⁴	0.0	2127.70 x 10 ⁴

H. GROUND WATER LEVEL OF CLUSTER-VIII

Cluster - VIII of B.C.C.L mines are under administrative control of Bastacolla Area, Jharia Coalfield. Cluster-VIII consists of ten mines namely Bastacolla mixed mines (OC & UG), Bera mixed mines (OC&UG), Dobari UG, Kuya mixed mines (OC&UG), Proposed Goluckdih (NC) OC mine, Ghanoodih OC mine and Kujama OC mine. This cluster is located in west part of Jharia Coalfield in Dhanbad district of Jharkhand. All the above mines are contiguous in nature and the environmental impact is overlapping in ambient environment due to cumulative effect of mining activities. The life of the project has been worked out to be up to 25 years considering annual production target of 6.383 MTPA (toposheet no. 73 I/5 and I/6).

The present leasehold area of Cluster-VIII is 1331.95 Ha. The area has a general undulating topography with general slope towards south and south-west. The ground elevation in the area ranges from 175 m to 221 m AMSL. Chatkari Jore, Tisra Jore and their tributaries are controlling the drainage pattern of the area. The area comes under the watershed of Chatkari Jore.

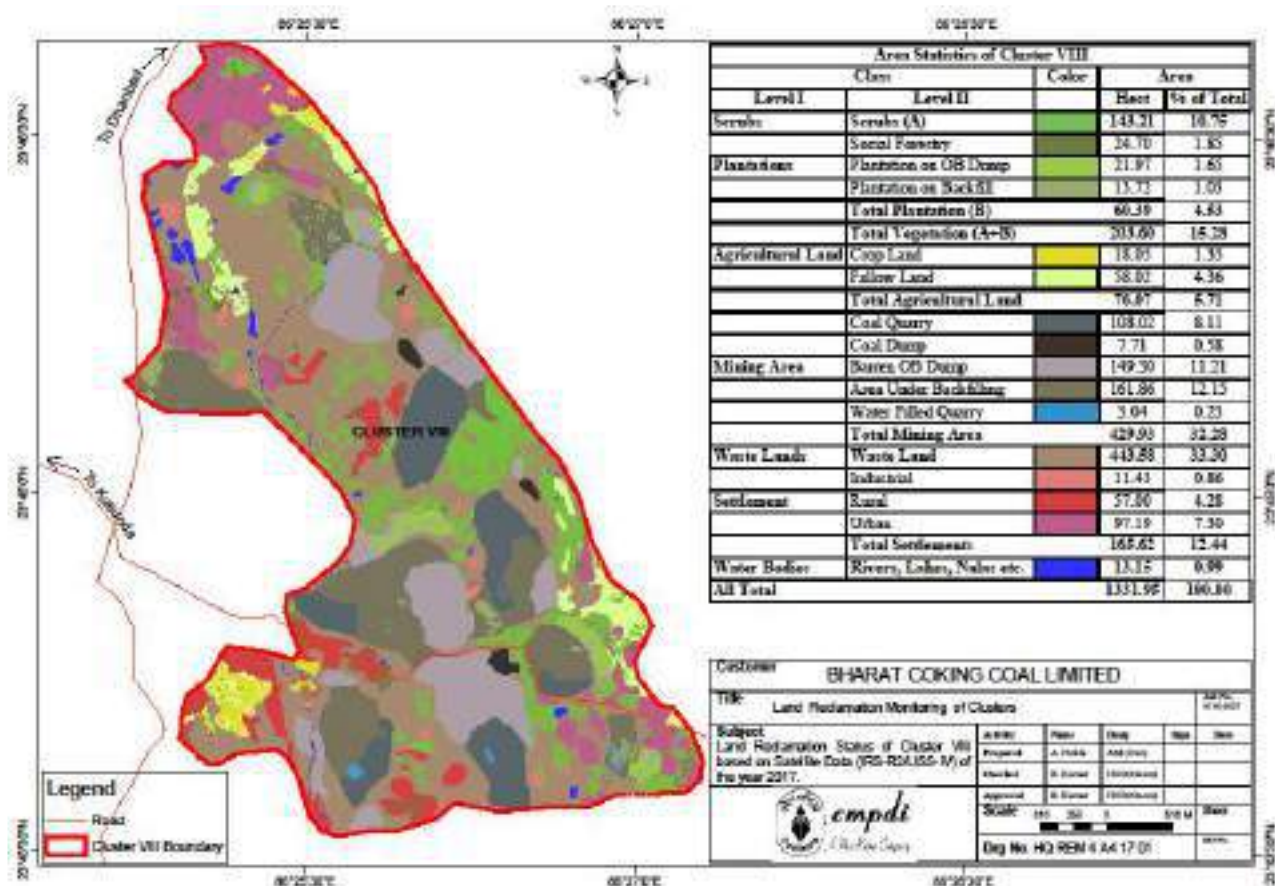
Monitoring stations (**D008 and D039**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has been done in the months of May'23, August'23, and Nov'23 and January'24. The Ground water level data is presented in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2023-24				2022-23				2021-22			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	D008	Alokdiha	7.70	4.42	4.82	6.75	6.32	4.25	5.42	6.34	4.55	1.85	2.27	3.20
2	D039	Tilaboni	8.52	2.52	3.28	5.75	7.50	1.85	3.05	1.75	10.70	4.60	5.10	8.15
Average WL (bgl)			8.11	3.47	4.05	6.25	6.91	3.05	4.24	4.05	7.63	3.23	3.69	5.68

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 4.55 m Max – 10.70 m
Post-monsoon GW Level (m): Min – 2.27 m Max – 5.42 m

LAND USE / LAND COVER MAP OF THE CLUSTER-VIII MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	279.69 x 10 ⁴	0.0	279.69 x 10 ⁴
2	Open Land	886.66 x 10 ⁴	0.0	886.66 x 10 ⁴
3	Road/ Paved Area	97.19 x 10 ⁴	0.0	97.19 x 10 ⁴
4	Rooftop area of building/ sheds	68.43 x 10 ⁴	0.0	68.43 x 10 ⁴
5	Total	1331.95 x 10 ⁴	0.0	1331.95 x 10 ⁴

I. GROUND WATER LEVEL OF CLUSTER-IX

Mines of cluster-IX are under administrative control of Lodna Area of B.C.C.L in western part of Jharia Coalfield which is located in Dhanbad district of Jharkhand. Cluster- IX consists of eight mines namely; North Tisra/South Tisra OCP, Jeenagora OCP, North Tisra UG, Lodna UG, Bagdigi UG, Bararee UG, Joyrampur UG and Jealgora UG (closed). Among them N. Tisra/S. Tisra OCP, Jeenagora OCP and N. Tisra UG mine will be amalgamated and will form North Tisra/South Tisra Expansion OCP. All above the mines are contiguous in nature and the environmental impact is overlapping in ambient environment due to cumulative effect of mining activities. The life of the project has been worked out to be up to 30 years considering annual production target of 8.513 MTPA (toposheet no. 73 I/6).

The present leasehold area of Cluster-IX is 1967.22 Ha. The topography of the area is undulating with gentle slope towards south. The RL varies from 221 m to 188.44 m AMSL. Chatkari Jore, Tisra Jore, Sulunga Jore and their tributaries are controlling the drainage pattern of the area. The area comes under the watershed of Chatkari Jore.

Monitoring stations (**D005, D007, D039 and D074**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has been done in the months of May'23, August'23, and Nov'23 and January'24. The Ground water level data is presented in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2023-24				2022-23				2021-22			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	D005	Jiyalgora	8.20	4.08	5.90	6.54	8.40	3.36	7.01	8.95	7.28	3.35	4.00	6.40
2	D007	Golden Pahari	9.03	1.88	3.64	5.18	9.03	2.17	5.67	6.57	6.08	2.38	2.63	3.88
3	D039	Tilaboni	8.52	2.52	3.28	5.75	7.50	1.85	3.05	1.75	10.70	4.60	5.10	8.15
4	D074	BhulanBararee	4.57	3.10	3.54	4.09	6.17	3.20	5.77	7.90	6.93	3.20	2.90	3.70
Average WL (bgl)			7.58	2.90	4.09	5.39	7.78	2.65	5.38	6.29	7.75	3.38	3.66	5.53

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 4.57 m Max – 10.70 m
Post-monsoon GW Level (m): Min – 2.63 m Max – 7.01 m

Area Statistics of Cluster IX

Level I	Class	Color	Hect	% of Total
Scrubs	Scrubs (A)		339.84	17.24
	Social Forestry		148.58	8.57
	Plantation on OB Dump		41.29	2.12
Plantations	Plantation on Backfill		8.88	0.35
	Total Plantation (B)		217.17	11.84
	Total Vegetation (A+B)		597.69	28.32
Agricultural Land	Fallow Land		44.49	2.28
	Total Agricultural Land		44.49	2.28
	Coal Quarry		178.55	9.08
Mining Area	Barris OB Dump		172.19	8.75
	Area Under Backfilling		17.55	3.04
	Coal Dump		8.87	0.46
	Water Filled Quarry		3.38	0.17
	Total Mining Areas		441.24	22.43
Waste Lands	Waste Land		614.64	31.24
	Industrial		8.11	0.46
Settlement	Rural		47.79	2.43
	Urban		232.31	11.81
	Total Settlements		280.23	14.70
Water Bodies	Rivers, Lakes, Nalas etc.		20.59	1.05
All Total			1967.22	100.00

Legend

- Railway Line
- [Red Outline] Cluster IX Boundary

Cluster IX

NBOC Colony

Declaration: BHARAT COKING COAL LIMITED

Title: Land Reclamation Monitoring of Clusters

Subject: Land Reclamation Status of Cluster IX based on Satellite Data (RS-43/LISS-VIS) of the year 2017.

Prepared by: S. K. Singh, SGT

Checked by: S. K. Singh, SGT

Approved by: S. K. Singh, SGT

Scale: 1:250,000

Date: 14/01/2017

Digital No. HQ RTR 4 44 17 01

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J. GROUND WATER LEVEL OF CLUSTER-X

Cluster-X consists of Bhowrah North OC & UG, Bhowrah South OC & UG, Amalgamated Sudamdih Patherdih, Sudamdih Shaft, Amlabad UG (Closed) and Sudamdih Coal Washery which comes under the administrative control of Eastern Jharia Area of Bharat Coking Coal Limited (B.C.C.L - A Subsidiary of Coal India Limited). This cluster of mines is located in eastern part of Jharia Coalfield in Dhanbad district of Jharkhand. The life of the project has been worked out to be more than 30 years considering annual production target of 2.289 MTY.

Cluster-X mine involves leasehold area of about 2057.47 Ha of land. It is covered in Survey of India toposheet no. 73 I/6. The area of Bhowrah North OC & UG, Bhowrah South OC & UG, Amalgamated Sudamdih Patherdih, Sudamdih Shaft, Amlabad UG (Closed) are 280.83 Ha, 571.58 Ha, 498.61 Ha, 391.50 Ha and 386.95 Ha respectively.

The present leasehold area of Cluster-X is 2057.47 Ha. The area has an undulating topography with gentle slope towards south and south-east. The RL varies from 185 m to 150.0 m AMSL. Gaurkuthi Nala and few seasonal streams are controlling the drainage pattern of the area. The area comes under the watershed of Damodar River.

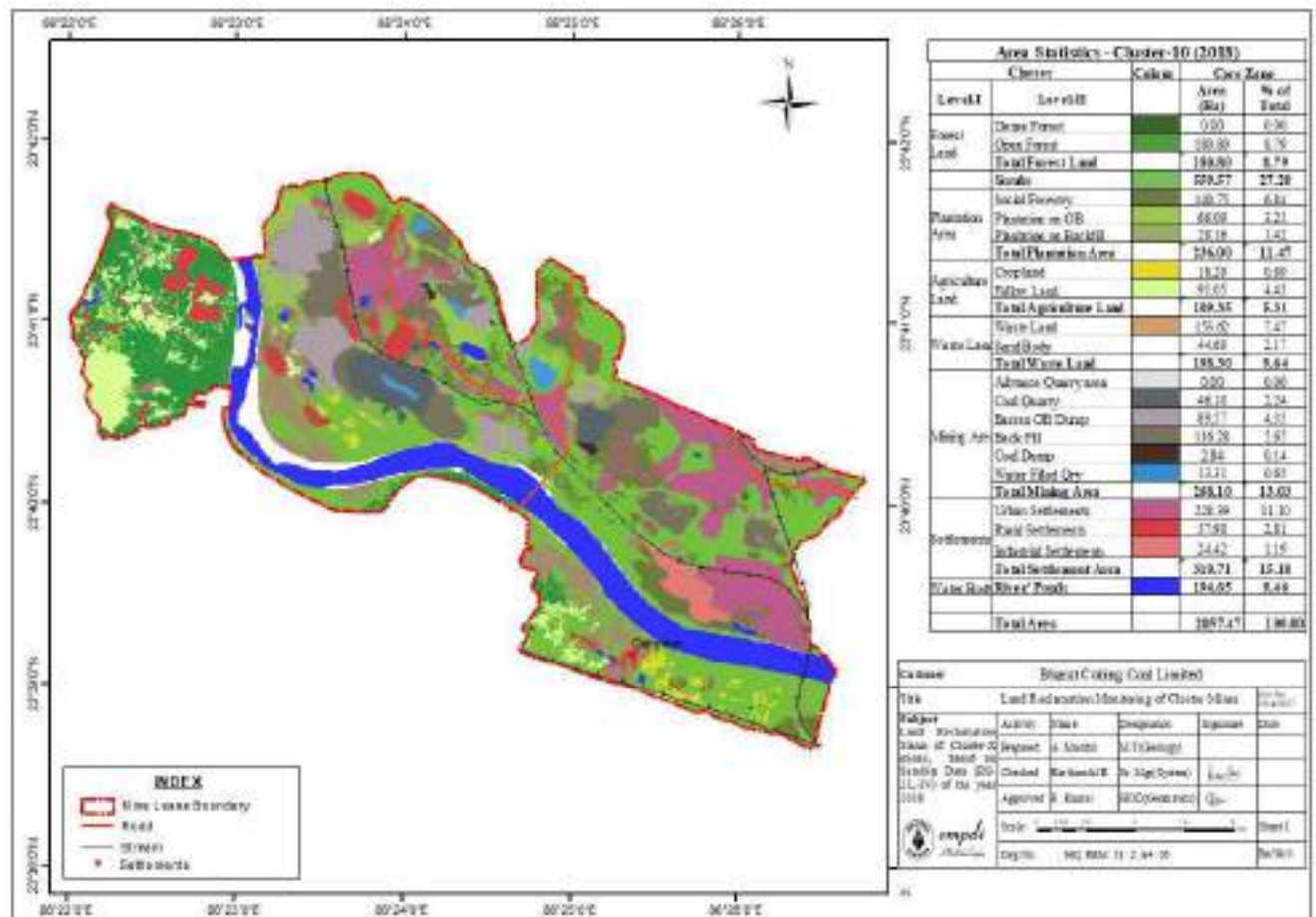
Monitoring stations (**A019, D035, D036 and D077**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has been done in the months of May'23, August'23, and Nov'23 and January'24, the Ground water level data is presented in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2023-24				2022-23				2021-22			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	A019	Bhowrah	2.90	2.10	2.60	2.73	4.10	1.82	2.54	1.79	3.30	1.95	1.90	2.20
2	D035	Patherdih	5.23	3.45	3.90	4.10	6.10	3.70	4.68	5.50	6.60	2.70	2.90	4.30
3	D036	Sudamdih	1.85	0.50	0.60	1.00	3.25	0.15	0.60	1.44	2.02	0.45	0.55	0.55
4	D077	Amlabad	5.98	3.90	3.93	5.07	6.50	3.40	4.70	6.00	5.98	2.60	4.69	5.60
Average WL (bgl)			3.99	2.49	2.76	3.23	4.99	2.27	3.13	3.68	4.48	1.93	2.51	3.16

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 1.85 m Max – 6.60 m
Post-monsoon GW Level (m): Min – 0.55 m Max – 4.70 m

LAND USE / LAND COVER MAP OF THE CLUSTER-X MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	1085.72 x 10 ⁴	0.0	1085.72 x 10 ⁴
2	Open Land	661.04 x 10 ⁴	0.0	661.04 x 10 ⁴
3	Road/ Paved Area	228.39 x 10 ⁴	0.0	228.39 x 10 ⁴
4	Rooftop area of building/ sheds	82.32 x 10 ⁴	0.0	82.32 x 10 ⁴
5	Total	2057.47 x 10 ⁴	0.0	2057.47 x 10 ⁴

K. GROUND WATER LEVEL OF CLUSTER-XI

Cluster–XI consists of eight coal mines; Moonidih UG, Gopalichak UG Project, Kachi Balihari 10/12 Pit UG, Pootkee Balihari Project UG, Bhagaband UG, Kendwadih UG (closed), Pootkee UG (closed), Kachi Balihari 5/6 Pit UG (closed) which are under the administrative control of Western Jharia Area of Bharat Coking Coal Limited (B.C.C.L - A Subsidiary of Coal India Limited). The Cluster- XI is located in central part of Jharia Coalfield in Dhanbad district of Jharkhand. The life of the project has been worked out to be up to 50 years considering annual production target of 6.604 MTPA (toposheet no. no. 73 I/5 7 73 I/6).

The present leasehold area of Cluster-XI is 3527.58 Ha. The area has an undulating topography with gentle slope towards south. The RL varies from 201 m to 166 m AMSL. Katri River, Jarian Nala, Ekra Jore and Kari Jore are controlling the drainage of the area. The area comes under the watershed of Katri River and Kari Jore.

Monitoring stations (**A017, A020 and A032**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has been done in the months of May'23, August'23, and Nov'23 and January'24. The Ground water level data is presented in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2023-24				2022-23				2021-22			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	A017	Kachi Balihari	2.41	1.78	2.19	2.57	2.62	2.06	2.59	2.64	3.36	1.62	2.37	2.54
2	A020	Gorbudih	8.02	4.05	4.20	7.27	5.59	3.18	3.54	5.27	5.47	1.47	2.02	3.07
3	A032	Baludih	3.83	0.95	1.60	2.09	2.25	0.65	1.75	2.79	2.35	0.73	0.96	1.50
Average WL (bgl)			4.75	2.26	2.66	3.98	3.49	1.96	2.63	3.57	3.73	1.27	1.78	2.37

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 2.25m Max – 8.02 m
Post-monsoon GW Level (m): Min – 0.96 m Max – 4.20 m

Figure 1: Land Use and Land Cover Map of the Proposed Coal Cluster in the Eastern Coalfield Division.

The map displays the spatial distribution of land use and land cover within the proposed coal cluster. The legend provides the following data:

Category	Area (Hectares)	Percentage (%)
Forest	1,10,000	10.00
Agriculture	1,10,000	10.00
Built-up	1,10,000	10.00
Water	1,10,000	10.00
Barren Land	1,10,000	10.00
Other	1,10,000	10.00
Total	1,10,000	100.00

The map includes a scale bar (0 to 10 km) and a north arrow. The legend also includes symbols for 'Cluster Boundary', 'Road', 'Water', 'Barren Land', 'Other', 'Forest', 'Agriculture', 'Built-up', and 'Water Body'.

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L. GROUND WATER LEVEL OF CLUSTER-XIII

Cluster-XIII, consists of one running mine (Murulidih 20/21 pit UG mine) and six abandoned mines i.e. Bhurungiya colliery, Muchraidih colliery, Hantoodih colliery, Padugora colliery, Murulidih colliery and Bhatdee colliery of Western Jharia area, BCCL which is located in the south-western part of Jharia coal field in Dhanbad district of Jharkhand. The area is covered under Survey of India toposheet no. 73 I/6. The life of the project has been worked out to be about 15 years considering annual production target of 0.234 MTPA.

The present leasehold area of Cluster-XIII is 1898.62 Ha. The area has an undulating topography with gentle slope towards south-east. The maximum RL is 224 m AMSL in the north-western part of the area whereas the minimum RL is 179 m AMSL at southern part. The area comes under the watershed area of Jamunia River and Katri River.

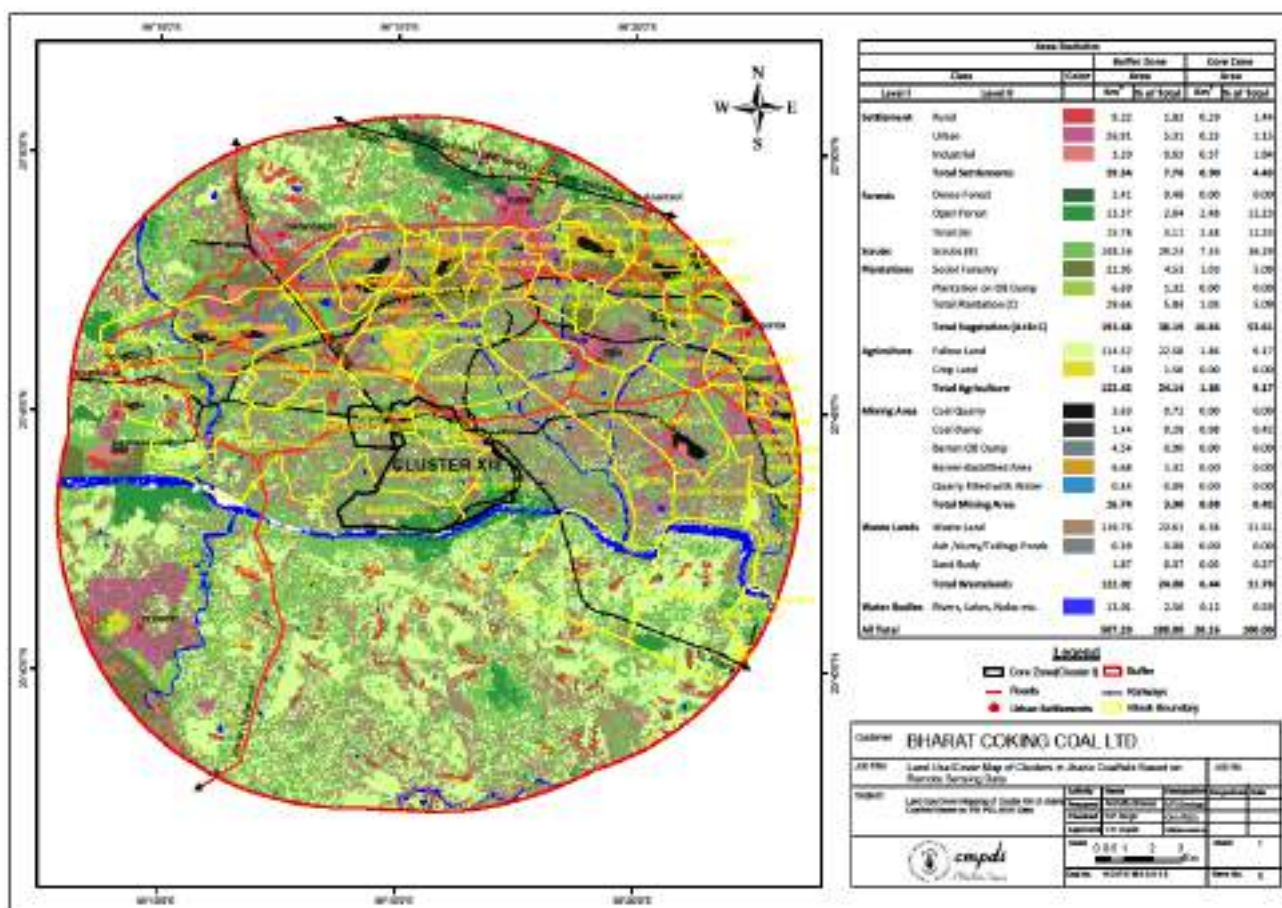
Monitoring stations (**A023, A034 and B048**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has been done in the months of May'23, August'23, Nov'23 and January'24. The Ground water level data is presented in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2023-24				2022-23				2021-22			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	A023	Machhayara	9.00	5.10	5.71	7.90	7.97	1.14	4.79	6.67	9.52	1.87	2.82	4.82
2	A034	Mahuda vil.	6.54	2.98	4.01	4.85	8.20	3.65	6.35	6.95	5.20	1.83	3.55	
3	B048	Mahuda	6.13	4.55	5.05	5.57	6.85	0.65	6.25	5.80	7.23	2.28	6.05	6.60
Average WL (bgl)			7.22	4.21	4.92	6.11	7.67	1.81	5.80	6.47	7.32	1.99	4.14	5.71

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 5.20 m Max – 9.52 m
Post-monsoon GW Level (m): Min – 2.82 m Max – 6.35 m

LAND USE / LAND COVER MAP OF THE CLUSTER-XIII MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	1484.41 x 10 ⁴	0.0	1570.48 x 10 ⁴
2	Open Land	183.28 x 10 ⁴	0.0	97.22 x 10 ⁴
3	Road/ Paved Area	71.84 x 10 ⁴	0.0	71.83 x 10 ⁴
4	Rooftop area of building/ sheds	159.09 x 10 ⁴	0.0	159.09 x 10 ⁴
5	Total	1898.62 x 10 ⁴	0.0	1898.62 x 10 ⁴

M. GROUND WATER LEVEL OF CLUSTER-XIV

Mines of Cluster-XIV are under administrative control of Western Jharia Area of B.C.C.L (Jharia Coalfield) which is located in Dhanbad district of Jharkhand. This cluster consists of Lohapatty UG and Lohapatty OC patch (proposed). The life of the project has been worked out to be up to 08 years considering annual production target of 0.526 MTPA. It is covered in Survey of India toposheet no. 73 I/2.

The present leasehold area of Cluster-XIV is 1418.25 Ha. The topography of the area is undulating with slope towards south west. The maximum RL is 224 m in the north-eastern part whereas the minimum RL is 170 m above mean sea level on the south-western part of the area. Jamunia River and its tributaries are controlling the drainage of the area. The area comes under the watershed area of Jamunia River.

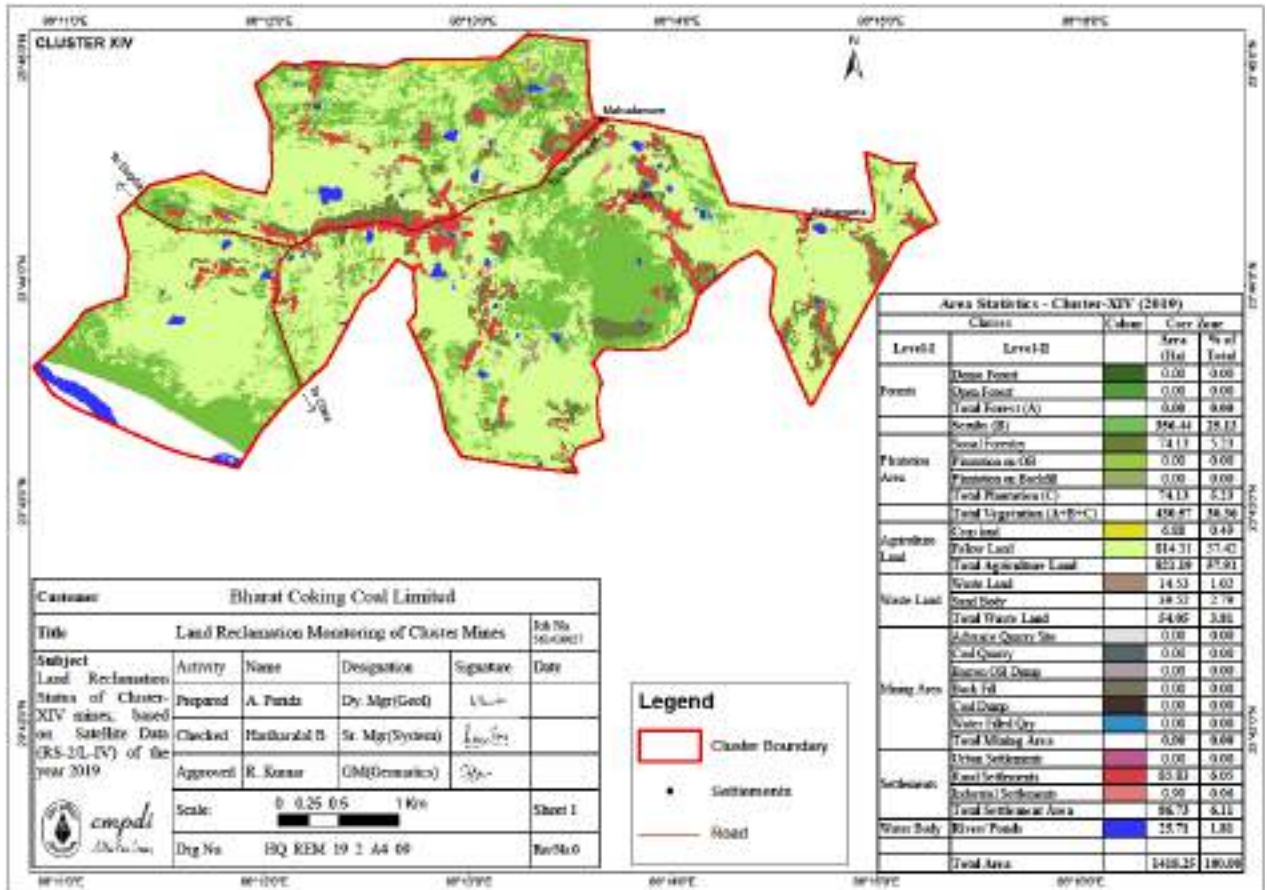
Monitoring stations (**B024 and B067**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has been done in the months of May'23, August'23, and Nov'23 and January'24. The Ground water level data is presented in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2023-24				2022-23				2021-22			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	B024	Telmuchu	4.63	3.13	3.24	3.93	5.53	1.34	3.46	4.23	5.68	1.55	2.08	3.07
2	B067	Simatanr	8.05	3.85	5.32	6.27	8.50	3.55	6.30	7.35	8.95	2.45	2.95	3.65
Average WL (bgl)			6.34	3.49	4.28	5.1	7.02	2.45	4.88	5.79	7.32	2.00	2.52	3.36

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 4.63 m Max – 8.95 m
Post-monsoon GW Level (m): Min – 2.08 m Max – 6.30 m

LAND USE / LAND COVER MAP OF THE CLUSTER-XIV MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	1251.76 x 10 ⁴	0.0	1251.76 x 10 ⁴
2	Open Land	79.76 x 10 ⁴	0.0	79.76 x 10 ⁴
3	Road/ Paved Area	85.83 x 10 ⁴	0.0	85.83 x 10 ⁴
4	Roof top area of building/ sheds	0.90 x 10 ⁴	0.0	0.90 x 10 ⁴
5	Total	1418.25 x 10 ⁴	0.0	1418.25 x 10 ⁴

N. GROUND WATER LEVEL OF CLUSTER-XV

Mines of Cluster - XV comes under administrative control of Govindpur Area and Barora Area of B.C.C.L (Jharia Coalfield) which is located in Dhanbad district of Jharkhand. Cluster-XV consists of four coal mines; Kharkharee UG (underground mine) and Dharmaband UG which are under administrative control of Govindpur Area and Madhuband UG & Phularitand UG which are under the administrative control of Barora Area. The life of the project has been worked out to be up to 30 years considering annual production target of 0.423 MTPA. It is covered in Survey of India toposheet no. 73 I/1 and 73 I/5.

The present leasehold area of Cluster-XV is 1696.55 Ha. The topography of the area is undulating with slope towards south-west. The maximum RL is 235 m in the Kharkharee mine area whereas the minimum RL is 165 m AMSL on the eastern & western part of the Cluster. Jamunia River and Khudia River are controlling the drainage of the area. The area comes under the watershed area of both Jamunia River and Khudia River.

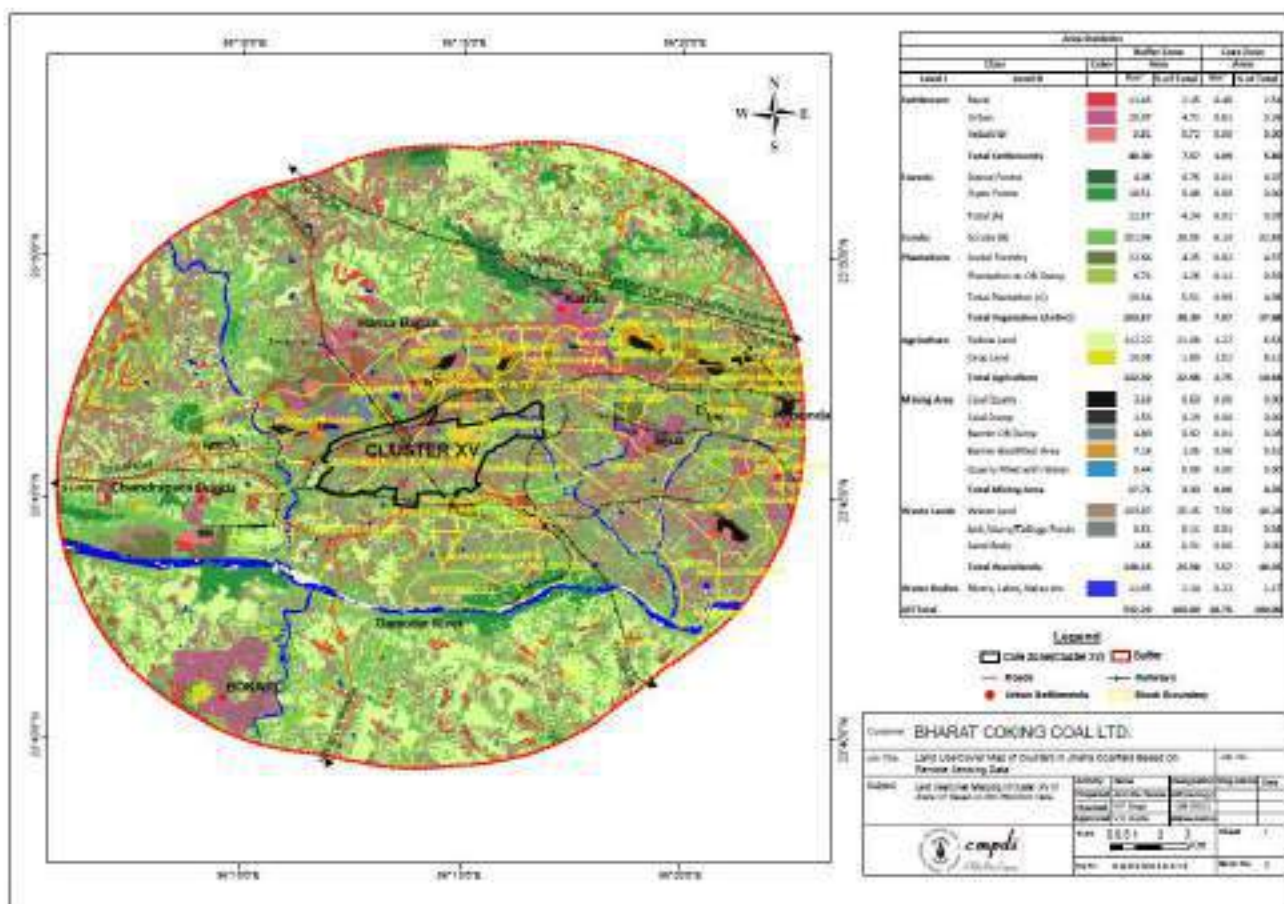
Monitoring stations (**A024, B032 and B062**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has been done in the months of May'23, August'23, and Nov'23 and January'24. The Ground water level data is presented in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2023-24				2022-23				2021-22			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	A024	Pipratn	5.38	3.60	3.90	5.00	7.28	2.55	4.33	5.32	10.13		2.78	4.55
2	B032	Madhuband	5.35	3.93	3.60	5.42	4.15	0.70	2.56	4.15	5.60	1.34	1.70	2.30
3	B062	Sadiyardih	4.80	2.35	3.10	4.00	6.45	1.77	4.91	5.15	6.87	1.35	4.50	4.60
Average WL (bgl)			5.18	3.29	3.53	4.81	5.96	1.67	3.93	4.87	7.53	1.35	2.99	3.82

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 4.15 m Max – 10.13 m
Post-monsoon GW Level (m): Min – 1.70 m Max – 4.91 m

LAND USE / LAND COVER MAP OF THE CLUSTER-XV MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	365.18 x 10 ⁴	0.0	957.34 x 10 ⁴
2	Open Land	1130.53 x 10 ⁴	0.0	538.37 x 10 ⁴
3	Road/ Paved Area	101.67 x 10 ⁴	0.0	101.67 x 10 ⁴
4	Rooftop area of building/ sheds	99.17 x 10 ⁴	0.0	99.17 x 10 ⁴
5	Total	1696.55 x 10 ⁴	0.0	1696.55 x 10 ⁴

O. GROUND WATER LEVEL OF CLUSTER-XVI

Mines of Cluster - XVI (Dahibari-Basantimata Group of mines) are under administrative control of Chanch Victoria Area of B.C.C.L (western part of Raniganj Coalfield) which is located in Dhanbad district of Jharkhand. There are total five collieries within this Cluster- XVI (Dahibari-Basantimata OC, Basantimata UG, New Laikdih OC, Laikdih Deep UG and Chanch UG Colliery). All the above mines are contiguous in nature and the environmental impact is overlapping in ambient environment due to cumulative effect of mining activities. Life of the project has been worked out to be up to 24 years considering annual production target of 1.963 MTPA. It is covered in Survey of India toposheet no. 73 I/14.

The present leasehold area of Cluster-XVI is 2008.40 Ha. The topography of the area is undulating with slope towards south-west. The area is plain with gently undulating with elevation varying from 100 m to 140 m AMSL. The general slope of the area is towards southeast. Barakar River and Khudia River are controlling the drainage of the area. The area comes under the watershed area of Barakar River.

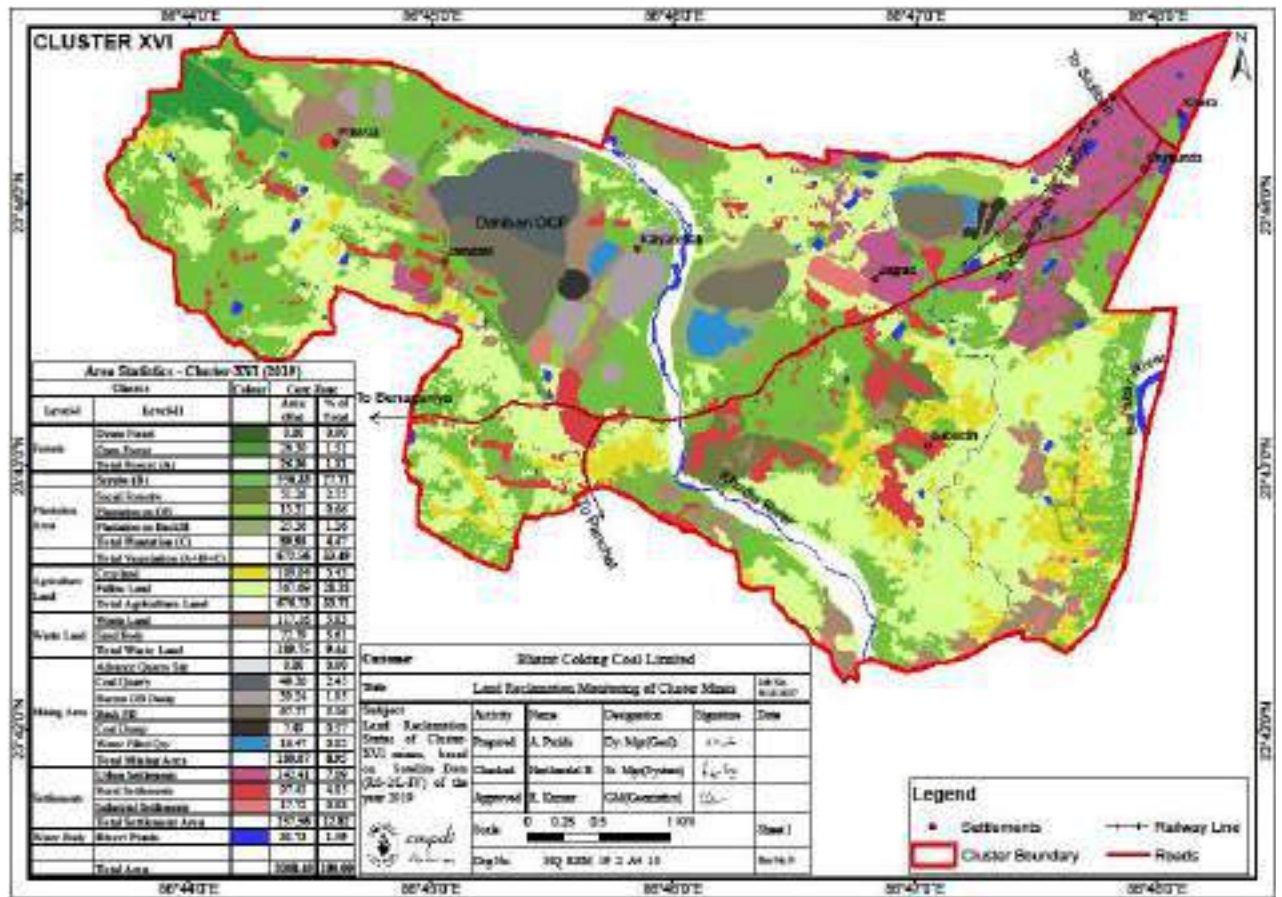
Monitoring stations (**DB022, DB023, DB024 & DB025**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has been done in the months of May'23, August'23, and Nov'23 and January'24. The Ground water level data is presented in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2023-24				2022-23				2021-22			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	May	Aug	Nov	Jan
1	DB022	Dahibari, Basti	4.25	2.07	2.43	3.31	3.72	1.47	1.99	1.58	3.83	1.55	2.05	1.57
2	DB023	Dahibari OC	4.8	2.61	2.94	4.24	3.56	1.71	2.60	2.40	3.67	1.05	2.68	1.70
3	DB024	Dahibari	8.25	3.5	4.18	6.87	7.08		3.91		7.30	4.20	2.85	5.80
4	DB025	Basantimata	5.15	2.6	2.9	3.17	4.89		2.81		5.04	1.01	2.90	2.63
Average WL (bgl)			5.61	2.70	3.11	4.40	4.81	1.59	2.83	1.99	4.96	1.95	2.62	2.93

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 3.56 m Max – 8.25 m
Post-monsoon GW Level (m): Min – 1.99 m Max – 4.18 m

LAND USE / LAND COVER MAP OF THE CLUSTER-XVI MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	1349.29 x 10 ⁴	0.0	1349.29 x 10 ⁴
2	Open Land	401.55 x 10 ⁴	0.0	401.55 x 10 ⁴
3	Road/ Paved Area	142.41 x 10 ⁴	0.0	142.41 x 10 ⁴
4	Rooftop area of building/ sheds	115.15 x 10 ⁴	0.0	115.15 x 10 ⁴
5	Total	2008.40 x 10 ⁴	0.0	2008.40 x 10 ⁴

4.0 GROUND WATER LEVEL SCENARIO

The summarized water level data of all clusters given in **Table – 7**.

Table –7: Groundwater level data (Cluster-wise)

Sl. No.	Cluster of BCCL	No. of Monitoring Wells	Water level Below ground level (May, Aug, Nov'23 & Jan'24)	Avg. Fluctuation (in meters) during 2023	Geological Formation
1	I	3 nos.	0.80 to 5.20 m	1.48 m	Barakar
2	II	4 nos.	0.50 to 10.73 m	2.16 m	Barakar
3	III	4 nos.	1.09 to 10.73 m	2.06m	Barakar
4	IV	3 nos.	1.95 to 8.45 m	3.59 m	Barakar
5	V	2 nos.	0.55 to 5.55 m	1.07 m	Barakar
6	VI	3 nos.	1.80 to 4.40 m	1.39 m	Barakar
7	VII	4 nos.	1.22 to 4.75 m	1.48 m	Barakar
8	VIII	2 nos.	2.52 to 8.52 m	4.06 m	Barakar
9	IX	4 nos.	1.88 to 9.03 m	3.49 m	Barakar
10	X	4 nos.	0.50 to 5.98 m	1.23 m	Barakar
11	XI	3 nos.	0.95 to 8.02 m	2.09 m	Barakar & Barren Measure
12	XIII	3 nos.	2.98 to 9.00 m	2.30 m	Raniganj
13	XIV	2 nos.	3.13 to 8.05 m	2.06 m	Raniganj
14	XV	3 nos.	2.35 to 5.42 m	1.64 m	Barakar & Barren Measure
15	XVI	4 nos.	2.07 to 8.25 m	2.50 m	Barakar

Depth to water level (in bgl) values describe that water level goes down to maximum 10.73 m during summer season and minimum up to 0.50 m during monsoon season of 2023. Un-confined aquifer is affected around 20 m to 30 m of maximum radius close to active opencast mining areas, showing steep gradient towards mine void. Other than that, there is no mining effect in the water level within JCF area and RCF area (part). Historical water level data and hydrograph of permanent observation stations from CGWB is shown in **Annexure–VI**. Water Table contour map and Depth to water level map both during pre & post-monsoon season is shown in **Plate-IV (A, B) & V (A, B)**.

Monitoring of groundwater (quantity & quality) to assess the present condition and resource has been done regularly in the coalfield area. Well hydrographs (**Annexure–VI**) are prepared and studied to identify long-term trends. Hydrograph trend analysis of CGWB monitoring wells and observation wells reveals

increasing groundwater level trends in most of the Cluster of mines. However, declining trends in both Pre and Post-monsoon GW level in Cluster-I, Cluster-V, Cluster-VI, Cluster-VIII and Cluster-XIII are recorded but no significant declining trend (>1.0 m/year) of water level is noticed in any particular area for the last 10 years within the coalfield area. Regarding quality monitoring, the water sample location map (**Plate-II**) with collection points details (dug wells) are given in **Annexure-V** and Quality is given in **Annexure-VII**.

5.0 DETAILS OF PIEZOMETERS

A piezometer network is useful for monitoring the impact of mining activity on groundwater regime. Total 23 nos. of Piezometers were constructed during 2022-23 within JCF and RCF to monitor GW level (**Plate-III**). The depth of piezometers varies from 30m to 300m below ground level.

Water level in the piezometers from May23 to Jan24 are furnished below in **Table-8** and the hydrographs (May22 to Jan24) are given in the Annexure VIB.

Table –8: Groundwater level data in Piezometers (Cluster-wise)

PZ ID	Cluster	Lat.	Long.	Depth (m)	May 23	June23	July23	Aug23	Sept 23	Oct 23	Nov 23	Dec 23	Jan24
PZ1A	I	23.7692	86.1754	40	12.26	13.20	8.80	6.75	6.50	7.50	8.65	9.90	11.98
PZ1B	I	23.7692	86.1753	115	30.20	29.10	24.04	19.00	19.90	21.90	24.05	26.90	30.40
PZ2A	II	23.7672	86.1890	87	30.90	31.60	22.50	17.50	16.50	18.90	22.50	25.50	28.33
PZ2B	II	23.7908	86.2470	77	8.02	7.30	5.10	3.50	3.90	4.30	4.50	4.40	4.6
PZ3A	III	23.8015	86.2824	172	89.5	89.1	83.73	76.50	78.85	81.00	82.64	84.00	86.42
PZ3B	III	23.7798	86.2418	30	24.72	23.72	18.0	14.1	13.2	15.12	18.3	20.4	23.23
PZ3C	III	23.8016	86.2824	124	-	-	-	-	-	-	-	-	-
PZ4A	IV	23.7764	86.3123	70	38.1	37.5	32.2	26.5	27.39	29.5	31.3	33.5	34.9
PZ4B	IV	23.7765	86.3125	240	100.9	98.2	94.6	89.9	90.8	91.3	91.6	92.1	92.7
PZ5A	V	23.7817	86.3569	35	8.5	7.8	5.8	2.5	3.5	4.4	4.8	5	5.31
PZ5B	V	23.7999	86.3619	94	90.94	85.5	80.1	75.08	73.2	78.04	82.0	86.1	90.32
PZ7A	VII	23.7701	86.4110	159	109.9	110.1	105.02	98.5	92.9	96.8	98.1	101.8	104.86
PZ7B	VII	23.7400	86.3997	35	29.36	30.02	21.38	16.63	15.68	17.96	21.38	24.23	26.18
PZ7C	VII	23.7342	86.4433	105	92.27	90.88	85.40	78.03	80.43	82.62	84.29	85.68	85.2

PZ8A	VIII	23.7556	86.4271	140	49.23	49.01	46.05	40.08	38.37	42.55	43.45	44.20	46
PZ9A	IX	23.7305	86.4464	84	43.85	44.55	41.87	38.25	39.43	40.50	41.32	42.00	40.32
PZ9B	IX	23.6962	86.4159	100	72.6	71.05	67.5	57.2	58.9	59.8	61.3	63.35	63.7
PZ10A	X	23.6880	86.4051	134	6.9	6.2	4.01	3.1	3.6	4.05	4.6	5.1	6.35
PZ11A	XI	23.7264	86.3419	300	52.7	47.5	37.2	28.09	34.6	37.1	39.05	40.9	53.15
PZ13A	XII	23.7138	86.2516	80	39.9	36.3	32.1	23.6	25.8	26.5	28.1	30.1	31.81
PZ14A	XIV	23.7415	86.2139	30	12.8	10.1	7.9	4.6	5.5	6.1	7.3	7.9	8.39
PZ14B	XIV	23.7415	86.2139	162	14.6	13.5	9.8	5.05	6.3	7.5	9.1	10.5	12.56
PZ16A	XVI	23.7308	86.7605	90	35.58	35.64	32.49	29.60	28.54	30.40	31.06	32.0	32.24

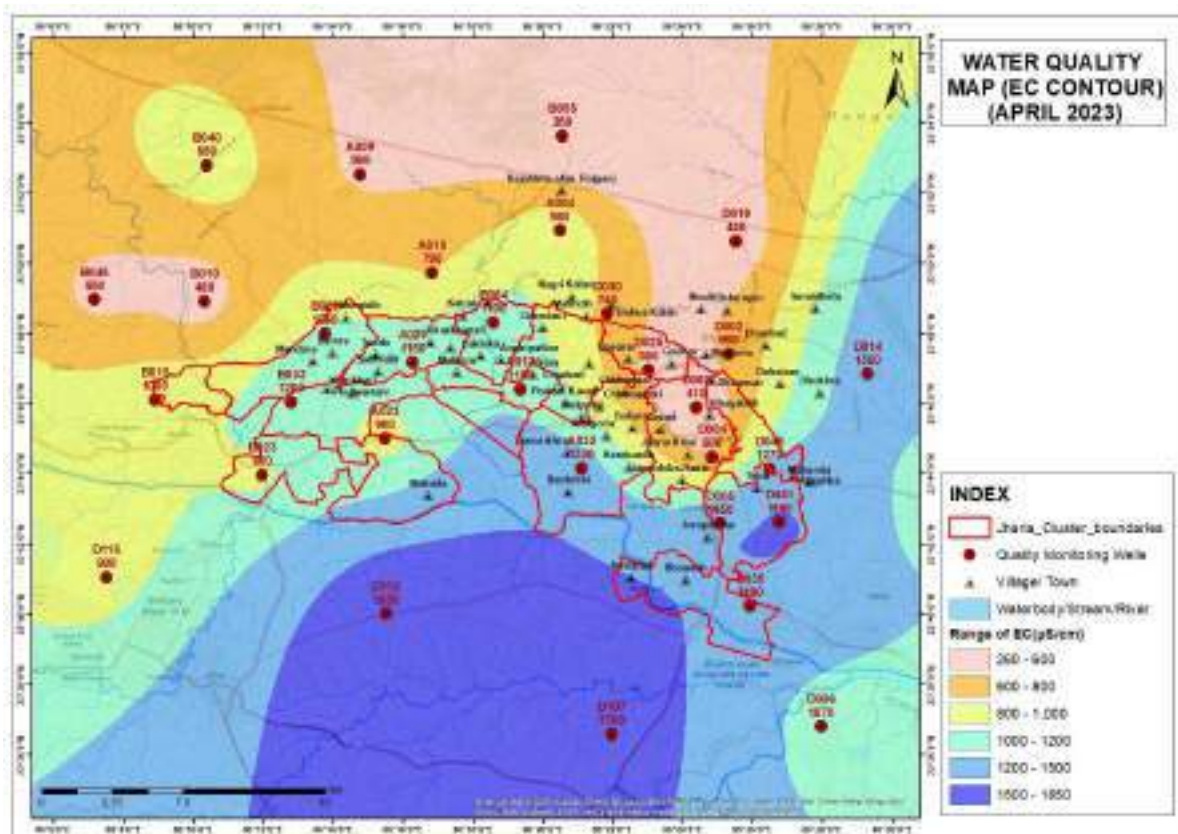
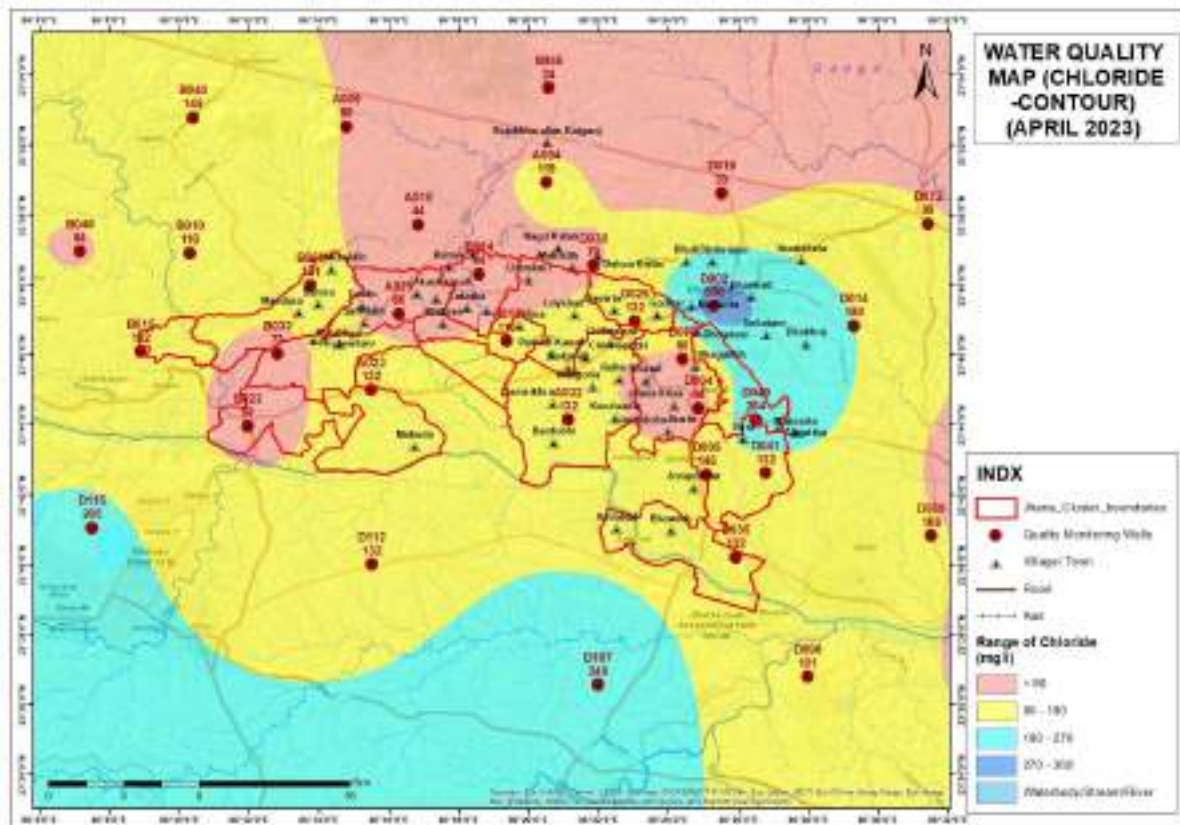
6.0 GROUND WATER QUALITY

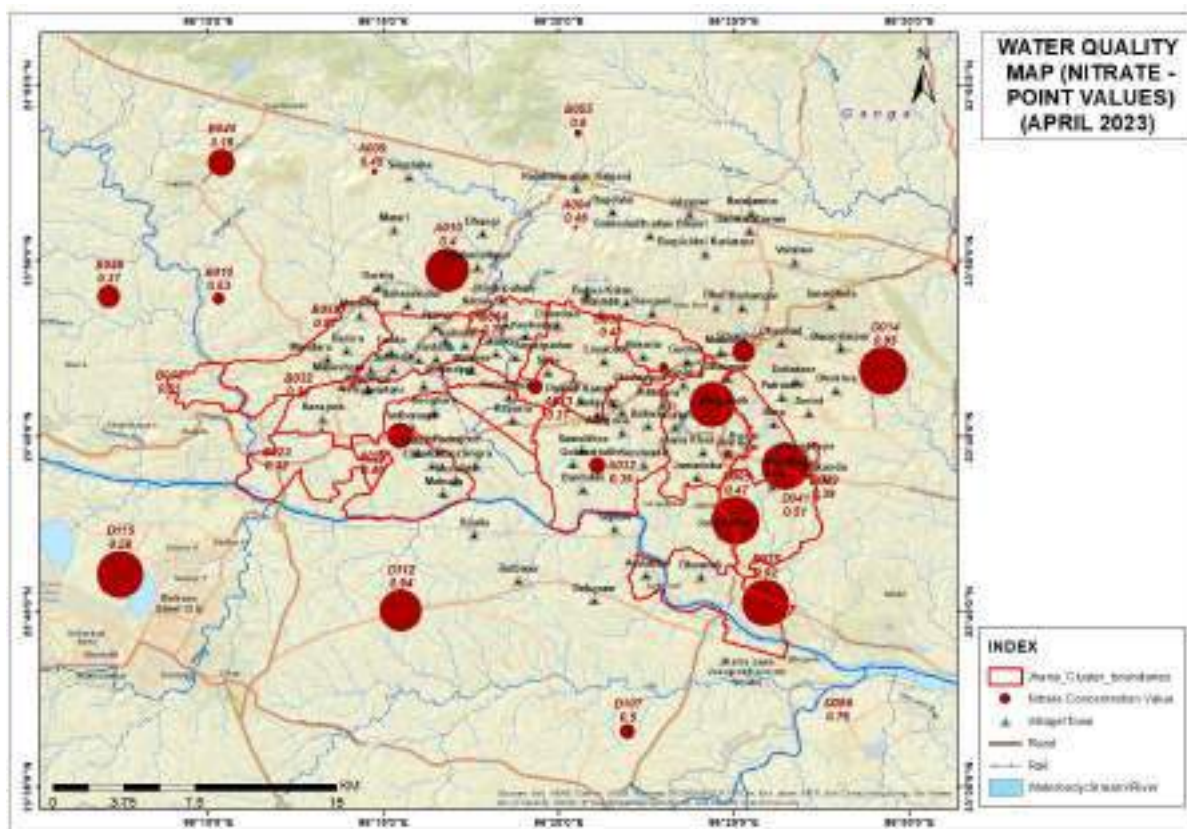
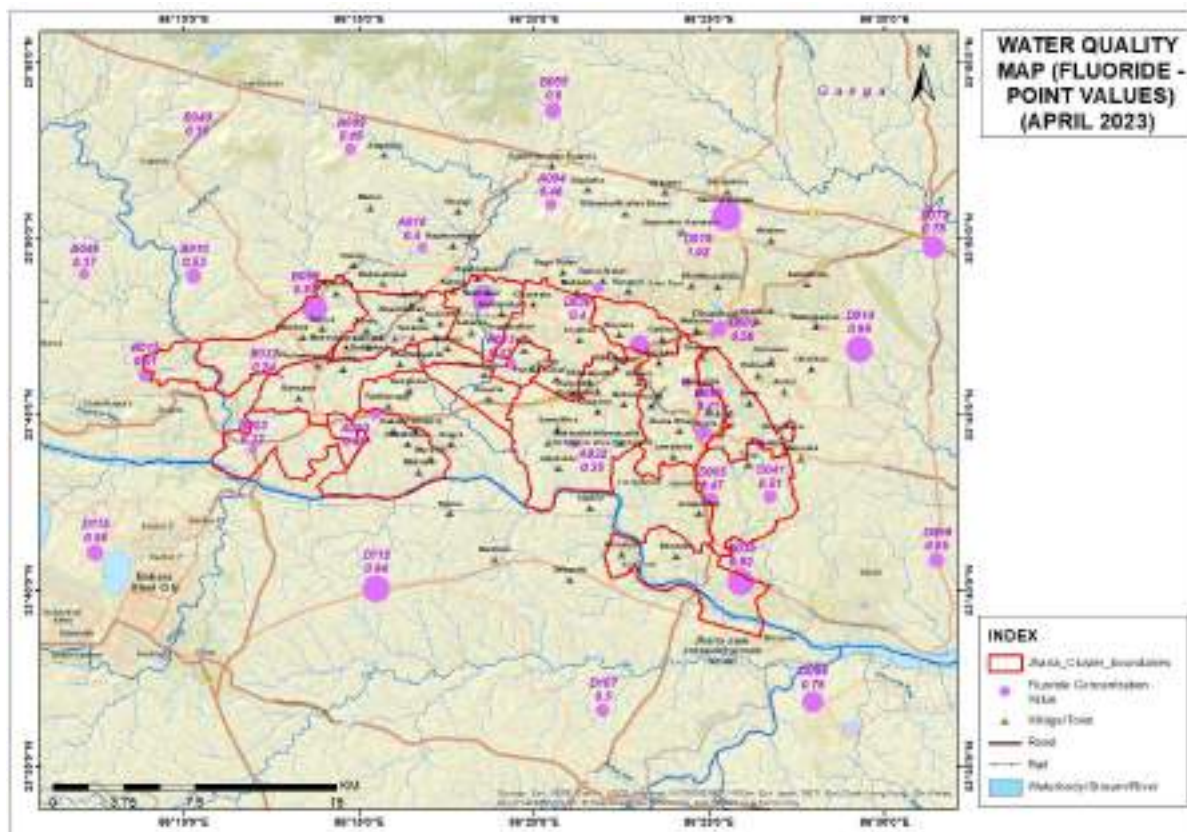
The ground water samples of the study area (15 nos. of Cluster of mines, BCCL) were collected from dug wells and analyzed. Thirty-five ground water samples were analyzed during the month of April and May'2023 at CMPDI, RI-II, Dhanbad. The water sampling details is given in **Annexure-V** and Water sample locations are shown in **Plate-II**. The water quality data is presented in **Annexure-VII**.

The study of the variations in water quality parameters is described below:

The pH of the groundwater samples varies between 7.63 (D-112) to 8.62 (B-64), the pH is within the IS 10500:2012 limit of drinking water standard.

The concentration of calcium in the water samples varies 21 (B-55) to 190 mg/l (D-107) and is above the permissible limit (75 mg/l) of drinking water standards. The sulphate ranges between 40 (B-55) to 659 mg/l (D-35) and the value of sulphate in water sample are above the permissible limit (200 mg/l). The Iron, Manganese, Zinc and Chromium concentration in the water samples found to be below the upper IS 10500:2012 limits for drinking water.





7.0 STAGE OF GROUNDWATER EXTRACTION

The groundwater is mainly utilized for domestic needs and irrigation purposes. The groundwater abstraction is mainly through dug wells and bore wells. The stage of groundwater development in Dhanbad District is 76.30% (as per 2017 GWRA). The highest stage of development is in Jharia Block (127.0%) & Dhanbad Block (107.50%) and lowest stage of development is in Chirkunda Block (35.5%) as per GWRA-2013. The Gondwana sandstones in general, known to constitute good aquifers at many places. However, the yield potential of the area adjoining to active mines in the coal belt is poor. The active mines often act as groundwater “sinks”. In contrast, the water-logged abandoned mines and pits act as potential sources of groundwater. As per the assessment by Central Ground Water Board (CGWB), Patna in 2022, Block wise data of Dhanbad District given below:

Table–9A: Block wise Stage of Groundwater development

SI No.	Administrative Unit		Category (GWRA-2013)	Category (GWRA-2017)	Category (GWRA-2022)
	District	Block			
1	Bokaro	Bermo	Over- exploited	Over- exploited	Over- exploited
2	Dhanbad	Baghmara	Critical	Critical	Safe
3	Dhanbad	Baliapur	Semi- Critical	Semi- Critical	Over- exploited
4	Dhanbad	Dhanbad	Over- exploited	Over- exploited	Semi-critical
5	Dhanbad	Jharia / Dhanbad Urban	Over- exploited	Over- exploited	Critical
6	Dhanbad	Topchachi	Critical	Critical	Critical
7	Dhanbad	Chirkunda	Safe	Safe	Safe

- **Dynamic Groundwater Resource Assessment, CGWB as per 2013, 2017 and 2022.**

Table-9B: Cluster wise Groundwater development scenario

Cluster/ Area	Adminis- trative Blocks/Stage Of GW Extraction	Total Water demand (cum/day)				Avg. GW level (bgl in m) 2023-24		GW level declining trend 2005-2023		Remarks
		Mine Discharge + BH pumping	Surface Water Source	Total Use (Domestic + Industrial)	Excess Or other use	Pre- monsoon	Post- monsoon	Pre- monsoon	Post- monsoon	
Cluster-I	Bermo (SOD: Over- exploited)	2173 (2065+108)	NIL	2112 (1698+414)	61	3.67	2.19	YES	YES	Recharge structure needed
Cluster-II	Baghmara (SOD: Safe)	8350	Jamunia river	6737 (2755+3982)	1613	5.16	3.00	NO	NO	Excess mine water needed to be utilized
Cluster-III		12760 (10960+1800)	NIL	8946 (7849+1097)	3814	5.53	3.47	NO	NO	
Cluster-IV		5900	MADA	5100 (3605+1495)	800	6.77	3.18	NO	NO	
Cluster-V		12690 (11025+1665)	MADA	11063 (5710+5353)	1897	3.63	2.56	YES	YES	
Cluster-VI	Dhanbad	4150	MADA	4150 (1664+2486)	0.0	4.09	2.70	YES	NO	--
Cluster-VII	(SOD: Semi- critical)	21565	MADA	20826 (17596+3230)	739	4.04	2.56	YES	YES	Excess mine water needed to be utilized water
Cluster-VIII	Jharia / Dhanbad Urban	9320	MADA	5294 (3730+1564)	4026	8.11	4.05	NO	NO	
Cluster-IX		12980	MADA	9358 (4549+4809)	3622	7.58	4.09	NO	NO	
Cluster-X		(SOD: Critical)	11825	Damodar river	6201 (4255+1946)	5624	3.99	2.76	YES	
Cluster-XI	Dhanbad (SOD: Critical)	24960	MADA & DVC	19425 (14015+5410)	5535	4.75	2.66	NO	NO	
Cluster-XIII	Baghmara	750	Damodar river	692	58.0	7.22	4.92	NO	NO	--
Cluster-XIV	(SOD: Safe)	943	NA	668	275	6.34	4.28	NO	NO	--
Cluster-XV		6200	NA	5941 (4600+1341)	259	5.18	3.53	NO	NO	--
Cluster-XVI	Chirkunda (SOD: Safe)	1910	DVC (Barakar river)	1730 (1380+350)	180	5.61	3.11	NO	NO	--

MADA – Mineral Area Development Authority, Jharkhand, Dhanbad (payment basis).

DVC – Damodar Valley Corporation, Maithon/Panchet, Jharkhand (payment basis).

8.0 IMPACT OF MINING ON GROUND WATER REGIME

8.1 GENERAL CONSEQUENCES OF COAL MINES ON AMBIENT HYDROGEOLOGICAL REGIME

Mining of coal either by opencast or underground method is bound to incise one or more water bearing strata (aquifers) which, in turn, may result in depletion or draw down in water levels and a corresponding inflow of water into the mine workings. The potential effects of coal mining operations on the hydrogeological regime are as under:

- ❖ Creates disruption in formation/aquifer
- ❖ Dewatering of aquifers
- ❖ Change in hydraulic gradient
- ❖ Modification in recharge of aquifers
- ❖ Change in groundwater flow pattern

The general need in mine planning from the hydrogeological point of view is the estimation of ground water seepage into the mine, its rate, the mine pumping capacity to meet the storm rainwater accumulation, extent of depression of water surface and management of mine effluent (mine water). It is also desirable that the consequences of mining operation on groundwater regime be determined in advance. However, the mine pumping in most of the cases are passive dewatering for the safety of the mine pit, active mine dewatering is done in few cases for very high potential aquifers.

8.2 POTENTIAL CONSEQUENCES OF OPENCAST AND UNDERGROUND COAL MINES ON HYDROGEOLOGICAL REGIME IN JHARIA COALFIELD

Generally, in the opencast and underground mines of Jharia Coalfield, alluvium and overlying weathered mantle are the first to be excavated, followed by upper Barakar Formation / Aquifer. Since these formations vary in thickness, compaction and their constituents over the area, their aquifer properties also vary.

The porosity and the compactness in the sandstone controls the discharge from these aquifers. The alluvium and weathered Formation wherever loose and fragile possess more porosity and this has high groundwater potential. Due to the mine cut, a depression in the water table is created. The initial discharges due to this depression is large in amount because of concentration of flow to that region. In the top zones, water table condition prevails and semi-confined conditions exist in the stratified section (Gondwana Sedimentary basin). With progress of mine operations, there is an increase in the depth of incision, as a result which, the semi-confined aquifers are also gets punctured.

During mining, the hydraulic gradients generally steep down near mine i.e. within the mine influence area. In the up-dip region, only un-confined aquifer is punctured through the mining process and thus only unconfined aquifer is affected whereas in the down-dip region both un-confined and semi-confined aquifers may be affected. The confined aquifers of lower Barakar Formation in the mining area are not punctured as it lies below the working coal seams and hence normally there is no noticeable effect in the aquifer related to this formation.

8.3 ESTIMATION OF RADIUS OF MINE INFLUENCE ZONE

Radius of Influence can be defined as the radial distance from the center of the borehole to the point where there is no lowering of groundwater table/potentiometric surface.

The radius of influence (R) for Opencast and UG Mines within Jharia CF is calculated by using Sichardt's formula based on present mining scenario.

$$R_0 = C \cdot (H-h) \cdot \sqrt{K}$$

Where, R_0 - Radius of influence (m), C - Constant =3000,

(H-h)- Drawdown (m), K – Hydraulic conductivity (m/s).

Here, K for Barakar Formations is 0.05 m/d or 5.7×10^{-7} m/sec.

Here, it may be appropriate to mention that the presence of prominent boundaries/water bodies, faults or inter-fringing of sandstone and shale beds may restrict the propagation of drawdown cone. With the presence of low permeable beds such as clay/shale and younger coal seams in the formation, laying above the working seams the water level in the phreatic aquifer is not directly affected. Both, the phreatic and semi-confined aquifers, get affected during the working by board and pillar method as subsidence takes place while extracting total coal (depillaring). Surface vigilance and filling up subsided zone, if any, has to be constantly under observation. The effect on groundwater level for most of the coalmine in Jharia coalfield has been observed in the down-dip side, generally within a distance up to 500 m from active mine zone and becomes milder/ negligible thereafter.

9.0 CONSERVATION MEASURES & FUTURE STRATEGY

- BCCL has installed 25 Pressure Filter Plant of total capacity of 4.16 MGD to meet drinking water requirement in nearby area. At present 63 Water Treatment Plants are operational having

capacity of 16.16 MGD within Jharia Coalfield area. Further, installation of 28 more Pressure Filter Plants having capacity of 5.84 MGD are in progress.

- BCCL has participated in development of low cost technology for drinking water in a CSIR project along with CIMFR, Dhanbad and a pilot plant of 4000 Liters/hour is functional at PB Project site of BCCL. Similar plants have been proposed at other sites of BCCL.
- A scheme titled 'Scheme for multi-purpose utilization of surplus mine water of Barora Area, Block II and Govindpur Area of BCCL' was prepared with a view to harness the excess water discharge to take care of the persistence problem of water scarcity in the nearby villages. In the scheme, two water reservoirs of capacity 27 MG and 17 MG have been proposed in the non-coal bearing area for storage of 3250 GPM and 2000 GPM surplus mine water which will be fed by mine discharge at mines of Barora, Block-II and Govindpur Area through pipe line.
- Rooftop rainwater harvesting (RWH) has been taken up in the project areas using the administrative buildings. 138 no. of quarters having roof-top area of about 14950 sq. m. is ready to harvest rainwater and around 13150 cum/annum of water is going to recharge the nearby groundwater system through RWH structures. Proposal has already been made to facilitate this kind of RWH structure at suitable locations i.e., Lodna Area, Kusunda Area (Jawahar Nagar, Matkuria, Coal Board Colony), Sijua Area (Nichitpur and Tetulmari Colony) within Jharia Coalfield to augment groundwater recharge.
- After cessation of mining, with plenty of rainfall and abundant ground water recharge, the water levels will recoup and attain normalcy. Thus, the impact of mining on groundwater system may be considered as a temporary phenomenon. The abandoned mine workings (UG) behave as water pool and improves the resources availability in the coalfield area.
- Utilization of treated mine water discharge by both, industry and local people, in the mine influence area. The excess mine water can be used to recharge groundwater system by connecting pipelines to abandoned dug wells. Utilization of mine water for irrigation will also enhance the ground water recharge potential through artificial recharge in the area.
- Increase vegetative cover by plantation in the mine area under land amelioration measures. This will contain the surface run-off and increase the groundwater recharge.
- Imparting awareness among workers and local peoples about Rainwater harvesting and artificial recharge will have priority. This aspect is usually covered during the Environmental Week celebrated every year (5 to 12 June).

- Monitoring of water quality of mine water discharge, local River/nala and domestic water source (dug well/hand pump wells) will continue under routine monitoring (May, August, November & Jan).

10.0 EXISTING/PROPOSED RAINWATER HARVESTING STRUCTURES IN BCCL COAL MINES

Fig-3 to 4.



Proposed Rain Water Harvesting Site GVTC, Cluster-I, Barora Area



Proposed Rain Water Harvesting Site Nehru Balika Vidhalaya, Cluster-I, Barora Area

Fig-5 to 6.



Proposed Rain Water Harvesting Site Barora Area Guest House, Cluster-I, Barora Area



Proposed Rain Water Harvesting Site Regional Hospital Baghmara, Cluster-I, Barora Area

Fig-7 to 8.



Proposed Rain Water Harvesting Site – Barora Area Office, Cluster-I, Barora Area



RECHARGE POND / ABANDONED IN THE JCF MINE AREA

Fig-9 to 10.



RECHARGE POND / ABANDONED IN THE JCF MINE AREA



FILTER PLANT IN THE MINE AREA

Fig-11 to 12.



RECHARGE POND / ABANDONDED IN THE JCF MINE AREA



RECHARGE POND / ABANDONDED IN THE JCF MINE AREA

Fig-13 to 14.



RECHARGE POND / ABANDONED IN THE JCF MINE AREA



Government of India
Ministry of Environment, Forest and Climate Change
Wetlands Division

List of Ramsar Sites in India

S. No	Name of Ramsar site	State	Area in hectares	Date of designation	Coordinates
1.	Ashtamudi Wetland	Kerala	6,140	19/08/2002	08°57'N 076°34'E
2.	Beas Conservation Reserve	Punjab	6,429	26/09/2019	31°23'N 075°11'E
3.	Bhitarkanika Mangroves	Odisha	65,000	19/08/2002	20°39'N 086°54'E
4.	Bhoj Wetland	Madhya Pradesh	3,201	19/08/2002	23°13'N 077°19'E
5.	Chandertal Wetland	Himachal Pradesh	49	08/11/2005	32°28'N 077°36'E
6.	Chilika Lake	Odisha	116,500	01/10/1981	19°42'N 085°21'E
7.	Deepor Beel	Assam	4,000	19/08/2002	26°07'N 091°39'E
8.	East Calcutta Wetlands	West Bengal	12,500	19/08/2002	22°27'N 088°27'E
9.	Harike Lake	Punjab	4,100	23/03/1990	31°13'N 075°12'E
10.	Hokera Wetland	Jammu & Kashmir	1,375	08/11/2005	34°04'N 074°42'E
11.	Kanjli	Punjab	183	22/01/2002	31°25'N 075°22'E
12.	Keoladeo National Park (MR)	Rajasthan	2,873	01/10/1981	27°13'N 077°31'E
13.	Keshopur-Miani Community Reserve	Punjab	344	26/09/2019	32°05'N 075°23'E
14.	Kolleru Lake	Andhra Pradesh	90,100	19/08/2002	16°37'N 081°12'E
15.	Loktak Lake (MR)	Manipur	26,600	23/03/1990	24°25'N 093°49'E
16.	Nalsarovar	Gujarat	12,000	24/09/2012	22°46'N 072°02'E
17.	Nandur Madhameshwar	Maharashtra	1,437	21/06/2019	20°01'N 074°06'E
18.	Nangal Wildlife Sanctuary	Punjab	116	26/09/2019	31°23'N 076°22'E
19.	Nawabganj Bird Sanctuary	Uttar Pradesh	225	19/09/2019	26°36'N 080°39'E
20.	Parvati Arga Bird Sanctuary	Uttar Pradesh	722	02/12/2019	26°56'N 082°09'E
21.	Point Calimere Wildlife and Bird Sanctuary	Tamil Nadu	38,500	19/08/2002	10°19'N 079°37'E
22.	Pong Dam Lake	Himachal Pradesh	15,662	19/08/2002	32°01'N 076°04'E
23.	Renuka Wetland	Himachal Pradesh	20	08/11/2005	31°37'N 077°27'E
24.	Ropar	Punjab	1,365	22/01/2002	31°01'N 076°30'E
25.	Rudrasagar Lake	Tripura	240	08/11/2005	23°28'N 091°16'E
26.	Saman Bird Sanctuary	Uttar Pradesh	526	02/12/2019	27°00'N 079°10'E
27.	Samaspur Bird Sanctuary	Uttar Pradesh	799	03/10/2019	25°59'N 081°23'E
28.	Sambhar Lake	Rajasthan	24,000	23/03/1990	27°00'N 075°00'E
29.	Sandi Bird Sanctuary	Uttar Pradesh	309	26/09/2019	27°18'N 079°58'E
30.	Sarsai Nawar Jheel	Uttar Pradesh	161	19/09/2019	26°58'N 079°15'E

Annexure – IV**Rainfall Data (in mm) At Dhanbad Observatory Station, IMD (Source: WRIS Website data)**

Year	January	February	March	April	May	June	July	August	Sep	Oct	Nov	Dec	Annual
1994	26.5	20.0	3.3	23.5	4.5	289.5	245.5	240.0	134.0	40.5	0.0	0.0	1027.3
1995	15.0	18.3	20.0	0.0	34.5	122.0	140.1	257.0	446.0	0.0	34.0	5.5	1092.4
1996	12.5	12.5	5.2	0.0	0.0	210.5	138.5	400.0	214.0	24.0	0.0	0.0	1017.2
1997	10.5	17.5	2.8	63.5	41.5	231.5	599.3	621.1	196.8	16.5	34.0	16.0	1851.0
1998	20.5	21.0	160.0	18.0	40.0	80.0	347.0	409.0	123.0	120.5	11.0	0.0	1350.0
1999	0.0	0.0	0.0	0.0	64.0	150.0	511.0	336.0	510.5	124.0	0.0	0.0	1695.5
2000	2.0	15.0	0.0	20.0	68.0	452.5	270.5	89.0	234.5	-	0.0	0.0	1151.5
2001	0.0	0.0	34.0	13.0	104.0	448.7	552.5	121.0	107.0	126.5	0.0	0.0	1506.7
2002	12.0	10.0	26.0	0.0	32.5	185.0	150.0	125.5	310.0	64.0	0.0	0.0	915.0
2003	6.0	58.5	38.5	40.0	24.0	-	366.1	279.0	145.1	151.6	0.0	2.3	1111.1
2004	18.45	2.13	1.55	53.93	9.53	95.95	408.57	261.07	174.01	63.01	51.10	12.85	1152.15
2005	44.49	23.11	26.16	17.90	28.95	272.26	388.86	158.86	69.03	117.63	0.09	1.67	1149.01
2006	0.00	0.00	3.11	12.64	86.68	113.20	505.72	316.06	339.51	9.80	3.73	0.00	1390.45
2007	0.00	58.69	35.76	21.08	25.33	139.60	666.30	416.85	363.93	43.63	1.57	0.00	1772.74
2008	16.44	1.96	6.27	6.78	37.26	180.58	422.25	275.33	198.31	27.64	0.00	0.00	1172.82
2009	0.00	0.26	5.81	0.19	105.82	78.32	232.20	370.39	429.16	68.56	11.31	0.98	1303.00
2010	0.59	19.64	7.62	38.24	93.72	146.68	157.31	198.97	239.75	78.76	5.26	40.53	1027.07
2011	0.00	1.60	18.25	12.81	102.58	294.61	174.35	445.43	214.88	30.35	0.69	0.00	1295.55
2012	18.45	2.13	1.55	53.93	9.53	95.95	408.57	261.07	174.01	63.01	51.10	12.85	1152.15
2013	0.07	17.62	0.79	15.24	105.51	176.77	170.14	276.70	135.76	304.46	0.00	0.00	1203.06
2014	9.27	35.71	21.21	8.16	62.77	112.58	283.73	223.38	214.48	30.30	0.00	0.00	1001.59
2015	12.06	3.33	26.71	45.73	32.91	162.96	385.21	239.38	71.34	15.62	0.00	0.61	995.86
2016	6.16	17.59	1.73	1.33	73.90	197.34	248.86	395.33	424.81	30.45	0.00	0.00	1397.50
2017	5.12	0.00	34.96	59.89	81.01	141.66	502.58	168.84	111.95	274.18	0.64	4.12	1384.95
2018	0.00	0.06	2.90	159.52	31.22	202.84	344.59	211.91	153.63	16.31	0.04	20.99	1144.01
2019	0.00	25.18	7.24	46.99	109.43	109.11	292.02	234.65	327.95	199.63	0.10	5.13	1357.43
2020	21.14	5.94	74.96	27.94	71.32	218.12	187.01	258.74	196.87	52.23	1.23	0.00	1115.50

Annexure – IV**Rainfall Data (in mm) At Dhansar (Rescue station) Observatory Station
State Sec Deptt of Coord, BCCL**

Year	January	February	March	April	May	June	July	August	Sep	Oct	Nov	Dec	Annual
2005	34.20	22.80	41.80	32.20	33.00	193.00	542.00	107.80	185.60	39.20	0.00	2.00	1233.60
2006	0.00	0.00	34.40	33.80	87.60	214.20	477.70	246.30	172.00	0.00	1.00	0.00	1267.00
2007	0.00	22.00	37.80	0.00	78.70	167.20	545.00	426.40	351.40	52.00	0.00	0.00	1680.50
2008	5.80	4.80	17.80	18.40	18.00	216.10	433.48	183.80	297.80	85.80	0.00	0.00	1281.78
2009	0.00	0.00	1.60	2.20	112.00	72.80	269.20	192.80	333.00	98.20	10.20	0.00	1092.00
2010	0.00	12.20	7.60	9.20	64.30	206.20	199.40	212.60	230.10	45.30	3.4	----	991.90
2011	7.60	0.00	18.0	11.40	121.60	344.20	163.40	452.0	374.0	41.80	0.00	0.00	1534.20
2012	17.6	13.4	1.0	9.0	6.60	52.0	328.20	315.10	367.70	11.60	61.60	18.0	1201.80
2013	0.0	32.0	3.0	33.90	190.40	244.20	192.80	364.40	304.70	233.60	0.0	0.0	1599.0
2014	12.40	36.80	21.80	2.60	79.80	217.60	305.30	315.60	178.0	6.40	0.0	0.0	1176.0
2015	23.80	0.0	6.20	76.20	35.80	122.10	407.60	244.40	145.20	25.60	0.0	6.20	1093.10
2016	3.0	20.60	5.50	0.0	99.40	181.60	248.80	456.70	443.60	50.40	0.0	0.0	1509.60
2017	8.80	0.0	3.80	17.90	33.20	120.0	533.40	284.70	247.40	207.70	3.40	0.0	1460.30
2018	0.0	0.0	0.0	102.90	76.30	270.60	382.30	338.80	159.50	38.90	2.40	37.90	1346.60
2019	0.0	49.60	10.20	54.20	132.0	188.0	319.10	343.60	403.10	156.40	3.20	10.80	1667.00
2020	22.0	7.60	77.80	76.80	86.20	214.10	296.80	351.40	214.0	92.0	0.0	0.0	1438.70
2021	0.00	0.00	21.8	12	157.4	295	382.2	130.2	451.8	285	54.4	43	1832.8
2022	12.8	85.8	0	0	61.8	130.2	104.6	350.1	172.2	64.4	0	3	984.9

Location of Hydrograph Stations (Dug Wells)

Well No	Latitude	Longitude	Well No	Latitude	Longitude
A002	86.2586	23.8181	D029	86.3742	23.8208
A004	86.3417	23.8492	D030	86.3640	23.8096
A006	86.3149	23.8498	D034	86.3837	23.7733
A007	86.2982	23.8287	D035	86.4321	23.6705
A008	86.2635	23.8527	D036	86.4360	23.6564
A009	86.2462	23.8758	D039	86.4371	23.7195
A010	86.2805	23.8290	D046	86.5211	23.7377
A013	86.3226	23.7735	D047	86.4076	23.7539
A015	86.3425	23.8249	D052	86.4473	23.7538
A016	86.3598	23.7807	D054	86.3751	23.7222
A017	86.3672	23.7520	D056	86.4600	23.6590
A019	86.4004	23.6847	D057	86.4999	23.6467
A020	86.3272	23.7481	D059	86.5253	23.6806
A023	86.2581	23.7502	D062	86.4805	23.7029
A024	86.2275	23.7535	D063	86.4636	23.6760
A025	86.2540	23.7830	D065	86.4929	23.7442
A026	86.3005	23.7787	D068	86.4623	23.7054
A027	86.3402	23.8090	D070	86.5443	23.7112
A028	86.2979	23.7900	D071	86.5248	23.7922
A029	86.2713	23.7865	D072	86.5238	23.8293
A032	86.3521	23.7360	D074	86.4255	23.7015
A034	86.2537	23.7136	D075	86.3985	23.6509
B001	86.2402	23.8164	D077	86.3707	23.6802
B002	86.2091	23.7950	D080	86.4067	23.7650
B009	86.1797	23.8387	D088	86.3950	23.6230
B010	86.1718	23.8153	D089	86.3872	23.5968
B011	86.2063	23.8256	D090	86.4209	23.6058
B012	86.2049	23.8094	D091	86.4378	23.5621
B014	86.2704	23.8008	D096	86.4663	23.6135
B015	86.1484	23.7685	D105	86.3295	23.6436
B017	86.1194	23.7514	D109	86.1983	23.6554
B018	86.0918	23.7459	D112	86.2586	23.6670
B024	86.2161	23.7410	D113	86.2785	23.6948
B027	86.3418	23.7562	D115	86.1250	23.6843
B029	86.2076	23.6992	D117	86.1787	23.7136
B032	86.2135	23.7676	DB001	86.7902	23.7303
B033	86.2053	23.8552	DB010	86.8561	23.7085
B038	86.2135	23.8834	DB012	86.8713	23.7638
B040	86.1731	23.8799	DB013	86.8687	23.7814
B041	86.1611	23.9121	DB018	86.7915	23.7394
B043	86.2420	23.8949	DB019	86.7483	23.7194
B044	86.1276	23.8735	DB002	86.7794	23.7500
B046	86.1195	23.8163	DB022	86.7571	23.7237
B047	86.1233	23.7702	DB023	86.7514	23.7291

B048	86.2783	23.7259	DB024	86.7509	23.7309
B051	86.1521	23.7941	DB025	86.7399	23.7337
B053	86.1636	23.7683	DB026	86.7500	23.7194
B054	86.3639	23.8660	DB027	86.7232	23.7298
B055	86.3427	23.8940	DB028	86.6836	23.7472
B057	86.2860	23.8738	DB029	86.6548	23.7462
B059	86.2293	23.8000	DB003	86.7638	23.6555
B060	86.2541	23.8059	DB030	86.6654	23.7950
B062	86.1929	23.7628	DB031	86.6980	23.7884
B065	86.3076	23.8083	DB033	86.8126	23.7645
B067	86.2325	23.7233	DB034	86.7877	23.7785
B068	86.0873	23.7225	DB036	86.7546	23.7980
B071	86.0799	23.8088	DB038	86.7361	23.8346
D003	86.4149	23.7804	DB039	86.7150	23.7996
D005	86.4180	23.7098	DB004	86.8062	23.6541
D007	86.4574	23.7220	DB047	86.7509	23.7557
D008	86.1915	23.8340	DB005	86.8216	23.6785
D010	86.4947	23.7252	DB008	86.81519	23.73067
D012	86.4484	23.7771	DB009	86.8135	23.7354
D014	86.4884	23.7808	K010	86.9157	23.7059
D018	86.4317	23.8189	K012	86.9277	23.7267
D019	86.4253	23.8440	K015	86.9103	23.8177
D020	86.4023	23.8527	K020	86.8824	23.8514
D022	86.4021	23.8015	K021	86.9277	23.7267
D025	86.3837	23.7828	K026	86.8808	23.7414
D028	86.4016	23.8223	K030	86.8472	23.7396

Details of Hydrograph Stations (Dug Wells)

Well No	Location	M.P. (agl) in m	Well Dia in m	Well Depth (m bmp)	Formation	Owner	Utility
A002	Beharekudur	0.63	3.00	12.93	Metamorphic	Nona Das	Domestic
A004	Daldoli	0.52	3.12	6.00	Metamorphic	Govt.	Domestic
A006	Barwadi,Kanko	0.75	3.15	9.10	Metamorphic	Govt.	Domestic
A007	Chaddriderdih	0.45	1.80	9.95	Metamorphic	Hazi	Domestic
A008	Siskari	0.60	1.95	12.50	Metamorphic	Govt.	Domestic
A009	Srirampur	0.43	2.10	9.80	Metamorphic	Mosque	Domestic
A010	Phulwar	0.63	1.90	10.90	Metamorphic	Govt.	Domestic
A013	Sijua	0.40	2.35	6.90	Barakar	Rajen	Domestic
A015	Tetulmari	0.90	1.85	9.00	Metamorphic	Dharmendar	Domestic
A016	Ekra, Kalali	0.45	3.10	6.50	Barakar	Govt.	Domestic
A017	Kachi Balihari	0.56	1.60	5.30	Barakar	Govt.	Domestic
A019	Bhaura	0.54	3.15	11.65	Barakar	Govt.	Domestic
A020	Gorbhudih	0.43	3.30	8.30	BM	Govt.	Domestic
A023	Machhyara	0.43	1.85	12.40	Raniganj	Govt	Domestic
A024	Pipra Tanr	0.22	1.80	19.55	Raniganj	Govt	Domestic
A025	Sinidih	0.22	2.00	11.30	Barakar	Govt	Domestic
A026	Pasitanr	0.32	1.80	9.65	Barakar	Govt	Domestic
A027	Chandor	0.60	2.50	5.50	Barakar	Govt	Domestic
A028	Lakarka 6 no.	0.65	1.30	5.25	Barakar	BCCL	Domestic
A029	Aambagan	0.10	2.60	9.15	Barakar	Govt	Domestic
A032	Baludih	0.55	2.30	6.85	BM	Govt	Domestic
A034	Bhatdih	0.55	3.50	24.50	Raniganj	BCCL	Domestic
B001	Muraidih	0.47	1.80	5.35	Talchir	Govt	Domestic
B002	Baghmara Tola	0.32	1.85	11.25	Metamorphic	Govt	Domestic
B009	Jari Tanr	0.60	2.57	9.00	Metamorphic	Hariram Majhi	Domestic
B010	Narayanpur	0.23	4.57	8.60	Metamorphic	Mukteswar	Domestic
B011	Nischitpur	0.60	2.08	11.30	Metamorphic	Babulal Das	Domestic
B012	Harina	0.37	2.20	10.87	Metamorphic	Ramayan	Domestic
B014	Mathadih	0.76	2.15	3.75	Barakar	Govt	Domestic
B015	Bera Basti	0.55	1.60	2.50	Talchir	Dhanu Roy	Domestic
B017	Chandrapura	0.40	1.85	11.40	Barakar	Govt	Domestic
B018	Khanoodih	0.66	2.30	13.25	Metamorphic	Govt	Domestic
B024	Telmuchu	0.67	4.35	10.83	Raniganj	Govt	Domestic
B027	Chirudih Basti	0.08	1.40	11.00	BM	Govt	Domestic
B029	Popanki	0.50	1.70	6.50	Metamorphic	Govt	Domestic
B032	Madhuband	0.80	4.30	8.60	Barakar	BCCL	Domestic
B033	Ramakunda	0.75	3.20	9.65	Metamorphic	Liluram Mahato	Domestic

B038	Tantri	0.4	1.80	11.3	Metamorphic	Panchayat	Domestic
B040	BhuiwarChita	0.4	1.80	9.15	Metamorphic	Govt	Domestic
B041	Pawapur	0.45	3.00	6.7	Metamorphic	Govt	Domestic
B043	Chatatanr	0.5	1.50	9.2	Metamorphic	Govt	Domestic
B044	Lachmipur	0.35	3.35	10.1	Metamorphic	Govt	Irrigation
B046	Telo	0.2	1.50	8.1	Metamorphic	Govt	Domestic
B047	Madanpur	0.7	1.80	10.8	Metamorphic	DVC	Domestic
B048	Mahuda	0.65	2.10	11.50	Raniganj	Mosque	Domestic
B051	Taranga	0.00	2.50	5.75	Metamorphic	Bisun	Irrigation
B053	Karmatanr	0.58	2.70	13.25	Barakar	Govt	Domestic
B054	Domanpur	0.45	3.30	9.55	Metamorphic	Govt	Domestic
B055	Rantanr	0.50	3.40	5.25	Metamorphic	Govt	Domestic
B057	Kotaldih	0.60	3.20	7.5	Metamorphic	Govt	Domestic
B059	Khodovaly	0.60	2.40	9.30	Barakar	BCCL	Domestic
B060	Bahiyardih	0.77	3.00	15.60	Barakar	BCCL	Domestic
B062	Sadariyadiah	0.15	3.10	9.50	Barakar	Govt	Domestic
B065	Jhinjipahari	0.95	2.20	12.4	Metamorphic	Private	Domestic
B067	Simatanr	0.55	2.20	11.8	Raniganj	Govt	Domestic
B068	Sibutanr	0.4	2.20	6	Metamorphic	DVC	Domestic
B071	Bandiyo	0.55	3.50	7.1	Metamorphic	Govt	Irrigation
D003	Dhansar	0.6	1.70	8.7	Barakar	Govt	Domestic
D005	Jiyalgora PO	0.7	2.80	10.55	Metamorphic	Govt	Domestic
D007	Golden Pahari	0.67	2.85	10.05	Barakar	BCCL	Domestic
D008	Alokdiha	0.35	1.75	8.15	Metamorphic	Govt	Domestic
D010	Rakhisitpur	0.55	1.65	4.6	Metamorphic	Govt	Domestic
D012	Dhowatanr	0.75	1.85	13.2	Metamorphic	Govt	Domestic
D014	Karmatanr	0.48	1.90	11.55	Metamorphic	Nepal	Domestic
D018	Dhaiya	0.44	2.00	8.1	Metamorphic	Govt	Domestic
D019	Memko More	0.42	3.80	7.57	Metamorphic	Govt	Domestic
D020	Dhanbad	0.22	3.10	11.45	Metamorphic		Domestic
D022	Shyamnagar	0.35	1.70	6.3	Metamorphic	Govt	Domestic
D025	Godhar More	0.6	2.75	5.8	Barakar	Govt	Domestic
D028	Nawadih	0.46	2.00	10.6	Metamorphic	Gitarani Paul	Domestic
D029	Karamara	0.5	3.10	10.5	Metamorphic	Govt	Domestic
D030	Borkiboa	0.7	2.00	5.6	Metamorphic	Haru	Domestic
D034	Kusunda	0.6	1.50	3.45	Barakar	BCCL	Domestic
D035	Patherdih	0.4	2.00	11.2	Metamorphic	Govt	Domestic
D036	Sudamdih	0.9	2.00	6.2	Metamorphic	BCCL	Domestic
D039	Tilabani	0.85	2.00	20	Barakar	BCCL	Domestic
D046	Sindupur	0.74	3.00	8.75	Metamorphic	Govt	Domestic
D047	Ena colliery	0.45	3.20	23.8	Barakar	BCCL	Domestic
D052	Goluckdih	0.47	3.10	5	Metamorphic	Govt	Domestic
D054	Amtal	0.65	6.40	10.8	Barakar	Govt	Domestic
D056	Bhutgoria	0.5	1.80	12.75	Metamorphic	Govt	Domestic
D057	Kandra	0.37	2.10	6.55	Metamorphic	Govt	Domestic

D059	Belghutu Tola	0.5	3.60	9.3	Metamorphic	Govt	Domestic
D062	Bendachuna	0.65	2.80	12.1	Metamorphic	Saheb Ram	Domestic
D063	Chatabad	0.2	1.90	10.7	Metamorphic	Govt	Domestic
D065	Nischitpur	0.15	3.15	10.6	Metamorphic	Govt	Domestic
D068	Surunga	0.53	3.00	10.25	Metamorphic	Govt	Domestic
D070	Jaladih	0.7	1.80	9.5	Metamorphic	Govt	Domestic
D071	Domandih	0.65	2.00	13.5	Metamorphic	Govt	Domestic
D072	Gobindpur	0.4	1.70	6.7	Metamorphic	Govt	Domestic
D074	Bhulan-Barari	0.1	1.60	12.8	Barakar	Govt	Domestic
D075	Manpur	0.6	2.90	10.2	BM	Govt	Domestic
D077	Rohoniatanr	0.4	3.15	6.9	BM	Govt	Domestic
D080	Bastacolla	0.7	2.50	24.95	Barakar	Govt	Domestic
D088	Laghla more	0.35	2.00	7.75	Metamorphic	Govt	Domestic
D089	Machatanr	0.6	1.60	9.15	Metamorphic	Govt	Domestic
D090	Marradih	0.42	3.10	8.8	Metamorphic	Govt	Domestic
D091	Asurbandh	0.65	1.80	8.1	Metamorphic	Govt	Domestic
D096	Paradih	0.85	1.30	9.2	BM	Private	Domestic
D105	Bandhwatanr	0.55	3.00	9.15	Metamorphic	Dasarath Mahato	Domestic
D109	Domatanr	0.65	9.15	9	Metamorphic	Shiv Charan Mahato	Domestic
D112	Bansra	0.45	1.38	7.75	Metamorphic		Domestic
D113	Dumarda	0.7	3.00	11	Metamorphic	Govt	Domestic
D115	Mahuar	0.15	2.00	6.45	Metamorphic	Private	Domestic
D117	Bhatua	0.23	2.70	10	Metamorphic	Govt	Domestic
DB001	Laikadih	1	2.55	14.96	Barakar	BCCL	Domestic
DB010	Siulibari	0.6	1.8	13.88		Govt	Domestic
DB012	Puapur	0.85	1.8	9.6		Govt	Domestic
DB013	Sarbari	0.5	2	7.85		Govt	Domestic
DB018	Parbelia	0.75	1.6	7		Govt	Domestic
DB019	Chungei	0.73	1.8	6.45	BM	Govt	Domestic
DB002	Barakar	0.42	1.8	9.63	Barakar	Govt	Domestic
DB022	Kulti College	0.9	1.85	16.25	Raniganj	Govt	Domestic
DB023	Sabanpur	0.67	1.42	5.75	BM	Govt	Domestic
DB-24	Dendua More	0.58	2	12.8	Barakar	Govt	Domestic
DB025	Saraspahari	0.65	3	16.3		Govt	Domestic
DB026	Luchibad	0.7	4	9.8		DVC	Domestic
DB027	Dahibari	0.67	2.4	10.65		Govt	Domestic
DB028	Dahibari	0.7	2.3	8	Barakar	BCCL	Domestic
DB029	Dahibari	0.6	3.6	13.7	Barakar	BCCL	Domestic
DB003	Palasya	0.37	1.55	5.25		Govt	Domestic
DB030	Patlabari	0.6	3.1	10.55		Govt	Domestic
DB031	Ledaharia	0.6	1.2	8.84		Govt	Domestic

DB003	Patharkua	0.7	2	9.2		Kajal Chatterjee	Domestic
DB034	Kelyasol	0.6	3.6	11.6		Govt	Domestic
DB036	Ramkanali	0.55	2.4	8		Chhotka Marandi	Domestic
DB038	Nirsa	0.55	3.8	7.8		Govt	Domestic
DB039	Barajor/Amkura	0.65	3	6.9		Forest Dept.	Domestic
DB004	Tetuldanga	0.62	2.22	8.98	Talcher	DVC	Domestic
DB047	Madanpur	0.65	3.2	8.3		Govt	Irrigation
DB005	Lukuidih	0.48	3.2	7.8		Govt	Domestic
DB008	Pandra	0.8	2.2	5.75		Govt	Domestic
DB009	Mugma	0.68	3	19.25		Govt	Domestic
K010	Phatepur	0.8	2.02	28.3		Govt	Domestic
K012	Ethora	0.81	2	15.9		Govt	Domestic
K015	Kankurkunda	0.55	2.1	12.5		Govt	Domestic
K020	Majhladih	0.79	1.22	11.77		Govt	Domestic
K021	Pratappur	0.6	1.4	10.94		Govt	Domestic
K026	Bodra	0.9	2.1	10		Govt	Domestic
K030	Kulti Station	0.31	0.75	4.25		Govt	Domestic

MP: Measuring Point
Abn.: Abandoned
G.L.: Ground Level

R.L.: Reduced Level
b.g.l.: Below Ground Level
bmp: Below Measuring Point

W.L.: Water Level m: Meter
a.g.l.: Above Ground Level
BM: Barren Measure

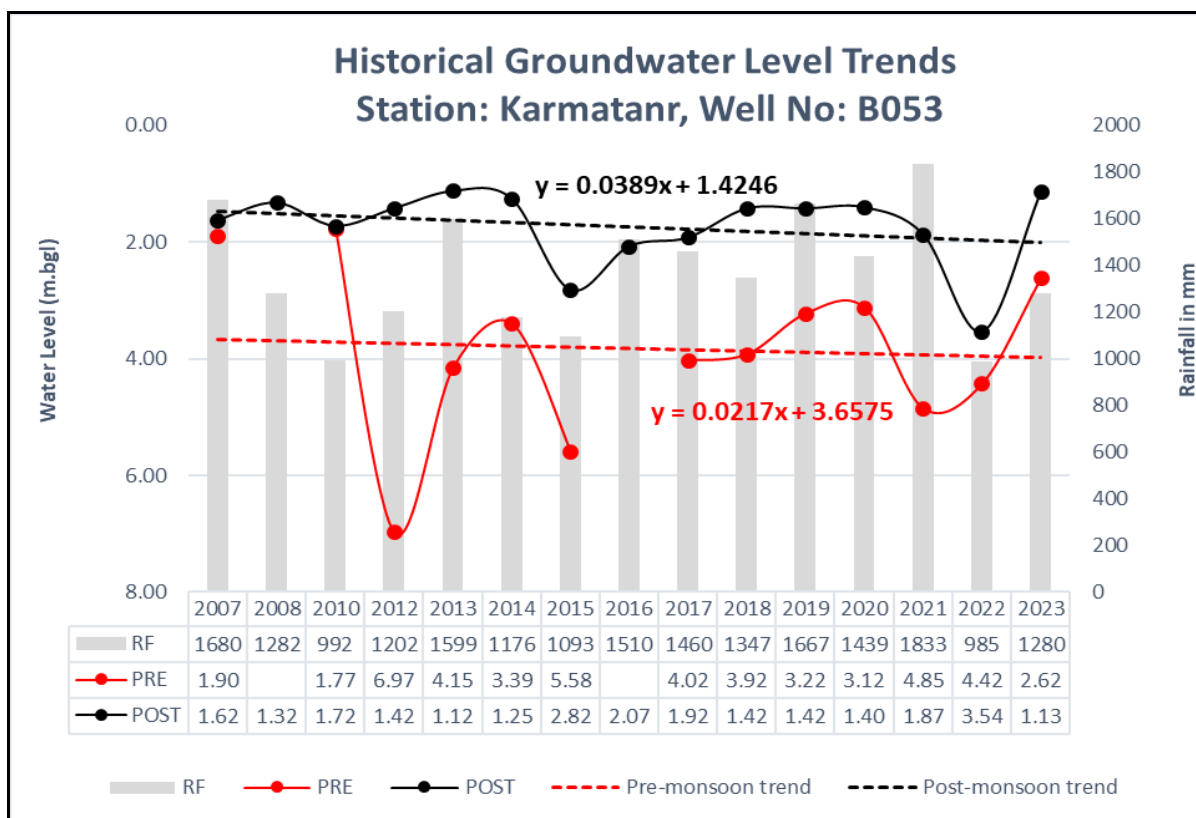
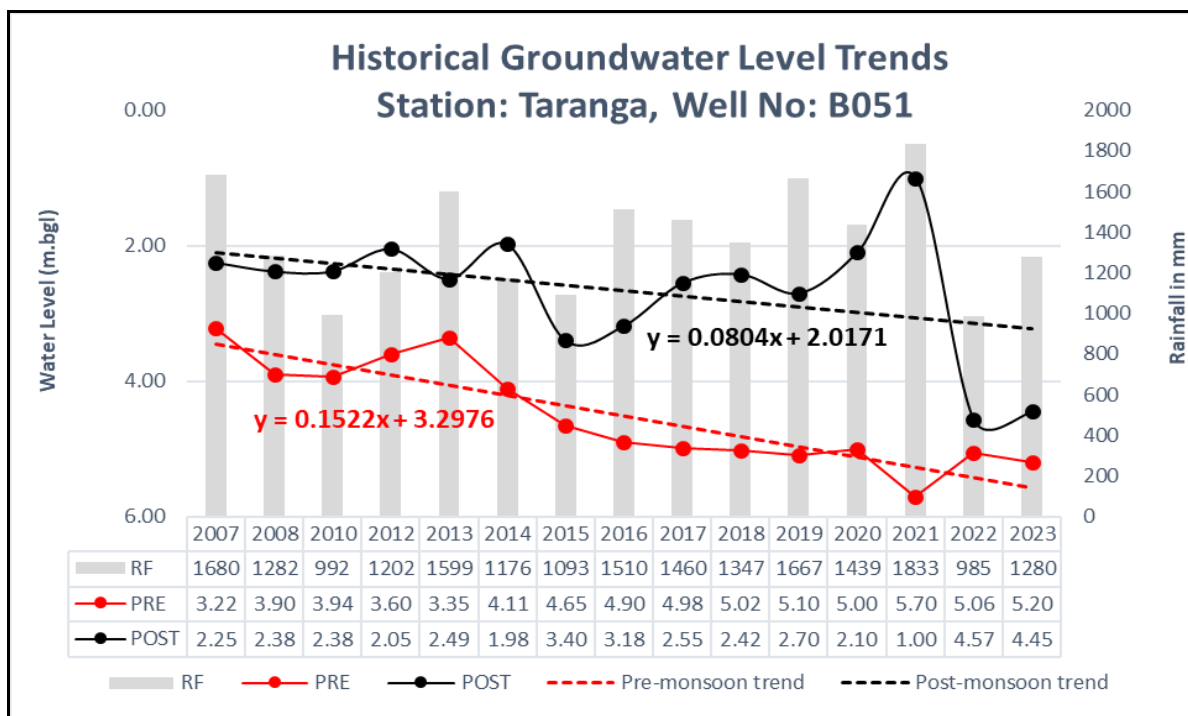
Historical Water Level data of Hydrograph Stations

Well No	Water level below ground level (bgl) in meters																	
	May 15	Nov 15	May 16	Nov 16	May 17	Nov 17	May 18	Nov 18	May 19	Nov 19	May 20	Nov 20	May 21	Nov 21	May 22	Nov 22	May 23	Nov 23
JCF																		
A002	9.10	5.21	9.30	4.95	8.15	4.35	8.27	4.78	7.55	3.25	6.95	3.00	6.87	4.50	6.45	4.91	4.80	3.10
A004	4.56	1.78	5.20	1.48	3.48	0.91	4.48	1.73	3.38	1.78	4.63	2.28	3.51	1.83	4.40	1.80	3.51	1.90
A006	8.25	6.25	8.25	3.95	6.95	3.35	8.40	5.35	4.90	4.25	7.75	5.30	7.00	4.07	8.40	5.30	7.35	4.72
A007	7.79	4.57	9.45	5.27	7.55	2.55	7.40	3.75	9.45	4.10	7.35	3.70	6.63	3.66	7.40	3.75	8.15	5.65
A008		9.73	11.85	3.20	9.90	1.38			11.30				8.99	4.30	8.80	4.20	10.70	5.03
A009	6.70	5.47	7.23	4.44	7.77	2.42	6.42	5.22	8.87	5.07	6.12	4.62	7.42	4.55	6.30	5.05	7.42	4.76
A010	9.61	8.37		2.42	7.47	2.27	7.72	5.47	8.17	5.57	7.57	5.29	8.92	5.60	7.70	5.40	8.92	5.05
A013	3.60	5.30	5.20	3.85	4.40				5.10				4.63	2.60	4.60	2.50	4.63	2.31
A015	7.15	7.00	7.95	5.20	6.50	3.95			7.00				6.93	3.76	6.70	3.50	6.93	3.62
A016	5.55	4.17	5.85	3.15	3.65	2.20	4.30	3.65	5.45	1.95	7.15	1.75	3.45	2.00	5.80	3.08	5.55	3.52
A017	3.79	2.64	2.44	2.69	2.44	2.24	3.34	2.84	2.94	2.24	2.14	1.69	3.36	2.37	2.62	2.59	2.41	2.19
A019			7.81	4.11	6.38	2.46	5.55	2.45	4.86	3.44	6.06	3.26	3.31	1.91	4.10	2.54	2.90	2.60
A020	4.59	2.93	7.49	3.50	4.27	1.77	4.57	2.57	4.57	1.82	8.47	3.87	5.47	2.02	5.59	3.54	8.02	4.20
A023	11.37	9.37	11.87	8.13	11.87	6.97	11.15	7.17	11.97	3.77	8.92	5.62	9.52	2.82	7.97	4.79	9.00	5.71
A024	17.20	14.58	16.62	12.43	16.28	4.18	14.58	6.88	15.88	2.48	4.88	4.28	10.13	2.78	7.28	4.33	5.38	3.90
A025	7.78	5.85	7.43	4.58	6.38	2.88	6.63	3.13	6.08	1.93	2.98	1.83	5.78	2.43	3.31	2.08	2.93	2.60
A026	7.33	3.18	8.93	4.48	5.28	2.53	6.23	3.88	6.58	3.33	6.98	3.18	5.66	2.73	6.42	4.31	8.40	3.83
A027	4.40	3.99	4.85	1.80	2.90	1.25	2.90	1.00	2.40	0.92	2.40	1.10	1.67	0.90	1.90	1.33	1.70	1.60
A028	4.35	3.60	3.35	1.47	4.30	1.55	4.15	2.51	2.45	3.15	4.00	3.03	6.23	3.75	4.23	3.30	3.45	3.35
A029	4.55	4.60	5.92	6.96	4.40	1.30	6.45	2.10	4.85	3.40	6.20	3.20	6.49	5.90	4.60	1.15	5.60	3.20
A032	4.41	2.13	4.75	2.10	3.15	1.55	2.80	0.70	2.75	0.95	1.90	1.75	2.35	0.96	2.25	1.75	3.83	1.60
A034	8.40	4.81	4.75	4.45	12.45	4.45	5.90	3.70	6.35	3.95	8.35	3.45	5.20	3.55	8.20	6.35	6.54	4.01
B001	3.28	2.75	3.58	1.93	2.33	1.63	2.88	2.08	3.18	1.73	3.28	1.63	2.58	1.91	2.10	1.81	3.22	2.45
B002	-	-	10.93	6.99	10.9	6.8	-	-	10.88	6.58	-	-	10.13	6.5	9.8	6.4	10.55	4.47
B009	8.82	3.50	8.90	3.90	7.80	2.30	8.40	3.40	6.56	3.25	8.51	3.27	7.61	3.16	7.40	4.60	6.75	3.20
B010	7.12	3.63	6.77	4.69	7.97	4.42	6.97	2.79	8.02	2.77	6.92	2.80	7.12	3.35	6.80	2.70	7.47	4.42
B011	9.49	3.45	9.20	4.55	10.60	2.80	9.90	4.68	9.38	4.65	10.05	4.90	8.24	4.02	9.50	4.60	10.30	3.75
B012	8.78	7.31	7.17	8.63	9.03	5.33	8.37	4.83	8.98	8.63	8.63	5.66	8.68	6.99	6.4	4.7	8.88	5.63
B014	2.94	2.29	2.44	0.47	2.94	1.84	3.64	2.84	2.24	2.74	2.44	1.04	2.84	2.04	3.24	2.6	2.84	2.34
B015	1.5	0.45	1.85	0.55	1.85		1.85	0.85	1.9	0.95	3.7	1.47	1.46	0.35	3.67	1.02	3.2	1
B017	6.65	2.9	4.8	3.15	3	2.65	6.61	4.4	7.4	4.6	6.69	4.15	6.5	4.25	6.5	4.2	7.95	4.33
B018	9.01	6.16	6.39	5.19	6.24	1.99	8.56	3.39	8.34	3.34	8.54	3.52	7.84	3.62	8.5	3.2	7.36	3.9
B024	10.05	5.78	10.63	4.28	10.03	4.03	9.28	4.33	4.58	2.33	5.48	3.53	5.68	2.08	5.53	3.46	4.63	3.24
B027	9.87	5.47	6.07	4.22	8.12	3.87	9.97	5.67	7.52	5.42	8.87	5.47	8.89	4.73	10.1	4.8	8.89	4.16
B029	5.58	5.15	5.95	3.05	5.5				4.8	2.65			5.26	2.48	5.5	2.15	3.6	1.9
B032	7.55	3.32	6.95	3.07	6.95	2.8	6.75	3.9	5.55	1.7	3.3	2	5.6	1.7	4.15	2.56	7.3	3.54
B033	6.53	4.13	5.45	4.05	5.3	4.15	6.5	3.45	6.65	3.3	6.29	3.3	6.38	3.43	4.75	3.1	7.3	3.54
B038	10.65	7.95	10.82	4.2	7.6	4.5	10.3	5.1	10.8	4.85	9.17	4.85	9.34	4.18	8.1	5.2	8.17	5.2
B040	5.63	4.45	7.05	3.45	4.7	3.4	6.1	4.6	8.7	4.9	5.68	4.15	5.58	3.24	5.3	3.1	3.5	1.96
B041	5.9	2.85	5.25	3.75	5.35	2.9	5.25	2.05		1.95	5.37	2.25	5.36	2.4	5.05	3.6	6.45	4.02
B043	7.65	5.5	7.75	3.82	7.6	2.4	7.5	4.2		4.55	7.35	3.7	7.26	3.78	6.5	4.6	7.26	3.93
B044	9.15	5.54	7.7	4.79	6.6	2.75	9.68	5.05		4.6	8.58	4.73	7.51	3.83	9.1	6.3	9.35	7.63
B046	6.85	4.62	5.05	4.82	5.6	3.8	5.6	3.6			5.55	3.35	5.5	3.65	6.05	3.75	7.25	3.9
B047	9.33	8.6	8.85	6.7	10	4.37	8.2	5.3		5.1	8.02	4.66	7.15	4.73	8.75	5.6	7.8	4.95
B048	7.9	5.42	9.35	4.6	7.7	4.15	7.33	3.97	7.05	4.35	8.2	3.85	7.23	6.05	6.85	6.25	6.13	5.05
B051	4.65	3.4	4.9	3.18	4.98	2.55	5.02	2.42	5.1	2.7	5	2.1	5.7	1	5.06	4.57	5.2	4.45
B053	5.58	2.82		2.07	4.02	1.92	3.92	1.42	3.22	1.42	3.12	1.4	4.85	1.87	4.42	3.54	2.62	1.13

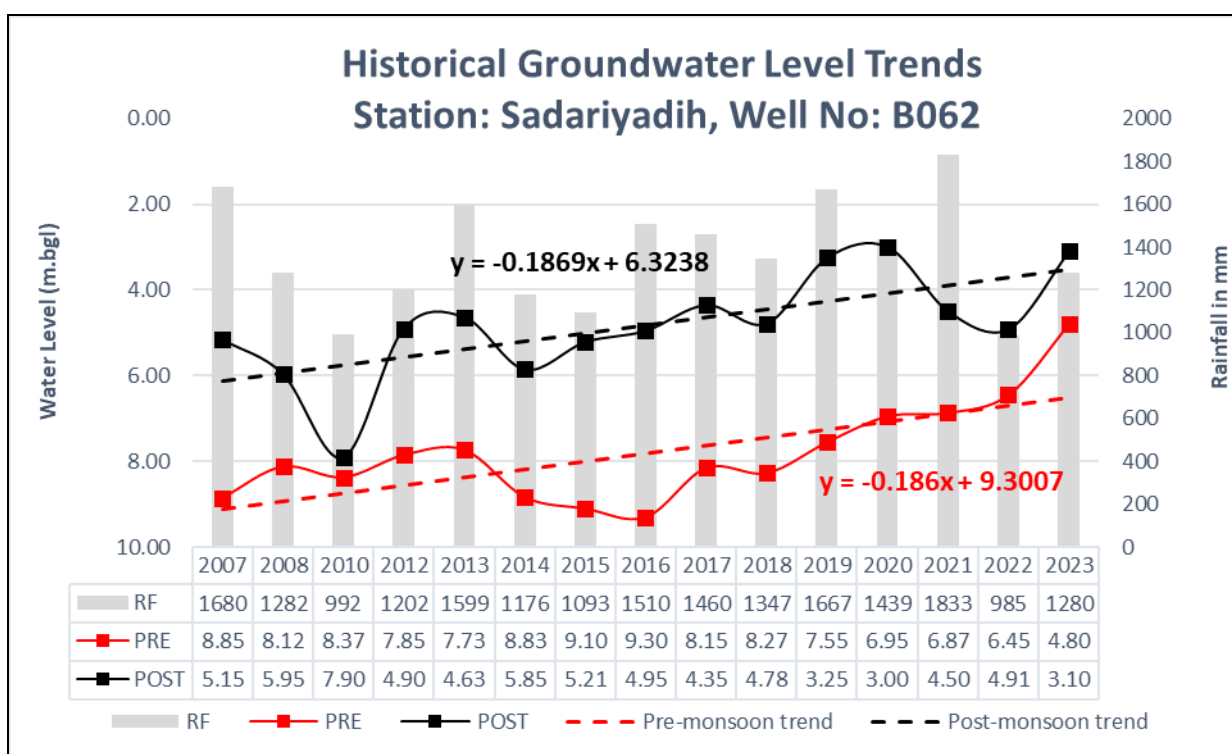
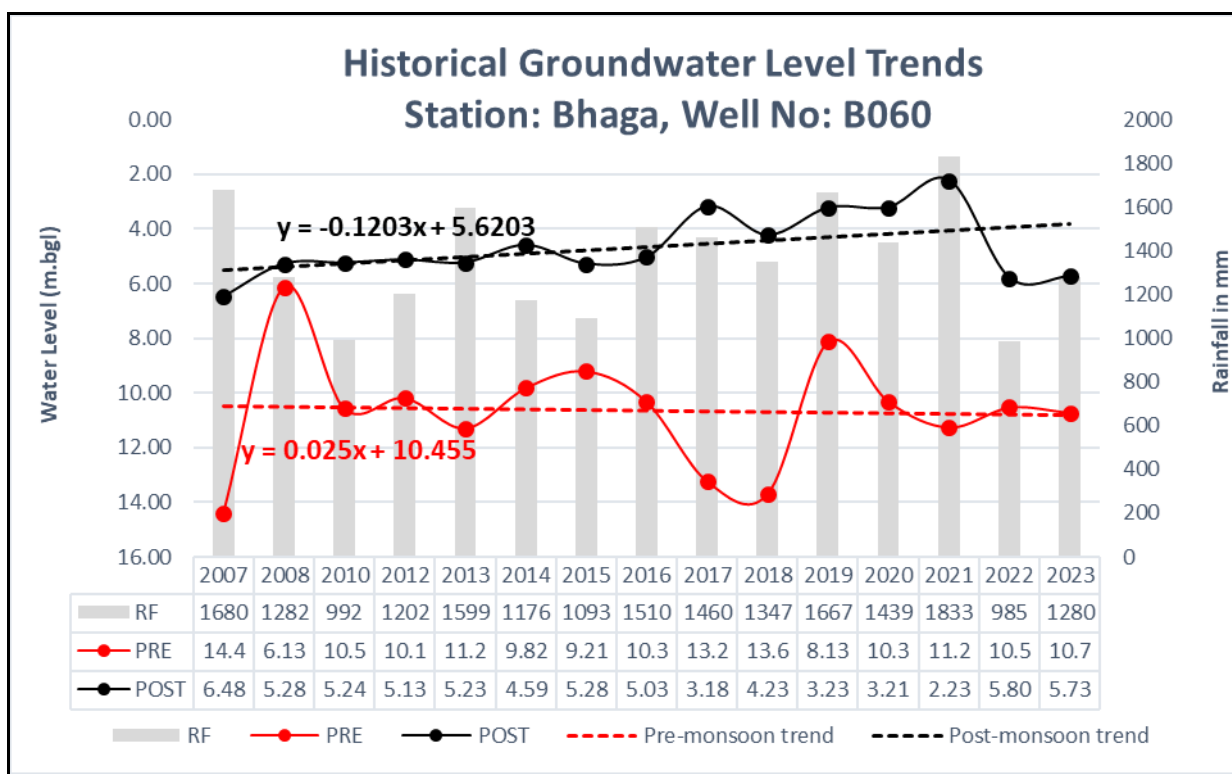
B054	7.62	4.56	9.25	5.55	7.2	4.1	7.55	3.65	9.05	3.55	7.7	3.87	7.4	3.43	7.3	4.75	7.65	5.8
B055	3.46	2.25	4.45	2.2	4.6	5.52	3.6	2.48		2.5	4.15	2.58	3.73	2.52	3.3	2	3.73	2.2
B057	6.18	3.35	6.9	3.45	5.9	3.6	6.2	3.1		2.95	6.4	3.05	5.36	2.92	6.1	3.5	5.36	3.26
B059	4.12	1.6	4.4	0.5	5.4	0.6	3.9	0.9	6.2	0.9	5.25	1.4	5.49	0.9	4.5	1.14	1.88	0.7
B060	9.21	5.28	10.33	5.03	13.23	3.18	13.68	4.23	8.13	3.23	10.33	3.21	11.26	2.23	10.53	5.8	10.73	5.73
B062	9.1	5.21	9.3	4.95	8.15	4.35	8.27	4.78	7.55	3.25	6.95	3	6.87	4.5	6.45	4.91	4.8	3.1
B065	7.82	5.87	7.15	2.68	9.05	1.25	10.03	2.4	11.05	0.95	9.25	2.3	9.03	1.42	7.45	2.27	8.45	2.35
B067	9.23	5.53	9.53	4.3	10	2.15	9.55	4	8.57	4.35	7.55	3.95	8.95	2.95	8.5	6.3	8.05	5.32
B068	5.05	3.42	5.25	2.8	4.35		5.2	3.85		3.65	5.1	3.44	4.18	3.76	5.5	4.6	7.92	4.6
B071	5.48	3.2	6.15				5.5	3.47		3.45			5.43	3.25	5.3	2.5	10.28	5.64
D003	4.25	2.25	2.35	1.9	2.15	2.3	3.43	2.45	1.75	1.3	5.4	1.38	3.41	0.85	5.96	1.32	3.15	1.85
D005	9.37	8.33	9.4	6.4	7.9	5.2	7.8	5.3	8.25	4.85	8.6	7.7	7.28	4	8.4	7.01	8.4	7.01
D007	8.25	5.61	7.53	4.03	7.33	2.88	7.53	2.83	8.23	3.28	7.33	5.13	6.08	2.63	9.03	5.67	9.03	3.64
D008	6.24	4.38	8	3.43	5.15	1.85	5.65	1.85	4.8	2.85	5.83	2.75	4.55	2.27	5.8	3.5	7.7	4.82
D010	3.77	2.9	3.77	1.6	3.65	1.6	3.95	2.6	3.5	2.73	3.78	2.45	3.55	1.47	3.5	1.9	5.4	2
D012	12.25	7.9	12.25	8.8	12.45	8.55	11.25	7.7	12.25	7.2	10.82	8.07	11.38	7.28	12	9.9	11.38	7.76
D014	11.02	9.47	10.77	8.12	10.22	7.47	10.52	7.42	10.32	7.07	9.47	5.65	9.57	7.02	10.3	7.1	9.57	6.18
D018	7.01	4.45	3.36	1.56	3.56	3.76	7.06	3.06		3.06			3.66	3.11	4.5	2.3	3.66	2.35
D019	8.43	5.12	8.33	5.5	7.76	4.65	7.53	4.83	7.45	4.85	7.21	4.25	7.47	4.4	7.05	4.4	7.68	5.48
D020	7.42	6.58	8.02	5.88	7.88	4.43	7.38	3.88	8.18	4.33	7.29	3.81	7.66	3.88	6.4	5.5	6.48	4.28
D022	5.78	2.67	5.45	4.75	4.15	1.15	5.8	1.75		2.5	5.75	1.7	3.8	0.5	4.6	1.7	3.8	1.36
D025	4.48	2.45	2.4	1.9	2.4	1.2	2.6	2.4	3.9	5.38	6.5	3.38	8.68	3.8	10.5	4.7	4.4	3.4
D028	9.38	7.22	9.27	3.57	8.64	2.79	9.04	5.74	8.52	5.59	7.44	4.62	8.75	5.51	7.9	5.6	8.75	4.87
D029	9.62	4.35	8.35	4.2	6.3	3.45	9.6	5.2	9.35	5	8.69	5	9.55	5.1	9.75	7.1	9.55	5.87
D030	4.55	3.15	4.45	3.2	4.4	1.25	4.58	1.1	4.6	0.75	4.5	1.35	4.23	0.84	4.37	2.29	4.08	2.2
D034	2.55	1.45	2.3	0.3	0.8	0.55	2.8	0.45	2.4	2	2.9	2.4	3.38	2.5	5	3.15	3.8	2.5
D035	9.8	7.9	9.52	6.45	8.8	3.6	8.4	4.45	8	3.8	8.2	5.4	6.6	2.9	6.1	4.68	5.23	3.9
D036	1.66	1.13	0.78	0.95	1.3	0.7	1.2	0.6	1.2	0.55	2.1	1	2.02	0.55	3.25	0.6	1.85	0.6
D039	5	2.61	2.18	2.65	5.05	4.75	4.95	4.35	4.95	5.6	9.05	5.7	10.35	4.75	7.5	3.05	8.52	3.28
D046	6.14	3.31	7.46	3.26	7.16	3.01	6.06	3.24	7.61	3.36	6.01	3.21			7.05	4.6	7.66	4.18
D047	9.6	3.6	3.18	2.95	3.15	2.85	5.33	2.55	4.55	4.35	9.45	5.45	4.05	2.45	2.2	1.5	4.45	3.27
D052			4.23	1.63	3.53	1.56	4.63	3.33	2.08	3.54	4.58	3.28			3.6	2	3.2	1.95
D054	8.78	6.7	9.5	3.55	8.65	5.35	8.85	3.45	9.35	3.15	7.33	2.88			9.5	6.9	8.03	6.3
D056	10.6	6.9	8.46	5.25	7.1	5	10.48	5.8	6.2	5.55	10	5.75	6.85	4.86	9.4	5.9	5.6	3.73
D057	5.94	5.33	6.1	5.41	5.23	3.43	6.03	4.63	5.23	4.43	6.13	3.98	5.42	3.5	5.2	4.05	5.18	3.65
D059	6.98	3.32	7.7	4.88	7.35	3.55			7.3				7.3	3.6	7.38	3.95	7.3	4.02
D062	7.43	4.12	6.33	3.5	7.76	3.65	7.35	4	7.45	3.85	7.21	3.85	7.47	3.4	7.75	4.4	7.47	3.74
D063	8.41	4.9	9.8	3.74	7.85	3.15	8.3	5.3	7.58	5.3	8.43	5.17	7.75	3.14	9.8	5.7	7.75	4.55
D065	7.48	4.36	8.85	2.35	6.95	4.95	7.45	3.9	8.35	3.85	7.68	3.85	7.41	4.83	7.9	5.7	6.4	4.65
D068	8.49	4.9	6.45	3.54	8.42	4.27	7.27	3.27		2.97	6.97	3.03	7.92	4.22	8.2	5.2	7.92	4.6
D070	7.1	4.25	7.55	3.08	6.5	4.28	7.2	5.1	5.1	4.8	7.12	4.8	6.13	3.78	7.5	5.05	8.6	4.63
D071	10.85	6.55	11.35	5.45	10.35	4.05	10.55	6.89	10.93	6.85	10.6	7	10.28	3.35	10.15	7.5	10.28	5.64
D072	4.62	2.6	3.41	2.3	2.5		5.65	3.6		3.75	6.92	3.86	4.36	2.69	3.3	2.2	5	2.9
D074	10.05	7.2	7.73	5	9.25	3.85	8.6	4.8	5.8	3.57	4.3	3.93	6.93	2.9	6.17	5.77	4.57	3.54
D075	7.42	4.5	5.75	1.4	3.2	1.3	7.4	3.4	5.25	4	7.45	3.27			5.8	2.3	5.75	2.8
D077	6.44	5.6	4.6	2.9	6.5	4.9	6.3	5.2	6.5	3.2	6.4	3.5	5.98	4.69	6.5	4.7	5.98	3.93
D080	10.97	3.35	6.55	4.15	8.65	3.7	9.35	4.2	5	3.05	4.3	4.9	7.1	2.55	6	3.3	4.75	2.6
D088	5.93	3.65		4.2	6.55	2.75	6.15	3.66		3.45	6.12	4.03	6.55	2.52	5.6	2.8	6.55	3.1
D089	5.2	3.22		4.7	6	2.7	5.3	3.7		3.6	5.45	3.63	4.41	2.55	5.7	4.2	4.41	3.55
D090	6.66	3.88		3.68	4.03	2.58	6.63	3.83		3.68	5.82	3.46	5.63	2.66	7	4.5	5.63	3.68
D091	6.85	4.95		4.15	5.65	2.65	6.85	3.15		3.4	6.4	3.4	5.18	3.02	5.2	3.1	5.18	3.2
D096	6.9	3.13		3.15	6		6.85	3.05					5.97	2.71	7.75	4.05	6.1	3.2
D105	7.57	3.1	8.15		7.95	4.3	4.1	4.2	7.7	4.48	6.7		8.2	6	7.05	4.92		
D109	8.15	6.55	5.8	4.15	7.51		7.78	3.5	6.35	3.85	7.9	3.22	7.33	3.1	5.2	3	7.33	2.88
D112	6.4	3.75	5.95	3.4	7.05	2.5	6.63	4.11	7.25	4.57	6.74	4.63	6.9	4.05	7.15	3.35	6.9	3.35

D113	6.6	3.85		3.95	7.28	2.35	6.85	3.3		3.5	6.1	3.45	6.8	2.99	7.3	4.3	5.75	3.48
D115		4.85		5.22	6.05	2.7	7.1	3.05		2.95	7.45	2.4	7.65	3.43	5.5	4.6	6.38	3.83
D117	7.86	5.34		5.67	8.8	4.37	7.92	5.02		5.02	7.52	4.79	7.87	5.11	8.7	5.5	7.27	5.25
RCF (Part)																		
DB001	5.4	4.08	4.17	3.7	4.5	3.8	4.35	4.2	4.85	4.3	5.08	4.08	4.88	3.88	4.73	3.76	3.94	2.77
DB002	3	1.8	3.2	1.98	3.42	2	3.19	2.02	3.6	2.62	3.97	2.43	3.30	2.31	3.20	2.24	2.9	2.25
DB003	4.8	3	5.3	3.22	5.32	2.42	5.6	3.1	5.67	3.12	4.72	3.37	4.53	3.20	4.40	3.11	4.55	2.98
DB004	7.5	4	7.32	3.12	6.59	3.42	6.8	4.1	5.8	3.55	5.17	3.01	4.96	2.98	4.81	2.89	6.1	4.80
DB005	6.88	3.26	6.48	3.8	5.48	3.8	4.98	3.13	5.08	2.78	5.1	3.26	4.90	3.10	4.75	3.00	5.52	3.50
DB008	4.6	2.8	4.57	3.02	4.17	2.13	4.17	2.89	4.27	3.07	5.01	3.1	4.81	2.95	4.67	2.86	4.5	3.42
DB009	9.45	4.5	10.5	5.26	11.5	6.26	9.26	5.22	11.01	6.26	10.4	6.44	9.98	5.00	9.68	4.85	9.5	5.18
DB010	5.68	4.07	4.75	3.75	4.4	2.5	4.8	2.9	4.55	2.95	5.28	3.07	5.07	2.92	4.92	2.83	4.6	3.12
DB012	6.5	2.05	6.76	2.78	6.3	2.73	5.18	2.55	5.08	2.73	4.9	2.05	4.70	1.95	4.56	1.89	5.44	2.30
DB013	3.55	6.5	3.25	5.8	3.72	5.5	3.1	5.3	2.92	5.4	3	4.5	4.88	2.98	4.73	2.89	4.5	2.70
DB018	5.48	3.65	4.6	3.2	4.2	3.3	4.2	2.99	4.6	2.55	3.8	2.9	3.65	2.76	3.54	2.67	4.25	2.61
DB019	5.26	3.02	5.5	3.93	5.53	3.18	4.98	3.03	5.33	3.98	4.9	3.02	4.70	2.87	4.56	2.78	4.8	2.96
DB022	4.87	3.1	4.63	2.23	4.83	2.53	3.16	1.83	3.8	2	3.99	2.16	3.83	2.05	3.72	1.99	4.25	2.43
DB023	4.05	2.82	4.17	2.97	3.9	2.57	4.4	2.17	4.67	2.27	3.82	2.82	3.67	2.68	3.56	2.60	4.8	2.94
DB024	9.47	6.3	9.48	4.08	7.38	4.3	8.88	4.98	8.93	4.46	7.6	3	7.30	2.85	7.08	3.91	8.25	4.18
DB025	8.1	3.5	7.73	3.63	6.88	3.23	6.68	2.65	6.4	2.78	5.25	3.05	5.04	2.90	4.89	2.81	5.15	2.90
DB026	5.9	3.77	6.14	3.53	6.6	3.52	7.3	4.86	7.6	4.6	6.93	3.77	6.65	3.58	6.45	3.47	6.9	3.66
DB027	6.26	3.2	5.77	2.92	6.02	3.35	5.97	3.69	5.57	3.37	6	3.59	5.76	3.41	5.59	3.31	6.85	3.63
DB028	3.08	3.74	1.9	4.1	2.1	3.9	1.88	4.3	2.6	3.8	1.9	3.35	3.80	2.03	3.69	1.97	4.2	2.39
DB029	9.1	4.8	8.6	4.6	8.1	3.98	7.6	4.1	7.1	4.25	6.9	4.3	6.62	4.09	6.43	3.96	8.5	4.67
DB030	7.02	3.6	7.6	3.8	6.8	3.98	7.1	3.8	6.85	3.5	6.01	4.25	5.77	4.04	5.60	3.92	7.5	3.89
DB031	7.84	3.78	7.44	3.6	6.8	3.8	5.45	3.8	5.55	3.55	4.91	3.78	4.71	3.59	4.57	3.48	5.7	2.98
DB033	6.05	4	6.85	3.95	5.07	3.65	5.55	2.9	5.6	3.15	4.69	3	4.50	2.85	4.37	2.76	5.6	3.10
DB034	9.2	4.02	7.93	3.3	6.95	3.88	6.4	3.3	5.9	3.18	5.33	3.8	6.12	3.61	5.94	3.50	5.5	3.08
DB036	6.48	4.15	8.1	4.8	6.75	3.98	7.85	3.9	8.4	4.25	6.46	3.8	6.20	3.61	6.02	3.50	5.04	3.24
DB038	4	2.95	4.2	2.05	3.8	2.8	3.95	2.43	3.55	2.31	3.68	2.95	3.53	2.80	3.43	2.72	3.73	2.66
DB039	5.45	3.31	6	3.6	5.8	3.8	5.62	3.47	5.1	3.5	5.74	3.31	5.51	3.14	5.35	3.05	6.67	3.90
DB047	7.62	4.8	8.77	3.27	6.77	3.62	8.97	3.63	9.07	3.77	6.56	3.8	6.30	3.61	6.11	3.50	7.02	4.30
K010	3.1	1.9	3.05	1.85	3	1.8	2.95	1.86	3.01	2.01	3.11	1.98	2.99	1.88	2.90	1.82	3.5	1.98
K012	4.16	1.98	4.8	2.5	3.9	1.75	4.05	1.9	3.75	1.8	3.65	1.95	3.50	1.85	3.40	1.80	3.7	2.00
K015	4.75	2.46	4.32	2.3	4	2.1	4.5	2.35	4.3	2.22	4.1	2.2	3.94	2.09	3.82	2.03	4.8	2.10
K020	7.25	2.85	7.1	2.7	6.5	2.8	6.75	2.98	6.3	2.5	6.2	2.4	5.95	2.28	5.77	2.21	5.44	2.50
K021	5.45	2.98	5.3	2.8	5.4	3.09	5.1	3	4.88	2.8	4.9	2.7	4.70	2.57	4.56	2.49	4.6	3.00
K026	2.2	1.46	2.7	1.8	2.1	1.6	2.08	1.65	2.1	1.55	2.07	1.4	1.99	1.33	1.93	1.29	2.1	1.50
K030	2.5	1.4	2.4	1.4	2.22	1.53	2.4	1.63	2.6	1.1	2.22	1.3	2.13	1.24	2.07	1.20	2.4	1.50

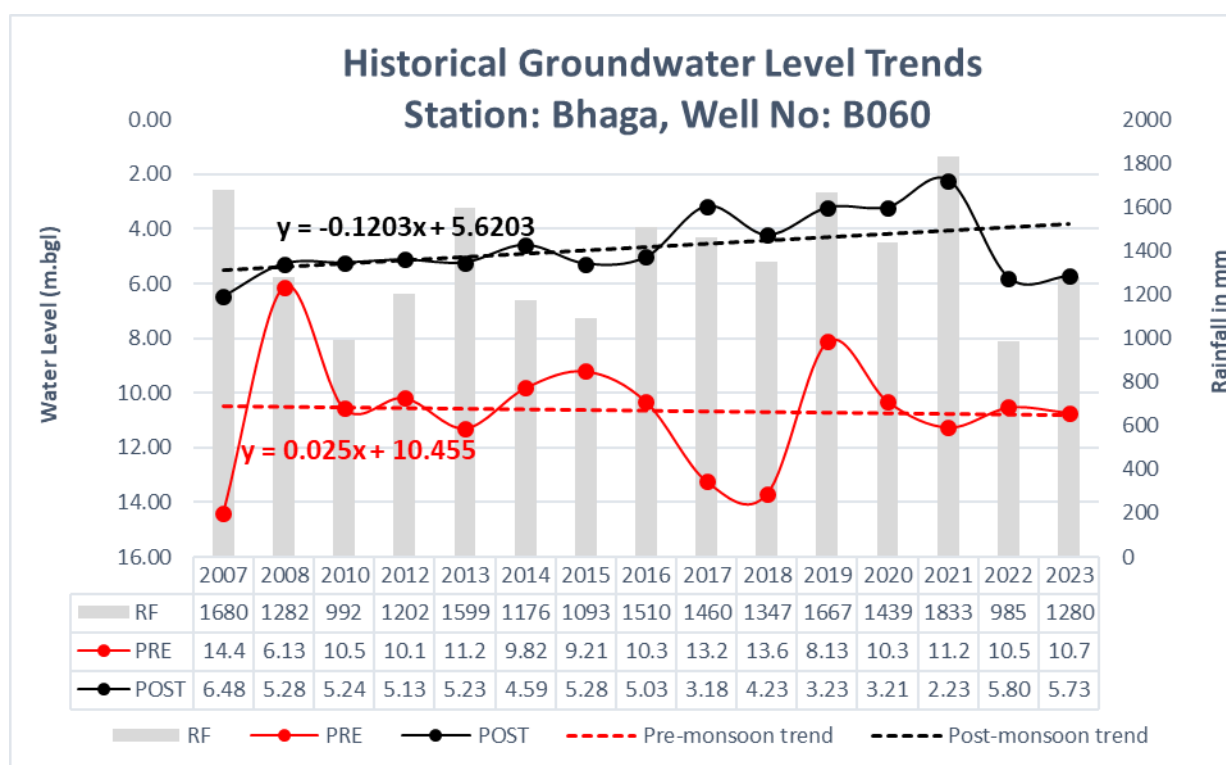
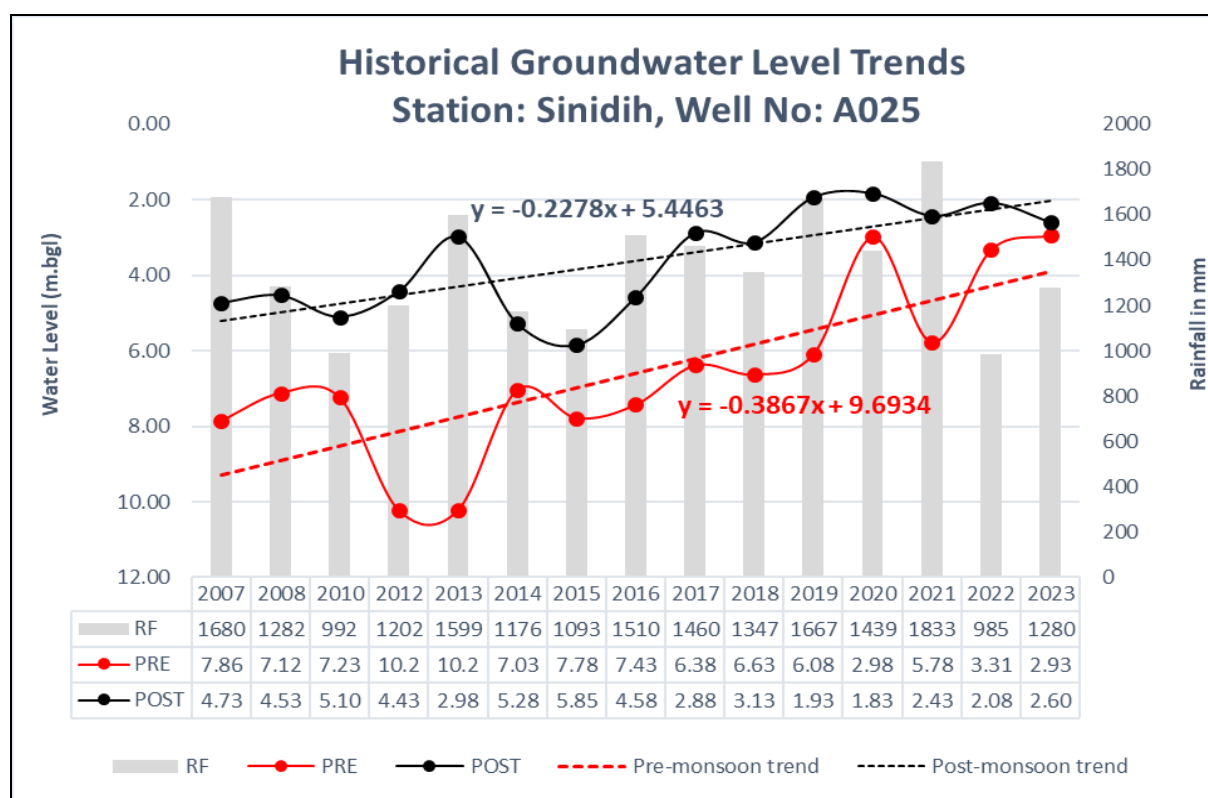
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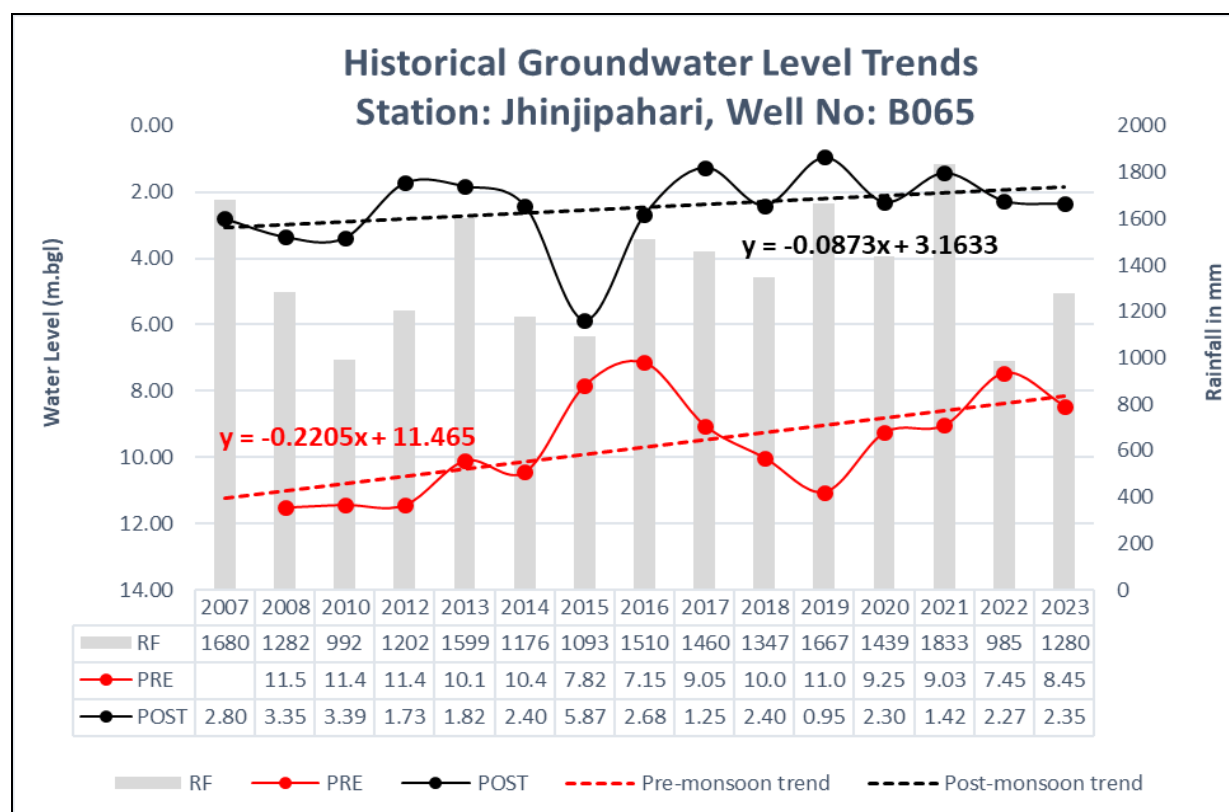
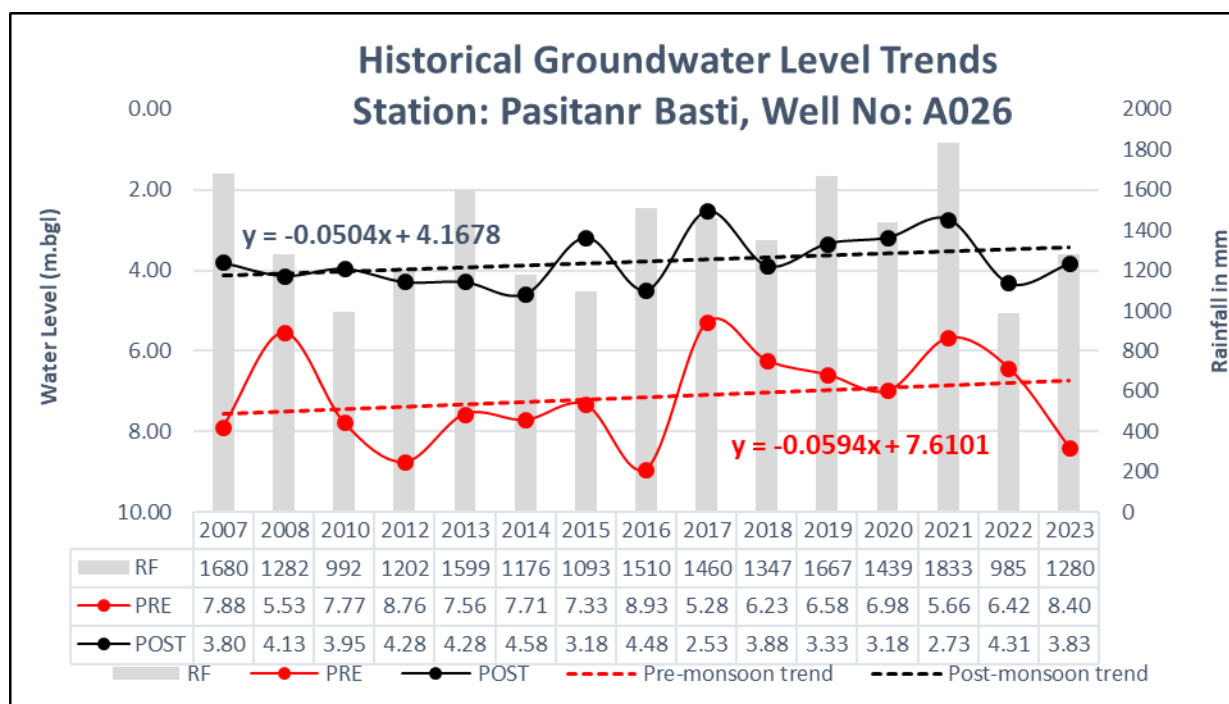
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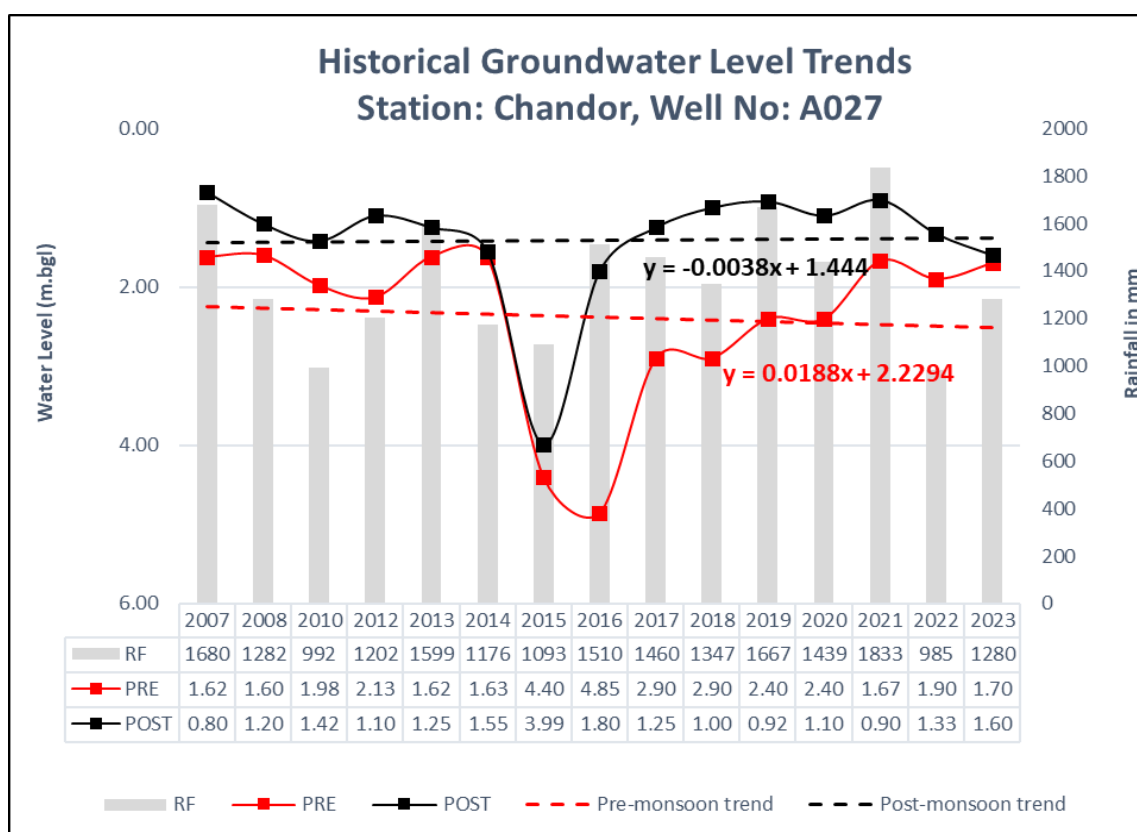
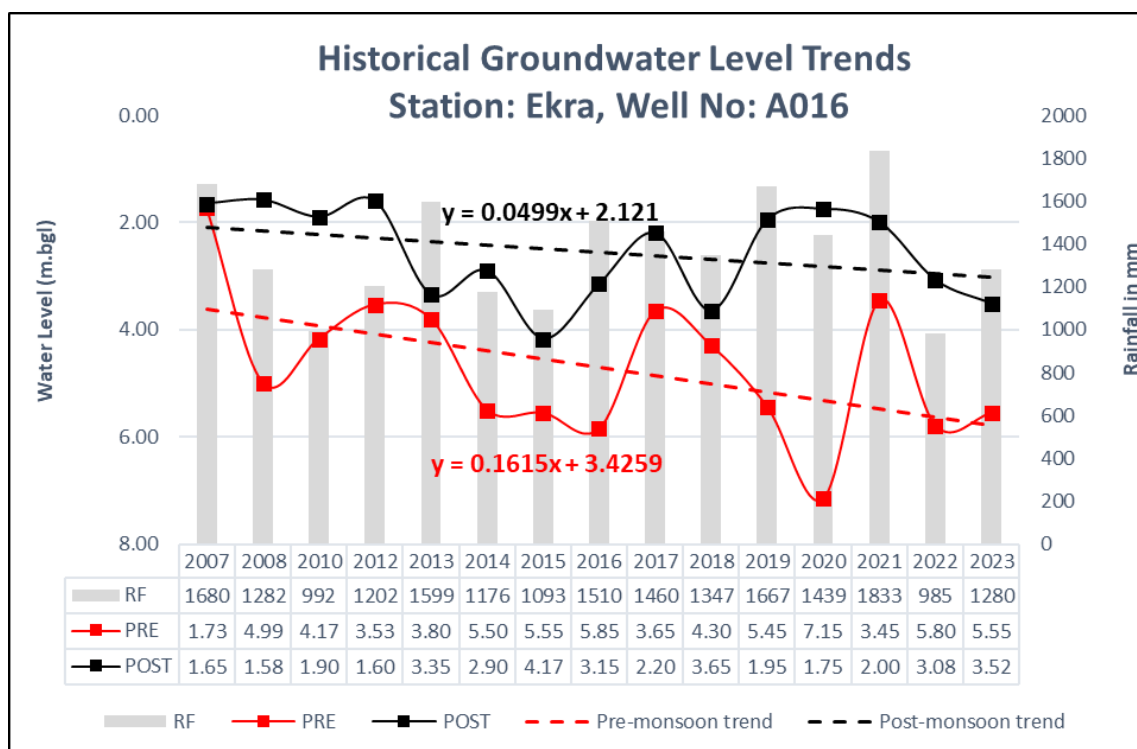
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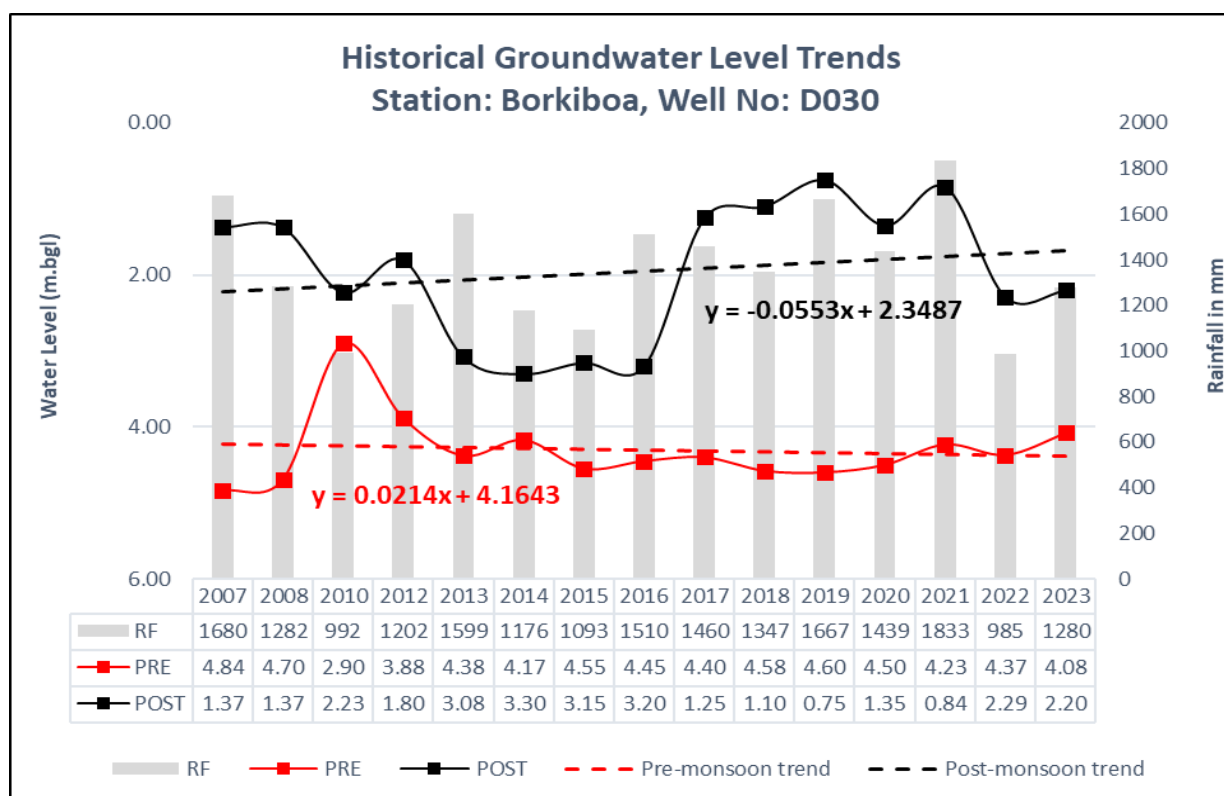
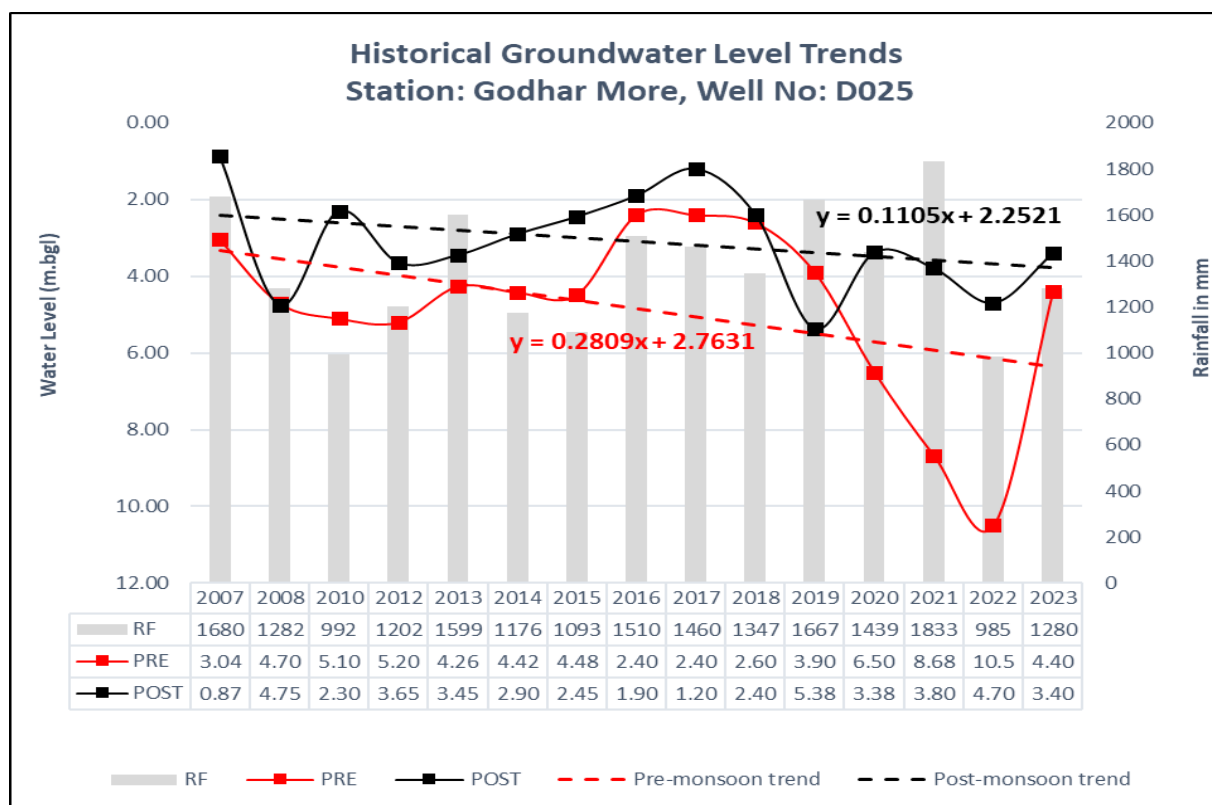
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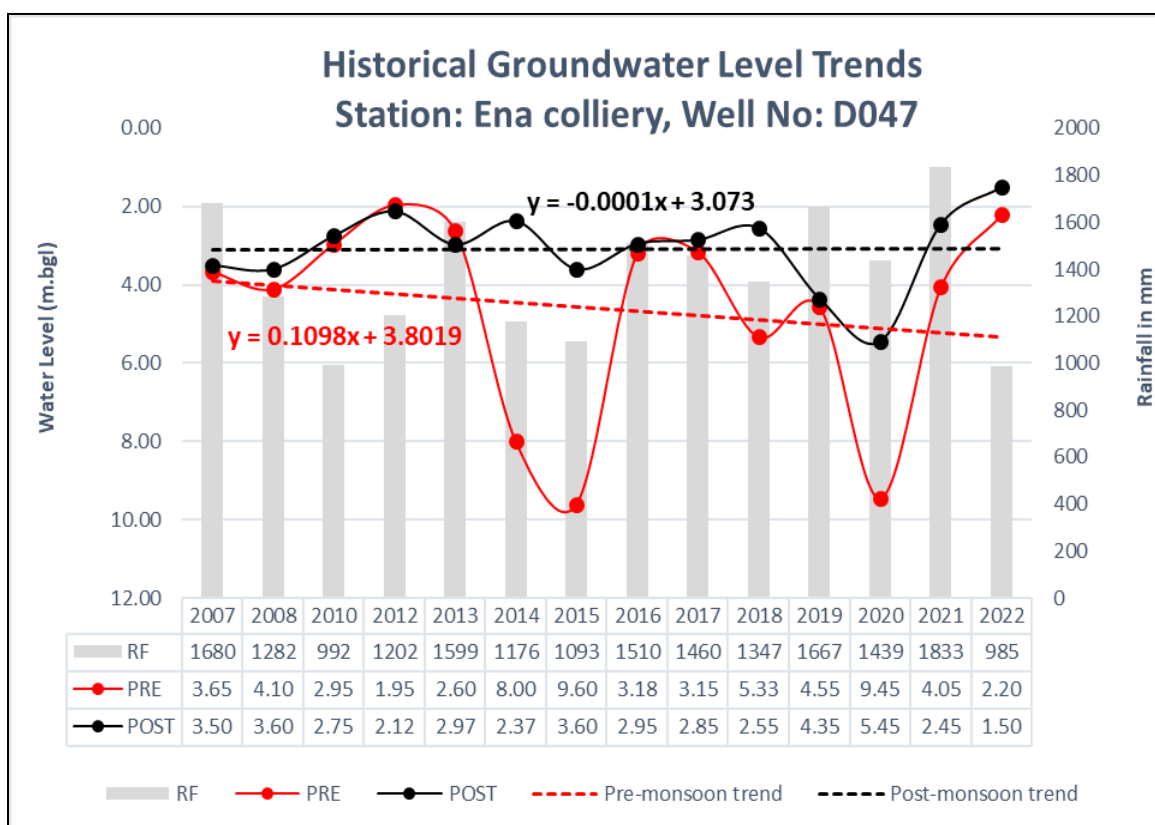
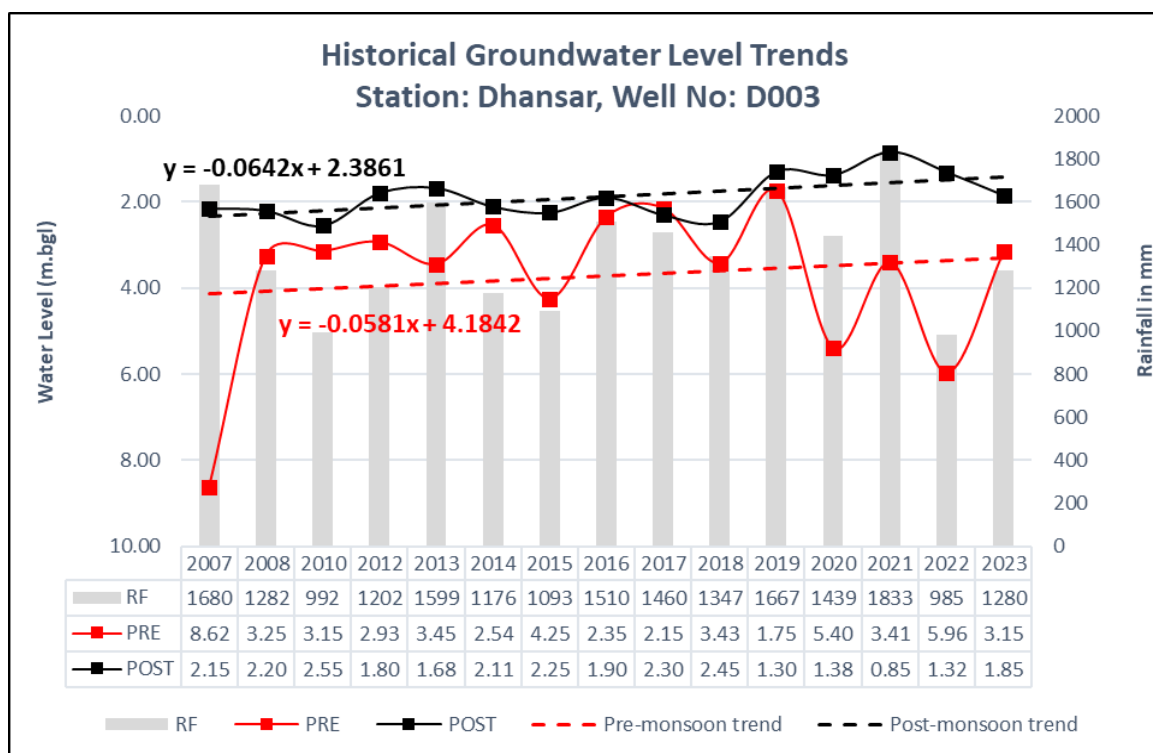
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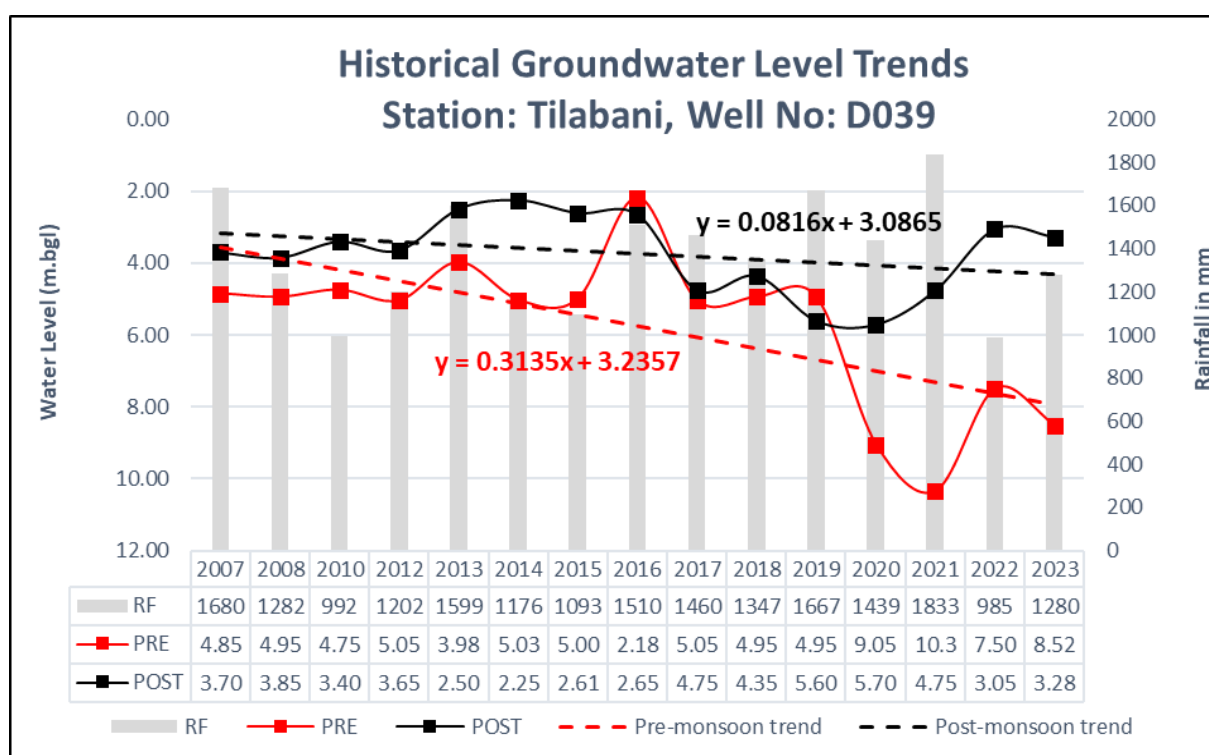
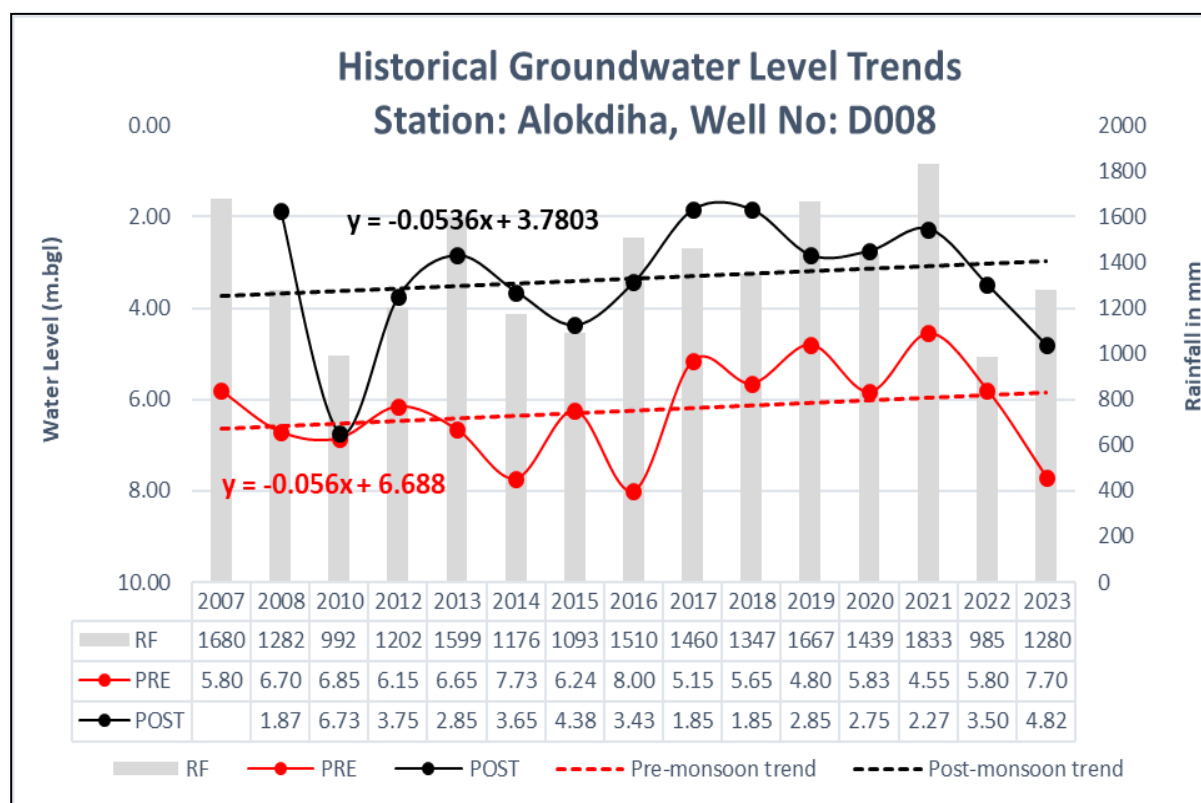
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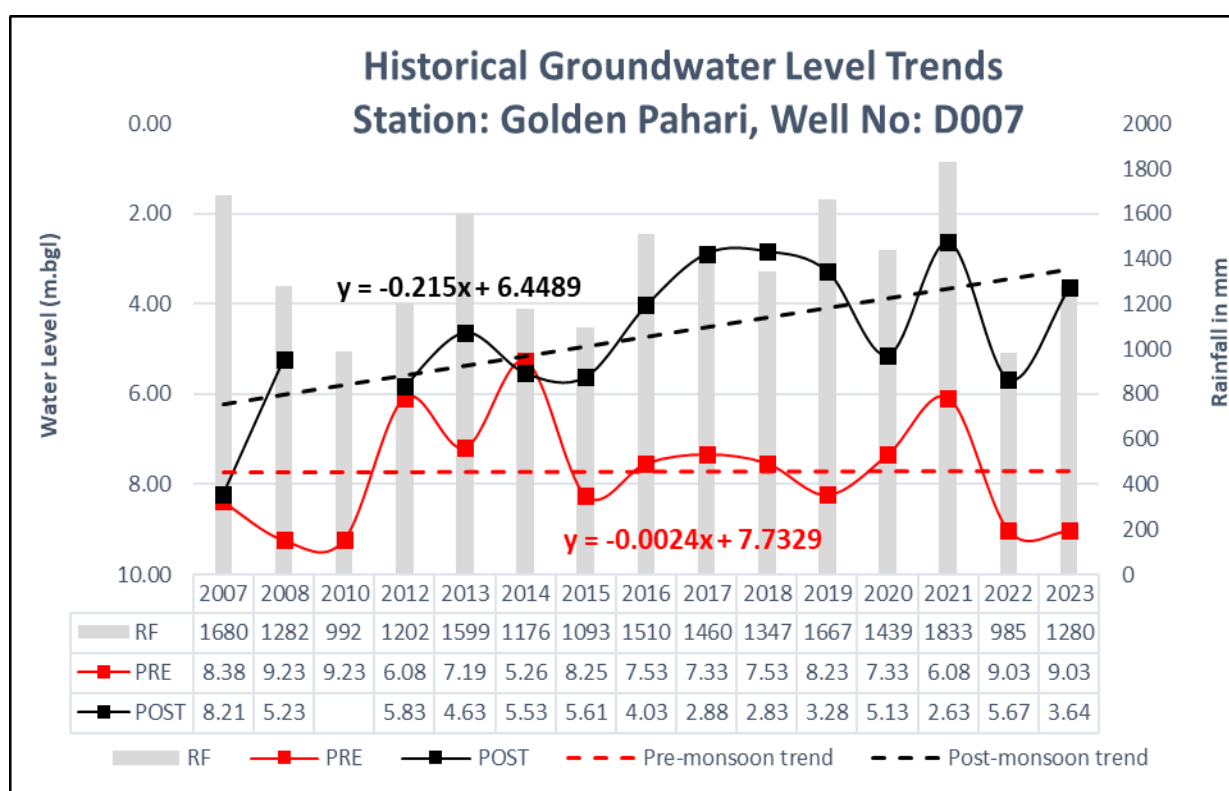
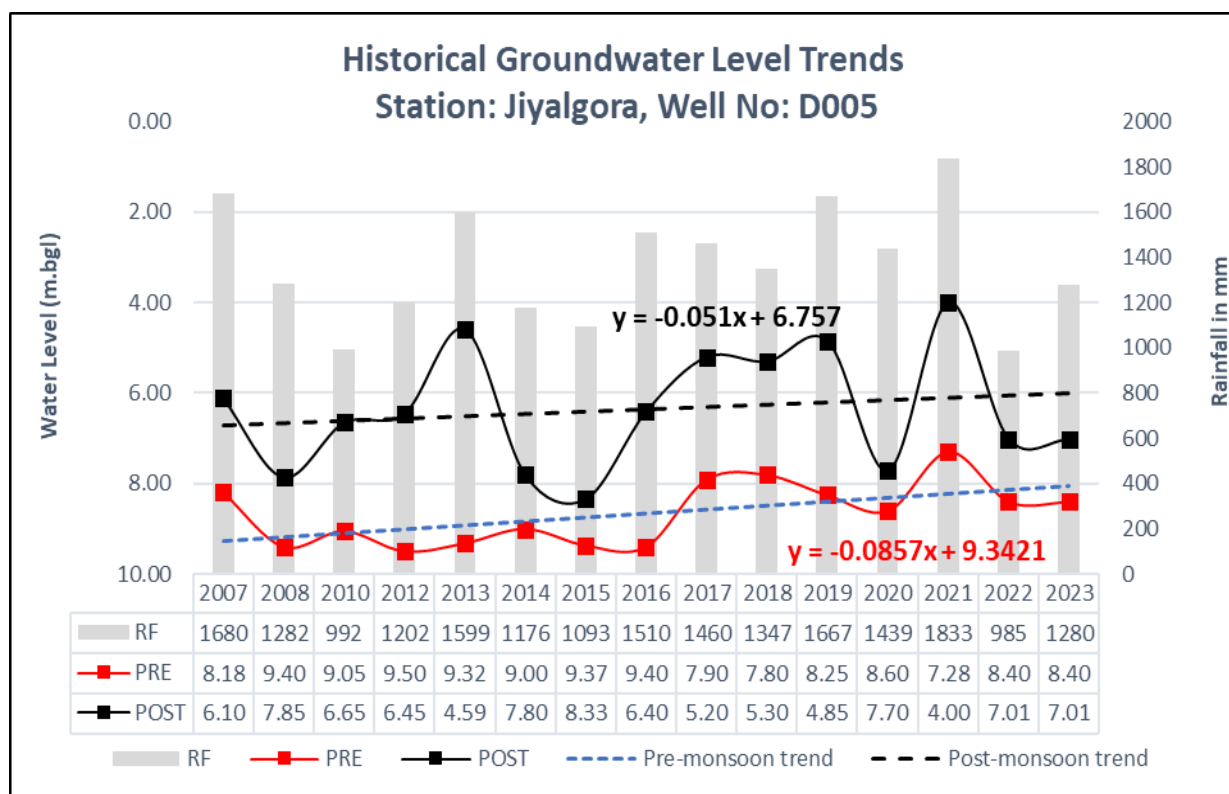
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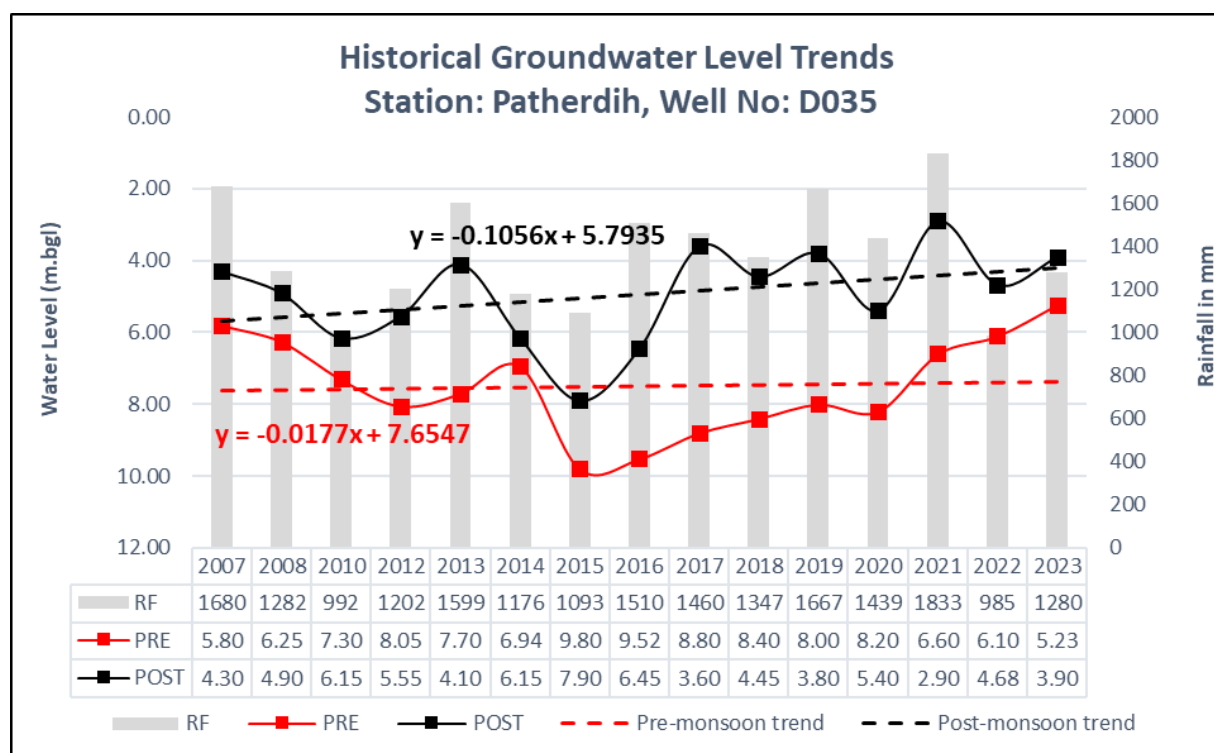
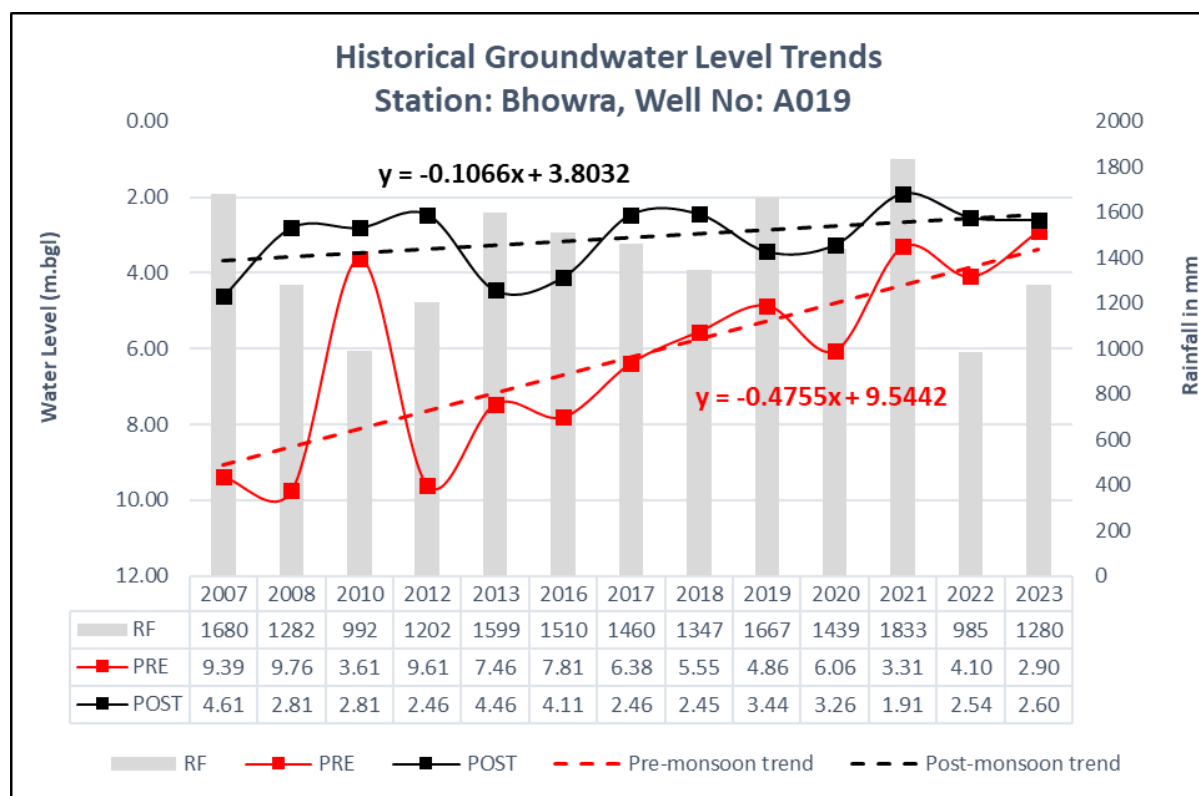
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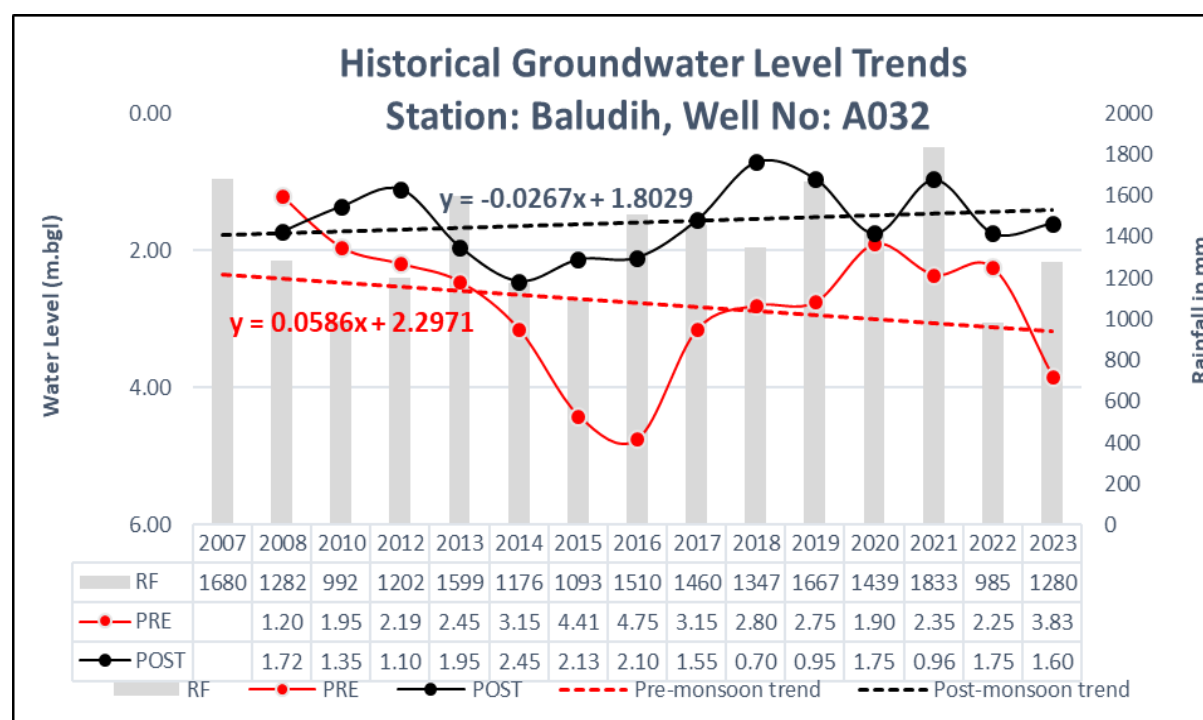
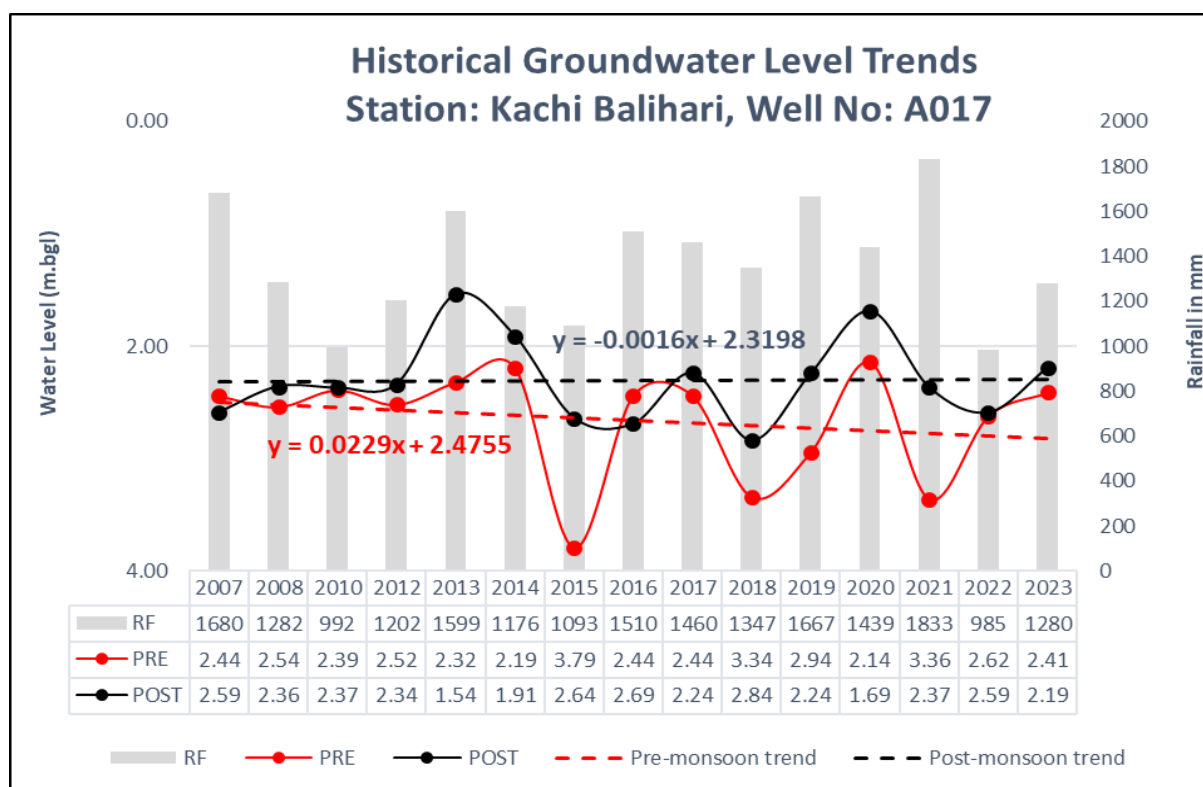
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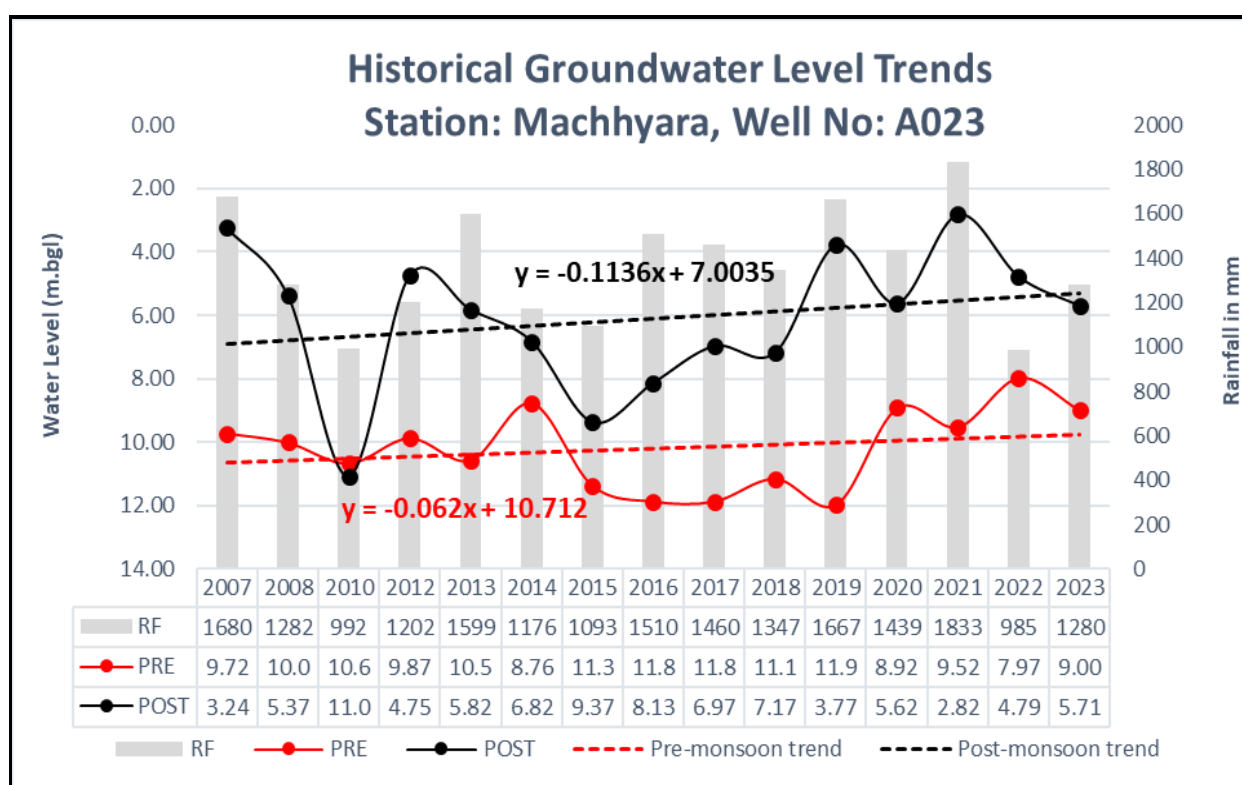
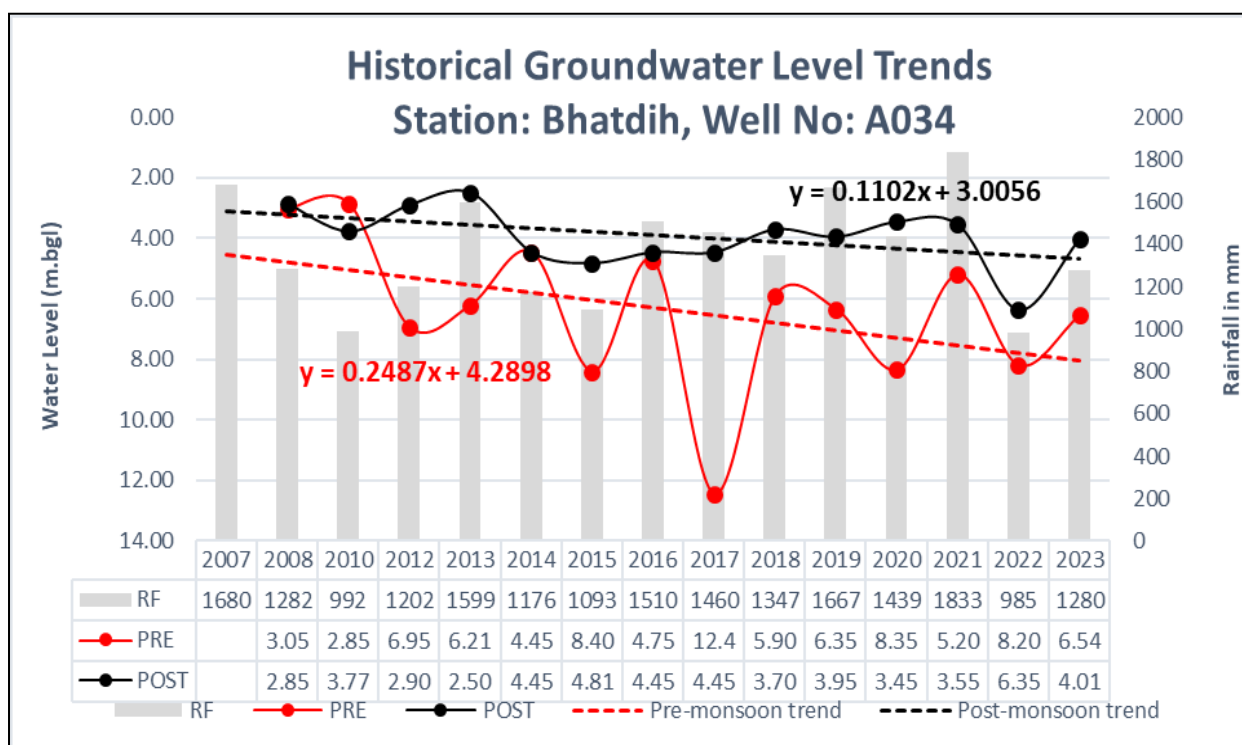
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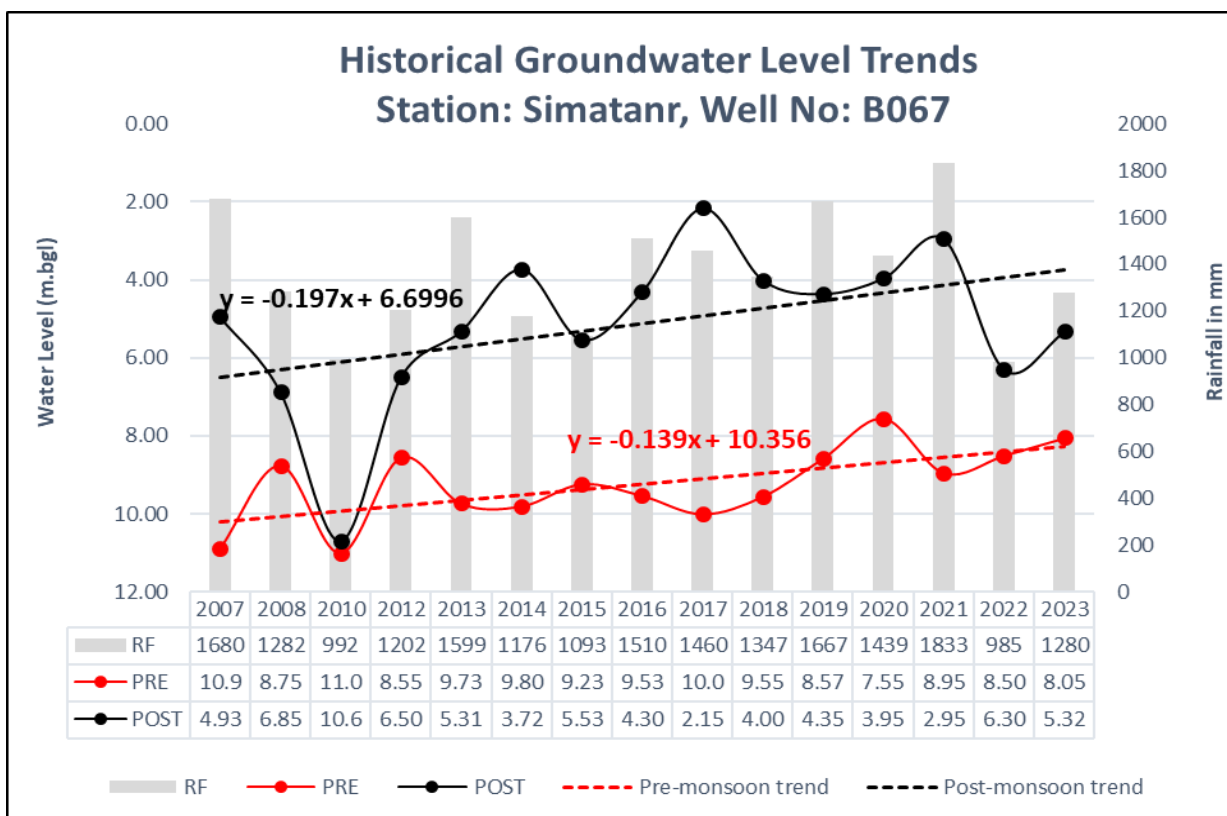
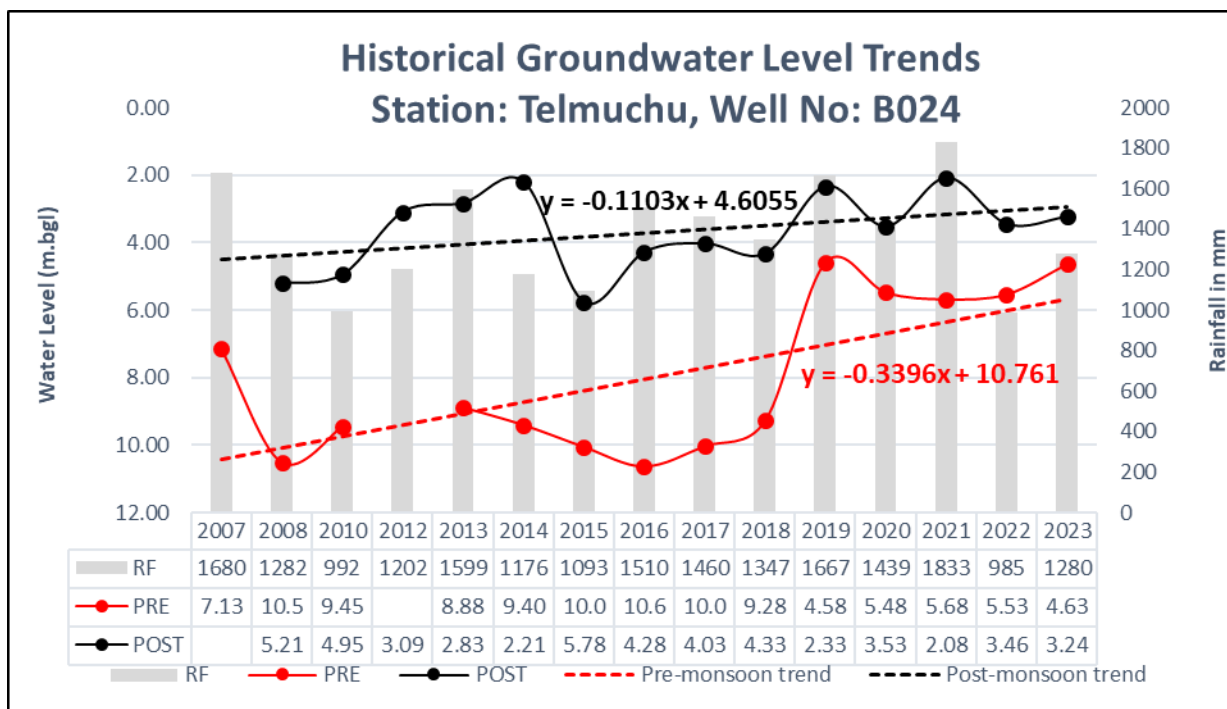
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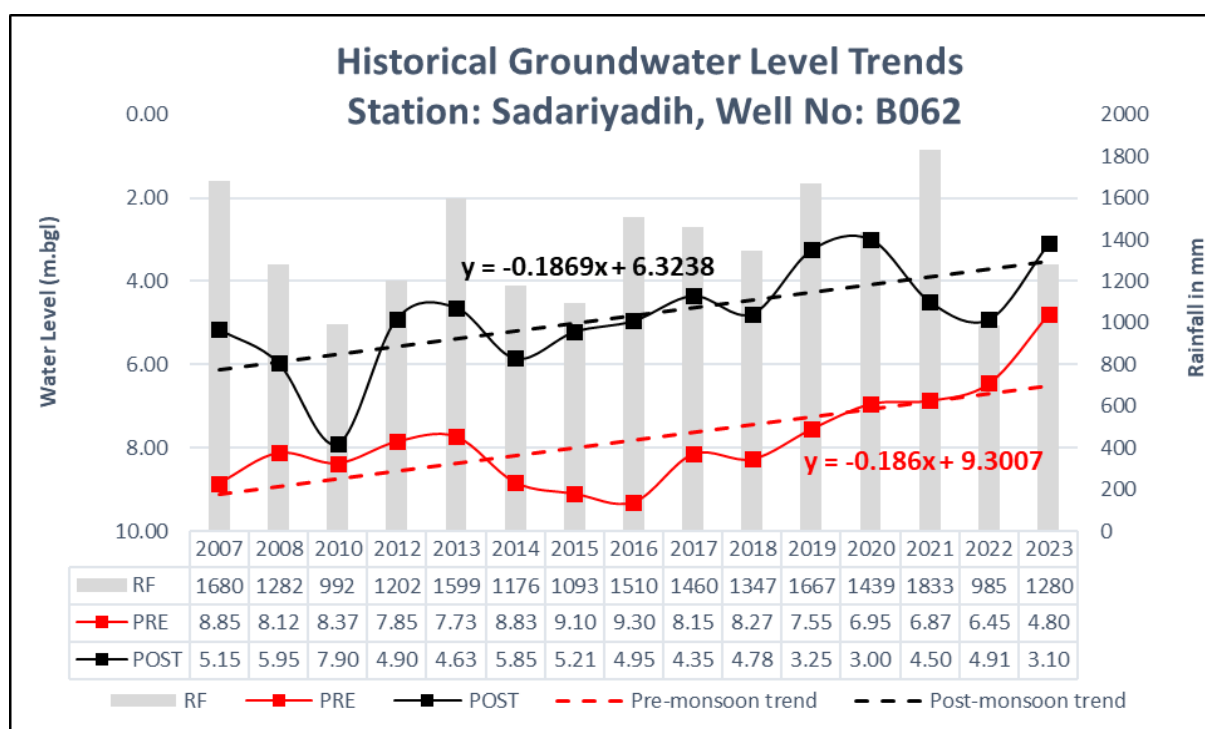
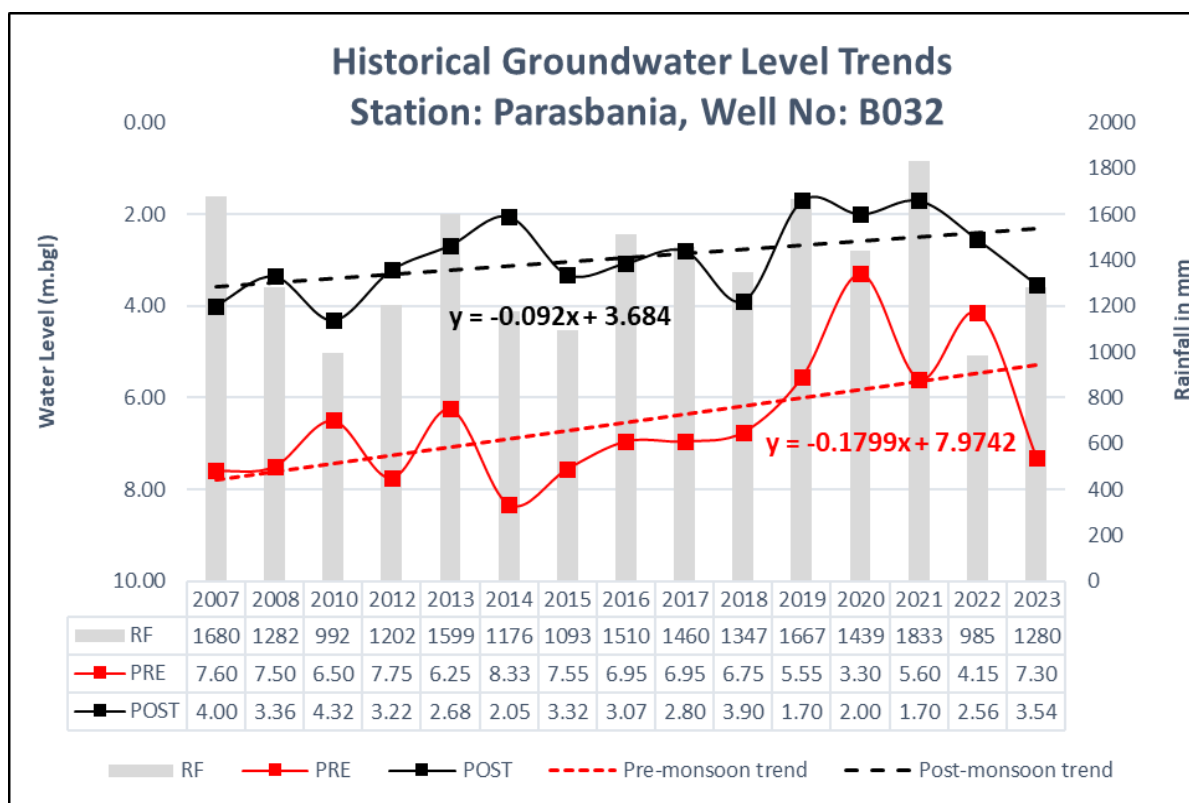
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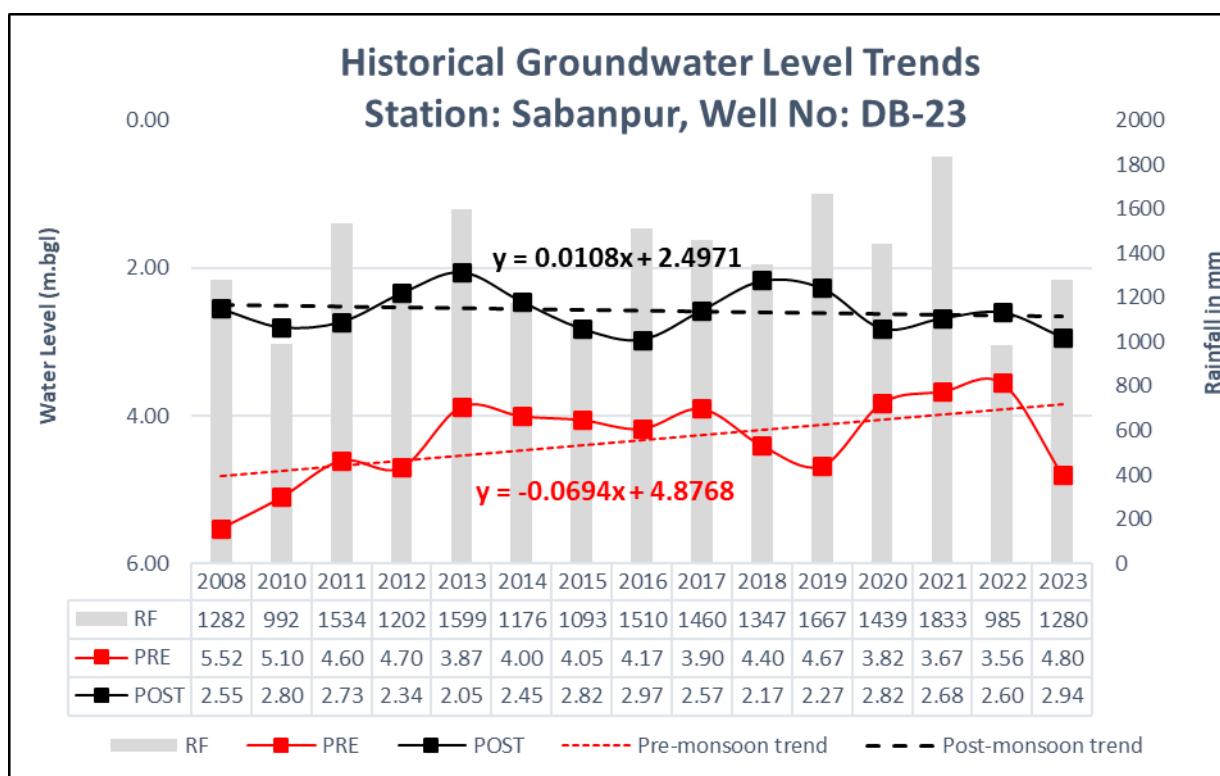
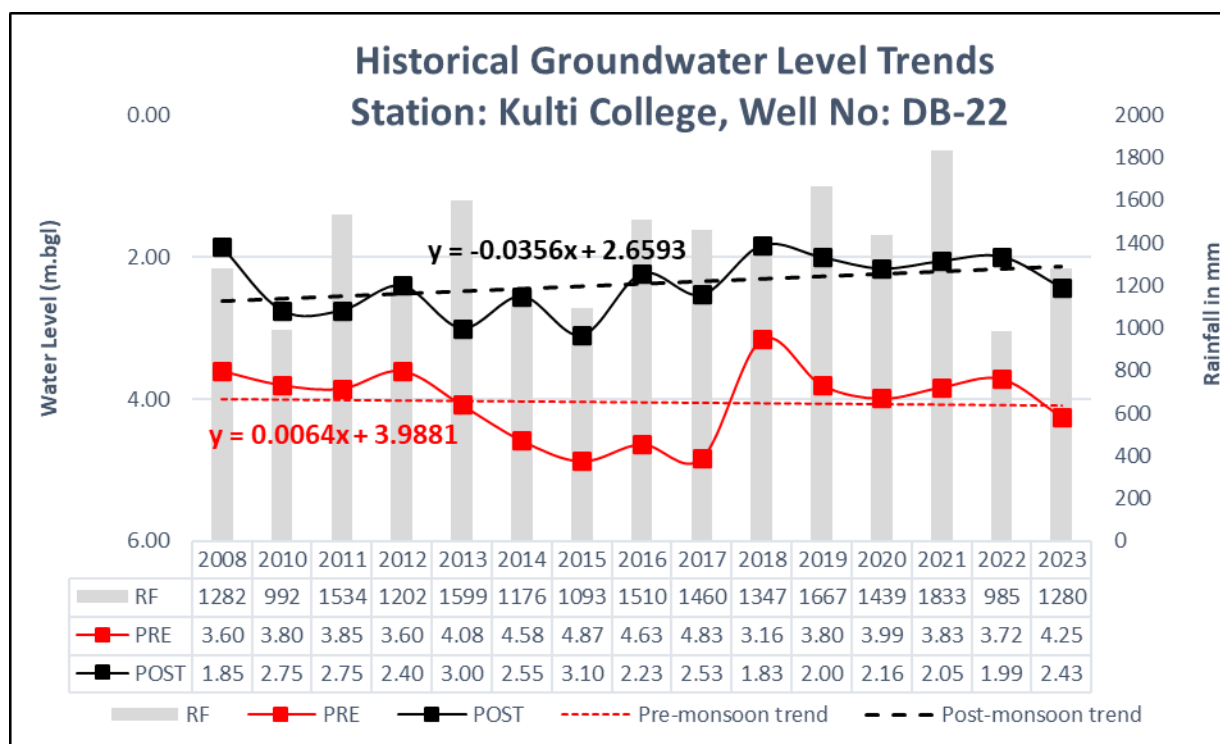
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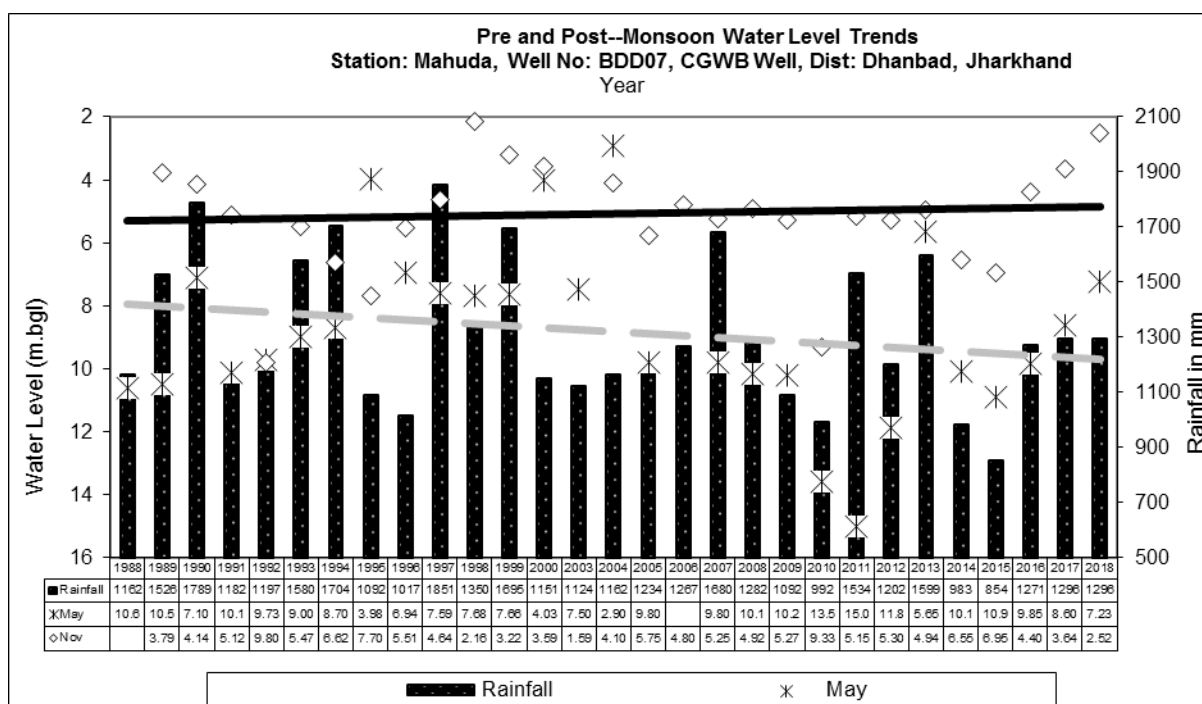
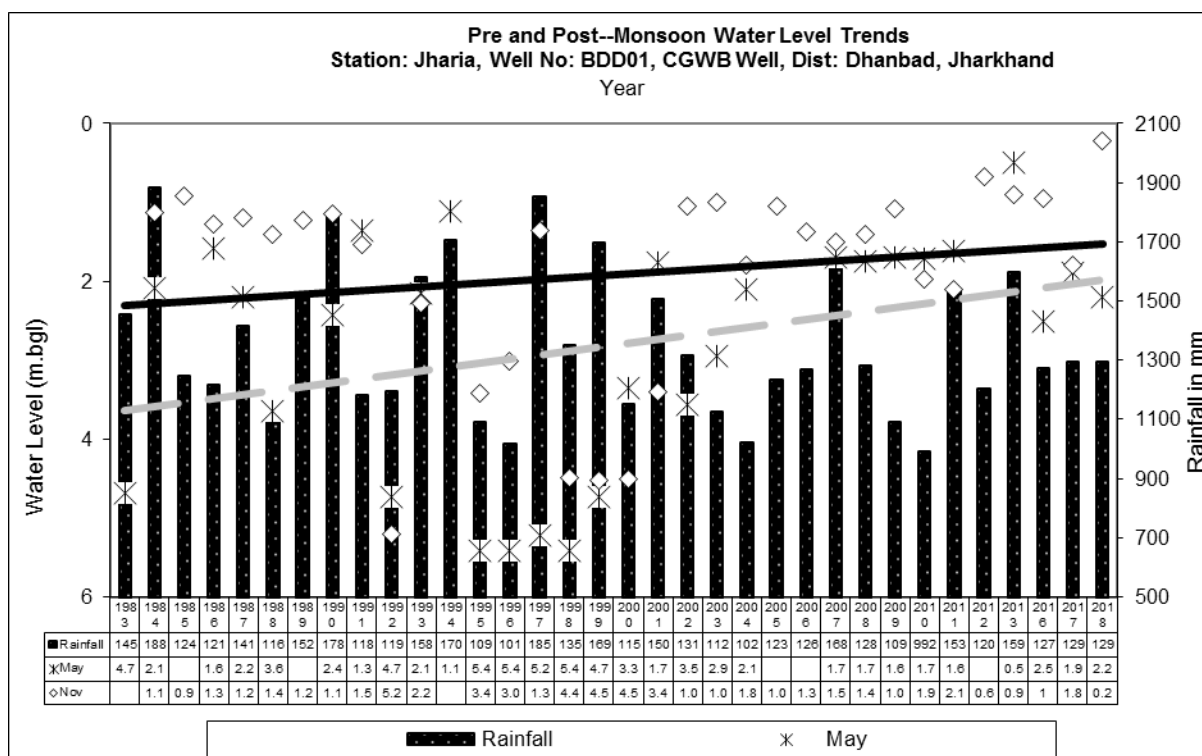
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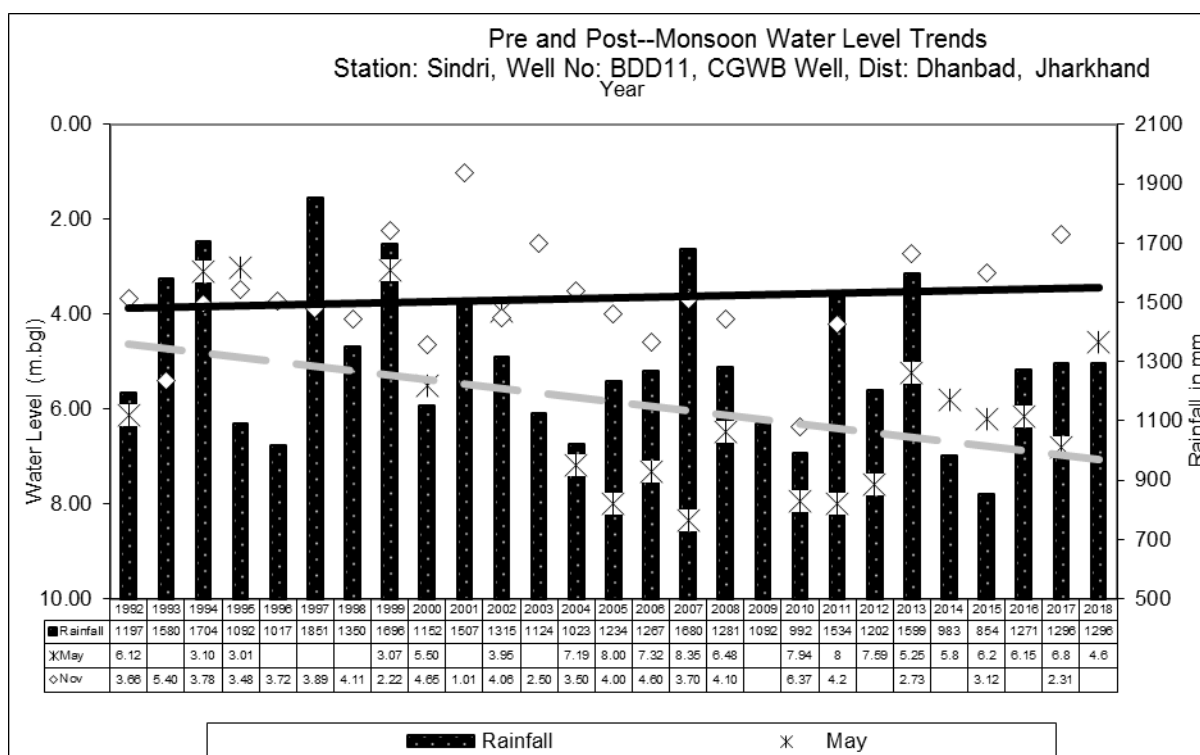
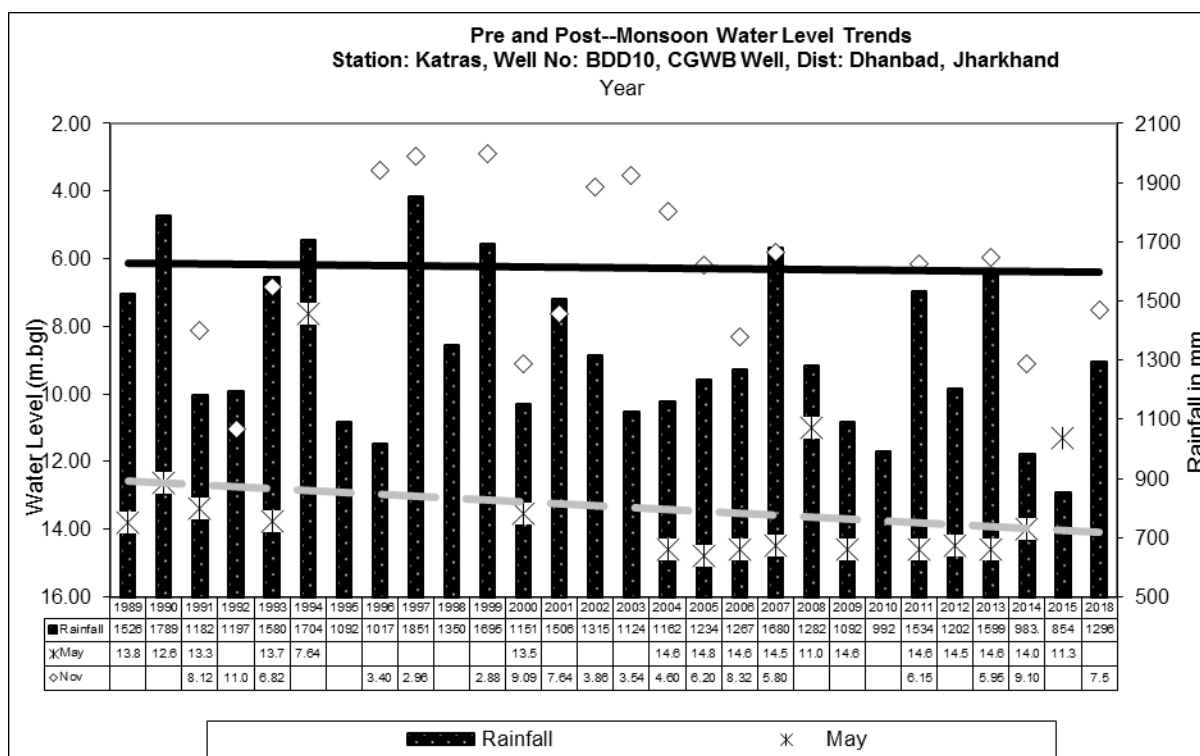
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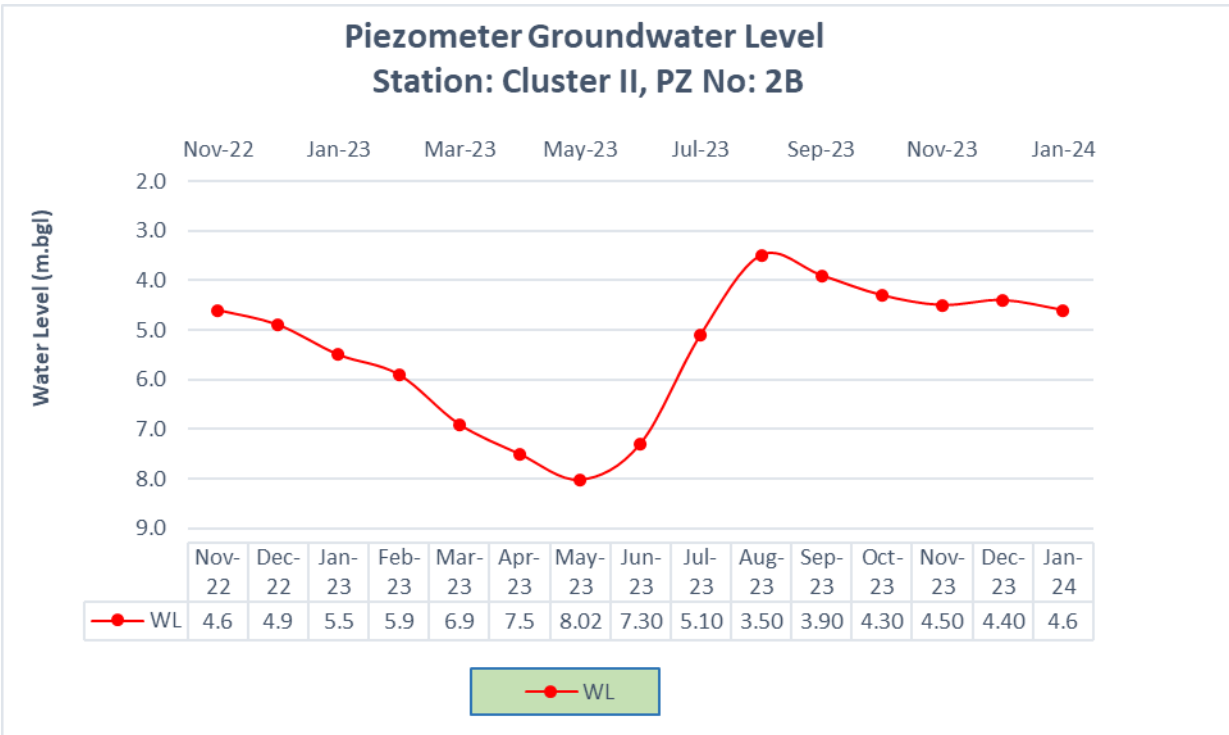
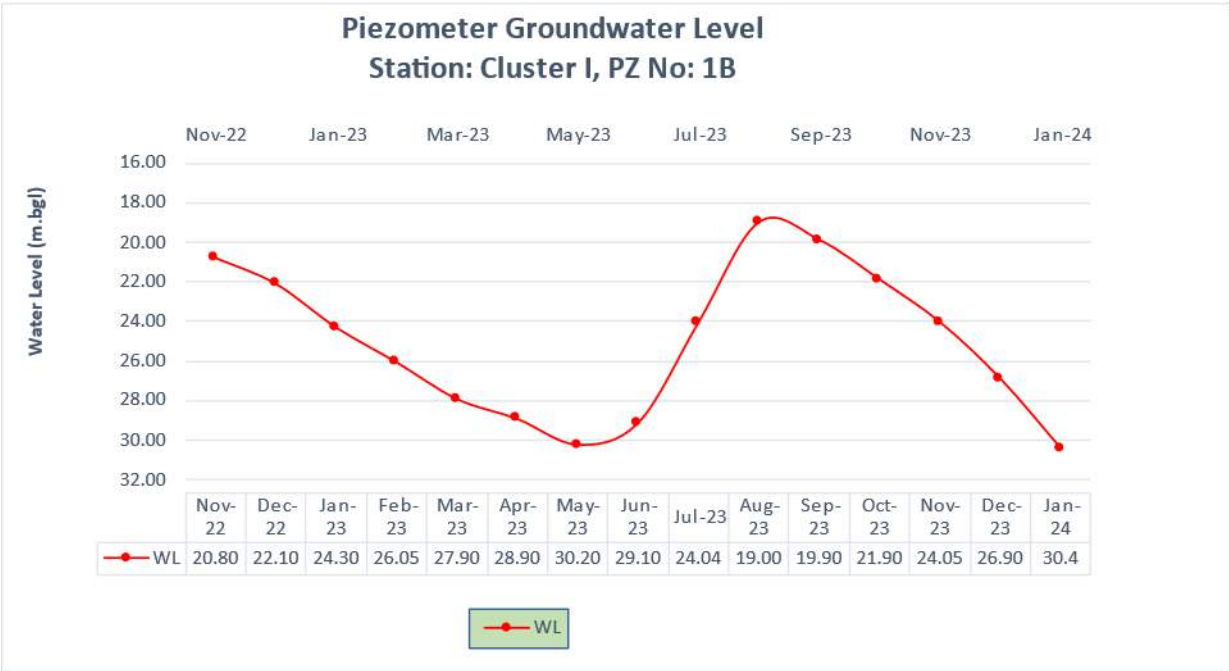
HYDROGRAPHS OF CGWB PERMANENT OBSERVATION STATIONS

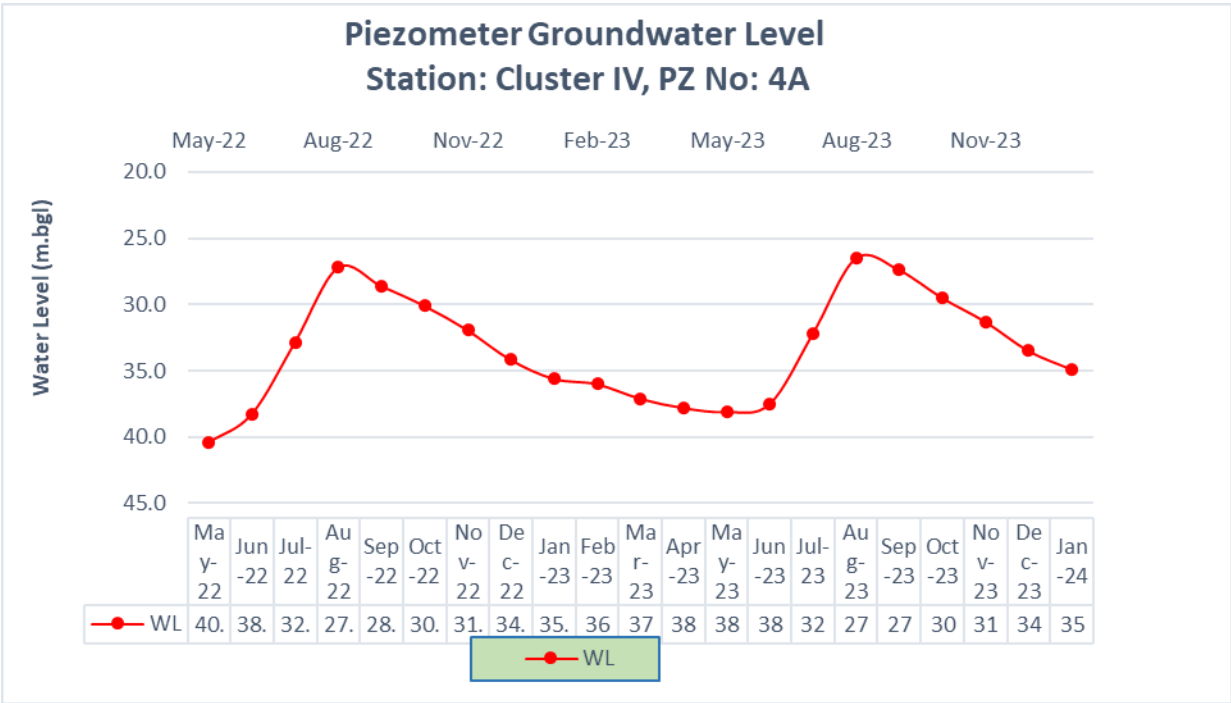
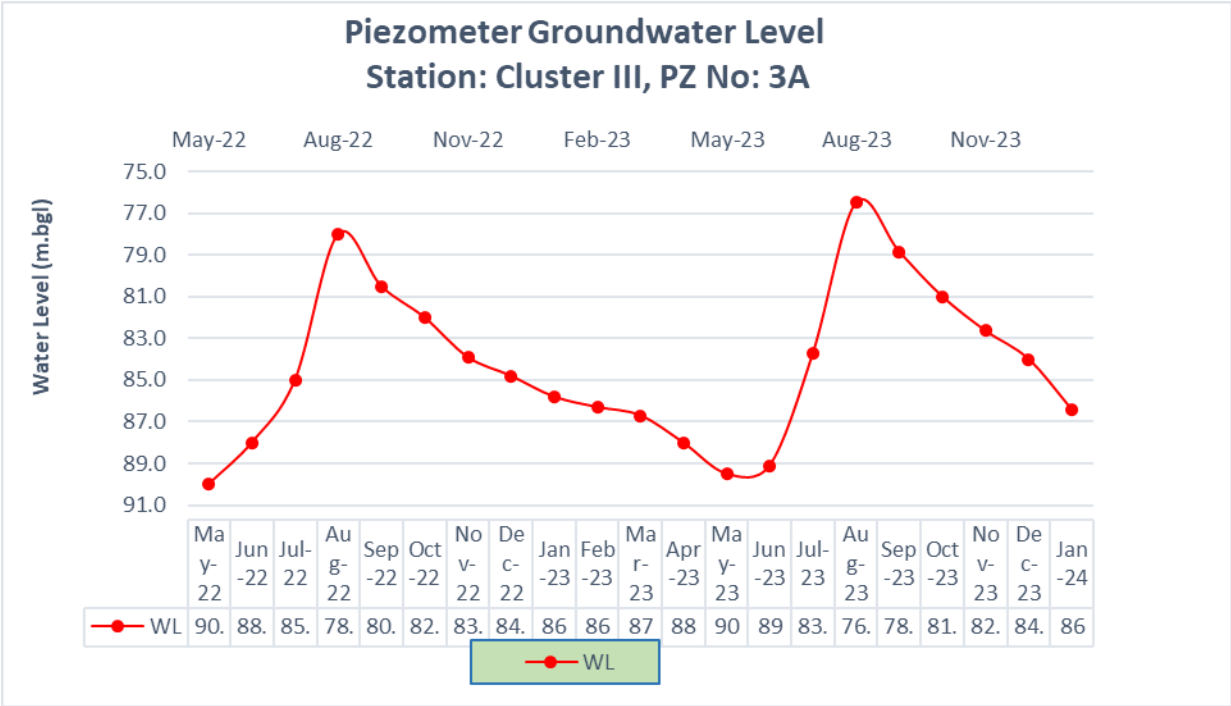


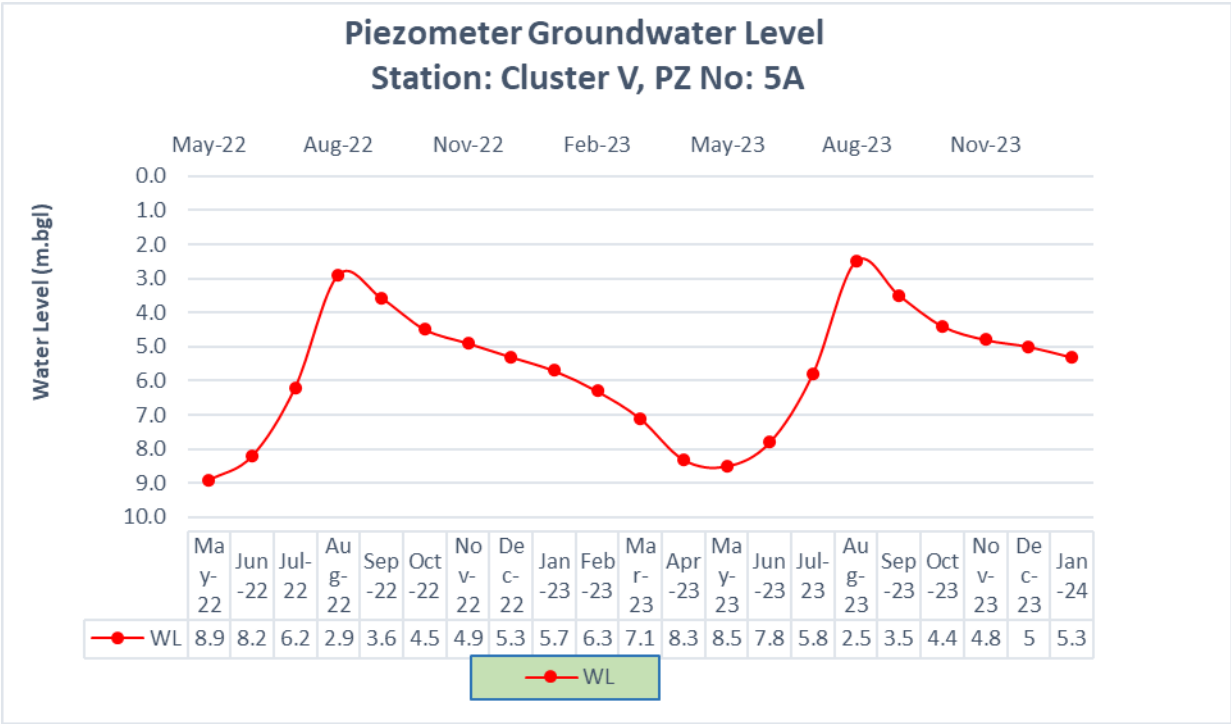
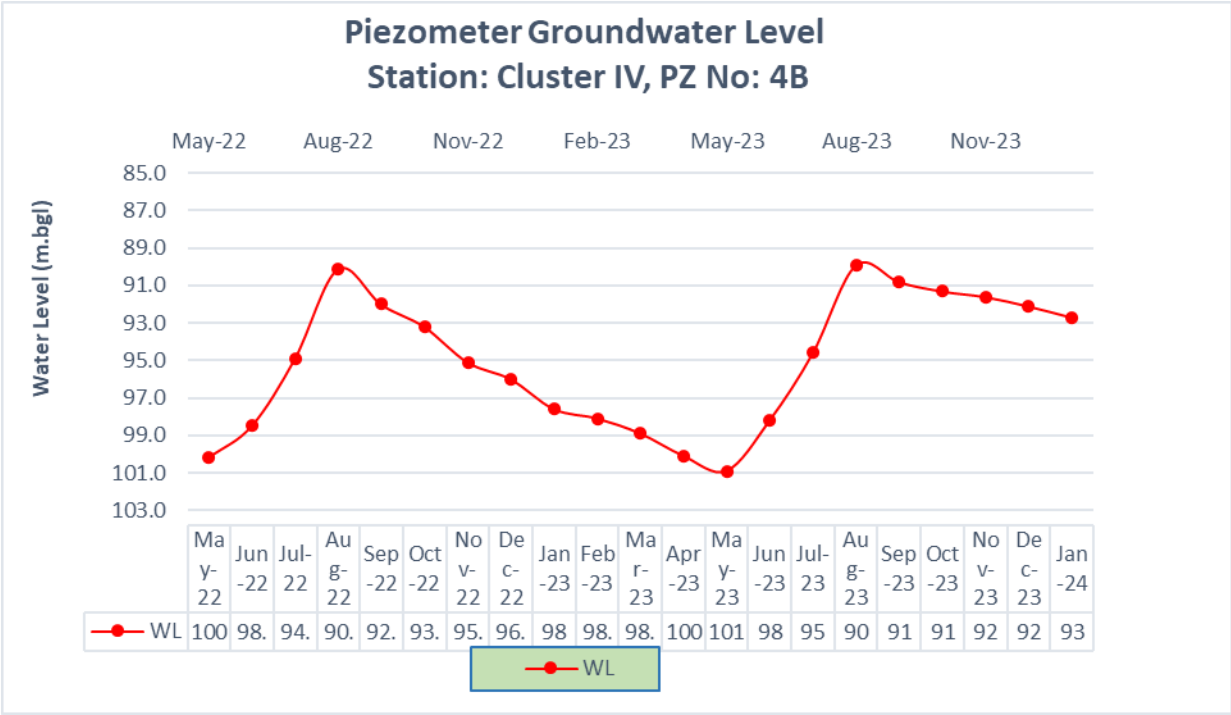
HYDROGRAPHS OF CGWB PERMANENT OBSERVATION STATIONS

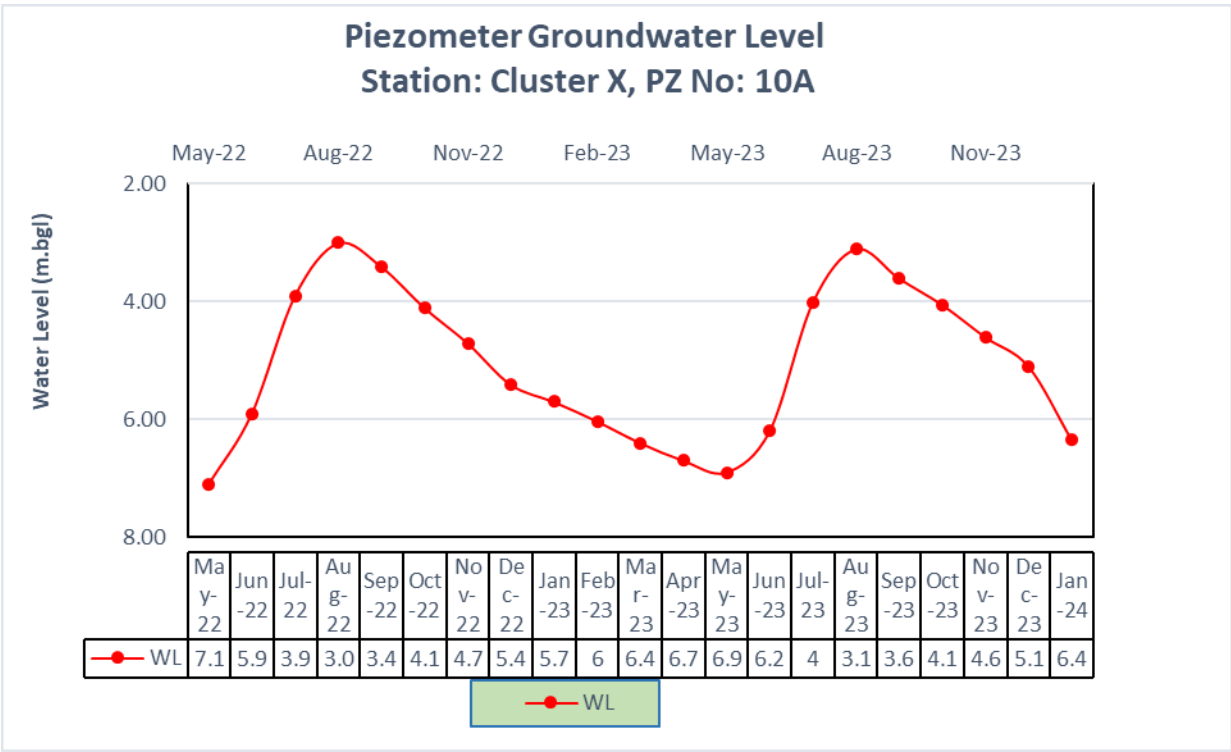
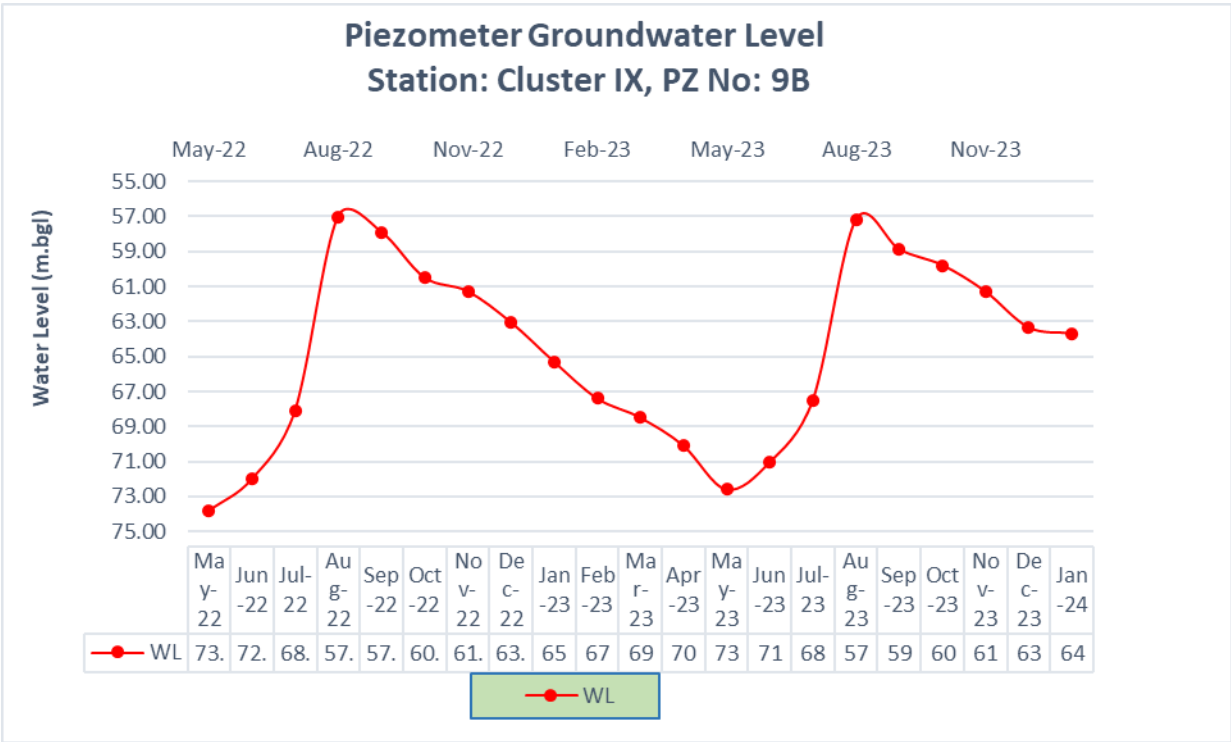


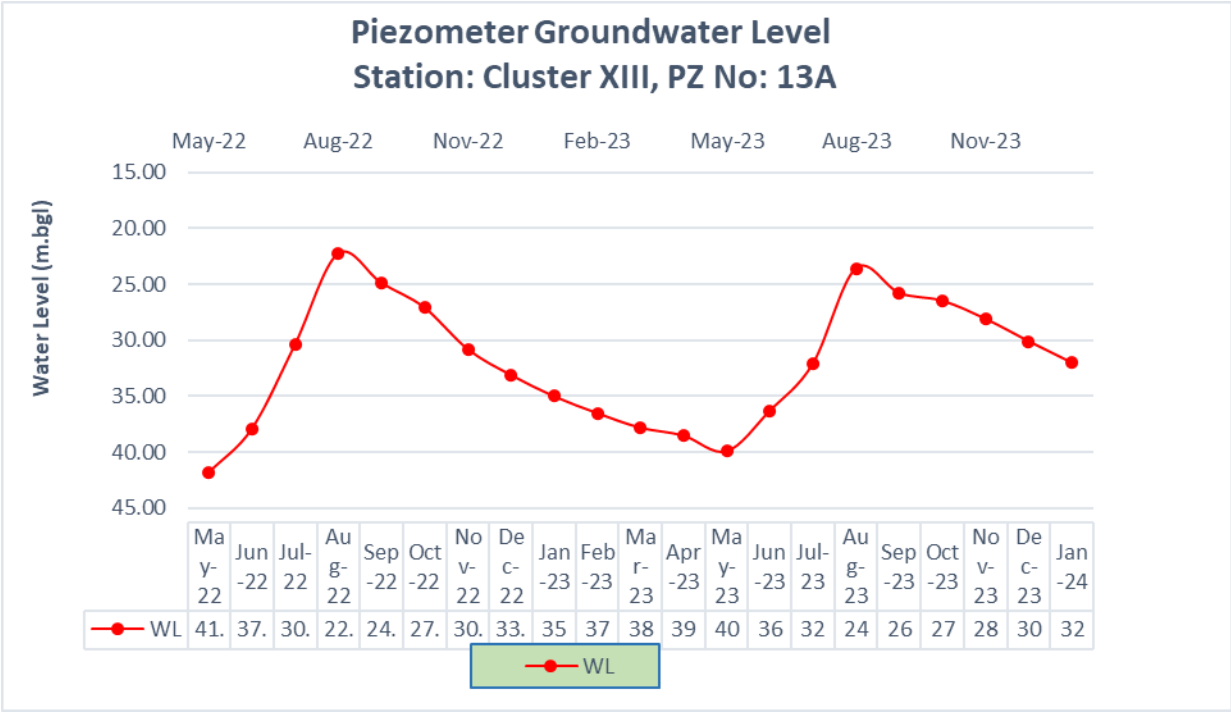
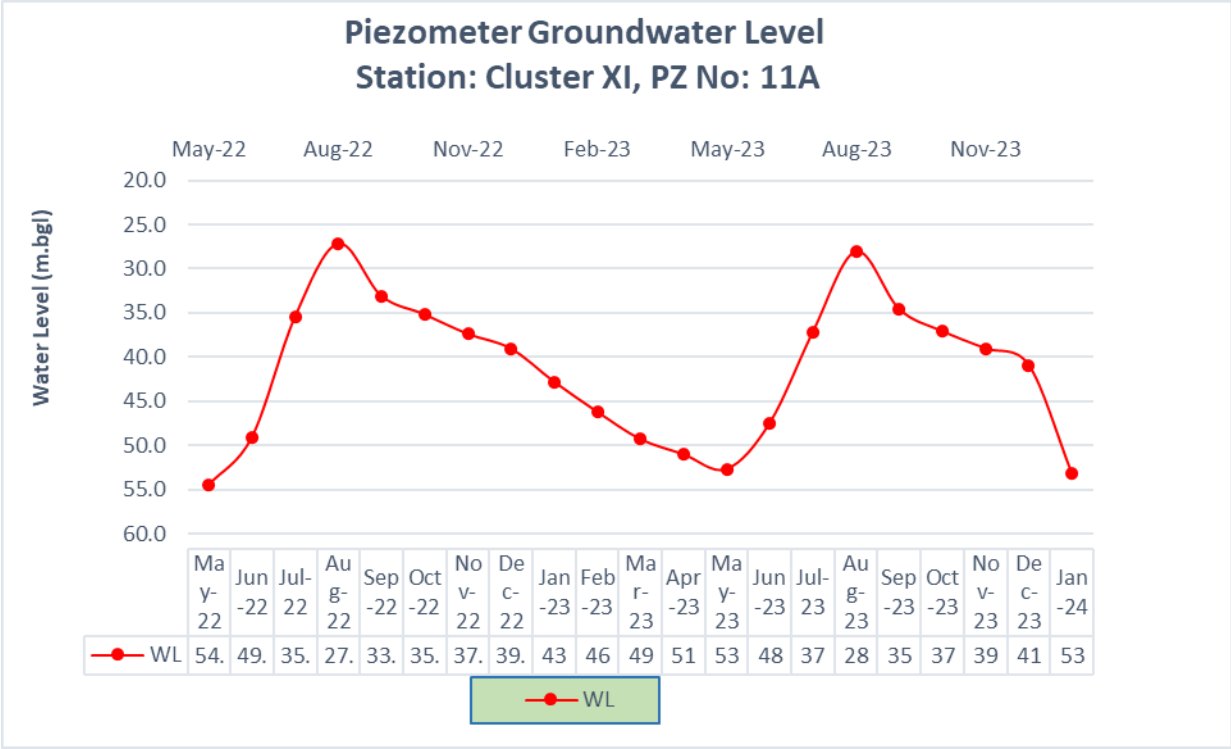
PIEZOMETER HYDROGRAPHS

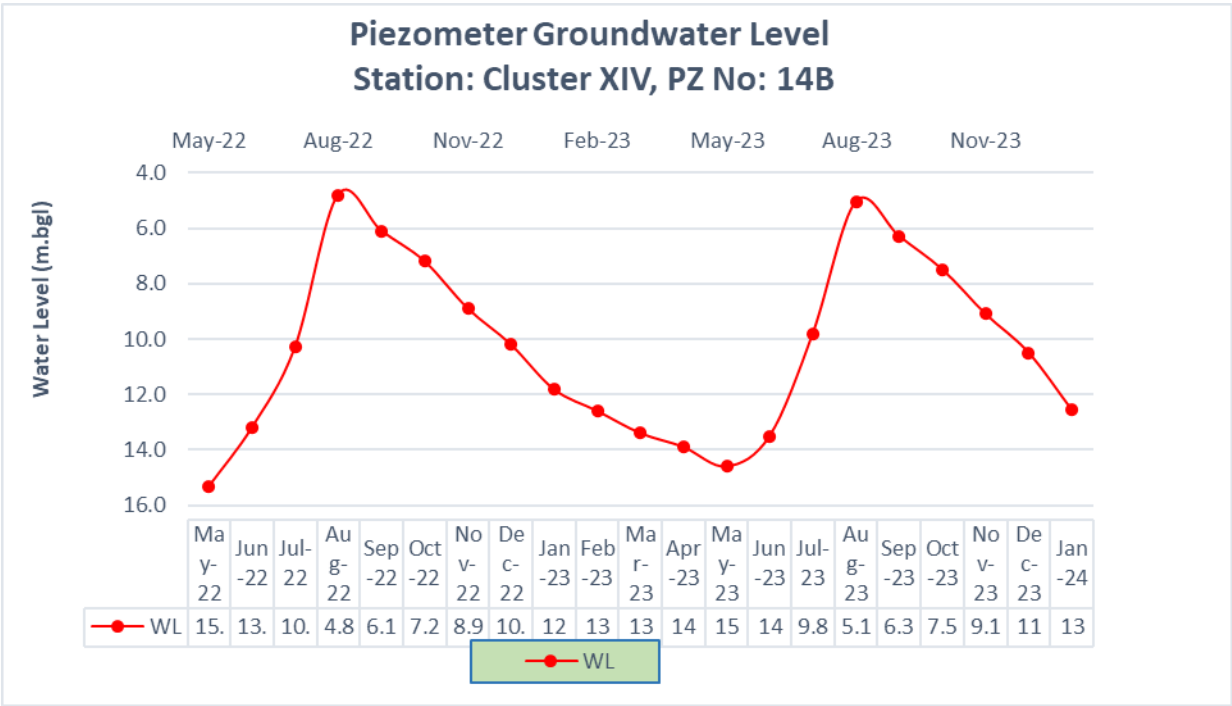
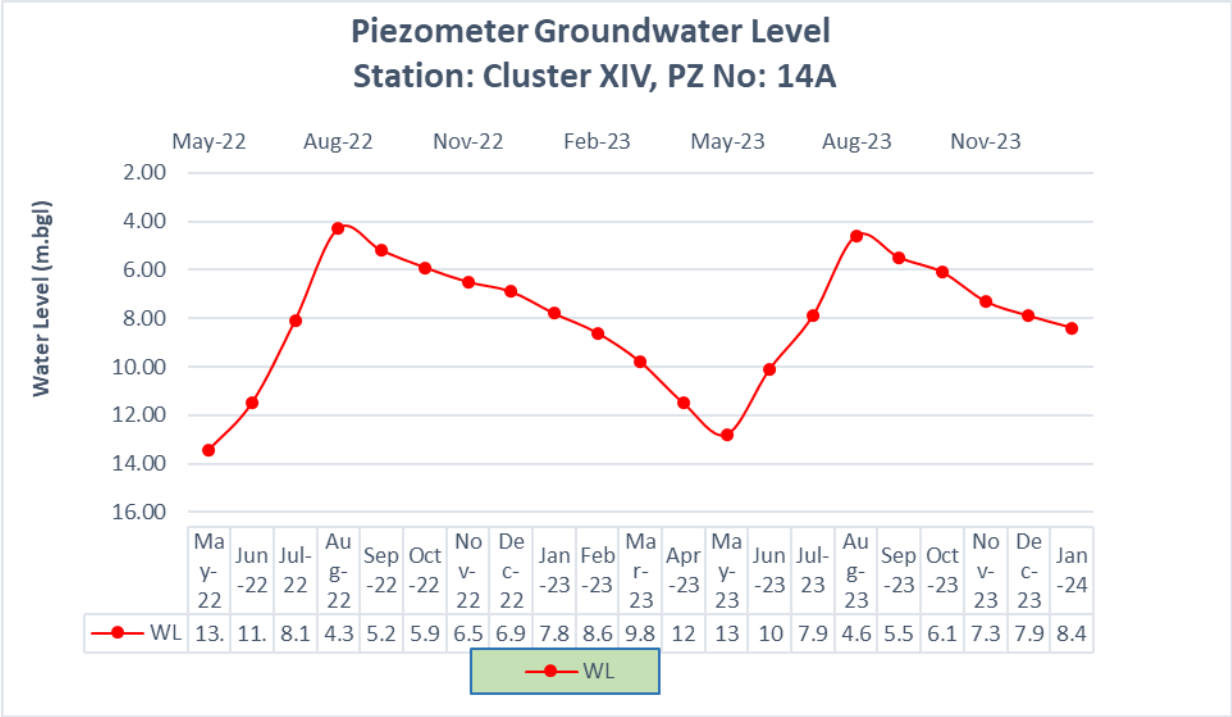












GROUNDWATER SAMPLE LOCATION DETAILS

Sampling month: June month of the assessment year of 2022-23

Sl No	Dug well (CMPDI)	Location	Sampling Date
			April'2023
1	A4	DALDOLI	04.04.2023
2	A9	SRIRAMPUR	04.04.2023
3	A10	PHULWAR	04.04.2023
4	A13	BHELATANR	04.04.2023
5	A23	MACHHAYARA	04.04.2023
6	A29	GOVINDPUR, AMBAGAN VILLAGE	04.04.2023
7	A32	MOONIDIH BAZAR	04.04.2023
8	B10	AMDIH NARAYANPUR	04.04.2023
9	B15	BERA VILLAGE	04.04.2023
10	B19	BHANDARIDAH	04.04.2023
11	B23	LOHAPATTI VILLAGE	04.04.2023
12	B32	MADHUBAND VILLAGE	04.04.2023
13	B40	BHUIANCHITRO	04.04.2023
14	B46	TELO	04.04.2023
15	B55	RANTANR VILLAGE	04.04.2023
16	B59	KHODOVALY VILLAGE	04.04.2023
17	B64	KESHALPUR, BATIGHAR	04.04.2023
18	D2	BIRSA MUNDA CHAWK, BANKMORE	05.04.2023
19	D4	JHARIA THANA	05.04.2023
20	D5	JIYALGORA (NEAR P.O.)	05.04.2023
21	D14	KARMATANR	04.04.2023
22	D19	MEMKO MORE	04.04.2023
23	D25	GODHUR MORE	04.04.2023
24	D30	BORKIBOA VILLAGE	04.04.2023
25	D35	PATHERDIH RAILWAY COLONY	05.04.2023
26	D41	JOYRAMPUR	05.04.2023
27	D49	TISRA THANA	05.04.2023
28	D59	SITALPUR	05.04.2023
29	D70	JALADIH	05.04.2023
30	D72	CHATI GOVINDPUR	04.04.2023
31	D80	DHANSAR MINE RESCUE STATION	05.04.2023
32	D96	BANSHRA	05.04.2023
33	D107	BOGULA	05.04.2023
34	D112	DEMUDI (DOMATANR)	04.04.2023
35	D115	TELMUCHU	04.04.2023

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES
(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - A10 , PHULWAR

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.26	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	0.79	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	39.5	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	0.6	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	40	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	55	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	216	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2- E. , Turbidimetric Method	92	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	44	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	39.05	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.4	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	<0.02	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES
(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - A13 , BHELATANR Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.16	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	1.15	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	35	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	4.2	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	78	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	44	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	174	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2- E. , Turbidimetric Method	135	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	133	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	13.53	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.77	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	1.15	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.02	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES
(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - A23(MACHHAYARA)

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.07	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	0.9	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	15.2	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	0.7	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	59	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	63	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	222	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2- E. , Turbidimetric Method	112	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	99	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	26	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.69	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	3.94	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.07	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	0.33	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - A29 , GOVINDPUR,AMBAGAN VILLAGE

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.02	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	1.15	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	45.5	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	3.6	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	71	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	79	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	120	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E , Turbidimetric Method	120	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	122	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	23.1	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.74	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.03	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

***All units in mg/L unless specified otherwise,*

***Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,*

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - A32 , MOONIDIH BAZAR

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	7.98	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	1.33	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	62.4	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	1.7	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	82	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	98	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	432	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E. , Turbidimetric Method	166	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	132	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	15.48	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.35	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	3.58	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.04	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	2.16	0.1	5	15

X

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - A4, DALDOLI

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	7.89	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	0.98	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	30.5	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	0.8	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	56	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	63	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	126	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E. , Turbidimetric Method	184	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	119	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	4.76	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.46	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	<0.02	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - A9, SRIRAMPUR

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.42	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	0.56	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	8.9	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	0.8	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	19	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	60	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	138	0	-	-
9	Sulphate, mg/l	APHA -23rd Edition, 4500-S 2-E. , Turbidimetric Method	185	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	88	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	5.64	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.45	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.02	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	0.38	0.1	5	15

X

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - B10, AMDIH NARAYANPUR

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.21	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	0.48	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	21	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	0.6	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	27	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	48	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	312	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2- E. , Turbidimetric Method	271	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	110	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	11.26	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.53	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	8.73	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.3	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

X

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - B15, BERA VILLAGE

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.04	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	1	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	47.8	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	1.7	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	26	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	95	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	360	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E , Turbidimetric Method	152	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	132	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	4.11	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.51	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.04	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES
(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - B19 , BHANDARIDIH

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	7.95	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	0.98	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	45.9	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	9.2	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	80	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	76	0	-	-
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	300	25	500	2000
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E , Turbidimetric Method	206	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	112	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	39.82	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.36	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.05	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

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**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES
(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - B23 , LOHAPATTI VILLAGE

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.27	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	0.96	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	65.1	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	1.5	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	48	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	60	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	402	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E , Turbidimetric Method	98	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	59	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	1	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.32	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	<0.02	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES
(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - B32 , MADHUBANDAH

Date of Sampling at Station : 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.19	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	1.2	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	60.8	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	1.7	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	57	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	103	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	312	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E. , Turbidimetric Method	85	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	73	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	2.44	0.5	45	No relaxation
012	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.24	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.02	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - B40 , BHUIANCHITRO

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.22	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	0.95	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	47.5	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	0.7	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	22	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	148	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	72	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E , Turbidimetric Method	198	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	145	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	24.4	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.19	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.02	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - B46 , TELO

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.04	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	0.55	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	27.6	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	0.5	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	24	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	60	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	240	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E. , Turbidimetric Method	110	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	84	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	20.67	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.37	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.02	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	0.15	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : -B55 , RANTANR VILLAGE

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	7.93	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	0.26	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	7.6	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	1	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	15	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	21	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	360	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E. , Turbidimetric Method	40	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	24	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	7.71	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.6	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	0.27	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	<0.02	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - B59, KHODOVALY VILLAGE

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.03	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	1.05	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	56.9	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	2.3	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	42	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	92	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	300	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2- E. , Turbidimetric Method	140	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	121	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	1.74	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.87	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.02	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	0.14	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

Ground Water Sampling at Monitoring Station Code : - B64 , KESHALPUR,BATIGHAR

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.62	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	1.1	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	38.4	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	5.2	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	94	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	134	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	120	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E , Turbidimetric Method	66	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	44	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	1.07	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.78	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.34	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	0.14	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - D107, BOGULA

Date of Sampling at Station: 05.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.32	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	1.7	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	73.6	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	13.7	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	63	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	190	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	288	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E , Turbidimetric Method	167	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	249	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	14.56	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.5	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	1.7	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - D112, DEMUDI(DOMATANR)

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	7.63	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	1.85	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	83.1	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	1.6	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	193	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	73	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	720	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E , Turbidimetric Method	156	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	132	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	37	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.94	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.02	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - D115 , TELMUCHU

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	7.96	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	0.9	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	38.5	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	0.8	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	70	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	37	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	240	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2- E. , Turbidimetric Method	203	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	205	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	41.39	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.58	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	<0.02	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - D14 , KARMATANR

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.02	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	1.35	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	64.6	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	1.4	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	58	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	161	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	180	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2- E. , Turbidimetric Method	190	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	180	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	42.14	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.95	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.04	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	0.13	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - D19, MEMKO MORE

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.15	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	0.44	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	19.7	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	1.3	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	10	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	40	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	156	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E , Turbidimetric Method	88	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	33	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	0.05	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	1.02	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.03	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - D2 , BIRSA MUNDA CHAWK, BANKMORE

Date of Sampling at Station: 05.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.07	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	0.66	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	36.5	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	0.5	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	58	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	45	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	960	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E. , Turbidimetric Method	192	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	330	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	19.97	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.56	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.02	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.2	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - D25 , GODHUR MORE

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	7.96	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	0.55	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	25.7	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	2.1	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	31	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	37	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	324	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E. , Turbidimetric Method	197	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	132	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	8.5	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.71	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	<0.02	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

1. Ground Water Sampling at Monitoring Station Code : - D30 , BORKIBOA VILLAGE

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	7.99	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	0.74	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	33.6	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	0.9	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	42	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	61	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	240	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E. , Turbidimetric Method	90	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	79	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	1	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.4	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.34	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	0.61	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

Ground Water Sampling at Monitoring Station Code : - D35 , PATHERDIH RAILWAY COLONY

1.

Date of Sampling at Station: 05.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	7.86	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	1.4	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	47.9	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	0.8	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	46	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	147	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	360	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E. , Turbidimetric Method	659	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	132	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	41.8	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.92	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.03	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES
(Wherever not specified, characteristics are expressed in mg/l, maximum)

Ground Water Sampling at Monitoring Station Code : - D4 , JHARIA THANA

1.

Date of Sampling at Station: 05.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.02	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	0.59	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	31	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	6	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	10	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	60	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	108	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E , Turbidimetric Method	56	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	44	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	7.51	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.54	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.02	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES
(Wherever not specified, characteristics are expressed in mg/l, maximum)

Ground Water Sampling at Monitoring Station Code : - D41 , JOYRAMPUR

1.

Date of Sampling at Station: 05.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.06	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	1.55	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	64.9	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	18.7	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	206	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	147	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	360	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E , Turbidimetric Method	156	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	132	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	1.16	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.51	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.03	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

Ground Water Sampling at Monitoring Station Code : - D49 , TISRA THANA

Date of Sampling at Station: 05.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.06	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	1.27	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	42.4	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	7.7	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	57	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	115	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	720	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E. , Turbidimetric Method	278	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	264	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	41.33	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.39	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.08	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	0.12	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

Ground Water Sampling at Monitoring Station Code : - D5, JIYALGORA (NEAR P.O.)

Date of Sampling at Station: 05.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.06	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	1.27	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	42.4	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	7.7	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	57	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	115	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	720	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E., Turbidimetric Method	278	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	264	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	41.33	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.39	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.08	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	0.12	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES
(Wherever not specified, characteristics are expressed in mg/l, maximum)

Ground Water Sampling at Monitoring Station Code : - D59, SITALPUR

Date of Sampling at Station: 05.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	7.91	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	1.2	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	75.4	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	2.6	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	48	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	52	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	150	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E. , Turbidimetric Method	120	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	106	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	0.17	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.55	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.06	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	0.13	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES
(Wherever not specified, characteristics are expressed in mg/l, maximum)

Ground Water Sampling at Monitoring Station Code : - D70JALADIH

Date of Sampling at Station: 05.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	7.93	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	0.65	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	32.6	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	1.1	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	26	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	89	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	240	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E , Turbidimetric Method	94	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	35	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	41.94	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.65	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.03	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

Ground Water Sampling at Monitoring Station Code : - D72, CHATI GOVINDPUR

Date of Sampling at Station: 04.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.11	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	1.6	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	98.7	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	1.1	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	99	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	66	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	210	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E. , Turbidimetric Method	171	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	99	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	10.37	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.78	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.02	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	0.11	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES

(Wherever not specified, characteristics are expressed in mg/l, maximum)

Ground Water Sampling at Monitoring Station Code : - D80 DHANSAR MINE RESCUE STATION

Date of Sampling at Station: 05.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.06	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	0.41	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	36.7	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	2.6	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	26	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	39	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	252	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E. , Turbidimetric Method	165	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	66	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	40.18	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.41	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.02	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	0.16	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER SAMPLES
(Wherever not specified, characteristics are expressed in mg/l, maximum)

Ground Water Sampling at Monitoring Station Code : - D96 BANSHRA

1.

Date of Sampling at Station: 05.04.2023

Sl. No.	Parameter	Method of Analysis	Observed Values	LDL	IS 10500: 2012	
					Acceptable Limit (Max)*	Permissible Limit in the Absence of Alternate Source (Max)
1	pH value	IS 3025, Part 11 : 1983 R 2017 Electrometric(pH Meter) Method	8.15	0.1	6.5-8.5	No relaxation
2	Electric Conductivity	IS 3025 (Part 14) -1984 R 2002	1.07	-	-	-
3	Sodium as Na	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	46.4	0.5	-	-
4	Potassium as K	IS : 3025, Part 45: 1993 R: 2003 Flame Photometer	2.3	0.5	-	-
5	Magnesium	APHA 24th Edition , 3500-Mg B: Calculation Method	42	6	30	100
6	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method	87	2	75	200
7	Carbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	0	0	-	-
8	Bicarbonate Alkalinity (CaCO ₃), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method	156	0	-	-
9	Sulphate, mg/l	APHA –23rd Edition, 4500-S 2-E , Turbidimetric Method	169	10	200	400
10	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method	101	5	250	1000
11	Nitrate , mg/l	APHA 24th Edition , UV-Spectrophotometric Method	1.11	0.5	45	No relaxation
12	Fluoride, mg/l	APHA, 23rd Edition, SPADNS Method	0.76	0.2	1	1.5
13	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method	<0.2	0.2	1	No relaxation
14	Manganese as Mn, mg/l, Max	IS 3025(Part 59) : 2006,R:2019, AAS-Flame Method	0.02	0.02	0.1	0.3
15	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th Edition AAS-VGA	<0.006	0.006	0.01	0.05
16	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA 24th Edition , AAS-GTA	<0.1	0.01	0.05	No relaxation
17	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method	<0.1	0.1	5	15

**All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

Abbreviations

Abn.: Abandoned

AMSL: Above mean sea level

Avg.: Average

APT: Aquifer Pumping Test

BCCL: Bharat Coking Coal Ltd.

bgl: Below Ground Level

Buffer zone: periphery of the 10 km radius from the project boundary

Core zone: Project / mine / colliery boundary (leasehold area)

CMPDI: Central Mine Plan & Design Institute

DVC: Damodar Valley Corporation

DTW: Depth to water level

GW: Groundwater

IMD: Indian Meteorological Division

JCF: Jharia Coalfield

RCF: Raniganj Coalfield

MADA: Mineral Area Development Authority

MCM: Million Cubic Meter

MGD: Million Gallon per day

NTU: Nephelometric Turbidity unit

OC / UG: Opencast / Underground

OCP / UGP: Opencast Project / Underground Project

RL: Reduced Level

RWH: Rainwater Harvesting

FF: Fire Fighting

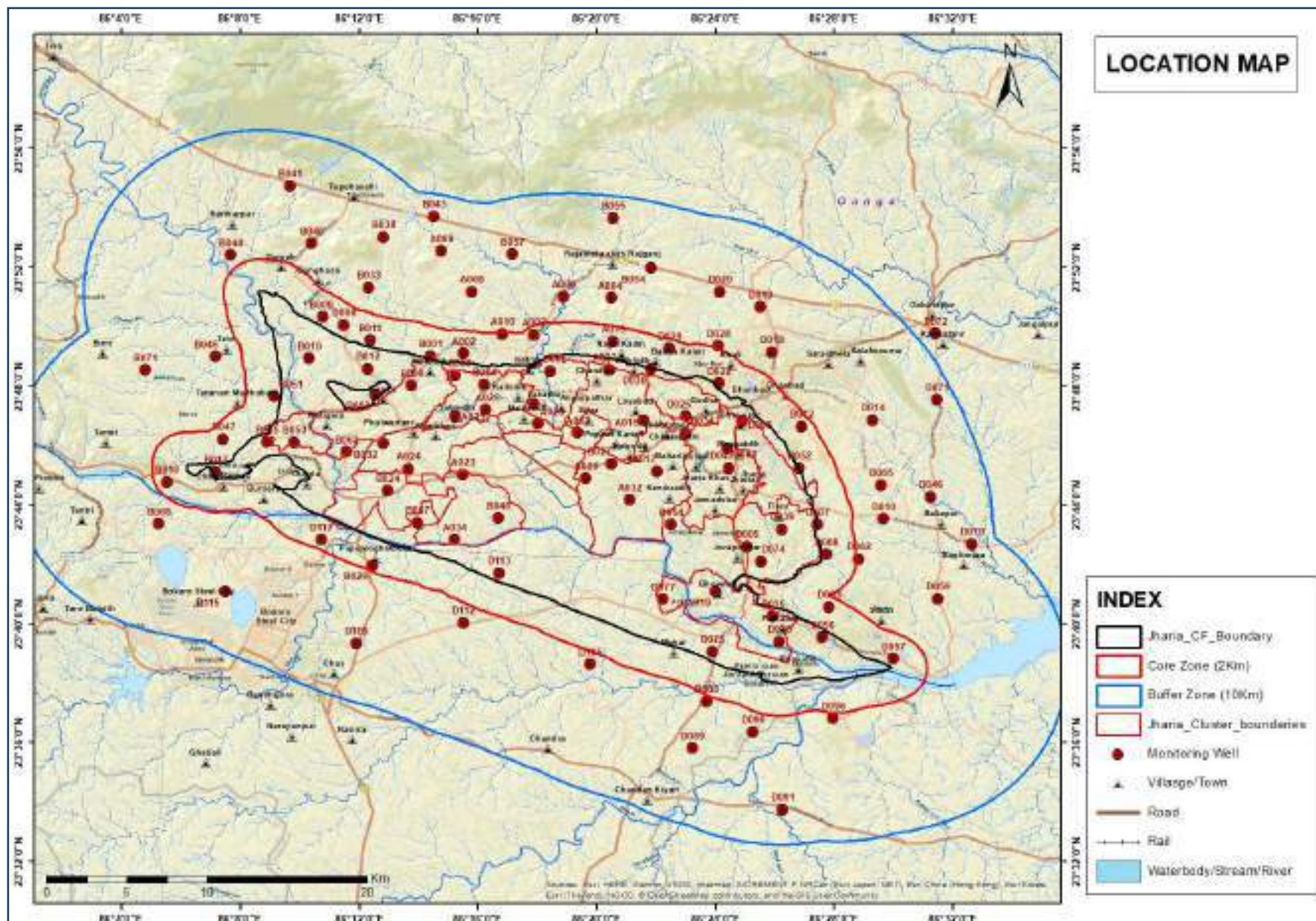


Plate- I: Location Map of Groundwater Level Monitoring stations (Dug wells)

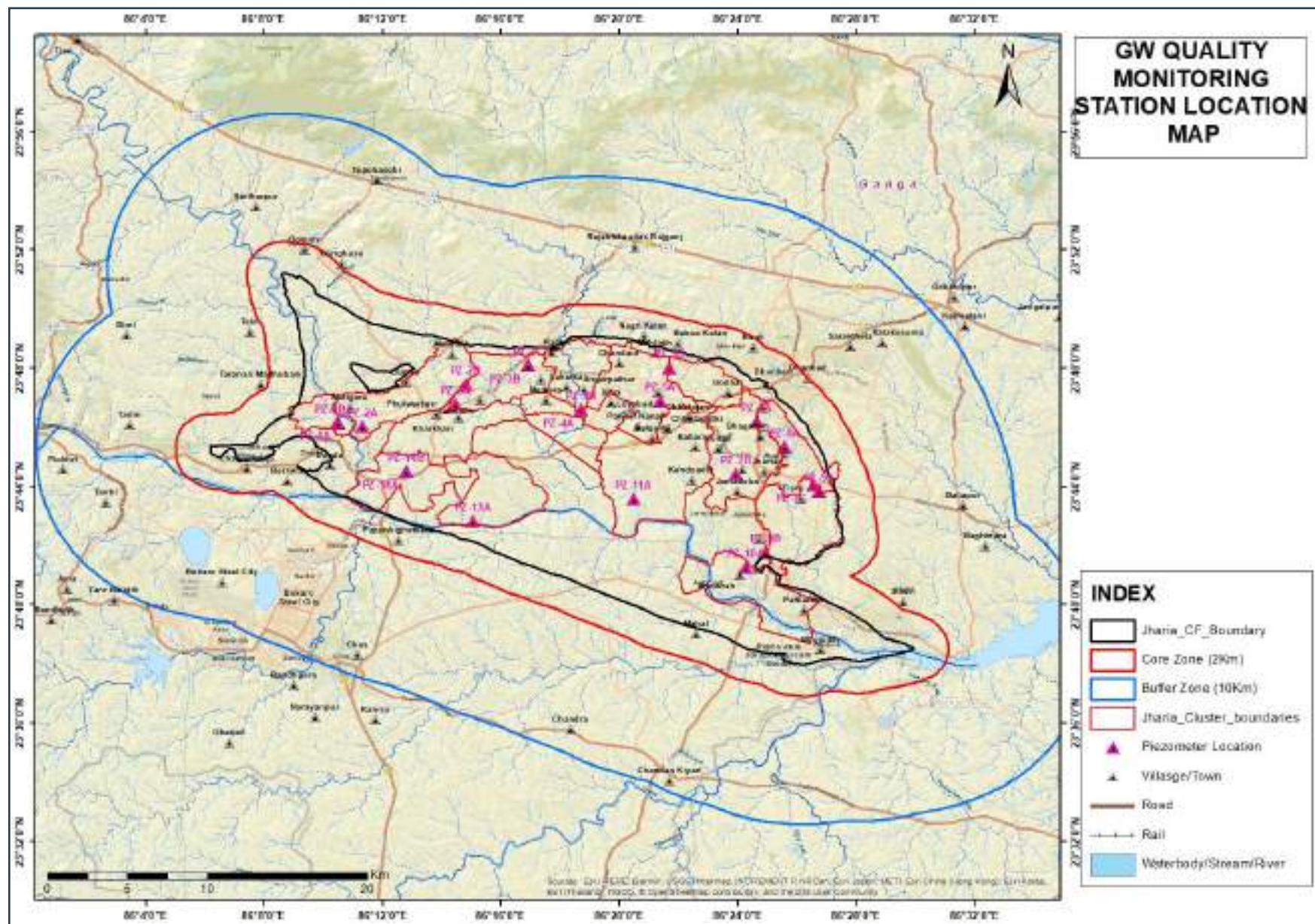


Plate- III: Location Map of Piezometers

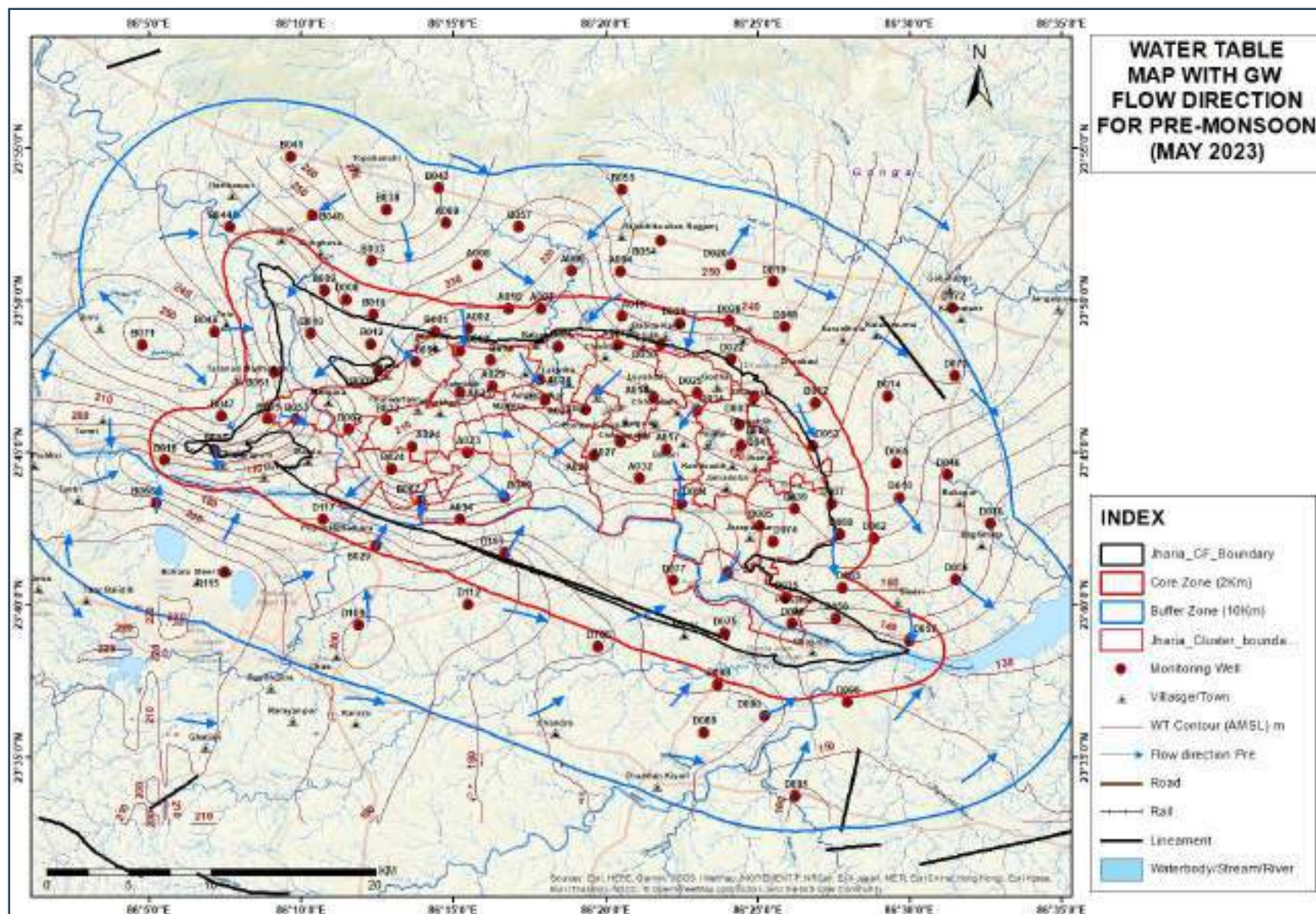


Plate- IVA: Water table Contour Map of JCF, Pre Monsoon (May'23)

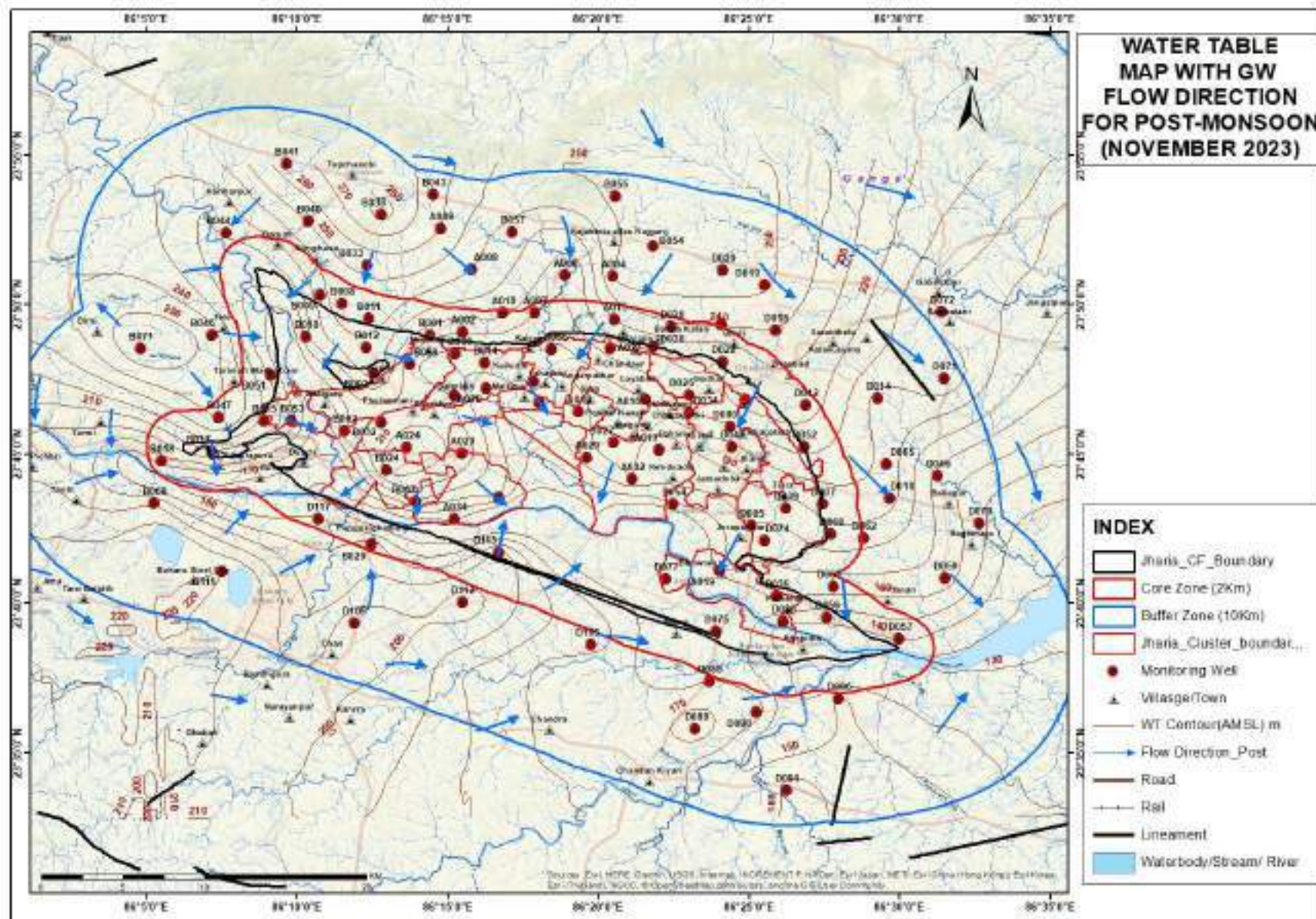


Plate- IVB: Water table Contour Map of JCF, Post Monsoon (Nov'23)





Plate- VB: Depth to Groundwater Level map of JCF, Post Monsoon (Nov'23)



CSR Booklet

Cluster-II

Bharat Coking Coal Limited

As per EC condition (Specific Condition : 27) The Details of transportation, CSR, R&R and implementation of environmental action plan for the clusters-II should be brought out in a booklet form within a year and regularly updated.

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1.0 INTRODUCTION

Coal India has adopted CSR as a strategic tool for sustainable growth. For Coal India in the present context, CSR means not only investment of funds for Social Activity but also Integration of Business processes with Social processes. Even much before the issue of CSR became global concern; Coal India was aware of its Corporate Social Responsibility and was fulfilling the aspiration of the Society through well-defined “Community Development Policy” within the periphery of 8 Kms. of the Project sites. This has resulted into a harmonious relationship between Coal India and the peripheral Communities. Coal India has identified land outsee, PAP and those staying within the radius of 25 Kms of the Project as primary beneficiaries. Poor and needy section of the society living in different parts of India is second beneficiaries. For carrying out CSR activities, 80% of the budgeted amount are be spent within the radius of 25 Km of the Project Site/Mines/Area HQ/Company HQ and 20% of the budget to be spent within the States in which operating.

2.0 SCOPE

As per Schedule VII of New Companies Act 2013 the following should be the Scope of Activities under Corporate Social Activities:

- 1) Eradicating hunger, poverty and malnutrition, promoting healthcare including preventive health care and sanitation and making available safe drinking water.
- 2) Promoting education, including special education and employment enhancing vocation skills especially among children, women, elderly, and differently able and livelihood enhancement projects.
- 3) Promoting gender equality, empowering women, setting up homes and hostels for women and orphans, setting up old age homes, day care centers and such other facilities for senior citizens and measures for reducing inequalities faced by socially and economically backward groups.
- 4) Ensuring environmental sustainability, ecological balance, protection of Flora and Fauna, animal welfare, agro-forestry, and conservation of natural resources and maintaining quality of soil, air and water.
- 5) Protection of national heritage, art and culture including restoration of buildings and sites of historical importance and works of art; setting up public libraries, promotion and development of traditional arts and handicrafts.
- 6) Measures for the benefit of armed forces veterans, war widows and their dependents
- 7) Training to promote rural sports, nationally recognized sports, Paralympics sports and Olympic Sports.
- 8) Contribution to the Prime Minister’s National Relief Fund or any other fund set up by the Central Government for socio-economic development and relief and welfare of the Scheduled Castes, the Scheduled Tribes, other backward classes, minorities and women.
- 9) Contributions or funds provided to technology incubators located within academic institutions which are approved by the Central Government.
- 10) Rural development projects.

3.0 SOURCE OF FUND

The fund for the CSR should be allocated based 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.

4.0 ACTION PLAN FOR CORPORATE SOCIAL RESPONSIBILITY

CSR activities are mainly taken at corporate level.

5.0 STATUS OF CSR ACTIVITIES

5.1 Details of CSR expenditure made at M/s BCCL Level:

FY	Expenditure (In Cr.)
2017-18	2.74
2018-19	6.52
2019-20	6.01
2020-21	6.12
2021-22	2.99
2022-23	11.42

5.2 Details of Civil work ,Medical Camps, CSR Clinics & Awareness Programme under taken at area level:

Civil work

Sl. No.	Details	Award value (In Lac)	Remarks
1	Construction of Community Hall under Harina Panchayat	5.25	Work processed on 26.03.2024
2	Water supply arrangement at Harsudih Basti	4.80	Work processed by 07.08.2023
3	Construction of PCC road at Gonduadih west under Mohanpur village (from Khalil Mahto home to Primary school).	3.98	25.01.2015 to 24.03.2015 (60 days)
4	Construction of Janaja shed at Ramakunda west under Amtand village	3.15	15.10.2014 to 14.12.2014 (60 days)
5	Construction of 1 no. chhathh ghat at Muraidih colony, Hirak road river side	3.01	15.10.2014 to 14.12.2014 (60 days)
6	Construction of Janaja shed at Muraidih colony near river of Hirak road	0.46	31.03.2014 to 29.04.2014 (30 days)
7	PCC Road jhunu Rajwar House to Tarkeswar Gope House at Bakaspura Village Luti Pahari (Jhunu Tarkeshwar) Road Length:-	2.30	This is benefiting to approx. 200 families in this locality by all-weather connectivity.
8	Making PCC Path from Manoj Matha House to Sahabuddin Ansari house at Ghunghusa Village (Mahato Shabbhuddin)	1.85	This is benefiting to approx. 300 families in this locality by all-weather connectivity
9	Steps for Ghat at sarbandh near hirak chowk under B-II Area	2.67	This will ease in performing rituals by local villages of Dumara ,harina & Bada pandeydih.

10	Cutting of earth from pond at Chaudhary bandh at Harina Basti, under B-II Area	19.22	This is benefiting to approx 5000 persons in this locality. This pond is used for multipurpose like irrigation, water for households drinking water for animals etc. it will also maintain the water level in locality.

9	Drinking Water pipe line works in hadi basti at Bhamkanali.	0.44	This is benefiting to approx. 150 families in this locality
10	Rep/Maint of Hand pump at Bara pandeydih (08 Nos).	0.26	This is benefiting to approx. 500 persons in this locality
11	Development work at rehabilitation site at Bhimkanali.	6.45	This is benefiting to approx. 500 persons in this locality
12	Construction of community hall at Bara Pandeydih Village Under Block-II Area	11.9	This is benefiting to approx. 1000 persons in this locality
13	Rep. Of Main road & Drain at Bakashpura rehabilitation site.	9.71	This is benefiting to approx. 1500 persons in this locality
14	Engagement of tankers for drinking water supply in nearby villages of B-II Area	1.9	This is benefiting to approx. 2000 families in Villages like Benidih Baghmara, Luttipahadi, Harina, Kessurgarh, Rathand, Nudkhurkee, Pinalgarhia, Mandra.
15	Engagement of departmental tankers for drinking water supply in nearby villages of B-II Area as on need basis.	-	This is benefiting to approx. 2000 families in Villages like Benidih Baghmara, Luttipahadi Kessurgarh, Madhuban Etc.

S.N.	Details	Award value (In Lac)	Remarks
1	Construction and maintenance for 5 years of toilets in Government schools in Gumla District under Swachh Vidyalaya Abhiyan. 125 toilets in 69 schools were constructed.	191.67	This is benefiting to approx. 7500 students
2	Construction and maintenance for 5 years of toilets in Government schools in Bokaro District under Swachh Vidyalaya Abhiyan. 179 toilets in 181 schools were constructed.	1702.98	This is benefiting to approx. 10000 students

Health: Medical Camps, CSR Clinics & Awareness Programme:

Medical Camps	Beneficiaries	Amount (in Rs.)
2014-15	5144	58095.75
2015-16	3397	38352.13
2016-17	595	30320.00
2018-19	789	30320.00
2019-20	310	-

CSR Clinic:

Year	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Total no patients	1660	1301	1895	1293	1305	810	910

SN	Health Awareness Programme	Amount (in Rs.)
1	Nasa Mukti Abhiyan	10000.00
2	Blood Pressure Detection	5000.00
4	Aids Awareness Programme	5000.00
5	Eye Checkup camp	25000.00

5.0 COVID Prevention related Activities (2020-21):

Type	No of beneficiaries	Hand wash	Mask
Hand wash and Mask Distribution	500	450	500
Blood sugar strips	124	NA	NA

6.0 COAL TRANSPORTATION PLAN: Cluster-II consists of mines of Block-II Area and Barora Area.

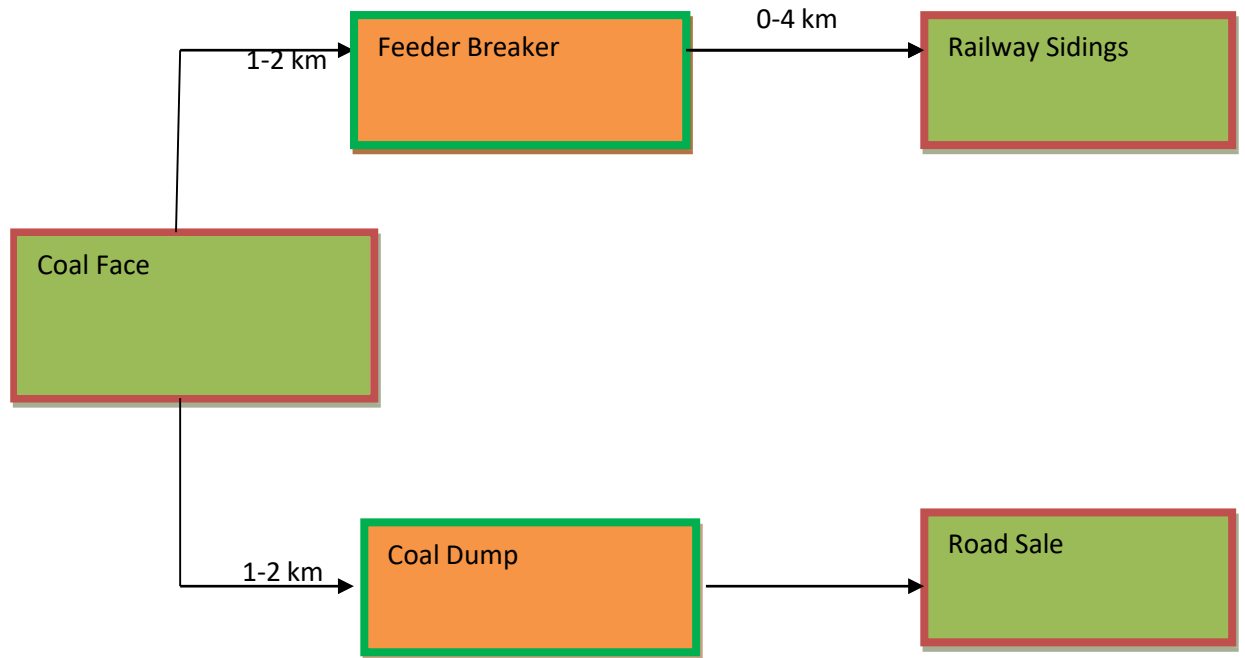


Fig: Coal transportation route

7.0 REHABILITATION AND RESETTLEMENT PLAN:

REHABILITATION AND RESETTLEMENT POLICY OF COAL INDIA LTD 2012.

Preamble

The location and quality of coal reserves, and their distance from major consumers determines to a great extent the selection of mine sites. For reserves that are close to the surface, opencast mining has proven to be the most efficient mining method. Opencast mines require relatively large areas of land. Population growth, particularly in India's eastern region, has made it increasingly difficult for the subsidiary coal companies to acquire the land they need for expanding their operations under the present Resettlement and Rehabilitation policy 2008 of Coal India.

The resettlement and rehabilitation policies followed by the subsidiary companies have evolved over time and undergone numerous changes in response to changing circumstances. As and when the Central or State Governments enact amendments to the Land Acquisition Act, issue new guidelines for resettlement and rehabilitation, as per its requirement Coal India reviews and modifies its resettlement and rehabilitation policy taking into account the changing conditions in coal producing areas.

In addition to compensation for land coal companies provide Rehabilitation and Resettlement (R&R) package for project affected persons to compensate for loss of livelihood. Apart from compensation for house site, house, trees, cow shed, cost of shifting etc., employment is also provided to land oustees. In addition to this, efforts are made to rehabilitate them by construction of houses, building roads, streets, schools, providing water etc. wherever feasible. However, demand for both more land compensation and better R&R package has been raised by project affected persons and has been highlighted in various Parliamentary Committees. Coal Companies often have to face representations and agitations by these land oustees who obstruct the smooth working of existing mines and come in the way of expansion of new projects.

In the past, subsidiaries found it relatively easy to acquire land, if they were able to offer employment. Partly because of this practice, subsidiaries have built up a largely unskilled labour force beyond their needs. This has contributed to the heavy losses and many mines are incurring and has also affected their efficiency and viability. The subsidiaries may still need to hire people in selected locations and continue to give preference to those whose livelihood will be affected by coal mining operations. However, increasingly subsidiaries will need to develop other ways and means to compensate land owners and others adversely affected by their projects and give them the option to choose which method of compensation best suits their needs. Greater emphasis will also need to be given to community requirements like schools, hospitals etc. Only proper resettlement and rehabilitation will elicit the required cooperation of project affected people, and make it possible for Coal India to acquire the land it needs to fulfill the ever increasing demand of coal for the economic development of the Country.

The purpose of the Resettlement and Rehabilitation Policy 2012 is to revise and provide greater flexibility to the basic principles for the resettlement and rehabilitation of people affected by coal mining projects i.e. Project Affect People (PAPs). It attempts to consolidate the different resettlement and rehabilitation practices that are being followed by subsidiaries as per the different State land Acquisition Acts and various decisions of the Coal India Board and to modify the Policy of 2008 so as to give the Board of the subsidiary Companies greater flexibility to deal more effectively with resettlement and rehabilitation issues and determine the rehabilitation packages best suited to local needs in line with this policy. The provisions of the National Rehabilitation and Resettlement Policy, 2007 and the Land Acquisition, Rehabilitation & Resettlement Bill, 2011 have also been kept in mind while framing the policy.

While Coal India's basic philosophy for compensating land-losers and other project-affected people remains substantially unchanged, the revised policy emphasizes the need to cultivate and maintain good relationships with the people affected by Coal India's projects starting as early as possible; it also underscores that the subsidiaries have a responsibility towards the land oustees whose livelihood is often taken away. On the other hand, subsidiaries need to protect themselves more effectively against unjustified claims, redundant manpower and swelling Wage Bills. To this end, the statement proposes that subsidiaries prepare detailed resettlement and rehabilitation action plans (RAPs) that clearly identify, at an early stage, the entitlements of the people affected by coal projects and enables them to exercise a choice between various options. The concept of Annuity in lieu of compensation/employment is also being introduced to mitigate, if not eliminate the ever dependence of Project Affected Families (PAFs) on CIL for provision of employment.

(1) The revised Resettlement & Rehabilitation Policy, 2012 is based on the deliberations of the inter Ministerial Committee set up vide O.M. 490191/2011-PR/W-I dated 01-07-2011 of Ministry of Coal, deliberations of the CMDs meet held on 05/03/2012 at New Delhi and has been approved by the CIL Board in its 278th meeting held on 12th and 13th March, 2012.

(2) Objectives and general principles of Coal India's Resettlement and Rehabilitation Policy- 2012

- A. To re-visit CIL's existing R&R policy 2008 and evolve a PAP friendly policy by incorporating such provisions of the National Policy and The Draft Land Acquisition, Rehabilitation and Resettlement Bill-2011 as considered suitable in light of the growing difficulties many subsidiaries face in land acquisition.
- B. To accord the highest priority for avoiding or minimizing disturbance of the local population while taking decisions to open new mines or expand existing ones too (exploring alternative sites and project designs) and to ensure that wherever people are likely to be adversely affected by a project, the subsidiaries will prepare resettlement and rehabilitation action plans for the project.
- C. To ensure a humane, participatory, informed consultative and transparent process for land acquisition for coal mining and allied activities with the least disturbance to the owners of the land and other affected families.
- D. To provide just and fair compensation to the affected families whose land has been acquired or proposed to be acquired or are affected by such acquisition and make

adequate provisions for loss of livelihood of such affected persons including their rehabilitation and resettlement.

- E. To ensure that the cumulative outcome of compulsory acquisition should be that the affected persons become partners in development leading to an improvement in their post acquisition social and economic status and matters connected therewith or incidental thereto.
- F. Through the preparation of resettlement and rehabilitation action plans, subsidiaries will safeguard that project-affected people improve or at least regain their former standard of living and earning capacity after a reasonable transition period. The transition period is to be kept to a minimum. However, the involvement of subsidiaries in resettlement and rehabilitation activities may continue until all the actions specified in the rehabilitation plan have been completed.
- G. Involuntary resettlement is conceived and executed as a development programme with project-affected people being provided sufficient resources and opportunities to share in a project's benefits. The efforts of subsidiaries are complementary to the Government's schemes in rural development and the concurrence, approvals and support from concerned Government authorities will be sought.
- H. In parallel, subsidiaries will work closely with non-governmental organizations of proven repute which are legally constituted and recognized and also have the confidence of the project-affected people, in the preparation and implementation of rehabilitation plans.
- I. Corporate Social Responsibility (CSR) : Activities shall be intensified in and around the villages where land is being acquired in accordance with the CSR Policy of Coal India.
- J. Actual implementation of R&R package must follow a detailed survey of the project-affected villages to formulate the list of persons/families affected by the project, nature of the affect, the likely loss of income, etc. For this purpose, if necessary, the services of a reputed NGO with an impressive record of integrity and performance may be engaged.

3. SCOPE:

This Policy may be called "Rehabilitation and Resettlement Policy of Coal India Limited-2012". It extends to the Coal India Limited and its subsidiary companies in India. It shall come into force from the date of its approval by the CIL Board and is applicable to all cases in which land is taken after the date of approval by the CIL Board. While implementing the policy it is to be ensured that the provisions of the concerned Acts applicable and Rules mentioned there under shall not be violated .

4. Definitions

(a) **"affected family"** means:

- (i) a family whose primary place of residence or other property or source of livelihood is adversely affected by the acquisition of land (including direct negotiation) for a project or involuntary displacement for any other reason; or

- (ii) any tenure holder, tenant, lessee or owner of other property, who on account of acquisition of land (including plot in the abadi or other property) in the affected area or other wise, has been involuntarily displaced from such land or other property; or
 - (iii) any agricultural or non-agricultural labourer, landless person (not having homestead land, agricultural land, or either homestead or agricultural land), rural artisan, small trader or self-employed person, who has been residing or engaged in any trade, business, occupation or vocation continuously for a period of not less than three years preceding the date of declaration of the affected area, and who has been deprived of earning his livelihood or alienated wholly or substantially from the main source of his trade, business, occupation or vocation because of the acquisition of land in the affected area or being involuntarily displaced for any other reason.
- (b) **'family'** includes a person, his/her spouse, son including minor sons, dependant daughters, minor brothers, unmarried sisters, father, mother residing with him or her and dependent on him/her for their livelihood; and includes **"nuclear family"** consisting of a person, his/her spouse and minor children. Provided that where there are no male dependants, the benefit due to a land loser may devolve on dependent daughter nominated by the land loser.
- (c) **"land owner"** includes any person—
- (i) whose name is recorded as the owner of the land or part thereof, in the records of the concerned authority; or
 - (ii) who is entitled to be granted Patta rights on the land under any law of the State including assigned lands; or
 - (iii) who has been declared as such by an order of the court or District Collector;
- (d) **Displaced person** - means and includes any person who is deprived of his homestead on account of acquisition. Provided that the person/family who does not ordinarily reside in the homestead land acquired for the project can be termed "Displaced" but he will be eligible for compensation only for homestead and not for livelihood.
- (e) **Ordinarily resides** shall mean residing in the homestead / acquired land for a period more than 6 months every year for at least the preceding 5 years.

5. Socio-economic Survey and preparation of RAP.

A baseline socioeconomic survey will be carried out to identify the PAPs who are enlisted to receive benefits in line with Coal India's Resettlement and Rehabilitation Policy. This survey will be conducted within two months of notification under the relevant land acquisition Acts by the subsidiaries with the help of reputed independent institutional agencies, who are well versed with the social matrix of the area.

The basic objective of the socio-economic study will be to generate baseline data on the social and economic status of the population who are likely to lose their means of livelihood or homestead due to the acquisition of the land for the project. The data base will be used to formulate a viable and practical Rehabilitation Action Plan (RAP) for the affected persons in line with their entitlements. Digital Satellite Maps would also be prepared of the project Area freezing the dwelling units and habitations existing at the time of negotiation for Land Acquisition wherever feasible. The RAP will also address the following-

(A) Implementation, Monitoring and Evaluation, Dispute Mechanism

The rehabilitation action plan will address the following:

- (i) The project design, including an analysis of alternative designs aimed at avoiding or minimizing resettlement;
- (ii) Socio-economic survey and activities to ensure restoration of incomes of PAPs in line with Coal India's Resettlement and Rehabilitation Policy;
- (iii) Description of the institutional and other mechanisms for provision of entitlements;
- (iv) Time table for the acquisition and preparation of the resettlement site(s);
- (v) The cost and budgets for the resettlement and rehabilitation of PAFs;
- (vi) Project-specific arrangements to deal with grievances of PAFs; and
- (vii) Time tables, benchmarks and arrangements for monitoring the resettlement and rehabilitation effort.

The RAP will be formulated in consultation with PAPs and State government.

(B). Environment Impact Assessment (EIA) will be conducted as per any law, rule and regulation of the locality in which the land has been acquired.

6. Eligibility Criteria -

(A) Eligibility Criteria for Economic Rehabilitation Benefits

This benefit shall accrue only to Entitled Project Affected Person. Entitled Project Affected Person shall be one from the following categories.

- (i) Persons from whom land is acquired including tribals cultivating land under traditional rights
- (ii) Persons whose homestead is acquired.
- (iii) Sharecroppers, land lessees, tenants & day labourers.
- (iv) Tribal dependent on forest produce as certified by the District Forest Officer/Revenue Authorities.

(B) Eligibility Criteria for Resettlement Benefits

1. Only a 'Displaced' family / person shall be eligible for resettlement benefits.
2. A family/person shall be termed 'displaced' and hence eligible for resettlement benefits if such family/person has been a permanent resident and ordinarily residing in the project area on the date of publication of notification U/S 9 of CBA(A&D) 1957 / U/S 11 of LA Act, 1894/ Or both/ on the date of the land vested with the State/ Central government as the case may be.

and

 - (a) on account of acquisition of his/her homestead land / structure is displaced from such areas

or

 - (b) He/she is a homesteadless or landless family/person who has been/is required to be displaced.

7. Census & Identification of displaced families:

1. Within two months of publication of notice U/S 4(1) of the Land Acquisition Act or U/S 7(1) of CBA (A.D) Act 1957 for acquisition of land for the project a census would be undertaken in the manner to be decided by the Collector / project authority for identification of displaced families and for preparing their socio-economic profile and list of eligible persons for the purpose of receiving Rehabilitation & Resettlement Benefits.

2. A photo identity card to each Entitled Project Affected Person shall be issued under the signature of the Collector / project authority concerned indicating the following particulars:

- (a) Name of the village/GP/PS :
- (b) Name, Father's name and address of the head of the family :
- (c) Category of entitlement :
- (d) Whether S.C./S.T./O.B.C./General :
- (e) Age, Sex, educational qualification of the members of the family :

8. Types of Compensation and Rehabilitation Entitlement

Option to the land losers regarding Rehabilitation & Resettlement Benefit - The land losers shall have the option for Rehabilitation and Resettlement benefits in accordance with the awards for each affected family in terms of the entitlements passed by the Concerned Collector of the State or as per this Policy with the consent of the concerned Collector.

8.1 Eligibility and Compensation

The table below shows the compensation and rehabilitation benefits will be offered by the subsidiaries for each Project Affected Person or family, affected by one of their projects. Evidence to the effect that a person is a legitimate PAP will need to be provided in the form of a written legal document, or reference to a record, such as a revenue officer certificate, electoral roll, ration card or school record.

Category of Persons affected by the Project	Compensation and Rehabilitation entitlement option
	Provisions
(i) Persons (including tribals cultivating land under traditional rights) from whom land is acquired.	All land owners with titles will receive monetary compensation for the land acquired from them. The value of the land is determined on the basis of prevailing legal norms. <i>In respect of tribals cultivating land under traditional rights, authentication of land held under traditional rights by state authorities will be necessary.</i> In addition to above the following shall apply.

Category of Persons affected by the Project	Compensation and Rehabilitation entitlement option
	Provisions
	A). Land Compensation - Land compensation shall be paid as per the provisions of the concerned Act or State Govt. notification. Where no notification of the State Govt. is available the concerned subsidiary Board may decide on the rate of compensation keeping in view the compensation provided by the neighboring states. Authentication of land held under traditional rights by state authorities will be necessary. In addition to above Solatium will be paid as per provisions of the concerned Act / as imposed by the Concerned State Govt. Escalation of land compensation – Escalation will be paid as per provisions of the concerned Act / as imposed by the Concerned State Govt. or Escalation at the rate of 12% per annum for a maximum period of three years. (B): Employment provision: Apart from payment of the land compensation, employment may be given in the following manner – 1) The maximum total number of employments that may be provided to the land losers would be limited to the total no. of acres of land acquired divided by two. However employments will be released in proportion to the land possessed. 2) For every two acres of land one employment can be considered; 3) Subsidiaries of CIL may give an option to the Land losers having less than two acres of land to club together their land to the extent of two acres and nominate one of the land losers among the groups or their dependent for employment under package deal or employment under Descending order system by preparing the list of eligible land owners in the descending order of land lost subject to the cut off equivalent to the total number of permissible employments or any other method with the approval of the respective Board of the subsidiary. 4) The land loser must be a domiciled resident/Mool Niwasi and the certificate to this effect shall be issued by the concerned State Authority 5) The modalities for offering employment shall be such as may be approved by the Board of the Subsidiary companies as per the unique conditions of the subsidiary provided that - a) The initial employment shall be given with pay of Category-I pay scale of NCWA, with training period of 6 months. b) In the seniority list, the seniority of the appointee should be reflected in appropriate manner in order to keep the senior most as senior. c) The land loser trainees shall be posted as per requirement, including underground duties.

Category of Persons affected by the Project	Compensation and Rehabilitation entitlement option
	Provisions
	(C): Lumpsum Monetary Compensation – 1. All the land losers who are not eligible for employment as above shall be entitled to receive monetary compensation in lieu of employment at the rate of Rs.5,00,000/- (Five Lakhs) for each acre of land on pro-rata basis. 2. Land losers who are offered employment as per principle specified in point No (8.(i)B) above will have the option either to opt for employment or to forego employment and opt for monetary compensation at the rate of Rs.5,00,000/- (Five lakhs) for each acre of land on pro-rata basis with minimum of Rs. 50,000 (Fifty thousands) provided that the employment thus surrendered shall not be available for offer to any other person and will stand lapsed from the total sanctioned number of employments as specified in point No.(8.(i)B1). 3. The Land losers who have clubbed their land in Package Deal can claim employment for only one land loser of the clubbed two acres of land and remaining land losers of the package cannot claim either employment or lump sum monetary compensation in lieu of the land contributed by them. 4. Annuity – All land losers who are entitled to get lump sum monetary compensation may opt for payment of compensation amount in the form of annuity made payable to the land losers monthly, annually or at such intervals (not less than one year) as may be opted for by him. The annuity be paid for a maximum period extending to 60 years of age or the life of the project for which the land has been acquired, whichever is earlier. Note: A person receiving a job forgoes all claims to above compensation and a person receiving above compensation forgoes all claims to employment.
(ii) Person whose homestead is acquired	I. Compensation for homestead shall be paid as per the standard valuation method of the L.A Act, of the concerned State Govt. II. One time lump sum payment of Rs.3,00,000/- (three lakhs),shall be paid in lieu of alternate House site, Assistance in designing Shifting Allowance,compensation for construction of cattle shed , Monetary compensation for construction of work shed etc.The compensation shall be paid to displaced persons only after vacation and demolition of the homestead/ work shed etc. III. Subsistence allowance :Each affected displaced family will get subsistence allowance at the rate of 25 days (Minimum Agricultural Wage) per month for one year.

Category of Persons affected by the Project	Compensation and Rehabilitation entitlement option
	Provisions
(iii) Sharecroppers, land lessees, tenants and day labourers	The subsidiary will assist PAP to take-up non farm self employment through petty contracts or formation of cooperatives. If such co-operatives will not be entitled for awarding work as per Manual for lack of experience, the said co-operative will be facilitated by awarding small jobs to acquire experience after relaxation of the provisions of the Manual pertaining to experience with approval of the Subsidiary Boards. Subsequent jobs may be awarded after getting report of the timely completion / quality / of the awarded jobs from the concerned Department or contractors. Contractors will also be persuaded to give job to eligible PAPs on a preferential basis, where feasible as per terms of contract.
(iv) Landless tribals, Tribal dependant on forest produce	The subsidiary will assist PAP to establish non farm self employment through the provision of infrastructure, petty contracts or formation of cooperatives and encourage provisions of Jobs with contractors. Contractors will be persuaded to give jobs to eligible PAPs on preferential basis, where feasible. - In addition, the subsidiaries will shift the tribal community as a unit and provide facilities to meet the specific needs of the tribal community that will allow them to maintain their unique cultural identity. - Tribal affected family will be given one time financial assistance of 500 days of MAW for loss of customary right or usages of forest produce. Loss of customary rights needs to be authenticated by the district authority. - Tribal affected families resettled out of the district shall be given 25% higher rehabilitation and resettlement benefit.

9. Resettlement & Rehabilitation Committee - A Committee will be constituted at project Level under the chairmanship of the Collector to be called the Rehabilitation and Resettlement Committee with the following objectives to monitor and review the progress of implementation of the Rehabilitation and Resettlement scheme and to carry out post-implementation social audits in consultation with the village panchayat in rural areas and municipality in urban areas in the manner will be decided by the concerned State Govt.

- I. To approve the list of land losers and other PAPs;
- II. To approve the list of persons eligible to be offered employment as per R&R Policy;
- III. To approve the detailed Rehabilitation Plan for the project in consultation with the displaced persons and Gram Sabhas;
- IV. To expedite issue of domicile certificates and other necessary documentation required for State Authorities;
- V. To monitor and review the progress of the Rehabilitation Scheme, grant of benefits and handing over of possession of land in a smooth manner;
- VI. To facilitate the land acquisition process in any other manner as may be required including resolution of disputes;
- VII. To carry out post implementation social audit in consultation with the authorities.

10. Community facilities - The subsidiary will provide at the resettlement site a school, road with street light, pucca drain, pond, dugwell and/or tubewell for drinking water supply, community center, place of worship, dispensary, grazing land for cattle and play ground. Similar infrastructural facility, if necessary, will be extended to the host locality. The community facilities and services would be available to all residents of the area, including PAPs and the host population.

The approach for operation of community facilities would be flexible and all efforts will be made to involve the State and local self Government / Panchayat for operating the facilities. To achieve this, subsidiaries will pursue with these agencies to ensure the same. The planning of the community facilities and their construction should be undertaken in consultation with the affected community.

11. Corporate Social Responsibilities - This should be as per Company's Corporate Social Responsibility (CSR) Policy.

12. Monitoring and Evaluation Mechanism.

The RAP will be monitored and evaluated periodically after the completion of the land acquisition process.

- I. The resettlement and rehabilitation activities are the responsibility of a separate group, both at the projects and corporate level, which will be constituted for planning, implementation, monitoring and evaluation of the Rehabilitation Action Plan. At the corporate level the group will be headed by a senior manager, whereas at the project, an executive of the rank of manager will head the group. The project group should have at least one member with social science qualification / experience and skills.

- II. The project group will closely interact with the state authorities during the implementation of the RAP. Although the subsidiaries will develop the plots and infrastructural facilities in the resettlement colony and actively implement the RAP, assistance of State authorities will be taken for administrative services such as allotment of land. Implementation will be planned, monitored and corrective measures will be incorporated in the RAP, if needed. In addition to the State Government, the PAPs, the village leaders including the Pradhans and NGOs will be consulted and associated with the implementation of the RAP.
- III. The Resettlement and Rehabilitation Cell at the corporate level will evaluate the implementation of the RAP after its completion.

13. Flexibility to the Subsidiary Companies – The Subsidiary Companies Boards have been authorised to approve necessary modifications in the R&R Policy with reference to unique conditions prevailing at the concerned Subsidiaries as the policy is not exhaustive.

(The above list is only indicative and not exhaustive)

- II -

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**ENVIRONMENTAL MONITORING REPORT
OF
BHARAT COKING COAL LIMITED,
CLUSTER – II**

(FOR THE MONTH MARCH, 2024)

E. C. no. J-11015/35/2011-IA.II (M) dated 06.02.2013.



CMPDI

ISO 9001 Company
Regional Institute-II
Dhanbad, Jharkhand

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EXECUTIVE SUMMARY

1.0 Introduction

The purpose of environmental monitoring is to assess the quality of various attributes that affects the fauna and flora. In accordance with the quality of these attributes appropriate strategy is to be developed to control the pollution level within the permissible limits. The three major attributes are air, water and noise level.

Bharat Coking Coal Limited (BCCL), a Subsidiary company of Coal India Limited is operating Underground and Opencast Mines in Jharia Coalfield (JCF) is a part of Gondwana Coalfields located in Dhanbad district of Jharkhand, the JCF is bounded by 23°37' N to 23°52' N latitudes and 86°09' E to 86°30' E longitude occupying an area of 450 Sq.km. BCCL has awarded Environmental monitoring work of Jharia Coalfield (JCF) to Central Mine Planning & Design Institute Limited (CMPDIL). The environmental monitoring has been carried out as per the conditions laid down by the MoEF&CC while granting environmental clearance of project, consent letter issued by the respective SPCB, and other statutory requirements.

2.0 Sampling location and rationale

2.1 Ambient air sampling locations

The ambient air quality monitoring stations were selected to represent core, buffer zone area. The rationale has been based on the guidelines stipulated by MoEF&CC, consent letter of SPCB, as well as other statutory requirements.

2.2 Water sampling stations

The Water sampling stations were selected for mine sump water.

2.3 Noise level monitoring locations

Noise levels vary depending on the various activities in mining areas. The monitoring of noise level in different locations will be helpful to take appropriate mitigating measures. The rationale has been based on the guidelines stipulated by MoEF&CC, consent letter of SPCB, as well as other statutory requirements.

3.0 Methodology of sampling and analysis

3.1 Ambient air quality

Parameters chosen for assessment of ambient air quality were Particulate Matter (PM₁₀), Fine Particulate Matter (PM_{2.5}), Sulphur Di-oxide (SO₂) and Nitrogen Oxides (NO_x). Respirable Dust Samplers (RDS) and Fine Dust

Sampler (PM_{2.5} sampler) were used for sampling of PM₁₀, SO₂, & NO_x and Fine Dust Sampler (PM_{2.5} sampler) were used for sampling of PM_{2.5} at 24 hours interval once in a fortnight and the same for the gaseous pollutants. The samples were analysed in Environmental Laboratory of CMPDI, RI-II, Dhanbad.

3.2 Water quality

Water samples were collected as per standard practice. The Mine effluent samples were collected and analysed for four parameters on fortnightly basis. Thereafter the samples were preserved and analysed at the Environmental Laboratory of CMPDI, RI- II, Dhanbad.

3.3 Noise level monitoring

Noise level measurements in form of 'L_{EQ}' were taken using Integrated Data Logging Sound Level Meter. Noise levels were measured in Decibels, 'A' weighted average, i.e. dB(A).

4.0 Results and interpretations

4.1 Air quality

It has been seen from the analysis results that the 24 hours average concentration parameters like PM₁₀, PM_{2.5}, SO₂ and NO_x are mostly within the permissible limits in all sampling locations as per MoEF&CC Gazette Notification No. GSR 742(E) dt 25.09.2000 Standards for Coal Mines and National Ambient Air Quality Standard -2009. Sometimes the concentration of PM₁₀& PM_{2.5} exceeds the limits due to heavy public traffic, poor road condition, coke oven plants, burning of coal by surrounding habitants, brick making, municipal waste dumps and industries like Steel Plant, thermal Plants including their fly ash etc.

The following preventive and suppressive mitigative measures can be undertaken to contain the pollution level within prescribed level:-

- Wet drilling and controlled blasting should be practice.
- Explosive used should be optimised to restrict the dust generation.
- Transportation roads should be permanently asphalted free of ruts, potholes etc.
- Water should be sprayed on coal transportation road, service road more frequently and at regular interval.
- Dust from roads should be removed physically or mechanically.
- Greenbelts around industrial sites, service building area besides Avenue plantation along roads should be created.
- Coal dust should be suppressed by using fixed sprinklers.
- Regular maintenance of plant and machinery should be undertaken.

4.2 Water quality

The test results indicate that the major parameters compared with MoEF&CC Gazette Notification No. GSR 742(E) dt 25.09.2000 are within permissible limits.

4.3 Noise Level

During the noise level survey it has been observed that the noise level in the sampling locations is within the permissible limits prescribed as per MoEF&CC Gazette Notification No. GSR 742(E) dt 25.09.2000 Standards for Coal Mines for Industrial Area and Noise pollution (Regulation and Control) Rules, 2000.

INTRODUCTION

- 1.0 Any industry and development activities including coal mining is bound to affect environmental attributes. There are positive as well as negative impacts of such operations. For controlling the adverse impacts a regular monitoring is essential. The environmental monitoring is being done as per the guide-lines stipulated by Ministry of Environment, Forest and Climate Change (MoEF&CC), Govt. of India.

The very purpose of environmental monitoring is to assess the quality of various attributes which affects the environment. As per quality of these attributes appropriate strategy is to be developed to control the pollution level within the permissible limits. The three major attributes are air, water and noise level.

Bharat Coking Coal has awarded Environmental Monitoring work of all Projects, Cluster wise, to Central Mine Planning & Design Institute Limited (CMPDIL). The environmental monitoring has been carried out as per conditions laid down by MoEF&CC while granting environmental clearance to different projects. CMPDI has trained manpower and well equipped laboratory to carry out monitoring, analysis and R&D work in the field of environment.

- 1.1 The Cluster II is in the westernmost part of the Jharia coalfield. The Cluster – II is situated at a distance of about 40 - 45 kms from Dhanbad Railway Station. The mines of this cluster are operating since pre nationalization period (prior to 1972-73). It is connected by both Railway and Road. The drainage of the area is governed by Khudia Nala.
- 1.2 The Cluster II is designed to produce 0.9 MTPA (normative) and 1.17 MTPA peak capacity of coal. The average grade of coal W-II to W-IV.

The Project is being worked by deploying shovel dumper combination.

The Project has been granted Environmental Clearance from Ministry of Environment, Forest and Climate Change (MoEF&CC) for a rated capacity of 0.9 MTPA (normative) and 1.17 MTPA peak capacity of coal production vide letter no **E. C. no. J-11015/35/2011-IA.II (M) dated 06.02.2013.**

Ministry of Environment, Forest and Climate Change while granting environmental clearance has given one of the General conditions that “ Four ambient air quality monitoring stations should be established in the core zone as well as in the buffer zone for PM₁₀, PM_{2.5}, SO₂, NO_x monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets, other conditions regarding water / effluent and noise level monitoring in consultation with the State Pollution Control Board.”

In compliance of these conditions the Environmental Monitoring has been carried out & report prepared for submission to MoEF&CC & JSPCB and other statutory authorities.

AMBIENT AIR QUALITY MONITORING

2.1 Location of sampling station and their rationale:

(As per G.S.R. 742 (E) dt. 25th December, 2000)

2.1.1 Ambient Air Quality Sampling Locations

I. CORE ZONE Monitoring Location

i) Block II OCP (A4): Industrial Area

The location of the sampling station is 23°47'2.00"N & 86°11'15.00"E. The sampler was placed at an elevated platform of approx. height 1.5m above ground level near water treatment plant of Block II OCP.

ii) Muraidih OCP (A5): Industrial Area

The sampler was placed at a height of 1.5 m from the ground level at Muraidih project office.

II. BUFFER ZONE Monitoring Location

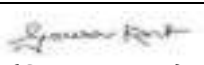
i) Madhuband Washery (A3) : Industrial area

The location of the sampling station is at 23°47'24.01"N & 86°11'32.00"E in the Washery premises. The sampler was placed at a height of approx. 1.5m above ground level.

ii) Madhuband UGP (A33) : Industrial area

The location of the sampling station is at 23°46'5.60"N & 86°12'27.50"E at the Project office. The sampler was placed at a height of approx. 1.5m above ground level near the project office.

AMBIENT AIR QUALITY DATA

 <b style="color: red;">CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED <b style="color: green;">Environment Laboratory, Regional Institute-II <b style="color: red;">Ambient Air Quality Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in											
Test Report for Ambient Air Samples											
Month & Year		03/2024		Cluster		Cluster II		ULR No.		TC1012224000000632F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue		14.05.2024	
Project		Block II OCP		Sample Ref. No.		REM/BCCL/2024/03		Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		06.03.2024		20.03.2024		Period of Analysis		06.03.2024		15.04.2024	
Zone of Station:		Core Zone									
Sl. No.	Parameter	Method Analysis	of	Observed Values (in $\mu\text{g}/\text{m}^3$)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009		
				1st FN	2nd FN						
1	PM ₁₀	IS -5182(Part 23):2006, R-2017		118	83	10 $\mu\text{g}/\text{m}^3$ - 1000 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	300	100		
2	PM _{2.5}	IS -5182(Part 24):2019		46	31	10 $\mu\text{g}/\text{m}^3$ - 400 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	Not Specified	60		
3	SO ₂	IS-5182(Part-2): 2001 , R-2017		<10	<10	10 $\mu\text{g}/\text{m}^3$ - 1050 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	120	80		
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017		27	28	06 $\mu\text{g}/\text{m}^3$ - 420 $\mu\text{g}/\text{m}^3$	06 $\mu\text{g}/\text{m}^3$	120	80		
<i>**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average, * LDL indicates Lower Detection Limit,</i>											
 ANALYSED BY		 REVIEWED BY				 Authorised Signatory					
Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.											
---- End of Report ---- Page -1 of 1											



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

CMPDIL, RI-II
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Test Report for Ambient Air Samples

Month & Year		03/2024	Cluster	Cluster II			ULR No.	TC1012224000000632F		
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	14.05.2024		
Project		Muraidih OCP		Sample Ref. No.	REM/BCCL/2024/03		Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		07.03.2024		21.03.2024	Period of Analysis	07.03.2024	15.04.2024	Zone of Station:	Core Zone	
Sl. No.	Parameter	Method of Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009		
			1st FN	2nd FN						
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	86	90	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100		
2	PM _{2.5}	IS -5182(Part 24):2019	37	34	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60		
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80		
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	32	29	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80		

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,

ANALYSED BY

(Gaurav Kant)
REVIEWED BY

(Amit Raj Mishra)
Authorised Signatory

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Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

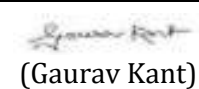
CMPDIL, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
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 email: rdri2cmpdi@coalindia.in

Test Report for Ambient Air Samples

Month & Year		03/2024	Cluster	Cluster II			ULR No.	TC1012224000000632F
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	14.05.2024
Project		Madhuband Washery	Sample Ref. No.	REM/BCCL/2024/03	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		07.03.2024	21.03.2024	Period of Analysis	07.03.2024	15.04.2024	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method Analysis of	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
			1st FN	2nd FN				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	76	82	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100
2	PM _{2.5}	IS -5182(Part 24):2019	41	28	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	33	29	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average * LDL indicates Lower Detection Limit,


 ANALYSED BY


 (Gaurav Kant)
 REVIEWED BY


 (Amit Raj Mishra)
 Authorised Signatory

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Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

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Test Report for Ambient Air Samples

Month & Year		03/2024	Cluster	Cluster II			ULR No.	TC1012224000000632F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	14.05.2024	
Project		Madhuband UGP		Sample Ref. No.	REM/BCCL/2024/03	Sampling Method	CMPDI/RI-II/LPM 11 , (IS 5182)		
Date of Sampling		08.03.2024		21.03.2024	Period of Analysis	08.03.2024	15.04.2024	Zone of Station:	Buffer Zone
Sl. N o.	Parameter	Method Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN	2nd FN					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	112	72	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	59	39	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	29	31	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average * LDL indicates Lower Detection Limit,

ANALYSED BY

REVIEWED BY

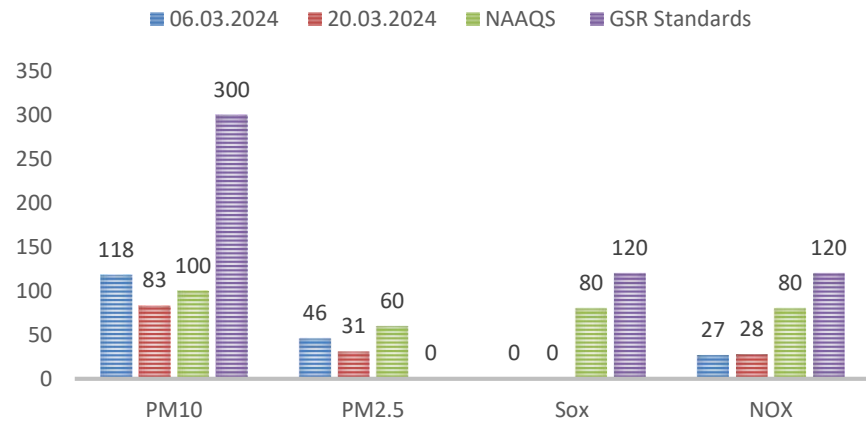
Authorised Signatory

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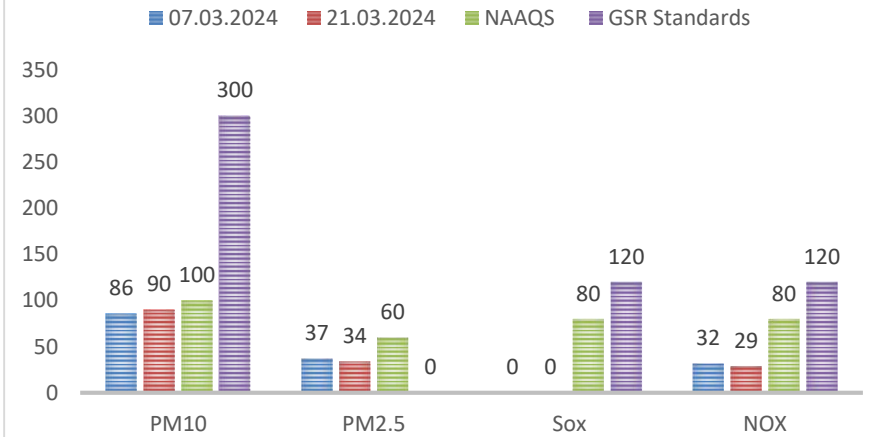
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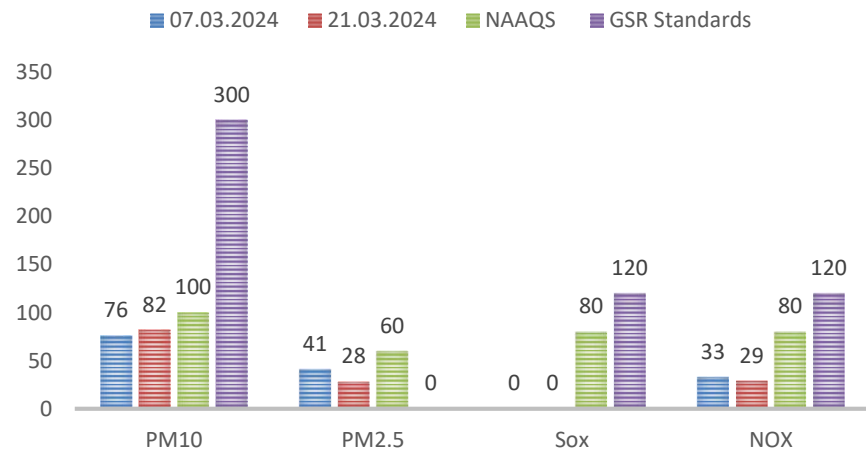
AMBIENT AIR QUALITY AT BLOCK II OCP



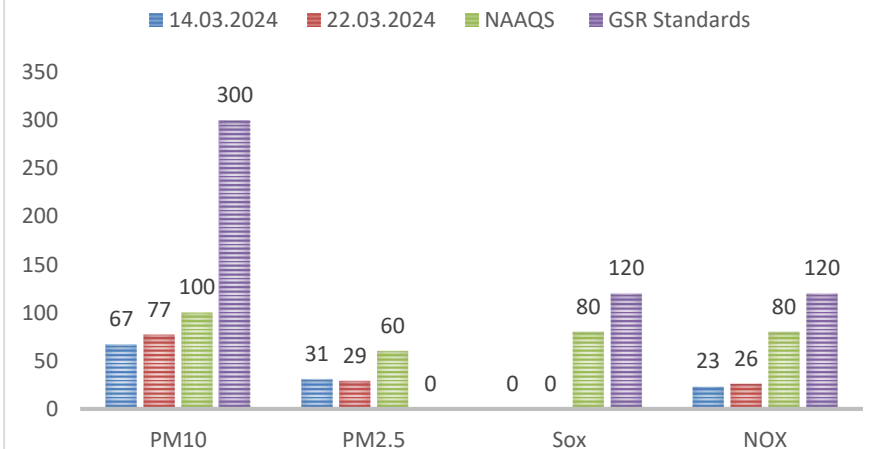
AMBIENT AIR QUALITY AT MURAIIDIH OCP



AMBIENT AIR QUALITY AT MADHUBAND WASHERY



AMBIENT AIR QUALITY AT MADHUBAND UGP



WATER QUALITY MONITORING

3.1 Location of sampling sites

(Refer **Plate No. – II**)

i) Mine Discharge of Block II (MW2)

A sampling point is fixed to assess the effluent quality of Mine discharge. This location is selected to monitor effluent discharge in to Khudia Nala.

3.2 Methodology of sampling and analysis

Water samples were collected as per standard practice. The effluent samples were collected and analyzed for four parameters on fortnightly basis at the Environmental Laboratory of CMPDI RI-II, Dhanbad.

3.3 Results & Interpretations

The results are given in tabular form along with the applicable standards. Results are compared with Schedule - VI, effluent prescribed by MoEF&CC. Results show that most of the parameters are within the permissible limits.



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
MINE EFFLUENT TEST REPORT

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Test Report for Mine Effluent samples

Month & Year	03/2024	Cluster	Cluster II		ULR No.		TC101222400000650F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	14.05.2024	
Project	Block II	Sampling Ref. No.	REM/BCCL/2024/03		Sampling Method		IS 3025 (Part-1)	CMPDI/RI-II/LPM 13
Sampling Stations	(i)	Block II	Sample Collected in 2.5 Ltr Jerricane , Color as observed is transparent			Period of Analysis	04.03.2024 to 30.03.2024	
			Date of Sampling		11.03.2024	26.03.2024		
Sl. No.	Parameter	Method of Analysis	Observed Values		STANDARDS FOR COAL MINES (Stipulated by Ministry of Environment and Forests (MoEF), Vide Notification No. GSR 742(E), Dt: 25.09.2000)	LDL		
			First Fortnight	Second Fortnight				
1	Total Suspended Solids	IS 3025/17:1984, R :2017, Gravimetric	48	46	100 (Max)	10		
2	pH	IS-3025/11:1983, R-2017, Electrometric	8.02	8.04	5.5 - 9.0	0.2		
3	Oil & Grease	IS 3025/39:1991, R : 2019, Partition Gravimetric	<2.0	<2.0	10 (Max)	2		
4	COD	APHA 23rd Edition 5220 C Titrimetric Method	32	36	250 (Max)	4		

***Grab sampling carried out for water samples. **All units in mg/L unless specified otherwise *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,*

ANALYSED BY

(Kumar Vaibhav)

REVIEWED BY

(Amit Raj Mishra)

Authorised Signatory

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---- End of Report ----

NOISE LEVEL QUALITY MONITORING

4.1 Location of sampling sites

- i) **Block II OCP (N4)**
- ii) **Muraidih OCP (N5)**
- iii) **Madhuband Washery (N3)**
- iv) **Madhuband UGP (N33)**

4.2 Methodology of sampling and analysis

Noise level measurements in form of ' L_{EQ} ' were taken using Integrated Data Logging Sound Level Meter during day time & night time. Noise levels were measured for the complete day & night time, the Intergration time taken was one hour or 3600 seconds. Noise levels were measured in Decibels, 'A' weighted average, i.e. dB (A).

4.2 Results & Interpretations

Ambient noise levels were recorded during day time & night time and the observed values were compared with standards prescribed by MoEF&CC. The results of Noise levels recorded during day & night time on fortnightly basis are presented in tabular form along with the applicable standard permissible limits. The observed values in terms of L_{EQ} are presented. The observed values at all the monitoring locations are found to be within permissible limits.



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Noise Level Test Report

Month & Year	03/2024	Cluster	Cluster II					ULR No.	TC1012224000000666F
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)							Date of Issue	14.05.2024
Project	Block II OCP		Sample Ref. No.		REM/BCCL/2024/03		Sampling Method		CMPDI/RI-II/LPM 22
				Date of Sampling		06.03.2024	20.03.2024	Zone Category of Station:	Core Zone
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
			First Fortnight	Second Fortnight				Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	51	49.4	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	50.3	50.1					
3		08:00 - 09:00	51.2	52.3					
4		09:00 - 10:00	52.4	53.3					
5		10:00 - 11:00	55	55.5					
6		11:00 - 12:00	55.5	55.8					
7		12:00 - 13:00	57.7	59.4					
8		13:00 - 14:00	62.9	64.7					
9		14:00 - 15:00	65.2	67.1					
10		15:00 - 16:00	62.2	64					
11		16:00 - 17:00	63	65.2					
12		17:00 - 18:00	65.2	69.1					
13		18:00 - 19:00	67.5	66.3					
14		19:00 - 20:00	65.2	64.6					
15		20:00 - 21:00	62.9	63.6					
16		21:00 - 22:00	61.5	60.4					
		Leq DAY	62.2	63.4					
1	Noise Level dB(A)Leq -Night	22:00-23:00	58.6	56	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	58.2	55.6					
3		00:00- 01:00	51.3	52.1					
4		01:00-02:00	51	51.1					
5		02:00-03:00	50.3	49.9					
6		03:00-04:00	51.6	52.2					
7		04:00-05:00	52	52.1					
8		05:00-06:00	52.7	53.2					
		Leq NIGHT	54.5	53.2					

*LDL indicates Lower Detection Limit

**All noise measurements are integrated for a 01 hour period, All units in dB(A)

Sampling Assistants
ANALYSED BY

(Gaurav Kant)
REVIEWED BY

(Amit Raj Mishra)
Authorised Signatory

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 cmpdi <i>A Mine Rules Company</i> CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDI, RI-II KOYLA BHAWAN COMPLEX DHANBAD. - 826005 Phone: 0326-223-850 email: rdri2cmndi@coalindia.in									
Month & Year	03/2024	Cluster	Cluster II				ULR No.	TC101222400000666F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	14.05.2024	
Project	Muraidih OCP	Sample Ref. No.	REM/BCCL/2024/03			Sampling Method	CMPDI/RI-II/LPM 22		
			Date of Sampling	07.03.2024	21.03.2024	Zone Category of Station:	Core Zone		
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
			First Fortnight	Second Fortnight				Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	46.6	47.2	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	47.8	49.8					
3		08:00 - 09:00	53	52.4					
4		09:00 - 10:00	54.2	54.9					
5		10:00 - 11:00	55	55.4					
6		11:00 - 12:00	57.6	57.4					
7		12:00 - 13:00	58.8	59.7					
8		13:00 - 14:00	53.9	54.7					
9		14:00 - 15:00	55	55.4					
10		15:00 - 16:00	57.6	58.8					
11		16:00 - 17:00	52.1	51					
12		17:00 - 18:00	47.7	47.7					
13		18:00 - 19:00	46.1	46					
14		19:00 - 20:00	46.6	46.3					
15		20:00 - 21:00	46	46.1					
16		21:00 - 22:00	45.8	44.9					
		Leq DAY	53.7	54.2					
1	Noise Level dB(A)Leq -Night	22:00-23:00	42.9	42.4	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	42.5	40.7					
3		00:00- 01:00	42.1	39.9					
4		01:00-02:00	42	39.7					
5		02:00-03:00	41.6	39.6					
6		03:00-04:00	41.1	40.3					
7		04:00-05:00	42.7	42					
8		05:00-06:00	42.7	42.6					
		Leq NIGHT	42.2	41.1					

**LDL indicates Lower Detection Limit*
***All noise measurements are integrated for a 01 hour period, All units in dB(A)*

Sampling Assistants
ANALYSED BY


 (Gaurav Kant)
REVIEWED BY


 (Amit Raj Mishra)
Authorised Signatory

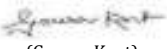
Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

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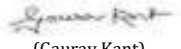
 cmpdi A Mine Rules Company CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in									
Month & Year	03/2024	Cluster	Cluster II					ULR No.	TC1012224000000666F
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)							Date of Issue	14.05.2024
Project	Madhuband Washery		Sample Ref. No.	REM/BCCL/2024/03		Sampling Method		CMPDI/RI-II/LPM 22	
			Date of Sampling	07.03.2024	21.03.2024	Zone Category of Station:		Buffer Zone	
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
								Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	67.1	67.3	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	54.4	51.1					
3		08:00 - 09:00	53	48.3					
4		09:00 - 10:00	69.2	72.1					
5		10:00 - 11:00	61.2	57.7					
6		11:00 - 12:00	55	55					
7		12:00 - 13:00	62.7	64.8					
8		13:00 - 14:00	62.2	61.1					
9		14:00 - 15:00	61.9	62.7					
10		15:00 - 16:00	58.5	59.2					
11		16:00 - 17:00	65.7	67.1					
12		17:00 - 18:00	51.6	50.5					
13		18:00 - 19:00	60.8	61.6					
14		19:00 - 20:00	65.7	66.7					
15		20:00 - 21:00	62.1	62.5					
16		21:00 - 22:00	60.8	61.9					
		Leq DAY	63.1	64.4					
1	Noise Level dB(A)Leq -Night	22:00-23:00	57.3	58.2	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	57.1	57.2					
3		00:00- 01:00	56.6	56.9					
4		01:00-02:00	56.2	56.5					
5		02:00-03:00	56	55.3					
6		03:00-04:00	55	55.1					
7		04:00-05:00	55.1	55.1					
8		05:00-06:00	55.3	56.2					
		Leq NIGHT	56.2	56.4					

**LDL indicates Lower Detection Limit*
***All noise measurements are integrated for a 01 hour period, All units in dB(A)*

Sampling Assistants ANALYSED BY	 (Gaurav Kant) REVIEWED BY	 (Amit Raj Mishra) Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

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 cmpdi A Mine Rules Company CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in									
Month & Year	03/2024	Cluster	Cluster II				ULR No.	TC1012224000000666F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bcccl@coalindia.in)						Date of Issue	14.05.2024	
Project	Madhuband UGP		Sample Ref. No.	REM/BCCL/2024/03		Sampling Method	CMPDI/RI-II/LPM 22		
s			Date of Sampling	14.03.2024	22.03.2024	Zone Category of Station:	Buffer Zone		
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
								Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	42.3	42.9	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	45.2	44.4					
3		08:00 - 09:00	48.6	49					
4		09:00 - 10:00	49.9	49.7					
5		10:00 - 11:00	49.7	49.8					
6		11:00 - 12:00	49.4	49					
7		12:00 - 13:00	50.3	50					
8		13:00 - 14:00	53.8	57.5					
9		14:00 - 15:00	55	55					
10		15:00 - 16:00	55.5	52.1					
11		16:00 - 17:00	48.2	48.3					
12		17:00 - 18:00	47.1	47					
13		18:00 - 19:00	46.5	46.4					
14		19:00 - 20:00	46.3	45.9					
15		20:00 - 21:00	46.1	45.5					
16		21:00 - 22:00	44.9	45.1					
		Leq DAY	50.3	50.5					
1	Noise Level dB(A)Leq -Night	22:00-23:00	42.2	42.7	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	42.1	42.8					
3		00:00- 01:00	42	42.1					
4		01:00-02:00	41.3	41.7					
5		02:00-03:00	41	41.5					
6		03:00-04:00	42.4	42.7					
7		04:00-05:00	42.7	42.9					
8		05:00-06:00	43	42.8					
		Leq NIGHT	42.1	42.4					
*LDL indicates Lower Detection Limit									
**All noise measurements are integrated for a 01 hour period, All units in dB(A)									
Sampling Assistants		 (Gaurav Kant) ANALYSED BY REVIEWED BY			 (Amit Raj Mishra) Authorised Signatory				
Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.									
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AMBIENT AIR QUALITY MONITORING

2.1 Location of sampling station and their rationale:

(As per G.S.R. 742 (E) dt. 25th December, 2000)

2.1.1 Ambient Air Quality Sampling Locations

I. CORE ZONE Monitoring Location

i) Block II OCP (A4): Industrial Area

The location of the sampling station is 23°47'2.00"N & 86°11'15.00"E. The sampler was placed at an elevated platform of approx. height 1.5m above ground level near water treatment plant of Block II OCP.

ii) Muraidih OCP (A5): Industrial Area

The sampler was placed at a height of 1.5 m from the ground level at Muraidih project office.

II. BUFFER ZONE Monitoring Location

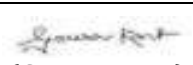
i) Madhuband Washery (A3) : Industrial area

The location of the sampling station is at 23°47'24.01"N & 86°11'32.00"E in the Washery premises. The sampler was placed at a height of approx. 1.5m above ground level.

ii) Madhuband UGP (A33) : Industrial area

The location of the sampling station is at 23°46'5.60"N & 86°12'27.50"E at the Project office. The sampler was placed at a height of approx. 1.5m above ground level near the project office.

AMBIENT AIR QUALITY DATA

  		CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Air Quality Test Report				CMPDI, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in							
Test Report for Ambient Air Samples													
Month & Year		02/2024		Cluster		Cluster II		ULR No.		TC1012224000000578F			
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue		30.03.2024			
Project		Block II OCP		Sample Ref. No.		REM/BCCL/2024/02		Sampling Method		CMPDI/RI-II/LPM 11, (IS 5182)			
Date of Sampling		13.02.2024		Period of Analysis		13.02.2024		15.03.2024		Zone of Station:		Core Zone	
Sl. No.	Parameter	Method Analysis	of	Observed Values (in $\mu\text{g}/\text{m}^3$)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009				
				1st FN	2nd FN								
1	PM ₁₀	IS -5182(Part 23):2006, R-2017		92	88	10 $\mu\text{g}/\text{m}^3$ - 1000 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	300	100				
2	PM _{2.5}	IS -5182(Part 24):2019		35	44	10 $\mu\text{g}/\text{m}^3$ - 400 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	Not Specified	60				
3	SO ₂	IS-5182(Part-2): 2001 , R-2017		<10	<10	10 $\mu\text{g}/\text{m}^3$ - 1050 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	120	80				
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017		17	26	06 $\mu\text{g}/\text{m}^3$ - 420 $\mu\text{g}/\text{m}^3$	06 $\mu\text{g}/\text{m}^3$	120	80				
<i>**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average, * LDL indicates Lower Detection Limit,</i>													
 ANALYSED BY				 REVIEWED BY				 Authorised Signatory					
Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.													
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Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

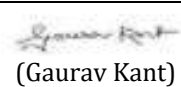
Test Report for Ambient Air Samples

Month & Year		02/2024	Cluster	Cluster II			ULR No.	TC1012224000000578F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	30.03.2024	
Project		Muraidih OCP		Sample Ref. No.	REM/BCCL/2024/02	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		15.02.2024		29.02.2024	Period of Analysis	16.02.2024	15.03.2024	Zone of Station:	Core Zone
Sl. No.	Parameter	Method of Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN	2nd FN					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	90	93	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	33	47	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	31	30	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


ANALYSED BY


(Gaurav Kant)
REVIEWED BY


(Amit Raj Mishra)
Authorised Signatory

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Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

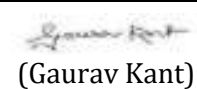
CMPDIL, RI-II
KOYLA BHAWAN COMPLEX
DHANBAD. -826005
Phone:0326-223-850
email: rdri2cmpdi@coalindia.in

Test Report for Ambient Air Samples

Month & Year		02/2024	Cluster	Cluster II			ULR No.	TC1012224000000578F
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	30.03.2024
Project		Madhuband Washery	Sample Ref. No.	REM/BCCL/2024/02	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		14.02.2024	28.02.2024	Period of Analysis	14.02.2024	15.03.2024	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method Analysis of	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
			1st FN	2nd FN				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	129	133	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100
2	PM _{2.5}	IS -5182(Part 24):2019	66	54	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	32	30	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80

****All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average * LDL indicates Lower Detection Limit,**


ANALYSED BY


(Gaurav Kant)
REVIEWED BY


(Amit Raj Mishra)
Authorised Signatory

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CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

CMPDI, RI-II
KOYLA BHAWAN COMPLEX
DHANBAD. -826005
Phone:0326-223-850
email: rdri2cmpdi@coalindia.in

Test Report for Ambient Air Samples

Month & Year		02/2024	Cluster	Cluster II			ULR No.	TC1012224000000578F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	30.03.2024	
Project		Madhuband UGP		Sample Ref. No.	REM/BCCL/2024/02	Sampling Method	CMPDI/RI-II/LPM 11 , (IS 5182)		
Date of Sampling		06.02.2024		21.02.2024	Period of Analysis	06.02.2024	15.03.2024	Zone of Station:	Buffer Zone
Sl. N o.	Parameter	Method Analysis	of	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
				1st FN	2nd FN				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017		84	69	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100
2	PM _{2.5}	IS -5182(Part 24):2019		42	30	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017		<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017		29	31	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80

****All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average * LDL indicates Lower Detection Limit,**



ANALYSED BY



(Gaurav Kant)
REVIEWED BY



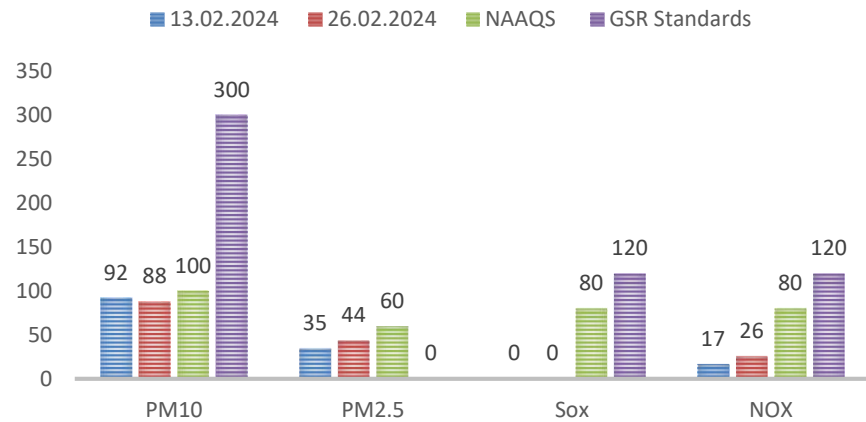
(Amit Raj Mishra)
Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

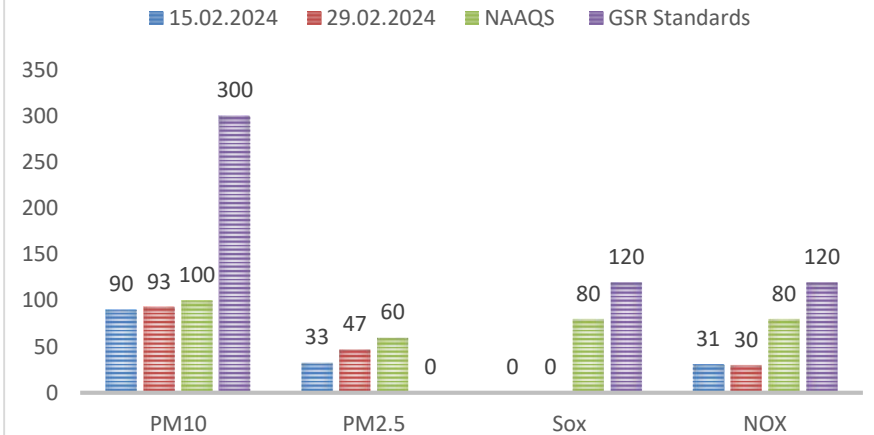
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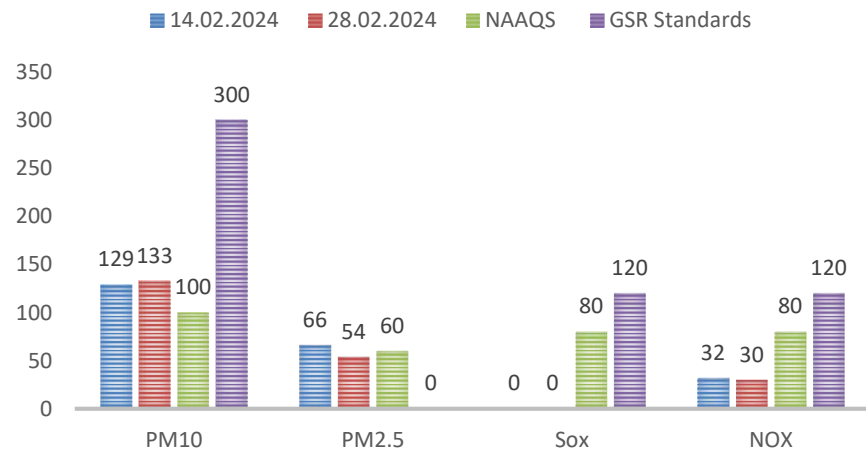
AMBIENT AIR QUALITY AT BLOCK II OCP



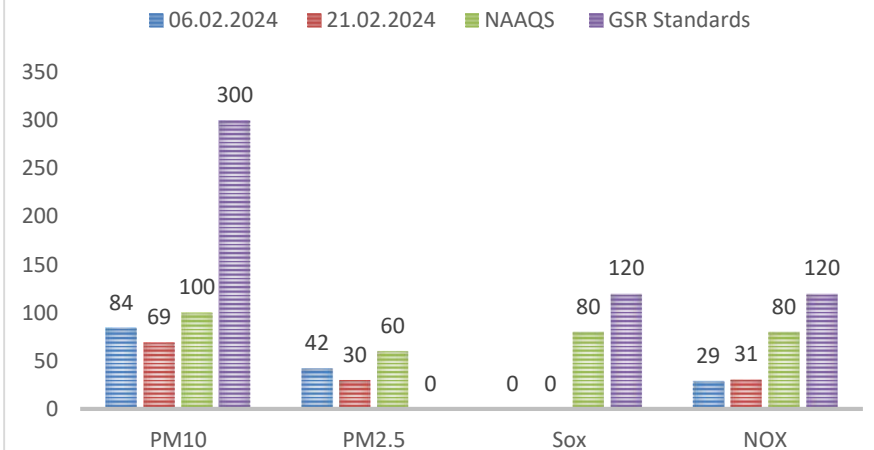
AMBIENT AIR QUALITY AT MURAIIDH OCP



AMBIENT AIR QUALITY AT MADHUBAND WASHERY



AMBIENT AIR QUALITY AT MADHUBAND UGP



WATER QUALITY MONITORING

3.1 Location of sampling sites

(Refer **Plate No. – II**)

i) Mine Discharge of Block II (MW2)

A sampling point is fixed to assess the effluent quality of Mine discharge. This location is selected to monitor effluent discharge in to Khudia Nala.

3.2 Methodology of sampling and analysis

Water samples were collected as per standard practice. The effluent samples were collected and analyzed for four parameters on fortnightly basis at the Environmental Laboratory of CMPDI RI-II, Dhanbad.

3.3 Results & Interpretations

The results are given in tabular form along with the applicable standards. Results are compared with Schedule - VI, effluent prescribed by MoEF&CC. Results show that most of the parameters are within the permissible limits.



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
MINE EFFLUENT TEST REPORT

CMPDI, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Test Report for Mine Effluent samples

Month & Year	02/2024	Cluster	Cluster II		ULR No.		TC1012224000000596F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	30.03.2024	
Project	Block II	Sampling Ref. No.	REM/BCCL/2024/02		Sampling Method		IS 3025 (Part-1)	CMPDI/RI-II/LPM 13
Sampling Stations	(i)	Block II	Sample Collected in 2.5 Ltr Jerricane , Color as observed is transparent			Period of Analysis	12.02.2024 TO 15.03.2024	
			Date of Sampling		12.02.2024	26.02.2024		
Sl. No.	Parameter	Method of Analysis	Observed Values		STANDARDS FOR COAL MINES (Stipulated by Ministry of Environment and Forests (MoEF), Vide Notification No. GSR 742(E), Dt: 25.09.2000)	LDL		
			First Fortnight	Second Fortnight				
1	Total Suspended Solids	IS 3025/17:1984, R :2017, Gravimetric	41	43	100 (Max)	10		
2	pH	IS-3025/11:1983, R-2017, Electrometric	7.92	7.87	5.5 - 9.0	0.2		
3	Oil & Grease	IS 3025/39:1991, R : 2019, Partition Gravimetric	<2.0	<2.0	10 (Max)	2		
4	COD	APHA 23rd Edition 5220 C Titrimetric Method	32	32	250 (Max)	4		

***Grab sampling carried out for water samples. **All units in mg/L unless specified otherwise *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,*

ANALYSED BY

(Kumar Vaibhav)

REVIEWED BY

(Amit Raj Mishra)

Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env), CMPDI, RI-II.

---- End of Report ----

NOISE LEVEL QUALITY MONITORING

4.1 Location of sampling sites

- i) **Block II OCP (N4)**
- ii) **Muraidih OCP (N5)**
- iii) **Madhuband Washery (N3)**
- iv) **Madhuband UGP (N33)**

4.2 Methodology of sampling and analysis

Noise level measurements in form of ' L_{EQ} ' were taken using Integrated Data Logging Sound Level Meter during day time & night time. Noise levels were measured for the complete day & night time, the Intergration time taken was one hour or 3600 seconds. Noise levels were measured in Decibels, 'A' weighted average, i.e. dB (A).

4.2 Results & Interpretations

Ambient noise levels were recorded during day time & night time and the observed values were compared with standards prescribed by MoEF&CC. The results of Noise levels recorded during day & night time on fortnightly basis are presented in tabular form along with the applicable standard permissible limits. The observed values in terms of L_{EQ} are presented. The observed values at all the monitoring locations are found to be within permissible limits.



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CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Noise Level Test Report

Month & Year	02/2024	Cluster	Cluster II	ULR No.				TC1012224000000612F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)							Date of Issue	30.03.2024
Project	Block II OCP		Sample Ref. No.	REM/BCCL/2024/02		Sampling Method		CMPDI/RI-II/LPM 22	
				Date of Sampling	13.02.2024	26.02.2024	Zone Category of Station:	Core Zone	
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
			First Fortnight	Second Fortnight				Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	51.1	49.3	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	50.3	50					
3		08:00 - 09:00	51.3	52.3					
4		09:00 – 10:00	52.4	53.3					
5		10:00 - 11:00	55	55.6					
6		11:00 - 12:00	55.6	55.9					
7		12:00 - 13:00	57.7	59.4					
8		13:00 - 14:00	62.8	64.8					
9		14:00 - 15:00	65.2	67.1					
10		15:00 - 16:00	62.2	64					
11		16:00 - 17:00	62.9	65.2					
12		17:00 - 18:00	65.2	69.2					
13		18:00 - 19:00	67.4	66.3					
14		19:00 - 20:00	65.2	64.7					
15		20:00 - 21:00	62.8	63.6					
16		21:00 - 22:00	61.5	60.5					
		Leq DAY	62.1	63.4					
1	Noise Level dB(A)Leq -Night	22:00-23:00	60.3	57.6	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	59.8	57.2					
3		00:00- 01:00	52.7	53.5					
4		01.00-02.00	52.4	52.5					
5		02.00-03.00	51.7	51.4					
6		03.00-04.00	53	53.6					
7		04.00-05.00	53.4	53.5					
8		05:00-06:00	54.1	54.7					
		Leq NIGHT	56.0	54.7					

*LDL indicates Lower Detection Limit

**All noise measurements are integrated for a 01 hour period, All units in dB(A)

Sampling Assistants
ANALYSED BY

(Gaurav Kant)
REVIEWED BY

Raj Mishra
Authorised Signatory

(Amit)

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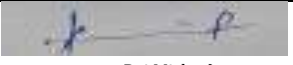
   CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850									
Month & Year	02/2024	Cluster	Cluster II				ULR No.	TC1012224000000612F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	30.03.2024	
Project	Muraidih OCP	Sample Ref. No.	REM/BCCL/2024/02		Sampling Method	CMPDI/RI-II/LPM 22			
SL. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
								Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	46.7	47.2	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	47.8	49.7					
3		08:00 - 09:00	53	52.4					
4		09:00 - 10:00	54.1	54.9					
5		10:00 - 11:00	55	55.5					
6		11:00 - 12:00	57.6	57.4					
7		12:00 - 13:00	58.7	59.7					
8		13:00 - 14:00	53.8	54.7					
9		14:00 - 15:00	55	55.5					
10		15:00 - 16:00	57.6	58.7					
11		16:00 - 17:00	52.1	51.1					
12		17:00 - 18:00	47.7	47.7					
13		18:00 - 19:00	46.2	46.1					
14		19:00 - 20:00	46.7	46.4					
15		20:00 - 21:00	46.1	46.2					
16		21:00 - 22:00	45.9	44.9					
		Leq DAY	53.7	54.2					
1	Noise Level dB(A)Leq -Night	22:00-23:00	44.2	43.7	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	43.8	41.9					
3		00:00- 01:00	43.4	41					
4		01:00-02:00	43.3	40.8					
5		02:00-03:00	42.9	40.7					
6		03:00-04:00	42.3	41.5					
7		04:00-05:00	44	43.3					
8		05:00-06:00	44	43.9					
		Leq NIGHT	43.5	42.3					

*LDL indicates Lower Detection Limit

**All noise measurements are integrated for a 01 hour period, All units in dB(A)

Sampling Assistants
ANALYSED BY


(Gaurav Kant)
REVIEWED BY


Raj Mishra)
Authorised Signatory

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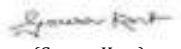
  CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in									
Month & Year	02/2024	Cluster	Cluster II				ULR No.	TC1012224000000612F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	30.03.2024	
Project	Madhuband Washery		Sample Ref. No.	REM/BCCL/2024/02		Sampling Method	CMPDI/RI-II/LPM 22		
				Date of Sampling	14.02.2024	28.02.2024	Zone Category of Station:	Buffer Zone	
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
			First Fortnight	Second Fortnight				Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	67.1	67.3	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	54.3	51.2					
3		08:00 - 09:00	53	48.3					
4		09:00 - 10:00	69.3	72.1					
5		10:00 - 11:00	61.2	57.7					
6		11:00 - 12:00	55	55					
7		12:00 - 13:00	62.7	64.9					
8		13:00 - 14:00	62.2	61.1					
9		14:00 - 15:00	61.9	62.7					
10		15:00 - 16:00	58.4	59.2					
11		16:00 - 17:00	65.7	67.1					
12		17:00 - 18:00	51.6	50.5					
13		18:00 - 19:00	60.8	61.6					
14		19:00 - 20:00	65.7	66.7					
15		20:00 - 21:00	62.1	62.5					
16		21:00 - 22:00	60.8	61.9					
		Leq DAY	63.2	64.4					
1	Noise Level dB(A)Leq - Night	22:00-23:00	58.9	59.8	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	58.6	58.7					
3		00:00- 01:00	58.2	58.4					
4		01:00-02:00	57.8	58.1					
5		02:00-03:00	57.6	56.9					
6		03:00-04:00	56.6	56.7					
7		04:00-05:00	56.7	56.7					
8		05:00-06:00	56.9	57.8					
		Leq NIGHT	57.7	58.0					

*LDL indicates Lower Detection Limit

**All noise measurements are integrated for a 01 hour period, All units in dB(A)

Sampling Assistants

ANALYSED BY



(Gaurav Kant)

REVIEWED BY



(Amit)

Raj Mishra)

Authorised Signatory

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Month & Year	02/2024	Cluster	Cluster II				ULR No.	TC101222400000612F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	30.03.2024	
Project	Madhuband UGP		Sample Ref. No.	REM/BCCL/2024/02		Sampling Method	CMPDI/RI-II/LPM 22		
s			Date of Sampling	06.02.2024	21.02.2024	Zone Category of Station:	Buffer Zone		
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
								Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	42.4	43	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	45.2	44.5					
3		08:00 - 09:00	48.6	49					
4		09:00 - 10:00	49.8	49.6					
5		10:00 - 11:00	49.6	49.7					
6		11:00 - 12:00	49.3	49					
7		12:00 - 13:00	50.3	49.9					
8		13:00 - 14:00	53.7	57.5					
9		14:00 - 15:00	55	55					
10		15:00 - 16:00	55.6	52.1					
11		16:00 - 17:00	48.2	48.3					
12		17:00 - 18:00	47.1	47					
13		18:00 - 19:00	46.6	46.5					
14		19:00 - 20:00	46.4	46					
15		20:00 - 21:00	46.2	45.5					
16		21:00 - 22:00	44.9	45.1					
		Leq DAY	50.3	50.5					
1	Noise Level dB(A)Leq -Night	22:00-23:00	43.5	44	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	43.4	44.1					
3		00:00- 01:00	43.3	43.4					
4		01:00-02:00	42.6	43					
5		02:00-03:00	42.2	42.8					
6		03:00-04:00	43.7	44					
7		04:00-05:00	44	44.2					
8		05:00-06:00	44.3	44.1					
		Leq NIGHT	43.4	43.7					

*LDL indicates Lower Detection Limit

**All noise measurements are integrated for a 01 hour period, All units in dB(A)

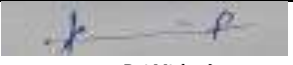
Sampling Assistants

ANALYSED BY



(Gaurav Kant)

REVIEWED BY



(Amit)

Raj Mishra)

Authorised Signatory

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AMBIENT AIR QUALITY MONITORING

2.1 Location of sampling station and their rationale:

(As per G.S.R. 742 (E) dt. 25th December, 2000)

2.1.1 Ambient Air Quality Sampling Locations

I. CORE ZONE Monitoring Location

i) Block II OCP (A4): Industrial Area

The location of the sampling station is 23°47'2.00"N & 86°11'15.00"E. The sampler was placed at an elevated platform of approx. height 1.5m above ground level near water treatment plant of Block II OCP.

ii) Muraidih OCP (A5): Industrial Area

The sampler was placed at a height of 1.5 m from the ground level at Muraidih project office.

II. BUFFER ZONE Monitoring Location

i) Madhuband Washery (A3) : Industrial area

The location of the sampling station is at 23°47'24.01"N & 86°11'32.00"E in the Washery premises. The sampler was placed at a height of approx. 1.5m above ground level.

ii) Madhuband UGP (A33) : Industrial area

The location of the sampling station is at 23°46'5.60"N & 86°12'27.50"E at the Project office. The sampler was placed at a height of approx. 1.5m above ground level near the project office.

AMBIENT AIR QUALITY DATA

 		CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Air Quality Test Report				CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in							
Test Report for Ambient Air Samples													
Month & Year		01/2024		Cluster		Cluster II		ULR No.		TC1012223000000273F			
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue		15.03.2024			
Project		Block II OCP		Sample Ref. No.		REM/BCCL/2024/01		Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)			
Date of Sampling		11.01.24 to 27.01.24		Period of Analysis		11.01.24		27.02.24		Zone of Station:		Core Zone	
Sl. No.	Parameter	Method Analysis	of	Observed Values (in $\mu\text{g}/\text{m}^3$)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009				
				1st FN A1705	2nd FN A1760								
1	PM ₁₀	IS -5182(Part 23):2006, R-2017		109	122	10 $\mu\text{g}/\text{m}^3$ - 1000 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	300	100				
2	PM _{2.5}	IS -5182(Part 24):2019		68	69	10 $\mu\text{g}/\text{m}^3$ - 400 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	Not Specified	60				
3	SO ₂	IS-5182(Part-2): 2001 , R-2017		<10	10	10 $\mu\text{g}/\text{m}^3$ - 1050 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	120	80				
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017		29	28	06 $\mu\text{g}/\text{m}^3$ - 420 $\mu\text{g}/\text{m}^3$	06 $\mu\text{g}/\text{m}^3$	120	80				
<i>**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average, * LDL indicates Lower Detection Limit,</i>													
 ANALYSED BY				 (Gaurav Kant) REVIEWED BY				 (Amit Raj Mishra) Authorised Signatory					
Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.													
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Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

CMPDIL, RI-II
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DHANBAD. -826005
Phone:0326-223-850
email: rdri2cmpdi@coalindia.in

Test Report for Ambient Air Samples

Month & Year		01/2024	Cluster	Cluster II			ULR No.	TC1012223000000273F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	15.03.2024	
Project		Muraidih OCP		Sample Ref. No.	REM/BCCL/2024/01	Sampling Method	CMPDI/RI-II/LPM 11 , (IS 5182)		
Date of Sampling		10.01.24		24.01.24	Period of Analysis	10.01.24	29.02.24	Zone of Station:	Core Zone
Sl. No.	Parameter	Method Analysis	of	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
				1st FN A1700	2nd FN A1749				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017		99	87	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100
2	PM _{2.5}	IS -5182(Part 24):2019		58	54	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017		11	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017		32	31	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,

ANALYSED BY

(Gaurav Kant)
REVIEWED BY

(Amit Raj Mishra)
Authorised Signatory

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Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

CMPDIL, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Test Report for Ambient Air Samples

Month & Year		01/2024	Cluster	Cluster II			ULR No.	TC1012223000000273F
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	15.03.2024
Project		Madhuband Washery	Sample Ref. No.	REM/BCCL/2024/01	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		06.01.24	29.01.24	Period of Analysis	10.01.24	29.02.24	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method Analysis of	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
			1st FN A1688	2nd FN A1763				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	86	92	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100
2	PM _{2.5}	IS -5182(Part 24):2019	34	32	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	30	29	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average * LDL indicates Lower Detection Limit,

ANALYSED BY

(Gaurav Kant)
REVIEWED BY

(Amit Raj Mishra)
Authorised Signatory

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Ambient Air Quality Test Report

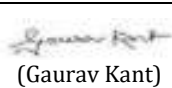
CMPDIL, RI-II
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 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Test Report for Ambient Air Samples

Month & Year		01/2024	Cluster	Cluster II			ULR No.	TC1012223000000273F
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmen.v.bccl@coalindia.in)					Date of Issue	15.03.2024
Project		Madhuband UGP	Sample Ref. No.	REM/BCCL/2024/01	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		05.01.24	25.01.24	Period of Analysis	05.01.24	29.02.2024	Zone of Station:	Buffer Zone
Sl. No .	Parameter	Method of Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
			1st FN A1683	2nd FN A1755				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	118	94	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100
2	PM _{2.5}	IS -5182(Part 24):2019	63	56	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	30	28	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average * LDL indicates Lower Detection Limit,


 ANALYSED BY


 (Gaurav Kant)
 REVIEWED BY

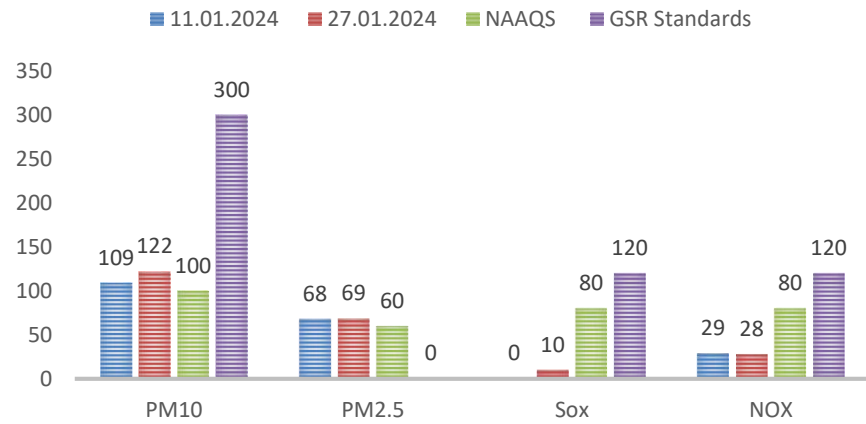

 (Amit Raj Mishra)
 Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

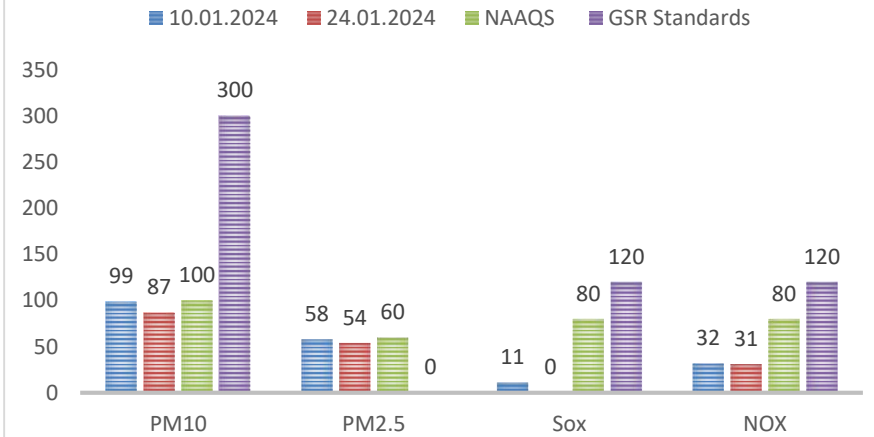
---- End of Report ----

Page -1 of 1

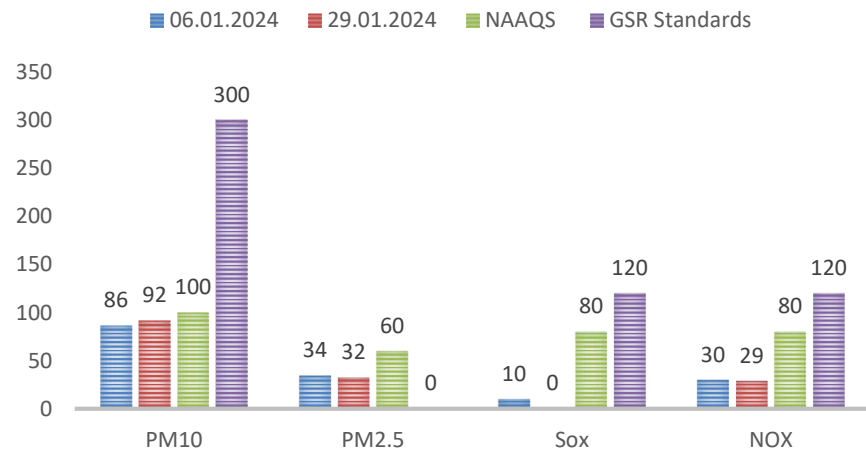
AMBIENT AIR QUALITY AT BLOCK II OCP



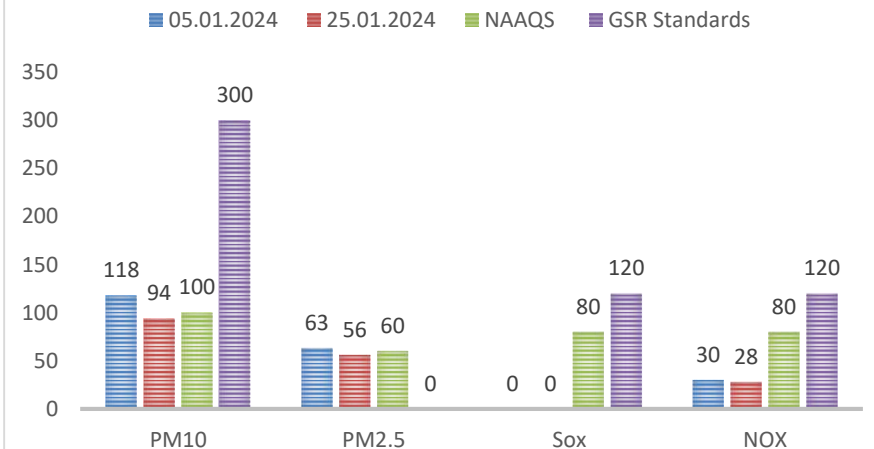
AMBIENT AIR QUALITY AT MURAIIDIH OCP



AMBIENT AIR QUALITY AT MADHUBAND WASHERY



AMBIENT AIR QUALITY AT MADHUBAND UGP



WATER QUALITY MONITORING

3.1 Location of sampling sites

(Refer **Plate No. – II**)

i) Mine Discharge of Block II (MW2)

A sampling point is fixed to assess the effluent quality of Mine discharge. This location is selected to monitor effluent discharge in to Khudia Nala.

3.2 Methodology of sampling and analysis

Water samples were collected as per standard practice. The effluent samples were collected and analyzed for four parameters on fortnightly basis at the Environmental Laboratory of CMPDI RI-II, Dhanbad.

3.3 Results & Interpretations

The results are given in tabular form along with the applicable standards. Results are compared with Schedule - VI, effluent prescribed by MoEF&CC. Results show that most of the parameters are within the permissible limits.



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
MINE EFFLUENT TEST REPORT

CMPDI, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Test Report for Mine Effluent samples

Month & Year	01/2024	Cluster	Cluster II		ULR No.		TC1012223000000291F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	15.03.2024	
Project	Block II	Sampling Ref. No.	REM/BCCL/2024/01		Sampling Method		IS 3025 (Part-1)	CMPDI/RI-II/LPM 13
Sampling Stations	(i)	Block II	Sample Collected in 2.5 Ltr Jerricane , Color as observed is transparent			Period of Analysis	01.01.2024 TO 30.01.2024	
			Date of Sampling		08.01.24	29.01.24		
Sl. No.	Parameter	Method of Analysis	Observed Values		STANDARDS FOR COAL MINES (Stipulated by Ministry of Environment and Forests (MoEF), Vide Notification No. GSR 742(E), Dt: 25.09.2000)	LDL		
			First Fortnight M0713	Second Fortnight M0747				
1	Total Suspended Solids	IS 3025/17:1984, R :2017, Gravimetric	36	37	100 (Max)	10		
2	pH	IS-3025/11:1983, R-2017, Electrometric	7.66	7.68	5.5 - 9.0	0.2		
3	Oil & Grease	IS 3025/39:1991, R : 2019, Partition Gravimetric	<2.0	<2.0	10 (Max)	2		
4	COD	APHA 23rd Edition 5220 C Titrimetric Method	32	28	250 (Max)	4		

**Grab sampling carried out for water samples. **All units in mg/L unless specified otherwise *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

ANALYSED BY

(Kumar Vaibhav)

REVIEWED BY

(Amit Raj Mishra)

Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

---- End of Report ----

NOISE LEVEL QUALITY MONITORING

4.1 Location of sampling sites

- i) **Block II OCP (N4)**
- ii) **Muraidih OCP (N5)**
- iii) **Madhuband Washery (N3)**
- iv) **Madhuband UGP (N33)**

4.2 Methodology of sampling and analysis

Noise level measurements in form of ' L_{EQ} ' were taken using Integrated Data Logging Sound Level Meter during day time & night time. Noise levels were measured for the complete day & night time, the Intergration time taken was one hour or 3600 seconds. Noise levels were measured in Decibels, 'A' weighted average, i.e. dB (A).

4.2 Results & Interpretations

Ambient noise levels were recorded during day time & night time and the observed values were compared with standards prescribed by MoEF&CC. The results of Noise levels recorded during day & night time on fortnightly basis are presented in tabular form along with the applicable standard permissible limits. The observed values in terms of L_{EQ} are presented. The observed values at all the monitoring locations are found to be within permissible limits.

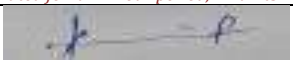
 cmpdi A Mini Ratna Company CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report									
Month & Year	01/2024	Cluster	Cluster II				ULR No.	TC1012223000000307F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	15.03.2024	
Project	Block II OCP	Sample Ref. No.	REM/BCCL/2024/01			Sampling Method	CMPDI/RI-II/LPM 22		
			Date of Sampling	11.01.2024	27.01.2024	Zone Category of Station:	Core Zone		
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
								Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	52.3	50.5	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	51.5	51.2					
3		08:00 - 09:00	52.5	53.5					
4		09:00 - 10:00	53.6	54.6					
5		10:00 - 11:00	56.3	56.9					
6		11:00 - 12:00	56.9	57.2					
7		12:00 - 13:00	59.1	60.8					
8		13:00 - 14:00	64.3	66.3					
9		14:00 - 15:00	66.7	68.7					
10		15:00 - 16:00	63.7	65.5					
11		16:00 - 17:00	64.4	66.7					
12		17:00 - 18:00	66.7	70.8					
13		18:00 - 19:00	69	67.9					
14		19:00 - 20:00	66.7	66.2					
15		20:00 - 21:00	64.3	65.1					
16		21:00 - 22:00	62.9	61.9					
		Leq DAY	63.6	65.0					
1	Noise Level dB(A)Leq -Night	22:00-23:00	61.7	59	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	61.2	58.5					
3		00:00- 01:00	53.9	54.8					
4		01:00-02:00	53.6	53.7					
5		02:00-03:00	52.9	52.6					
6		03:00-04:00	54.2	54.9					
7		04:00-05:00	54.7	54.8					
8		05:00-06:00	55.4	56					
		Leq NIGHT	57.4	56.1					

*LDL indicates Lower Detection Limit

**All noise measurements are integrated for a 01 hour period, All units in dB(A)

Sampling Assistants
ANALYSED BY


 (Gaurav Kant)
REVIEWED BY


 Raj Mishra)
Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

---- End of Report ----

Page -1 of 1

 CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850									
Month & Year	01/2024	Cluster	Cluster II				ULR No.	TC1012223000000307F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	15.03.2024	
Project	Muraidih OCP	Sample Ref. No.	REM/BCCL/2024/01			Sampling Method	CMPDI/RI-II/LPM 22		
			Date of Sampling	10.01.2024	24.01.2024	Zone Category of Station:	Core Zone		
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
			First Fortnight	Second Fortnight				Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	47.8	48.3	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	48.9	50.9					
3		08:00 - 09:00	54.2	53.6					
4		09:00 - 10:00	55.4	56.2					
5		10:00 - 11:00	56.3	56.8					
6		11:00 - 12:00	59	58.7					
7		12:00 - 13:00	60.1	61.1					
8		13:00 - 14:00	55.1	56					
9		14:00 - 15:00	56.3	56.8					
10		15:00 - 16:00	59	60.1					
11		16:00 - 17:00	53.3	52.3					
12		17:00 - 18:00	48.8	48.8					
13		18:00 - 19:00	47.3	47.2					
14		19:00 - 20:00	47.8	47.5					
15		20:00 - 21:00	47.2	47.3					
16		21:00 - 22:00	47	46					
		Leq DAY	55.0	55.5					
1	Noise Level dB(A)Leq -Night	22:00-23:00	45.2	44.7	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	44.8	42.9					
3		00:00- 01:00	44.4	42					
4		01:00-02:00	44.3	41.8					
5		02:00-03:00	43.9	41.7					
6		03:00-04:00	43.3	42.5					
7		04:00-05:00	45	44.3					
8		05:00-06:00	45	44.9					
		Leq NIGHT	44.5	43.3					

*LDL indicates Lower Detection Limit

**All noise measurements are integrated for a 01 hour period, All units in dB(A)

Sampling Assistants
ANALYSED BY


 (Gaurav Kant)
REVIEWED BY


 Raj Mishra
Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

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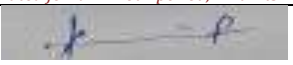
 CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in									
Month & Year	01/2024	Cluster	Cluster II				ULR No.	TC1012223000000307F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	15.03.2024	
Project	Madhuband Washery		Sample Ref. No.	REM/BCCL/2024/01		Sampling Method	CMPDI/RI-II/LPM 22		
				Date of Sampling	06.01.2024	29.01.2024	Zone Category of Station:	Buffer Zone	
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
								Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	68.7	68.9	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	55.6	52.4					
3		08:00 - 09:00	54.2	49.4					
4		09:00 - 10:00	70.9	73.8					
5		10:00 - 11:00	62.6	59.1					
6		11:00 - 12:00	56.3	56.3					
7		12:00 - 13:00	64.2	66.4					
8		13:00 - 14:00	63.7	62.5					
9		14:00 - 15:00	63.4	64.2					
10		15:00 - 16:00	59.8	60.6					
11		16:00 - 17:00	67.2	68.7					
12		17:00 - 18:00	52.8	51.7					
13		18:00 - 19:00	62.2	63					
14		19:00 - 20:00	67.2	68.3					
15		20:00 - 21:00	63.6	64					
16		21:00 - 22:00	62.2	63.4					
		Leq DAY	64.7	66.0					
1	Noise Level dB(A)Leq -Night	22:00-23:00	60.3	61.2	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	60	60.1					
3		00:00- 01:00	59.6	59.8					
4		01:00-02:00	59.2	59.5					
5		02:00-03:00	59	58.2					
6		03:00-04:00	57.9	58					
7		04:00-05:00	58	58					
8		05:00-06:00	58.2	59.2					
		Leq NIGHT	59.1	59.4					

**LDL indicates Lower Detection Limit*

***All noise measurements are integrated for a 01 hour period, All units in dB(A)*

Sampling Assistants
ANALYSED BY


 (Gaurav Kant)
REVIEWED BY


 Raj Mishra
Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

---- End of Report ----

Page -1 of 1

 cmpdi A Mine Rules Company CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDI, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in									
Month & Year	01/2024	Cluster	Cluster II				ULR No.	TC1012223000000307F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bcccl@coalindia.in)						Date of Issue	15.03.2024	
Project	Madhuband UGP		Sample Ref. No.	REM/BCCL/2024/01		Sampling Method	CMPDI/RI-II/LPM 22		
s				Date of Sampling	05.01.2024	25.01.2024	Zone Category of Station:	Buffer Zone	
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
								Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	43.4	44	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	46.3	45.5					
3		08:00 - 09:00	49.7	50.2					
4		09:00 - 10:00	51	50.8					
5		10:00 - 11:00	50.8	50.9					
6		11:00 - 12:00	50.5	50.2					
7		12:00 - 13:00	51.5	51.1					
8		13:00 - 14:00	55	58.9					
9		14:00 - 15:00	56.3	56.3					
10		15:00 - 16:00	56.9	53.3					
11		16:00 - 17:00	49.3	49.4					
12		17:00 - 18:00	48.2	48.1					
13		18:00 - 19:00	47.7	47.6					
14		19:00 - 20:00	47.5	47.1					
15		20:00 - 21:00	47.3	46.6					
16		21:00 - 22:00	46	46.2					
		Leq DAY	51.5	51.8					
1	Noise Level dB(A)Leq - Night	22:00-23:00	44.5	45	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	44.4	45.1					
3		00:00- 01:00	44.3	44.4					
4		01:00-02:00	43.6	44					
5		02:00-03:00	43.2	43.8					
6		03:00-04:00	44.7	45					
7		04:00-05:00	45	45.2					
8		05:00-06:00	45.3	45.1					
		Leq NIGHT	44.4	44.7					
*LDL indicates Lower Detection Limit									
**All noise measurements are integrated for a 01 hour period, All units in dB(A)									
Sampling Assistants ANALYSED BY			 (Gaurav Kant) REVIEWED BY			 Raj Mishra) Authorised Signatory			
Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.									
---- End of Report ----									

AMBIENT AIR QUALITY MONITORING

2.1 Location of sampling station and their rationale:

(As per G.S.R. 742 (E) dt. 25th December, 2000)

2.1.1 Ambient Air Quality Sampling Locations

I. CORE ZONE Monitoring Location

i) Block II OCP (A4): Industrial Area

The location of the sampling station is 23°47'2.00"N & 86°11'15.00"E. The sampler was placed at an elevated platform of approx. height 1.5m above ground level near water treatment plant of Block II OCP.

ii) Muraidih OCP (A5): Industrial Area

The sampler was placed at a height of 1.5 m from the ground level at Muraidih project office.

II. BUFFER ZONE Monitoring Location

i) Madhuband Washery (A3) : Industrial area

The location of the sampling station is at 23°47'24.01"N & 86°11'32.00"E in the Washery premises. The sampler was placed at a height of approx. 1.5m above ground level.

ii) Madhuband UGP (A33) : Industrial area

The location of the sampling station is at 23°46'5.60"N & 86°12'27.50"E at the Project office. The sampler was placed at a height of approx. 1.5m above ground level near the project office.

AMBIENT AIR QUALITY DATA

  		CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Air Quality Test Report				CMPDI, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in					
Test Report for Ambient Air Samples											
Month & Year		12/2023		Cluster		Cluster II		ULR No.		TC1012223000000389F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue		24.02.2024	
Project		Block II OCP		Sample Ref. No.		REM/BCCL/2023/12		Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		07.12.2023		22.12.2023		Period of Analysis		07.12.2023		30.01.2024	
Zone of Station:		Core Zone									
Sl. No.	Parameter	Method Analysis	Observed Values (in $\mu\text{g}/\text{m}^3$)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009			
			1st FN	2nd FN							
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	103	119	10 $\mu\text{g}/\text{m}^3$ - 1000 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	300	100			
2	PM _{2.5}	IS -5182(Part 24):2019	60	70	10 $\mu\text{g}/\text{m}^3$ - 400 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	Not Specified	60			
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	11	<10	10 $\mu\text{g}/\text{m}^3$ - 1050 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	120	80			
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	17	29	06 $\mu\text{g}/\text{m}^3$ - 420 $\mu\text{g}/\text{m}^3$	06 $\mu\text{g}/\text{m}^3$	120	80			
**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average, * LDL indicates Lower Detection Limit,											
 ANALYSED BY			 (Gaurav Kant) REVIEWED BY			 (Amit Raj Mishra) Authorised Signatory					
Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.											
---- End of Report ---- Page -1 of 1											



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CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

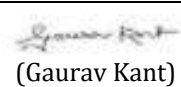
Test Report for Ambient Air Samples

Month & Year		12/2023	Cluster	Cluster II			ULR No.	TC1012223000000389F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	24.02.2024	
Project		Muraidih OCP		Sample Ref. No.	REM/BCCL/2023/12	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		14.12.2023		25.12.2023	Period of Analysis	14.12.2023	30.01.2024	Zone of Station:	Core Zone
Sl. No.	Parameter	Method of Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN	2nd FN					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	107	97	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	62	46	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	36	37	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


ANALYSED BY


(Gaurav Kant)
REVIEWED BY


(Amit Raj Mishra)
Authorised Signatory

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CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

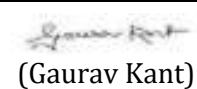
CMPDIL, RI-II
KOYLA BHAWAN COMPLEX
DHANBAD. -826005
Phone:0326-223-850
email: rdri2cmpdi@coalindia.in

Test Report for Ambient Air Samples

Month & Year		12/2023	Cluster	Cluster II			ULR No.	TC1012223000000389F
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	24.02.2024
Project		Madhuband Washery	Sample Ref. No.	REM/BCCL/2023/12	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		08.12.2023	16.12.2023	Period of Analysis	08.12.2023	30.01.2024	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method Analysis of	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
			1st FN	2nd FN				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	94	91	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100
2	PM _{2.5}	IS -5182(Part 24):2019	38	33	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	30	33	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80

****All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average * LDL indicates Lower Detection Limit,**


ANALYSED BY


(Gaurav Kant)
REVIEWED BY


(Amit Raj Mishra)
Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

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Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

CMPDI, RI-II
KOYLA BHAWAN COMPLEX
DHANBAD. -826005
Phone:0326-223-850
email: rdri2cmpdi@coalindia.in

Test Report for Ambient Air Samples

Month & Year		12/2023	Cluster	Cluster II			ULR No.	TC1012223000000389F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	24.02.2024	
Project		Madhuband UGP		Sample Ref. No.	REM/BCCL/2023/12	Sampling Method	CMPDI/RI-II/LPM 11 , (IS 5182)		
Date of Sampling		11.12.2023		25.12.2023	Period of Analysis	11.12.2023	30.01.2024	Zone of Station:	Buffer Zone
Sl. N o.	Parameter	Method Analysis	of	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
				1st FN	2nd FN				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017		118	105	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100
2	PM _{2.5}	IS -5182(Part 24):2019		65	62	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017		<10	10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017		31	30	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80

****All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average * LDL indicates Lower Detection Limit,**



ANALYSED BY



(Gaurav Kant)
REVIEWED BY



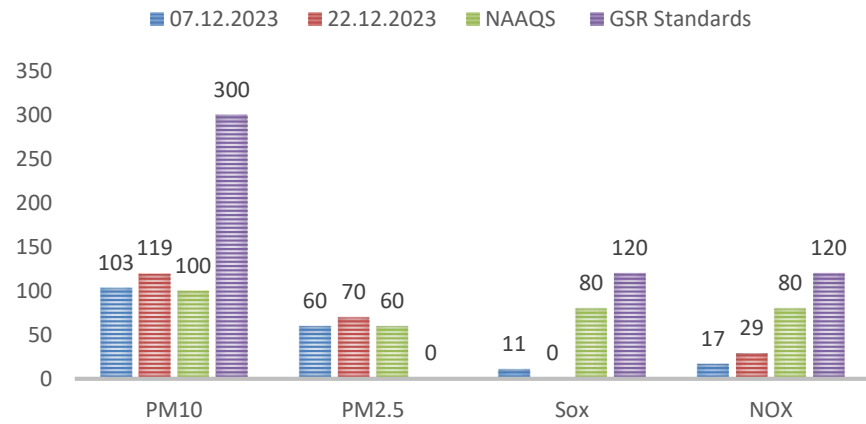
(Amit Raj Mishra)
Authorised Signatory

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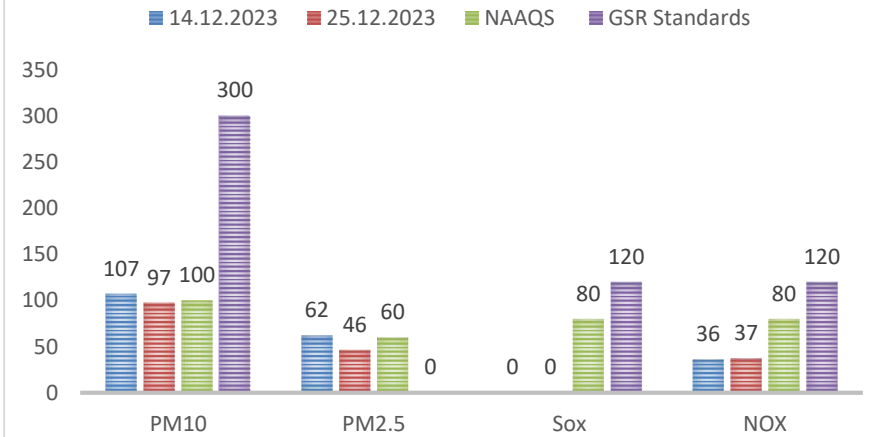
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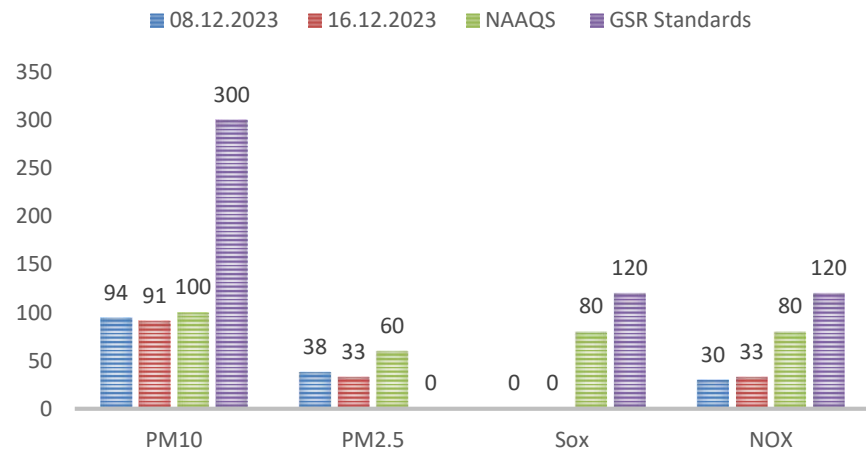
AMBIENT AIR QUALITY AT BLOCK II OCP



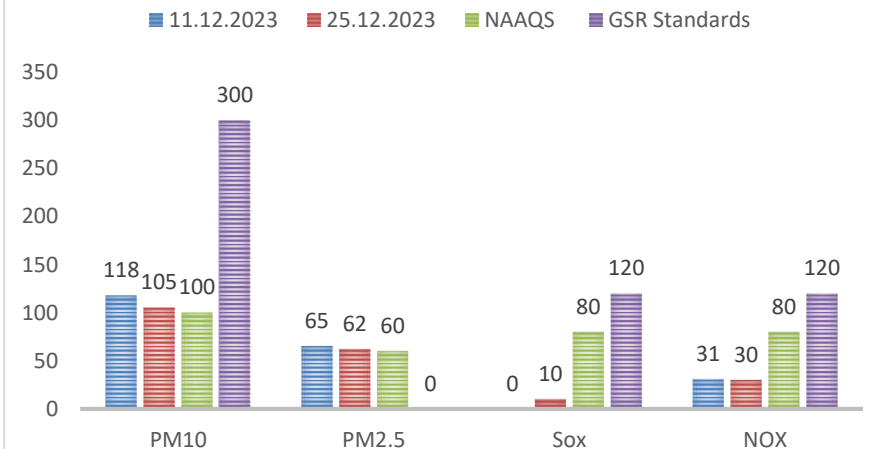
AMBIENT AIR QUALITY AT MURAIIDIH OCP



AMBIENT AIR QUALITY AT MADHUBAND WASHERY



AMBIENT AIR QUALITY AT MADHUBAND UGP



WATER QUALITY MONITORING

3.1 Location of sampling sites

(Refer **Plate No. – II**)

i) Mine Discharge of Block II (MW2)

A sampling point is fixed to assess the effluent quality of Mine discharge. This location is selected to monitor effluent discharge in to Khudia Nala.

3.2 Methodology of sampling and analysis

Water samples were collected as per standard practice. The effluent samples were collected and analyzed for four parameters on fortnightly basis at the Environmental Laboratory of CMPDI RI-II, Dhanbad.

3.3 Results & Interpretations

The results are given in tabular form along with the applicable standards. Results are compared with Schedule - VI, effluent prescribed by MoEF&CC. Results show that most of the parameters are within the permissible limits.



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
MINE EFFLUENT TEST REPORT

CMPDI, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Test Report for Mine Effluent samples

Month & Year	12/2023	Cluster	Cluster II		ULR No.		TC1012223000000407F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	24.02.2024	
Project	Block II	Sampling Ref. No.	REM/BCCL/2023/12		Sampling Method		IS 3025 (Part-1)	CMPDI/RI-II/LPM 13
Sampling Stations	(i)	Block II	Sample Collected in 2.5 Ltr Jerricane , Color as observed is transparent			Period of Analysis	01.12.2023 TO 28.12.2023	
			Date of Sampling		11.12.2023	25.12.2023		
Sl. No.	Parameter	Method of Analysis	Observed Values		STANDARDS FOR COAL MINES (Stipulated by Ministry of Environment and Forests (MoEF), Vide Notification No. GSR 742(E), Dt: 25.09.2000)	LDL		
			First Fortnight	Second Fortnight				
1	Total Suspended Solids	IS 3025/17:1984, R :2017, Gravimetric	39	44	100 (Max)	10		
2	pH	IS-3025/11:1983, R-2017, Electrometric	7.78	7.48	5.5 - 9.0	0.2		
3	Oil & Grease	IS 3025/39:1991, R : 2019, Partition Gravimetric	<2.0	<2.0	10 (Max)	2		
4	COD	APHA 23rd Edition 5220 C Titrimetric Method	28	32	250 (Max)	4		

***Grab sampling carried out for water samples. **All units in mg/L unless specified otherwise *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,*

ANALYSED BY

(Kumar Vaibhav)

REVIEWED BY

(Amit Raj Mishra)

Authorised Signatory

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NOISE LEVEL QUALITY MONITORING

4.1 Location of sampling sites

- i) **Block II OCP (N4)**
- ii) **Muraidih OCP (N5)**
- iii) **Madhuband Washery (N3)**
- iv) **Madhuband UGP (N33)**

4.2 Methodology of sampling and analysis

Noise level measurements in form of ' L_{EQ} ' were taken using Integrated Data Logging Sound Level Meter during day time & night time. Noise levels were measured for the complete day & night time, the Intergration time taken was one hour or 3600 seconds. Noise levels were measured in Decibels, 'A' weighted average, i.e. dB (A).

4.2 Results & Interpretations

Ambient noise levels were recorded during day time & night time and the observed values were compared with standards prescribed by MoEF&CC. The results of Noise levels recorded during day & night time on fortnightly basis are presented in tabular form along with the applicable standard permissible limits. The observed values in terms of L_{EQ} are presented. The observed values at all the monitoring locations are found to be within permissible limits.



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CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Noise Level Test Report

Month & Year	12/2023	Cluster	Cluster II					ULR No.	TC1012223000000423F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)							Date of Issue	24.02.2024	
Project	Block II OCP		Sample Ref. No.		REM/BCCL/2023/12		Sampling Method		CMPDI/RI-II/LPM 22	
				Date of Sampling	07.12.2023	22.12.2023	Zone Category of Station:		Core Zone	
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards		
			First Fortnight	Second Fortnight				Zones	Limits in dB	
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	50	48.3	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50	
2		07:00 - 08:00	49.2	49						
3		08:00 - 09:00	50.2	51.2						
4		09:00 - 10:00	51.3	52.2						
5		10:00 - 11:00	53.8	54.4						
6		11:00 - 12:00	54.4	54.7						
7		12:00 - 13:00	56.5	58.1						
8		13:00 - 14:00	61.5	63.4						
9		14:00 - 15:00	63.8	65.7						
10		15:00 - 16:00	60.9	62.6						
11		16:00 - 17:00	61.6	63.8						
12		17:00 - 18:00	63.8	67.7						
13		18:00 - 19:00	66	64.9						
14		19:00 - 20:00	63.8	63.3						
15		20:00 - 21:00	61.5	62.2						
16		21:00 - 22:00	60.2	59.2						
		Leq DAY	60.8	62.0						
1	Noise Level dB(A)Leq -Night	22:00-23:00	57.6	55.1	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50	
2		23:00- 00:00	57.2	54.7						
3		00:00- 01:00	50.4	51.2						
4		01:00-02:00	50.1	50.2						
5		02:00-03:00	49.4	49.1						
6		03:00-04:00	50.7	51.3						
7		04:00-05:00	51.1	51.2						
8		05:00-06:00	51.8	52.3						
		Leq NIGHT	53.5	52.3						

*LDL indicates Lower Detection Limit

**All noise measurements are integrated for a 01 hour period, All units in dB(A)

Sampling Assistants
ANALYSED BY

(Gaurav Kant)
REVIEWED BY

Raj Mishra)
Authorised Signatory

(Amit

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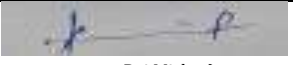
   CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850									
Month & Year	12/2023	Cluster	Cluster II				ULR No.	TC1012223000000423F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	24.02.2024	
Project	Muraidih OCP	Sample Ref. No.	REM/BCCL/2023/12		Sampling Method	CMPDI/RI-II/LPM 22			
SL. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
								Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	45.7	46.2	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	46.8	48.7					
3		08:00 - 09:00	51.9	51.3					
4		09:00 - 10:00	53	53.7					
5		10:00 - 11:00	53.8	54.3					
6		11:00 - 12:00	56.4	56.2					
7		12:00 - 13:00	57.5	58.4					
8		13:00 - 14:00	52.7	53.5					
9		14:00 - 15:00	53.8	54.3					
10		15:00 - 16:00	56.4	57.5					
11		16:00 - 17:00	51	50					
12		17:00 - 18:00	46.7	46.7					
13		18:00 - 19:00	45.1	45					
14		19:00 - 20:00	45.7	45.3					
15		20:00 - 21:00	45	45.1					
16		21:00 - 22:00	44.8	43.9					
		Leq DAY	52.5	53.0					
1	Noise Level dB(A)Leq -Night	22:00-23:00	42.2	41.7	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	41.8	40					
3		00:00- 01:00	41.4	39.2					
4		01:00-02:00	41.3	39					
5		02:00-03:00	40.9	38.9					
6		03:00-04:00	40.4	39.6					
7		04:00-05:00	42	41.3					
8		05:00-06:00	42	41.9					
		Leq NIGHT	41.5	40.4					

*LDL indicates Lower Detection Limit

**All noise measurements are integrated for a 01 hour period, All units in dB(A)

Sampling Assistants
ANALYSED BY


 (Gaurav Kant)
REVIEWED BY


 Raj Mishra)
Authorised Signatory

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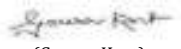
  CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in									
Month & Year	12/2023	Cluster	Cluster II				ULR No.	TC1012223000000423F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	24.02.2024	
Project	Madhuband Washery		Sample Ref. No.	REM/BCCL/2023/12		Sampling Method	CMPDI/RI-II/LPM 22		
				Date of Sampling	08.12.2023	16.12.2023	Zone Category of Station:	Buffer Zone	
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
			First Fortnight	Second Fortnight				Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	65.7	65.9	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	53.2	50.1					
3		08:00 - 09:00	51.9	47.3					
4		09:00 - 10:00	67.8	70.5					
5		10:00 - 11:00	59.9	56.5					
6		11:00 - 12:00	53.8	53.8					
7		12:00 - 13:00	61.4	63.5					
8		13:00 - 14:00	60.9	59.8					
9		14:00 - 15:00	60.6	61.4					
10		15:00 - 16:00	57.2	57.9					
11		16:00 - 17:00	64.3	65.7					
12		17:00 - 18:00	50.5	49.4					
13		18:00 - 19:00	59.5	60.3					
14		19:00 - 20:00	64.3	65.3					
15		20:00 - 21:00	60.8	61.2					
16		21:00 - 22:00	59.5	60.6					
		Leq DAY	61.8	63.0					
1	Noise Level dB(A)Leq - Night	22:00-23:00	56.3	57.2	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	56.1	56.2					
3		00:00- 01:00	55.7	55.9					
4		01:00-02:00	55.3	55.6					
5		02:00-03:00	55.1	54.4					
6		03:00-04:00	54.1	54.2					
7		04:00-05:00	54.2	54.2					
8		05:00-06:00	54.4	55.3					
		Leq NIGHT	55.2	55.5					

*LDL indicates Lower Detection Limit

**All noise measurements are integrated for a 01 hour period, All units in dB(A)

Sampling Assistants

ANALYSED BY



(Gaurav Kant)

REVIEWED BY



(Amit)

Raj Mishra)

Authorised Signatory

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  cmpdi <i>A Mine Rules Company</i> CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDI, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in									
Month & Year	12/2023	Cluster	Cluster II				ULR No.	TC1012223000000423F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	24.02.2024	
Project	Madhuband UGP		Sample Ref. No.	REM/BCCL/2023/12		Sampling Method	CMPDI/RI-II/LPM 22		
s			Date of Sampling	11.12.2023	25.12.2023	Zone Category of Station:	Buffer Zone		
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
								Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	41.4	42	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	44.2	43.5					
3		08:00 - 09:00	47.6	48					
4		09:00 - 10:00	48.8	48.6					
5		10:00 - 11:00	48.6	48.7					
6		11:00 - 12:00	48.3	48					
7		12:00 - 13:00	49.2	48.9					
8		13:00 - 14:00	52.6	56.3					
9		14:00 - 15:00	53.8	53.8					
10		15:00 - 16:00	54.4	51					
11		16:00 - 17:00	47.2	47.3					
12		17:00 - 18:00	46.1	46					
13		18:00 - 19:00	45.6	45.4					
14		19:00 - 20:00	45.3	44.9					
15		20:00 - 21:00	45.1	44.5					
16		21:00 - 22:00	43.9	44.1					
		Leq DAY	49.1	49.4					
1	Noise Level dB(A)Leq -Night	22:00-23:00	41.5	42	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	41.4	42.1					
3		00:00- 01:00	41.3	41.4					
4		01:00-02:00	40.6	41					
5		02:00-03:00	40.3	40.8					
6		03:00-04:00	41.7	42					
7		04:00-05:00	42	42.2					
8		05:00-06:00	42.3	42.1					
		Leq NIGHT	41.4	41.7					

*LDL indicates Lower Detection Limit

**All noise measurements are integrated for a 01 hour period, All units in dB(A)

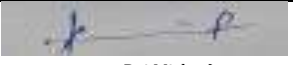
Sampling Assistants

ANALYSED BY



(Gaurav Kant)

REVIEWED BY



(Amit)

Raj Mishra)

Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

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AMBIENT AIR QUALITY MONITORING

2.1 Location of sampling station and their rationale:

(As per G.S.R. 742 (E) dt. 25th December, 2000)

2.1.1 Ambient Air Quality Sampling Locations

I. CORE ZONE Monitoring Location

i) Block II OCP (A4): Industrial Area

The location of the sampling station is 23°47'2.00"N & 86°11'15.00"E. The sampler was placed at an elevated platform of approx. height 1.5m above ground level near water treatment plant of Block II OCP.

ii) Muraidih OCP (A5): Industrial Area

The sampler was placed at a height of 1.5 m from the ground level at Muraidih project office.

II. BUFFER ZONE Monitoring Location

i) Madhuband Washery (A3) : Industrial area

The location of the sampling station is at 23°47'24.01"N & 86°11'32.00"E in the Washery premises. The sampler was placed at a height of approx. 1.5m above ground level.

ii) Madhuband UGP (A33) : Industrial area

The location of the sampling station is at 23°46'5.60"N & 86°12'27.50"E at the Project office. The sampler was placed at a height of approx. 1.5m above ground level near the project office.

AMBIENT AIR QUALITY DATA

  		CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Air Quality Test Report				CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in		
Test Report for Ambient Air Samples								
Month & Year	11/2023	Cluster	Cluster II			ULR No.	TC1012223000000325F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	24.11.2024	
Project	Block II OCP	Sample Ref. No.	REM/BCCL/2023/11	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)		
Date of Sampling	02.11.2023	29.11.2023	Period of Analysis	02.11.2023	31.12.2023	Zone of Station:	Core Zone	
Sl. No.	Parameter	Method Analysis of	Observed Values (in $\mu\text{g}/\text{m}^3$)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
			1st FN	2nd FN				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	108	135	10 $\mu\text{g}/\text{m}^3$ - 1000 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	300	100
2	PM _{2.5}	IS -5182(Part 24):2019	54	72	10 $\mu\text{g}/\text{m}^3$ - 400 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 $\mu\text{g}/\text{m}^3$ - 1050 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	20	19	06 $\mu\text{g}/\text{m}^3$ - 420 $\mu\text{g}/\text{m}^3$	06 $\mu\text{g}/\text{m}^3$	120	80
<i>**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average, * LDL indicates Lower Detection Limit,</i>								
 ANALYSED BY			 REVIEWED BY			 Authorised Signatory		
Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.								
---- End of Report ----								



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Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

Test Report for Ambient Air Samples

Month & Year		11/2023	Cluster	Cluster II			ULR No.	TC1012223000000325F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	24.01.2024	
Project		Muraidih OCP		Sample Ref. No.	REM/BCCL/2023/11	Sampling Method	CMPDI/RI-II/LPM 11 , (IS 5182)		
Date of Sampling		04.11.2023		17.11.2023	Period of Analysis	04.11.2023	31.12.2023	Zone of Station:	Core Zone
Sl. No.	Parameter	Method of Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN	2nd FN					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	103	93	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	57	48	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	28	29	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,

ANALYSED BY

(Gaurav Kant)
REVIEWED BY

(Amit Raj Mishra)
Authorised Signatory

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Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

CMPDIL, RI-II
KOYLA BHAWAN COMPLEX
DHANBAD. -826005
Phone:0326-223-850
email: rdri2cmpdi@coalindia.in

Test Report for Ambient Air Samples

Month & Year		11/2023	Cluster	Cluster II			ULR No.	TC1012223000000325F
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	24.11.2024
Project		Madhuband Washery	Sample Ref. No.	REM/BCCL/2023/11	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		03.11.2023	24.11.2023	Period of Analysis	03.11.2023	31.12.2023	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method Analysis of	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
			1st FN	2nd FN				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	93	88	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100
2	PM _{2.5}	IS -5182(Part 24):2019	49	42	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	12	12	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	34	32	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80

****All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average * LDL indicates Lower Detection Limit,**


ANALYSED BY

(Gaurav Kant)
REVIEWED BY


(Amit Raj Mishra)
Authorised Signatory

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Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

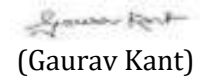
CMPDIL, RI-II
KOYLA BHAWAN COMPLEX
DHANBAD. -826005
Phone:0326-223-850
email: rdri2cmpdi@coalindia.in

Test Report for Ambient Air Samples

Month & Year		11/2023	Cluster	Cluster II			ULR No.	TC1012223000000325F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	24.11.2024	
Project		Madhuband UGP		Sample Ref. No.	REM/BCCL/2023/11	Sampling Method	CMPDI/RI-II/LPM 11 , (IS 5182)		
Date of Sampling		03.11.2023		25.11.2023	Period of Analysis	03.11.2023	31.12.2023	Zone of Station:	Buffer Zone
Sl. N o.	Parameter	Method Analysis of	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN	2nd FN					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	141	108	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	76	61	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	19	20	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

****All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average * LDL indicates Lower Detection Limit,**


ANALYSED BY


(Gaurav Kant)
REVIEWED BY

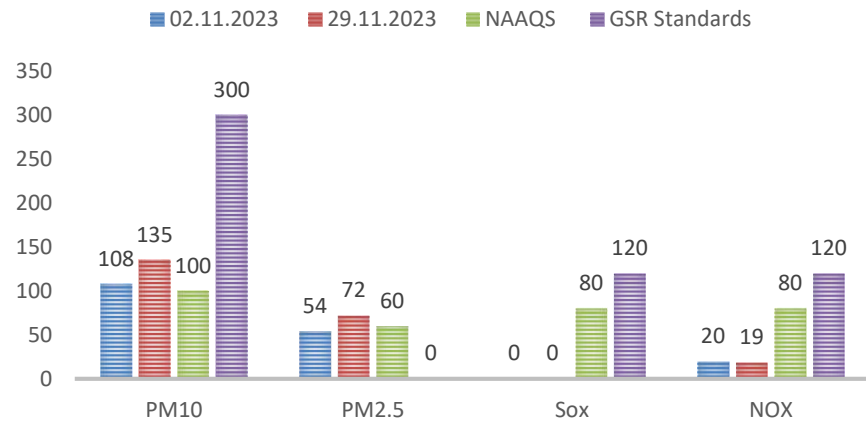

(Amit Raj Mishra)
Authorised Signatory

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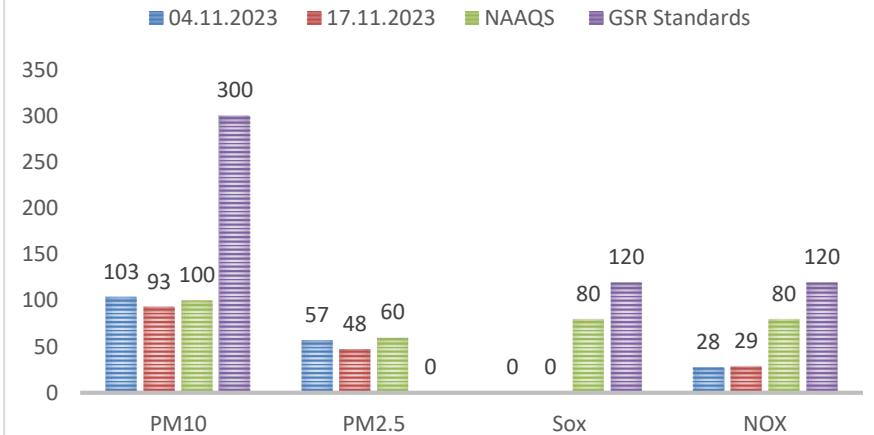
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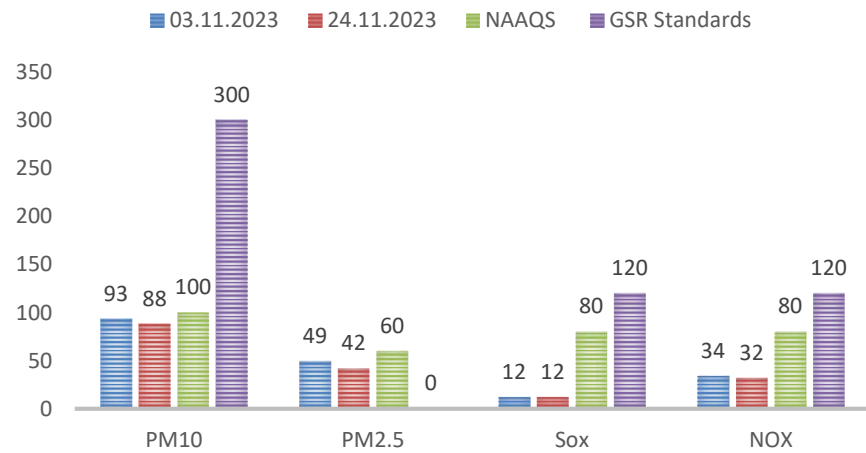
AMBIENT AIR QUALITY AT BLOCK II OCP



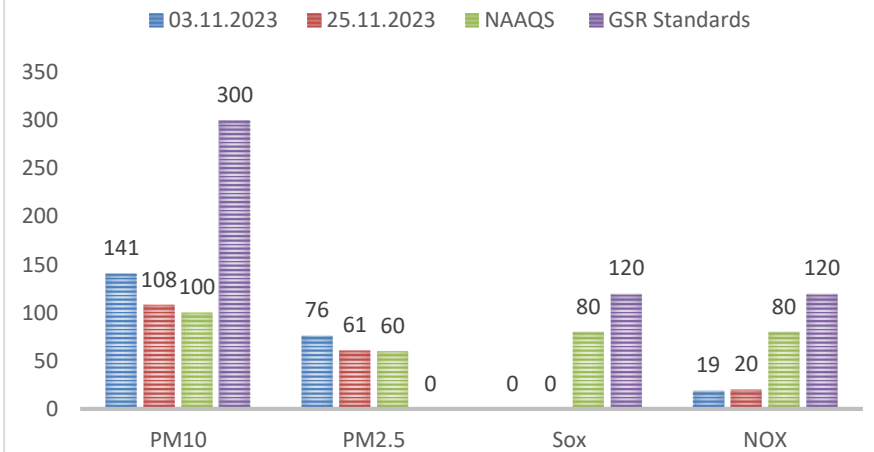
AMBIENT AIR QUALITY AT MURAIIDIH OCP



AMBIENT AIR QUALITY AT MADHUBAND WASHERY



AMBIENT AIR QUALITY AT MADHUBAND UGP



WATER QUALITY MONITORING

3.1 Location of sampling sites

(Refer **Plate No. – II**)

i) Mine Discharge of Block II (MW2)

A sampling point is fixed to assess the effluent quality of Mine discharge. This location is selected to monitor effluent discharge in to Khudia Nala.

3.2 Methodology of sampling and analysis

Water samples were collected as per standard practice. The effluent samples were collected and analyzed for four parameters on fortnightly basis at the Environmental Laboratory of CMPDI RI-II, Dhanbad.

3.3 Results & Interpretations

The results are given in tabular form along with the applicable standards. Results are compared with Schedule - VI, effluent prescribed by MoEF&CC. Results show that most of the parameters are within the permissible limits.



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
MINE EFFLUENT TEST REPORT

CMPDI, RI-II
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 Phone:0326-223-850
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Test Report for Mine Effluent samples

Month & Year	11/2023	Cluster	Cluster II		ULR No.		TC1012223000000343F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	24.11.2024	
Project	Block II	Sampling Ref. No.	REM/BCCL/2023/11		Sampling Method		IS 3025 (Part-1)	CMPDI/RI-II/LPM 13
Sampling Stations	(i)	Block II	Sample Collected in 2.5 Ltr Jerricane , Color as observed is transparent			Period of Analysis	06.11.2023 TO 30.11.2023	
			Date of Sampling		06.11.2023			
Sl. No.	Parameter	Method of Analysis	Observed Values		STANDARDS FOR COAL MINES (Stipulated by Ministry of Environment and Forests (MoEF), Vide Notification No. GSR 742(E), Dt: 25.09.2000)	LDL		
			First Fortnight	Second Fortnight				
1	Total Suspended Solids	IS 3025/17:1984, R :2017, Gravimetric	41	44	100 (Max)	10		
2	pH	IS-3025/11:1983, R-2017, Electrometric	8.06	8.04	5.5 - 9.0	0.2		
3	Oil & Grease	IS 3025/39:1991, R : 2019, Partition Gravimetric	<2.0	<2.0	10 (Max)	2		
4	COD	APHA 23rd Edition 5220 C Titrimetric Method	44	48	250 (Max)	4		

***Grab sampling carried out for water samples. **All units in mg/L unless specified otherwise *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,*

ANALYSED BY

(Kumar Vaibhav)

REVIEWED BY

(Amit Raj Mishra)

Authorised Signatory

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NOISE LEVEL QUALITY MONITORING

4.1 Location of sampling sites

- i) **Block II OCP (N4)**
- ii) **Muraidih OCP (N5)**
- iii) **Madhuband Washery (N3)**
- iv) **Madhuband UGP (N33)**

4.2 Methodology of sampling and analysis

Noise level measurements in form of ' L_{EQ} ' were taken using Integrated Data Logging Sound Level Meter during day time & night time. Noise levels were measured for the complete day & night time, the Intergration time taken was one hour or 3600 seconds. Noise levels were measured in Decibels, 'A' weighted average, i.e. dB (A).

4.2 Results & Interpretations

Ambient noise levels were recorded during day time & night time and the observed values were compared with standards prescribed by MoEF&CC. The results of Noise levels recorded during day & night time on fortnightly basis are presented in tabular form along with the applicable standard permissible limits. The observed values in terms of L_{EQ} are presented. The observed values at all the monitoring locations are found to be within permissible limits.



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CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Noise Level Test Report

Month & Year	11/2023	Cluster	Cluster II					ULR No.	TC1012223000000359F
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)							Date of Issue	24.11.2024
Project	Block II OCP		Sample Ref. No.		REM/BCCL/2023/11		Sampling Method		CMPDI/RI-II/LPM 22
				Date of Sampling	02.11.2023	29.11.2023	Zone Category of Station:		Core Zone
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
			First Fortnight	Second Fortnight				Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	48	46.4	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	47.3	47.1					
3		08:00 - 09:00	48.2	49.1					
4		09:00 – 10:00	49.2	50.1					
5		10:00 - 11:00	51.7	52.2					
6		11:00 - 12:00	52.2	52.5					
7		12:00 - 13:00	54.2	55.8					
8		13:00 - 14:00	59.1	60.8					
9		14:00 - 15:00	61.2	63.1					
10		15:00 - 16:00	58.5	60.1					
11		16:00 - 17:00	59.2	61.2					
12		17:00 - 18:00	61.2	65					
13		18:00 - 19:00	63.4	62.3					
14		19:00 - 20:00	61.2	60.7					
15		20:00 - 21:00	59.1	59.7					
16		21:00 - 22:00	57.8	56.8					
		Leq DAY	58.3	59.4					
1	Noise Level dB(A)Leq -Night	22:00-23:00	59.2	56.6	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	58.8	56.2					
3		00:00- 01:00	51.8	52.6					
4		01.00-02.00	51.5	51.6					
5		02.00-03.00	50.8	50.4					
6		03.00-04.00	52.1	52.7					
7		04.00-05.00	52.5	52.6					
8		05:00-06:00	53.3	53.8					
		Leq NIGHT	55.0	53.8					

*LDL indicates Lower Detection Limit

**All noise measurements are integrated for a 01 hour period, All units in dB(A)

Sampling Assistants
ANALYSED BY

(Gaurav Kant)
REVIEWED BY

Raj Mishra)
Authorised Signatory

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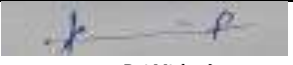
   CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850									
Month & Year	11/2023	Cluster	Cluster II				ULR No.	TC1012223000000359F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	24.01.2024	
Project	Muraidih OCP	Sample Ref. No.	REM/BCCL/2023/11			Sampling Method	CMPDI/RI-II/LPM 22		
SL. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
								Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	43.8	44.3	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	44.9	46.8					
3		08:00 - 09:00	49.8	49.2					
4		09:00 - 10:00	50.9	51.6					
5		10:00 - 11:00	51.7	52.1					
6		11:00 - 12:00	54.1	54					
7		12:00 - 13:00	55.2	56.1					
8		13:00 - 14:00	50.6	51.4					
9		14:00 - 15:00	51.7	52.1					
10		15:00 - 16:00	54.1	55.2					
11		16:00 - 17:00	48.9	48					
12		17:00 - 18:00	44.8	44.8					
13		18:00 - 19:00	43.3	43.2					
14		19:00 - 20:00	43.8	43.5					
15		20:00 - 21:00	43.2	43.3					
16		21:00 - 22:00	43	42.2					
		Leq DAY	50.3	50.8					
1	Noise Level dB(A)Leq -Night	22:00-23:00	43.3	42.8	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	42.9	41.1					
3		00:00- 01:00	42.5	40.3					
4		01:00-02:00	42.4	40.1					
5		02:00-03:00	42	40					
6		03:00-04:00	41.5	40.7					
7		04:00-05:00	43.1	42.4					
8		05:00-06:00	43.1	43					
		Leq NIGHT	42.6	41.5					

*LDL indicates Lower Detection Limit

**All noise measurements are integrated for a 01 hour period, All units in dB(A)

Sampling Assistants
ANALYSED BY


 (Gaurav Kant)
REVIEWED BY


 Raj Mishra)
Authorised Signatory

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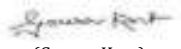
  CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in									
Month & Year	11/2023	Cluster	Cluster II				ULR No.	TC1012223000000359F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	24.11.2024	
Project	Madhuband Washery		Sample Ref. No.	REM/BCCL/2023/11		Sampling Method	CMPDI/RI-II/LPM 22		
			Date of Sampling	03.11.2023	24.11.2023	Zone Category of Station:	Buffer Zone		
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
								Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	63.1	63.3	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	51.1	48.1					
3		08:00 - 09:00	49.8	45.4					
4		09:00 - 10:00	65.1	67.7					
5		10:00 - 11:00	57.5	54.2					
6		11:00 - 12:00	51.7	51.7					
7		12:00 - 13:00	59	60.9					
8		13:00 - 14:00	58.5	57.4					
9		14:00 - 15:00	58.2	59					
10		15:00 - 16:00	54.9	55.6					
11		16:00 - 17:00	61.7	63.1					
12		17:00 - 18:00	48.4	47.5					
13		18:00 - 19:00	57.1	57.9					
14		19:00 - 20:00	61.7	62.7					
15		20:00 - 21:00	58.4	58.8					
16		21:00 - 22:00	57.1	58.2					
		Leq DAY	59.2	60.4					
1	Noise Level dB(A)Leq - Night	22:00-23:00	57.9	58.8	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	57.7	57.8					
3		00:00- 01:00	57.2	57.5					
4		01:00-02:00	56.8	57.1					
5		02:00-03:00	56.6	55.9					
6		03:00-04:00	55.6	55.7					
7		04:00-05:00	55.7	55.7					
8		05:00-06:00	55.9	56.8					
		Leq NIGHT	56.8	57.0					

*LDL indicates Lower Detection Limit

**All noise measurements are integrated for a 01 hour period, All units in dB(A)

Sampling Assistants

ANALYSED BY



(Gaurav Kant)

REVIEWED BY



(Amit)

Raj Mishra)

Authorised Signatory

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  cmpdi <i>A Mine Rules Company</i> CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDI, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in									
Month & Year	11/2023	Cluster	Cluster II				ULR No.	TC1012223000000359F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	24.11.2024	
Project	Madhuband UGP		Sample Ref. No.	REM/BCCL/2023/11		Sampling Method	CMPDI/RI-II/LPM 22		
s			Date of Sampling	03.11.2023	25.11.2023	Zone Category of Station:	Buffer Zone		
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
								Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	39.7	40.3	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	42.5	41.8					
3		08:00 - 09:00	45.7	46.1					
4		09:00 - 10:00	46.9	46.7					
5		10:00 - 11:00	46.7	46.8					
6		11:00 - 12:00	46.4	46.1					
7		12:00 - 13:00	47.3	47					
8		13:00 - 14:00	50.5	54					
9		14:00 - 15:00	51.7	51.7					
10		15:00 - 16:00	52.2	48.9					
11		16:00 - 17:00	45.3	45.4					
12		17:00 - 18:00	44.2	44.1					
13		18:00 - 19:00	43.7	43.6					
14		19:00 - 20:00	43.5	43.1					
15		20:00 - 21:00	43.3	42.7					
16		21:00 - 22:00	42.2	42.4					
		Leq DAY	47.1	47.3					
1	Noise Level dB(A)Leq -Night	22:00-23:00	42.6	43.1	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	42.5	43.2					
3		00:00- 01:00	42.4	42.5					
4		01:00-02:00	41.7	42.1					
5		02:00-03:00	41.4	41.9					
6		03:00-04:00	42.8	43.1					
7		04:00-05:00	43.1	43.3					
8		05:00-06:00	43.4	43.2					
		Leq NIGHT	42.5	42.8					

*LDL indicates Lower Detection Limit

**All noise measurements are integrated for a 01 hour period, All units in dB(A)

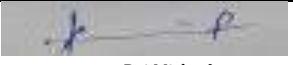
Sampling Assistants

ANALYSED BY



(Gaurav Kant)

REVIEWED BY



(Amit)

Raj Mishra)

Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

---- End of Report ----

AMBIENT AIR QUALITY MONITORING

2.1 Location of sampling station and their rationale:

(As per G.S.R. 742 (E) dt. 25th December, 2000)

2.1.1 Ambient Air Quality Sampling Locations

I. CORE ZONE Monitoring Location

i) Block II OCP (A4): Industrial Area

The location of the sampling station is 23°47'2.00"N & 86°11'15.00"E. The sampler was placed at an elevated platform of approx. height 1.5m above ground level near water treatment plant of Block II OCP.

ii) Muraidih OCP (A5): Industrial Area

The sampler was placed at a height of 1.5 m from the ground level at Muraidih project office.

II. BUFFER ZONE Monitoring Location

i) Madhuband Washery (A3) : Industrial area

The location of the sampling station is at 23°47'24.01"N & 86°11'32.00"E in the Washery premises. The sampler was placed at a height of approx. 1.5m above ground level.

ii) Madhuband UGP (A33) : Industrial area

The location of the sampling station is at 23°46'5.60"N & 86°12'27.50"E at the Project office. The sampler was placed at a height of approx. 1.5m above ground level near the project office.

AMBIENT AIR QUALITY DATA



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Ambient Air Quality Test Report

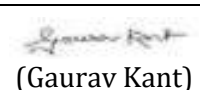
CMPDIL, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Test Report for Ambient Air Samples

Month & Year		10/2023	Cluster	Cluster II			ULR No.	TC1012223000000273F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	11.12.2023	
Project		Block II OCP		Sample Ref. No.	REM/BCCL/2023/10	Sampling Method	CMPDI/RI-II/LPM 11 , (IS 5182)		
Date of Sampling		10.10.23 to 23.10.23			Period of Analysis	10.10.23	28.11.23	Zone of Station:	Core Zone
Sl. No.	Parameter	Method Analysis	of	Observed Values (in $\mu\text{g}/\text{m}^3$)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
				1st FN	2nd FN				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017		87	91	10 $\mu\text{g}/\text{m}^3$ - 1000 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	300	100
2	PM _{2.5}	IS -5182(Part 24):2019		49	53	10 $\mu\text{g}/\text{m}^3$ - 400 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017		10	<10	10 $\mu\text{g}/\text{m}^3$ - 1050 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017		25	24	06 $\mu\text{g}/\text{m}^3$ - 420 $\mu\text{g}/\text{m}^3$	06 $\mu\text{g}/\text{m}^3$	120	80

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average, * LDL indicates Lower Detection Limit,


 ANALYSED BY


 (Gaurav Kant)
 REVIEWED BY


 (Amit Raj Mishra)
 Authorised Signatory

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Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

CMPDIL, RI-II
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Test Report for Ambient Air Samples

Month & Year		10/2023	Cluster	Cluster II			ULR No.	TC1012223000000273F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	11.12.2023	
Project		Muraidih OCP		Sample Ref. No.	REM/BCCL/2023/10	Sampling Method	CMPDI/RI-II/LPM 11 , (IS 5182)		
Date of Sampling		03.10.23		20.10.23	Period of Analysis	03.10.23	28.11.23	Zone of Station:	Core Zone
Sl. No.	Parameter	Method Analysis	of	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
				1st FN	2nd FN				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017		94	86	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100
2	PM _{2.5}	IS -5182(Part 24):2019		56	48	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017		12	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017		23	25	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,

ANALYSED BY

(Gaurav Kant)
REVIEWED BY

(Amit Raj Mishra)
Authorised Signatory

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Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

CMPDIL, RI-II
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email: rdri2cmpdi@coalindia.in

Test Report for Ambient Air Samples

Month & Year		10/2023	Cluster	Cluster II			ULR No.	TC1012223000000273F
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	11.12.2023
Project		Madhuband Washery	Sample Ref. No.	REM/BCCL/2023/10	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		10.10.23	23.10.23	Period of Analysis	10.10.23	28.11.23	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method Analysis of	Observed Values (in $\mu\text{g}/\text{m}^3$)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
			1st FN	2nd FN				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	95	87	10 $\mu\text{g}/\text{m}^3$ - 1000 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	300	100
2	PM _{2.5}	IS -5182(Part 24):2019	57	53	10 $\mu\text{g}/\text{m}^3$ - 400 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	15	11	10 $\mu\text{g}/\text{m}^3$ - 1050 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	23	20	06 $\mu\text{g}/\text{m}^3$ - 420 $\mu\text{g}/\text{m}^3$	06 $\mu\text{g}/\text{m}^3$	120	80

****All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average * LDL indicates Lower Detection Limit,**

ANALYSED BY

(Gaurav Kant)
REVIEWED BY

(Amit Raj Mishra)
Authorised Signatory

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Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

CMPDIL, RI-II
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email: rdri2cmpdi@coalindia.in

Test Report for Ambient Air Samples

Month & Year		10/2023	Cluster	Cluster II			ULR No.	TC1012223000000273F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	11.12.2023	
Project		Madhuband UGP		Sample Ref. No.	REM/BCCL/2023/10	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		05.10.23		18.10.23	Period of Analysis	05.10.23	28.11.2023	Zone of Station:	Buffer Zone
Sl. No .	Parameter	Method of Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN	2nd FN					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	93	98	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	53	56	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	11	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	22	25	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

****All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average * LDL indicates Lower Detection Limit,**

[Signature]

ANALYSED BY

[Signature]

(Gaurav Kant)
REVIEWED BY

[Signature]

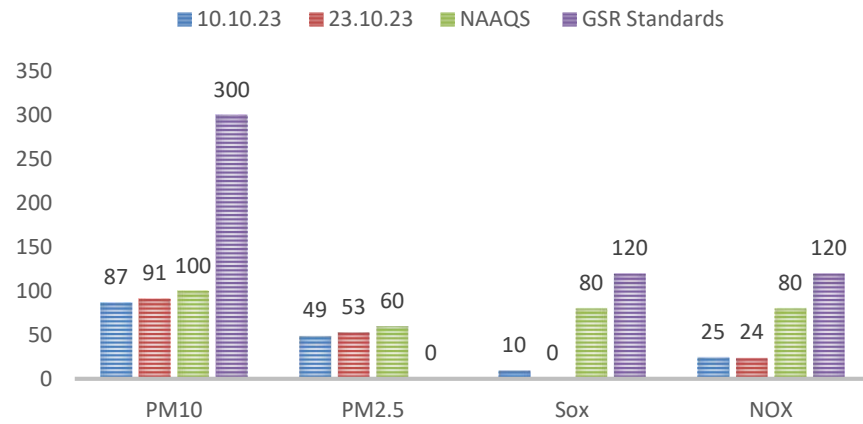
(Amit Raj Mishra)
Authorised Signatory

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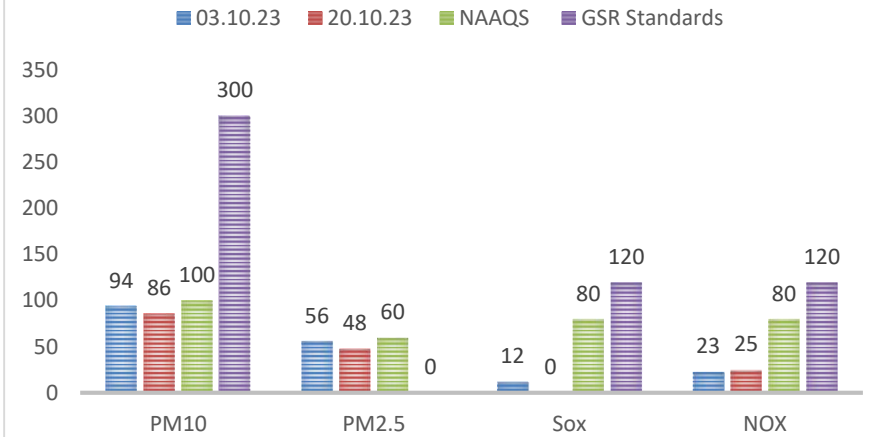
---- End of Report ----

Page -1 of 1

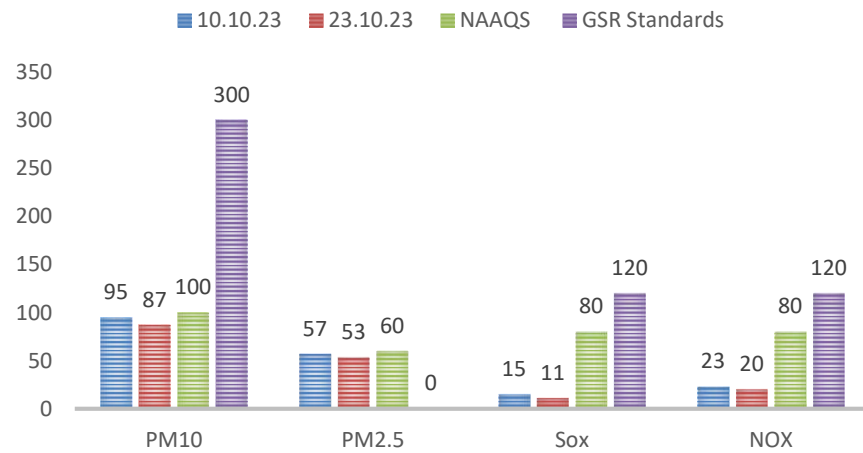
AMBIENT AIR QUALITY AT BLOCK II OCP



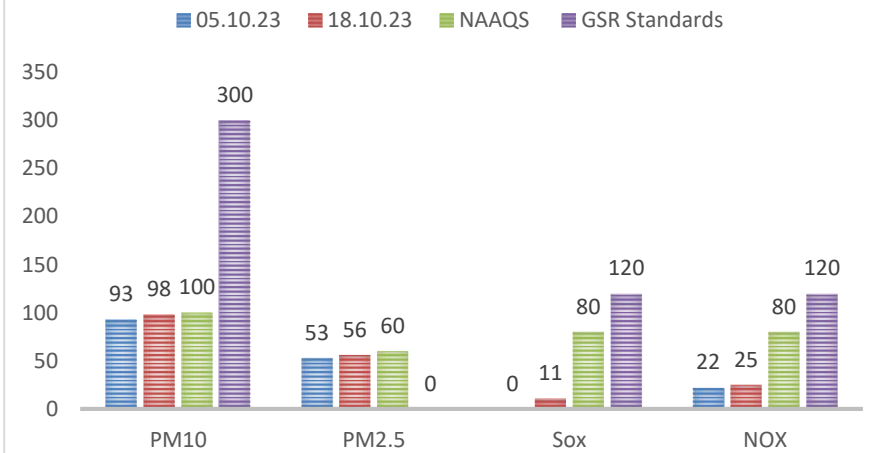
AMBIENT AIR QUALITY AT MURAIIDIH OCP



AMBIENT AIR QUALITY AT MADHUBAND WASHERY



AMBIENT AIR QUALITY AT MADHUBAND UGP



WATER QUALITY MONITORING

3.1 Location of sampling sites

(Refer **Plate No. – II**)

i) Mine Discharge of Block II (MW2)

A sampling point is fixed to assess the effluent quality of Mine discharge. This location is selected to monitor effluent discharge in to Khudia Nala.

3.2 Methodology of sampling and analysis

Water samples were collected as per standard practice. The effluent samples were collected and analyzed for four parameters on fortnightly basis at the Environmental Laboratory of CMPDI RI-II, Dhanbad.

3.3 Results & Interpretations

The results are given in tabular form along with the applicable standards. Results are compared with Schedule - VI, effluent prescribed by MoEF&CC. Results show that most of the parameters are within the permissible limits.



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
MINE EFFLUENT TEST REPORT

CMPDI, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Test Report for Mine Effluent samples

Month & Year	10/2023	Cluster	Cluster II	ULR No.	TC1012223000000291F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)				Date of Issue	11.12.2023
Project	Block II	Sampling Ref. No.	REM/BCCL/2023/10	Sampling Method	IS 3025 (Part-1)	CMPDI/RI-II/LPM 13
Sampling Stations	(i)	Block II	Sample Collected in 2.5 Ltr Jerrycane, Color as observed is transparent		Period of Analysis	03.10.23 to 31.10.23
Sl. No.	Parameter	Method of Analysis	Date of Sampling		03.10.23	30.10.23
			Observed Values		STANDARDS FOR COAL MINES (Stipulated by Ministry of Environment and Forests (MoEF), Vide Notification No. GSR 742(E), Dt: 25.09.2000)	
			First Fortnight	Second Fortnight	LDL	
1	Total Suspended Solids	IS 3025/17:1984, R :2017, Gravimetric	37	39	100 (Max)	
2	pH	IS-3025/11:1983, R-2017, Electrometric	7.89	7.87	5.5 - 9.0	
3	Oil & Grease	IS 3025/39:1991, R : 2019, Partition Gravimetric	<2.0	<2.0	10 (Max)	
4	COD	APHA 23rd Edition 5220 C Titrimetric Method	28	28	250 (Max)	

***Grab sampling carried out for water samples. **All units in mg/L unless specified otherwise *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,*

ANALYSED BY

(Kumar Vaibhav)

REVIEWED BY

(Amit Raj Mishra)

Authorised Signatory

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NOISE LEVEL QUALITY MONITORING

4.1 Location of sampling sites

- i) **Block II OCP (N4)**
- ii) **Muraidih OCP (N5)**
- iii) **Madhuband Washery (N3)**
- iv) **Madhuband UGP (N33)**

4.2 Methodology of sampling and analysis

Noise level measurements in form of ' L_{EQ} ' were taken using Integrated Data Logging Sound Level Meter during day time & night time. Noise levels were measured for the complete day & night time, the Intergration time taken was one hour or 3600 seconds. Noise levels were measured in Decibels, 'A' weighted average, i.e. dB (A).

4.2 Results & Interpretations

Ambient noise levels were recorded during day time & night time and the observed values were compared with standards prescribed by MoEF&CC. The results of Noise levels recorded during day & night time on fortnightly basis are presented in tabular form along with the applicable standard permissible limits. The observed values in terms of L_{EQ} are presented. The observed values at all the monitoring locations are found to be within permissible limits.



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CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Noise Level Test Report

Month & Year	10/2023	Cluster	Cluster II					ULR No.	TC1012223000000307F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)							Date of Issue	11.12.2023	
Project	Block II OCP		Sample Ref. No.		REM/BCCL/2023/10		Sampling Method		CMPDI/RI-II/LPM 22	
				Date of Sampling		10.10.23	23.10.23	Zone Category of Station:		Core Zone
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards		
			First Fortnight	Second Fortnight				Zones	Limits in dB	
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	50.3	48.6	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50	
2		07:00 - 08:00	49.5	49.3						
3		08:00 - 09:00	50.5	51.5						
4		09:00 - 10:00	51.6	52.5						
5		10:00 - 11:00	54.2	54.7						
6		11:00 - 12:00	54.7	55						
7		12:00 - 13:00	56.8	58.5						
8		13:00 - 14:00	61.9	63.7						
9		14:00 - 15:00	64.2	66.1						
10		15:00 - 16:00	61.3	63						
11		16:00 - 17:00	62	64.2						
12		17:00 - 18:00	64.2	68.1						
13		18:00 - 19:00	66.4	65.3						
14		19:00 - 20:00	64.2	63.6						
15		20:00 - 21:00	61.9	62.6						
16		21:00 - 22:00	60.6	59.5						
		Leq DAY	61.2	62.4						
1	Noise Level dB(A)Leq -Night	22:00-23:00	57	54.5	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50	
2		23:00- 00:00	56.6	54.1						
3		00:00- 01:00	49.9	50.7						
4		01:00-02:00	49.6	49.7						
5		02:00-03:00	48.9	48.5						
6		03:00-04:00	50.2	50.8						
7		04:00-05:00	50.6	50.7						
8		05:00-06:00	51.3	51.8						
		Leq NIGHT	53.0	51.8						

*LDL indicates Lower Detection Limit

**All noise measurements are integrated for a 01 hour period, All units in dB(A)

Sampling Assistants
ANALYSED BY

(Gaurav Kant)
REVIEWED BY

(Amit)
Raj Mishra)
Authorised Signatory

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   CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850									
Month & Year	10/2023	Cluster	Cluster II				ULR No.	TC1012223000000307F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	11.12.2023	
Project	Muraidih OCP	Sample Ref. No.	REM/BCCL/2023/10			Sampling Method	CMPDI/RI-II/LPM 22		
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards Zones	Core Zone Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	45.9	46.4	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	47.1	49					
3		08:00 - 09:00	52.2	51.6					
4		09:00 - 10:00	53.3	54.1					
5		10:00 - 11:00	54.2	54.6					
6		11:00 - 12:00	56.7	56.5					
7		12:00 - 13:00	57.9	58.8					
8		13:00 - 14:00	53	53.9					
9		14:00 - 15:00	54.2	54.6					
10		15:00 - 16:00	56.7	57.9					
11		16:00 - 17:00	51.3	50.3					
12		17:00 - 18:00	47	47					
13		18:00 - 19:00	45.4	45.3					
14		19:00 - 20:00	45.9	45.6					
15		20:00 - 21:00	45.3	45.4					
16		21:00 - 22:00	45.1	44.2					
		Leq DAY	52.8	53.3					
1	Noise Level dB(A)Leq -Night	22:00-23:00	41.7	41.2	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	41.3	39.6					
3		00:00- 01:00	40.9	38.8					
4		01:00-02:00	40.8	38.6					
5		02:00-03:00	40.5	38.5					
6		03:00-04:00	40	39.2					
7		04:00-05:00	41.5	40.8					
8		05:00-06:00	41.5	41.4					
		Leq NIGHT	41.1	39.9					

**LDL indicates Lower Detection Limit*

***All noise measurements are integrated for a 01 hour period, All units in dB(A)*

Sampling Assistants
ANALYSED BY


 (Gaurav Kant)
REVIEWED BY


 Raj Mishra
Authorised Signatory

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Month & Year		Cluster		Cluster II		ULR No.		TC101223000000307F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	
Project		Sample Ref. No.		REM/BCCL/2023/10		Sampling Method		CMPDI/RI-II/LPM 22	
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
								Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	66.1	66.3	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	53.5	50.4					
3		08:00 - 09:00	52.2	47.6					
4		09:00 - 10:00	68.2	71					
5		10:00 - 11:00	60.2	56.8					
6		11:00 - 12:00	54.2	54.2					
7		12:00 - 13:00	61.8	63.8					
8		13:00 - 14:00	61.3	60.1					
9		14:00 - 15:00	61	61.8					
10		15:00 - 16:00	57.6	58.3					
11		16:00 - 17:00	64.7	66.1					
12		17:00 - 18:00	50.8	49.7					
13		18:00 - 19:00	59.8	60.7					
14		19:00 - 20:00	64.7	65.7					
15		20:00 - 21:00	61.2	61.6					
16		21:00 - 22:00	59.8	61					
		Leq DAY	62.2	63.4					
1	Noise Level dB(A)Leq -Night	22:00-23:00	55.8	56.6	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	55.6	55.7					
3		00:00- 01:00	55.1	55.4					
4		01:00-02:00	54.7	55					
5		02:00-03:00	54.5	53.8					
6		03:00-04:00	53.5	53.6					
7		04:00-05:00	53.6	53.6					
8		05:00-06:00	53.8	54.7					
		Leq NIGHT	54.7	54.9					

*LDL indicates Lower Detection Limit
**All noise measurements are integrated for a 01 hour period, All units in dB(A)

Sampling Assistants
ANALYSED BY

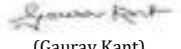

 (Gaurav Kant)
REVIEWED BY


 Raj Mishra
Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

---- End of Report ----

Page -1 of 1

   CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDI, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in									
Month & Year	10/2023	Cluster	Cluster II				ULR No.	TC1012223000000307F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bcccl@coalindia.in)						Date of Issue	11.12.2023	
Project	Madhuband UGP		Sample Ref. No.	REM/BCCL/2023/10		Sampling Method	CMPDI/RI-II/LPM 22		
s				Date of Sampling	05.10.23	18.10.23	Zone Category of Station:	Buffer Zone	
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
								Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	41.6	42.2	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	44.5	43.8					
3		08:00 - 09:00	47.9	48.3					
4		09:00 - 10:00	49.1	48.9					
5		10:00 - 11:00	48.9	49					
6		11:00 - 12:00	48.6	48.3					
7		12:00 - 13:00	49.5	49.2					
8		13:00 - 14:00	52.9	56.6					
9		14:00 - 15:00	54.2	54.2					
10		15:00 - 16:00	54.7	51.3					
11		16:00 - 17:00	47.5	47.6					
12		17:00 - 18:00	46.3	46.2					
13		18:00 - 19:00	45.8	45.7					
14		19:00 - 20:00	45.6	45.2					
15		20:00 - 21:00	45.4	44.8					
16		21:00 - 22:00	44.2	44.4					
		Leq DAY	49.5	49.7					
1	Noise Level dB(A)Leq - Night	22:00-23:00	41	41.5	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	40.9	41.6					
3		00:00- 01:00	40.8	40.9					
4		01:00-02:00	40.2	40.6					
5		02:00-03:00	39.9	40.4					
6		03:00-04:00	41.2	41.5					
7		04:00-05:00	41.5	41.7					
8		05:00-06:00	41.8	41.6					
		Leq NIGHT	41.0	41.3					
*LDL indicates Lower Detection Limit									
**All noise measurements are integrated for a 01 hour period, All units in dB(A)									
Sampling Assistants ANALYSED BY			 (Gaurav Kant) REVIEWED BY			 Raj Mishra) Authorised Signatory			
Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.									
---- End of Report ----									

Ambient Air Quality Standards for Jharia Coal Field
As per the Environment (Protection) Amendment Rules, 2000 notified vide notification G.S.R. 742(E), dated 25.9.2000.

Category	Pollutant	Time weighted average	Concentration in Ambient Air	Method of Measurement
1	2	3	4	5
III Coal mines located in the coal fields of • Jharia • Raniganj • Bokaro	Suspended Particulate Matter (SPM)	Annual Average * 24 hours **	500 µg/m ³ 700 µg/m ³	- High Volume Sampling (Average flow rate not less than 1.1 m ³ /min)
	Respirable Particulate Matter (size less than 10 µm) (RPM)	Annual Average * 24 hours **	250 µg/m ³ 300 µg/m ³	Respirable Particulate Matter sampling and analysis
	Sulphur Dioxide (SO ₂)	Annual Average * 24 hours **	80 µg/m ³ 120 µg/m ³	1.Improvedwest and Gaeke method 2.Ultraviolet fluorescene
	Oxide of Nitrogen as NO ₂	Annual Average * 24 hours **	80 µg/m ³ 120 µg/m ³	1. Jacob & Hochheiser Modified (Na-Arsenic) Method 2. Gas phase Chemilumine-scence

Note:

* Annual Arithmetic mean for the measurements taken in a year, following the guidelines for frequency of sampling laid down in clause 2.

** 24hourly/8hourly values shall be met 92% of the time in a year. However, 8% of the time it may exceed but not on two consecutive days.

NATIONAL AMBIENT AIR QUALITY STANDARDS

New Delhi the 18th November 2009

In exercise of the powers conferred by Sub-section (2) (h) of section 16 of the Air (Prevention and Control of Pollution) Act, 1981 (Act No. 14 of 1981), and in supersession of the notification No(s).S.O.384(E), dated 11th April 1994 and S.O.935(E), dated 14th NOVEMBER 1998, the Central Pollution Control Board hereby notify the National Ambient Air Quality Standards with immediate effect.

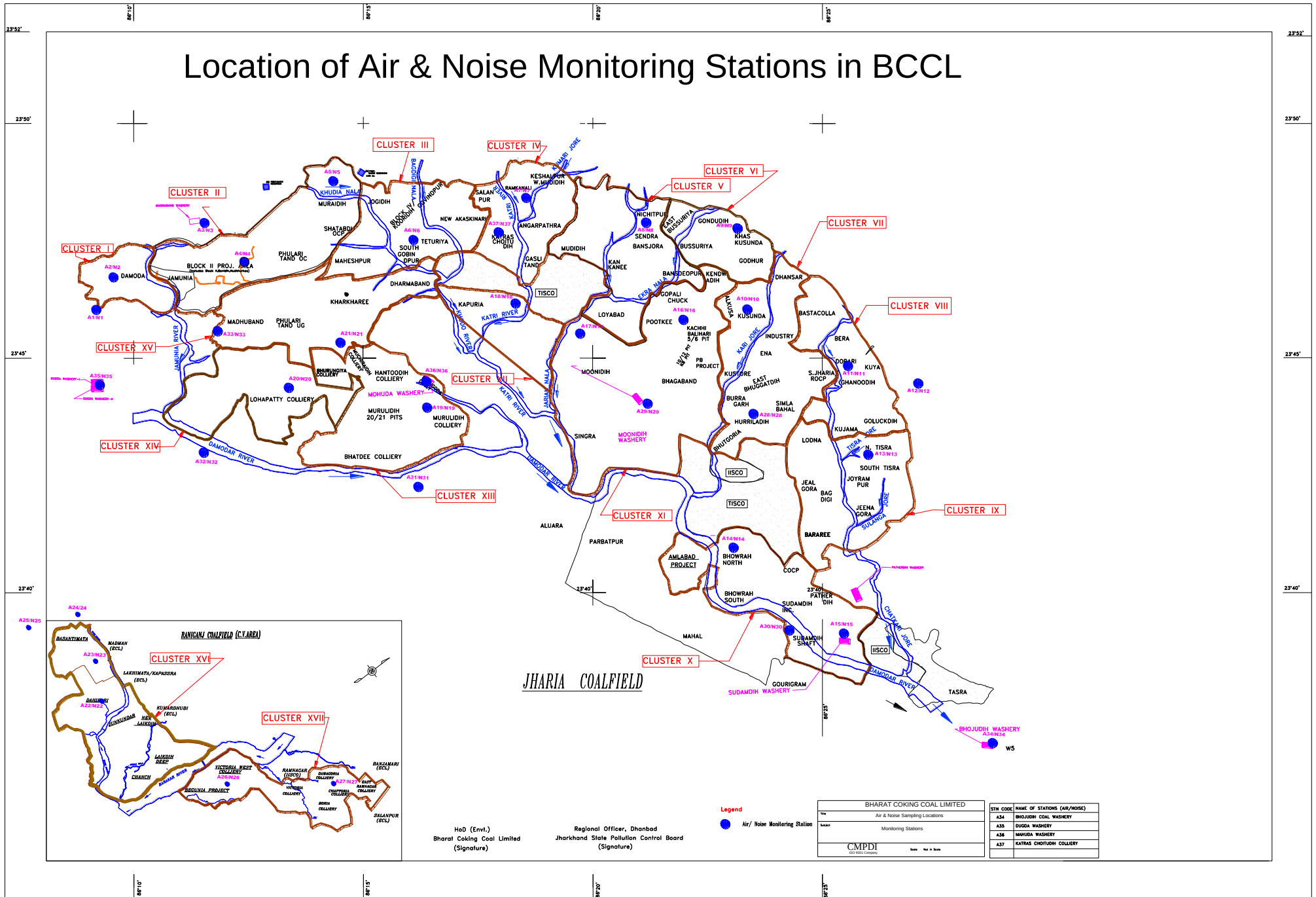
Pollutant	Time Weighted Average	Concentration in Ambient Air		Methods of Measurement
		Industrial, Residential, Rural and other Areas	Ecologically Sensitive Area (Notified by Central Government)	
Sulphur Dioxide (SO₂), µg/m³	Annual * 24 Hours **	50 80	20 80	-Improved West and Gaeke Method -Ultraviolet Fluorescence
Nitrogen dioxide (NO₂), µg/m³	Annual * 24 Hours **	40 80	30 80	-Jacob & Hochheiser modified (NaOH-NaAsO ₂) Method -Gas Phase Chemiluminescence
Particulate Matter (Size less than 10µm) or PM₁₀, µg/m³	Annual * 24 Hours **	60 100	60 100	-Gravimetric -TEOM -Beta attenuation
Particulate Matter (Size less than 2.5µm) or PM_{2.5}, µg/m³	Annual * 24 Hours **	40 60	40 60	-Gravimetric -TEOM -Beta attenuation
Ozone (O₃), µg/m³	8 Hours * 1 Hour **	100 180	100 180	-UV Photometric -Chemiluminescence -Chemical Method
Lead (Pb), µg/m³	Annual * 24 Hours **	0.50 1.0	0.50 1.0	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper -ED-XRF using Teflon filter
Carbon Monoxide (CO), mg/m³	8 Hours ** 1 Hour **	02 04	02 04	-Non dispersive Infrared (NDIR) Spectroscopy
Ammonia (NH₃), µg/m³	Annual * 24 Hours **	100 400	100 400	-Chemiluminescence -Indophenol blue method
Benzene (C₆H₆), µg/m³	Annual *	05	05	-Gas Chromatography (GC) based continuous analyzer -Adsorption and desorption followed by GC analysis
Benzo(a)Pyrene (BaP) Particulate phase only, ng/m³	Annual *	01	01	-Solvent extraction followed by HPLC/GC analysis
Arsenic (As), ng/m³	Annual *	06	06	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper
Nickel (Ni), ng/m³	Annual *	20	20	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper

* Annual Arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

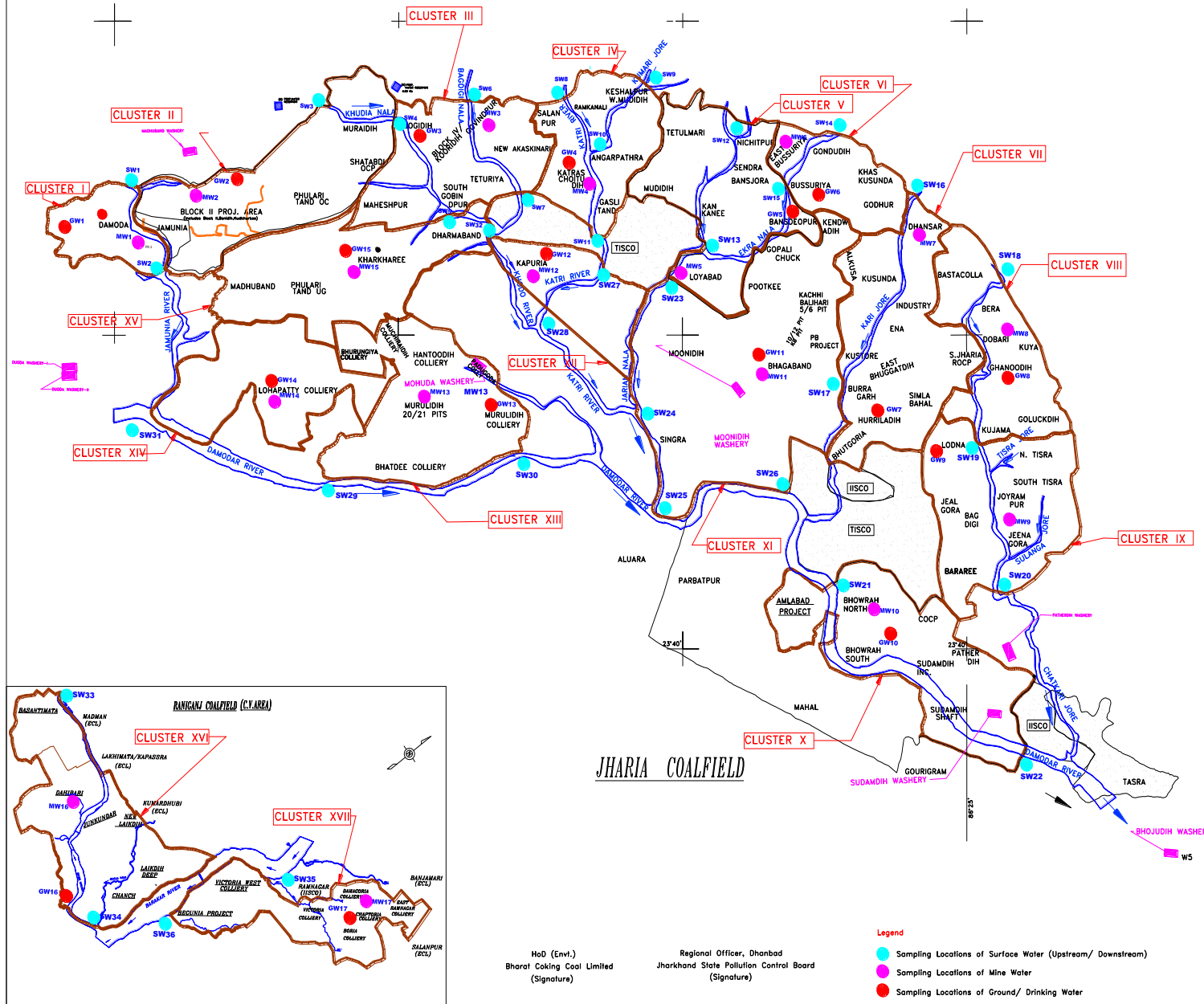
** 24 hourly or 8 hourly or 1 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they JUNE exceed the limits but not on two consecutive days of monitoring.

NOTE: Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category,

Location of Air & Noise Monitoring Stations in BCCL



Water Sampling Locations in BCCL



Cluster	Surface Water (US, DS)	Name of River Nala Jore	Minel Effluent	Sampling Location	Ground Water	Sampling Location
I	SW1, SW2	Jamuna River	MW1	Jamda Area Block II OCP	GW1	Ghatwary Village
II	SW3, SW4	Khudia Nala	MW2	Khudia Nala	GW2	Joytampur Village
III	SW5, SW6, SW7	Khudia Nala, Bagdihi Nala	MW3	Govindpur Colliery	GW3	Jogidih Village
IV	SW8, SW11, SW9, SW10	Kash River, Kurnari Jore	MW4	Chotidih	GW4	Kankane Village
V	SW12, SW13, SW15	Jarian Nala, Ekra Nala	MW5	Mudidih	GW5	Nichtpur
VI	SW14, SW15	Ekra Nala	MW6	East Basserua UGP	GW6	Bansjora Borewell
VII	SW16, SW17	Karl Jore	MW7	Chhanspur UGP	GW7	Hurradidh
VIII	SW18, SW19	Kashi Jore	MW8	Dobani UGP	GW8	Gharudih
IX	SW19, SW20	Kashi Jore	MW9	Jeenagora UGP	GW9	Lodna
X	SW21, SW22	Diamondar River	MW10	Shownath	GW10	Shownath Shor
XI	SW23, SW24, SW25, SW26	Jarian Nala, Diamondar River	MW11	Thagaband UGP	GW11	Thagabandh
XII	SW27, SW28	Karl Jore	MW12	Kapurta Murudih (2002)	GW12	Kapurta
XIII	SW29, SW30	Diamondar River	MW13	Chhanspur UGP	GW13	Muridih
XIV	SW31, SW29	Diamondar River	MW14	Lohapatti	GW14	Lohapatti
XV	SW5, SW32	Khudia Nala	MW15	Chhankare UGP	GW15	Kharkharee
XVI	SW33, SW34	Khudia Nala	MW16	Dhanbari UGP	GW16	Pallabari Village
XVII	SW35, SW36	Bamanki River	MW17	Jemagora Colliery	GW17	Chaptoria

Legend

- Sampling Locations of Surface Water (Upstream/ Downstream)
- Sampling Locations of Mine Water
- Sampling Locations of Ground/ Drinking Water

HoD (Envt.)
Bharat Coking Coal Limited
(Signature)

Regional Officer, Dhanbad
Jharkhand State Pollution Control Board
(Signature)

Customer	BHARAT COKING COAL LIMITED

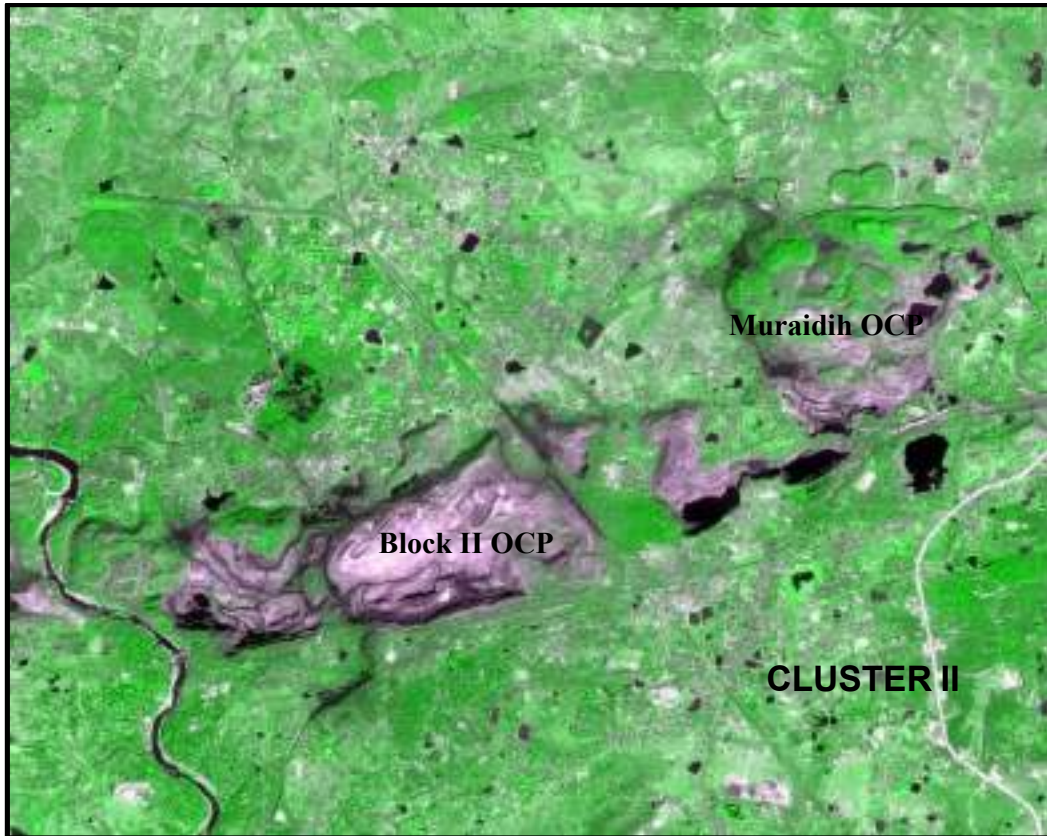
Site	WATER SAMPLING LOCATIONS

Subst	MONITORING STATIONS

1000

	CMPDI	Scale Not to Scale

**Land Reclamation/ Restoration Monitoring of Five Clusters of
(Opencast + Underground) Coal Mines of Bharat Coking Coal
Limited based on Satellite Data of the Year 2022**



Submitted to
Bharat Coking Coal Limited



**Land Reclamation/ Restoration Monitoring of Five Clusters
of (Opencast + Underground) Coal Mines of Bharat Coking
Coal Limited based on Satellite Data of the Year 2022**

March - 2023



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

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Executive Summary

1. **Project** Land reclamation/ restoration monitoring of five clusters of (Opencast + Underground) coal mines of Bharat Coking Coal Ltd. (BCCL) based on satellite data on every three-year basis.
2. **Objective** Objective of land reclamation/ restoration monitoring is to assess the area of backfilled, plantation, social forestry, active mining area, water bodies, distribution of wasteland, agricultural land and forest in the leasehold area of the project. This will help in assessing the progressive status of mined land reclamation and to take up remedial measures, if any, required for environmental protection.
3. **Salient Findings**
 - Out of 5 Clusters of mines viz. II, VI, XIV, XV and XVI, considered for land reclamation monitoring during the year 2022-23, cluster II, VI, XIV and XVI were as per CIL Work Order and cluster XV group of mines was added after receipt of letter of request from BCCL vide पत्रसंख्या:भाकोकोलि.विभागाध्यक्ष.पर्या.संचिका.C-12/2022/1365-1368 dated 21.07.2022.
 - Out of the total mine leasehold area of 8140.24 Ha. of the 05 clusters considered for monitoring during the year 2022-23; total excavated area is 1030.85 Ha. out of which 115.10 Ha. area (11.17%) is plantation on backfill (Biological Reclamation) and 621.40 Ha. area (60.28%) is under backfilling (Technical Reclamation) and 294.35 Ha. area (28.55%) is under active mining. Cluster wise details of land reclamation of the above Clusters is given in Table-1.
 - It has been observed from the analysis of Satellite Data of the year 2022 that area under technical reclamation has decreased from 624.23 Ha. (Yr. 2019) to 621.40 Ha. (Yr. 2022) which indicates a decrease of 2.83 Ha. with respect to the year 2019.
 - Area under biological reclamation has increased from 111.78 Ha. (Yr. 2019) to 115.10 Ha. (Yr. 2022) which indicates an increase of 3.32 Ha. with respect to the year 2019.

- Plantation on OB dumps in the above 5 clusters has increased from 62.48 Ha. (Yr. 2019) to 70.30 Ha. (Yr. 2022) which indicates an increase of 7.82 Ha. with respect to the year 2019.
- Plantation under Social forestry, Avenue plantations etc. in the above mentioned clusters has increased from 306.55 Ha. (Yr. 2019) to 360.84 Ha. (Yr. 2022) which indicates an increase of 54.29 Ha. with respect to the year 2019.
- Area under Active Mining in the above selected 5 clusters has increased from 273.50 Ha. to 294.35 Ha. which indicates an increase of 20.85 Ha. with respect to the year 2019.
- Total excavated area in the above selected 5 clusters has increased from 1009.51 Ha. to 1030.85 Ha. which indicates an increase of 21.34 Ha. with respect to the year 2019.
- Total area under plantation (green cover) has increased from 480.81 Ha. to 546.24 Ha. which indicates an increase of 65.43 Ha. with respect to the year 2019.
- The increase in area under Biological Reclamation is the result of the efforts of BCCL taken up towards land reclamation and environmental protection.
- On comparing the status of land reclamation of the above mentioned 5 clusters, it is evident from the analysis that total area under land reclamation has increased from 736.01 Ha. to 736.50 Ha. which indicates an increase of 0.49 Ha. with respect to the year 2019.
- This report and the findings will be considered as basis for further monitoring and reclamation related activities.

Table 1

Land Reclamation Status in five Clusters (Underground + Opencast Mines) of BCCL based on Satellite Data of the Year 2022

(Area in Hectare)

Sl. No.	Cluster No.	Total Leasehold Area		Technical Reclamation		Plantation						Area under Active Mining	Total Excavated Area		Total Area under Plantation (% Green Cover Generated in Leasehold)		Total Area under Reclamation		
						Biological Reclamation		Other Plantations											
				Area under Backfilling		Plantation on Excavated / Backfilled Area		Plantation on External OB Dumps		Social Forestry, Avaneue Plantation Etc.									
1	2	3		4		5		6		7		8		9 (=4+5+8)		10 (=5+6+7)		11(=4+5)	
		2019	2022	2019	2022	2019	2022	2019	2022	2019	2022	2019	2022	2019	2022	2019	2022	2019	2022
1	Cluster II	2260.54	2025.71	422.51	422.00	86.42	87.42	43.28	47.29	154.37	128.03	129.98	148.85	638.91	658.27	284.07	262.74	508.93	509.42
				66.13%	64.11%	13.53%	13.28%					20.34%	22.61%			12.57%	12.97%	79.66%	77.39%
2	Cluster VI	831.83	876.55	134.15	134.15	0.00	0.00	5.89	9.70	26.79	28.41	77.75	70.36	211.90	204.51	32.68	38.11	134.15	134.15
				63.31%	65.60%	0.00%	0.00%					36.69%	34.40%			3.93%	4.35%	63.31%	65.60%
3	Cluster XIV	1418.25	1577.22	0.00	0.00	0.00	0.00	0.00	0.00	74.13	72.42	0.00	0.00	0.00	0.00	74.13	72.42	0.00	0.00
				0.00%	0.00%	0.00%	0.00%					0.00%	0.00%			5.23%	4.59%	0.00%	0.00%
4	Cluster XV	-	1696.55	-	0.00	-	0.00	-	0.00	-	80.72	-	0.00	-	0.00	-	80.72	-	0.00
					0.00%		0.00%						0.00%				4.76%		0.00%
5	Cluster XVI	2008.4	1964.21	67.57	65.25	25.36	27.68	13.31	13.31	51.26	51.26	65.77	75.14	158.70	168.07	89.93	92.25	92.93	92.93
				42.58%	38.82%	15.98%	16.47%					41.44%	44.71%			4.48%	4.70%	58.56%	55.29%
	TOTAL	6519.02	8140.24	624.23	621.40	111.78	115.10	62.48	70.30	306.55	360.84	273.50	294.35	1009.51	1030.85	480.81	546.24	736.01	736.50
				61.83%	60.28%	11.07%	11.17%					27.09%	28.55%			7.38%	6.71%	72.91%	71.45%
(% is calculated with respect to Excavated Area as applicable)																			

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

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

1. Area under Biological Reclamation includes Areas under Plantation done on Backfilled Area Only.

2. Area under Technical Reclamation includes Area under Barren Backfilling only.

3. Area under Active Mining Includes Coal Quarry, Advance Quarry Site and Quarry filled with water etc., if any.

4. Social Forestry and Plantation on External OB Dumps are not included in Biological Reclamation and are put under separate categories as shown in the above Table.

5. (%) calculated in the above Table is in respect to Total Excavated Area except for "Total Area under Plantation" where % is in terms of "Leasehold Area".

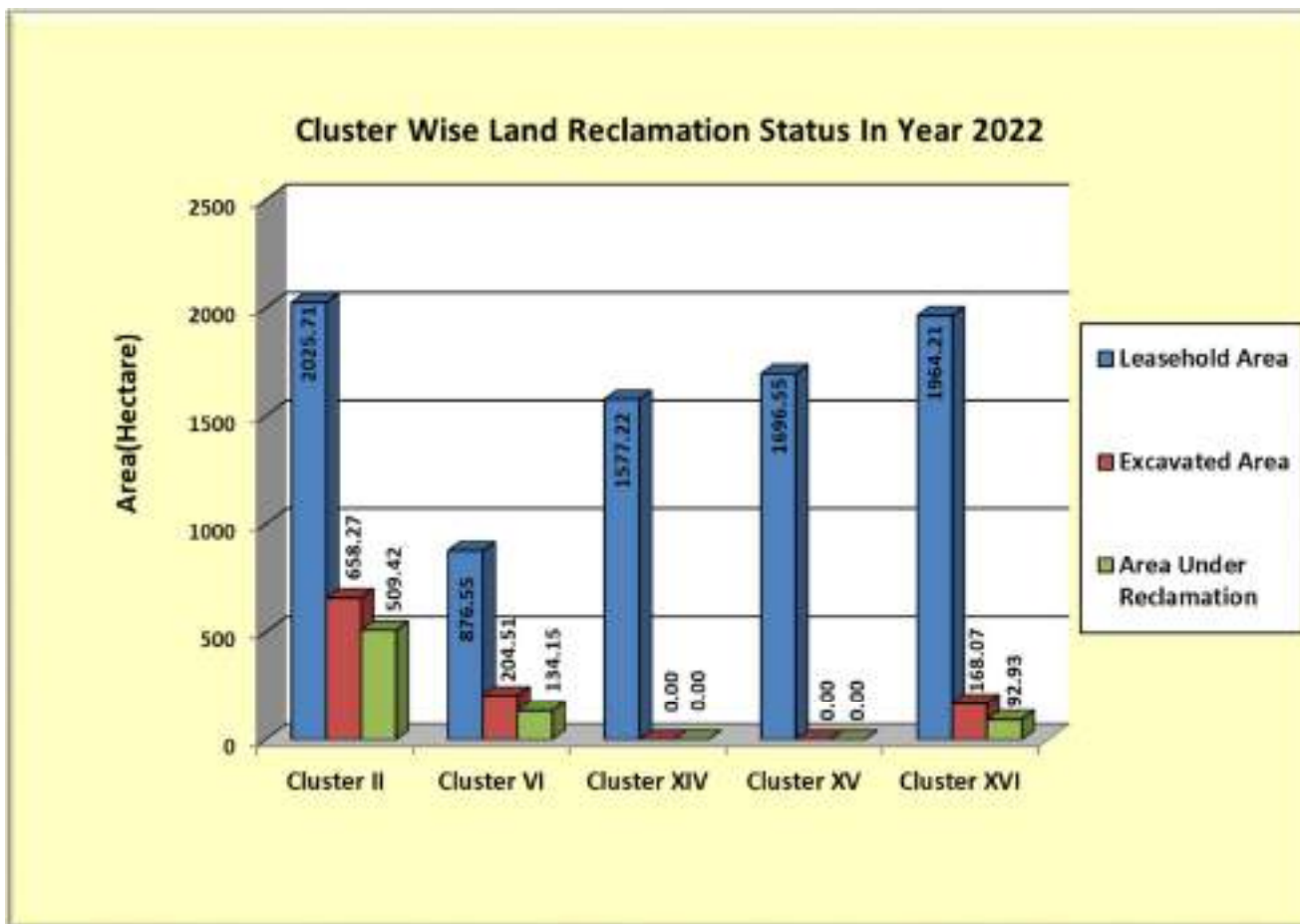


Fig. 1: Cluster wise Land Reclamation Status in five Clusters - 2022 (BCCL)

1. Background

- 1.1** Land is the most important natural resource which embodies soil, water, flora, fauna and total ecosystem. All human activities are based on the land which is the scarcest natural resource in our country. Mining is a site specific industry and it could not be shifted anywhere else from the location where mineral occurs. It is a fact that surface mining activities do affect the land environment due to ground breaking. Therefore, there is an urgent need to reclaim and restore the mined out land for its productive use for sustainable development of mining. This will not only mitigate environmental degradation, but would also help in creating a more congenial environment for land acquisition by coal companies in future.
- 1.2** Keeping above in view, Coal India Ltd. (CIL) issued a work order vide letter no. CIL/WBP/ENV/2017/DP/8391 dated 22.06.2017 to Central Mine Planning & Design Institute (CMPDI), Ranchi, for monitoring of clusters with coal mines (both underground and open cast projects) having less than 5 million m³ per annum capacity (Coal +OB) at an interval of three years based on remote sensing satellite data for sustainable development of mining. Earlier, CMPDI used to carry out land reclamation monitoring for individual projects of less than 5 million capacities, but from 2017 the same was carried out cluster wise for mines of BCCL. For operational reasons and convenience, underground and opencast mines (often with multiple overlapping seams), have now been clustered together. Further, a revised work order was issued vide letter no. CIL/ENV/2022-23/W.O/10899 dated 06.07.2022 from Coal India Limited for the period 2022-23 to 2023-24. According to this work order, 76 OC projects having more than 5 million cu. m (coal +OB) per annum capacity shall be monitored every year and also land reclamation monitoring of 33 OCPs having less than 5 million cu. m (coal +OB) per annum capacity, totaling 109 OC mines will be monitored in

2022-23 covering all the subsidiaries of Coal India Ltd. The result of land reclamation status of all such mines are hosted on the website of CIL, (www.coalindia.in), CMPDI (www.cmpdi.co.in) and the concerned coal companies in public domain. Detailed report is submitted to Coal India and respective subsidiaries.

- 1.3** Land reclamation monitoring of all cluster coal mining projects would also comply the statutory requirements of Ministry of Environment, Forest & Climate Change (**MoEF & CC**). Such monitoring would not only facilitate in taking timely mitigation measures against environmental degradation, but would also enable coal companies to utilize the reclaimed land for larger socio-economic benefits in a planned way.
- 1.4** Present report is embodying the finding of the study based on satellite data of the year 2022 carried out for five clusters of mines comprising both underground and opencast projects of Bharat Coking Coal Ltd.

2. Objective

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

3. Methodology

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

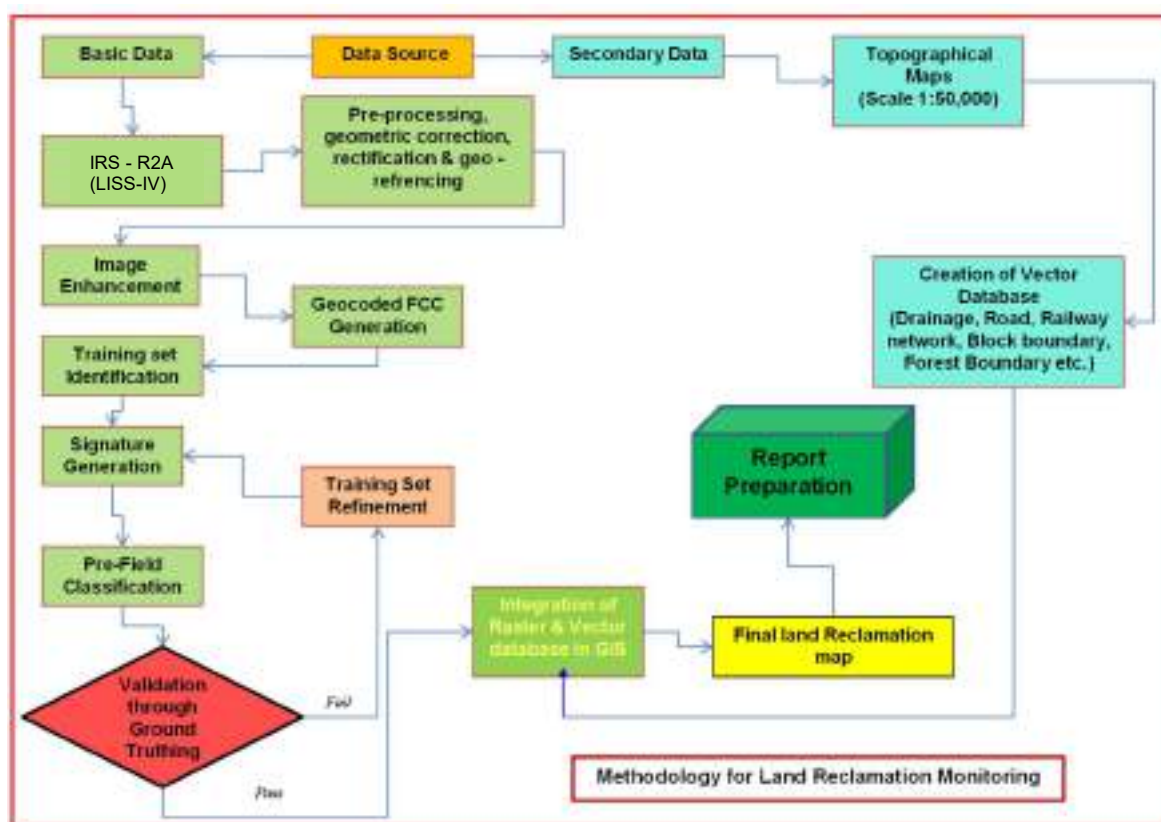


Fig. 2: Methodology of Land Reclamation Monitoring

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

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

- **Rectification & Geo-referencing:** Inaccuracies in digital imagery may occur due to 'systematic errors' attributed to earth curvature and rotation as well as 'non-systematic errors' attributed to satellite receiving station itself. Raw digital images may contain geometric distortions, which make them unusable as maps. Therefore, geo-referencing is required for correction of image data using ground control points (GCP) to make it compatible with the new series WGS-84 compatible Sol toposheet.
- **Image enhancement:**
To improve the interpretability of the raw data, image enhancement is necessary. Local operations modify the value of each pixel based on brightness value of neighbouring pixels using ERDAS IMAGINE 2022 s/w. and enhance the image quality for interpretation.
- **Training set selection**
Training set requires to be selected, so that software can classify the image data accurately. The image data are analysed based on the interpretation keys. These keys are evolved from certain fundamental image-elements such as tone/colour, size, shape, texture, pattern, location, association and shadow. Based on the image-elements and other geo-technical elements like land form, drainage pattern and physiography; training sets were selected/identified for each land use/cover class. Field survey was carried out by taking selective traverses in order to collect the ground information (or reference data) so that training sets are selected accurately in the image. This was intended to serve as an aid for classification.

- **Classification and Accuracy assessment**

Image classification is carried out using the maximum likelihood algorithm. The classification proceeds through the following steps: (a) calculation of statistics [i.e. signature generation] for the identified training areas, and (b) the decision boundary of maximum probability based on the mean vector, variance, covariance and correlation matrix of the pixels. After evaluating the statistical parameters of the training sets, reliability test of training sets is conducted by measuring the statistical separation between the classes that resulted from computing divergence matrix. The overall accuracy of the classification was finally assessed with reference to ground truth data.

- **Area calculation**

The area of each land use class in the leasehold is determined using ERDAS IMAGINE 2022 s/w.

- **Overlay of Vector data base**

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

- **Pre-field map preparation**

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

3.3 Ground Truthing:

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

3.4 Land reclamation database on GIS:

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

4. Land Reclamation Status in Bharat Coking Coal Ltd.

4.1 Following 5 clusters of mines comprising both underground and opencast projects of Bharat Coking Coal Ltd. have been taken up for land reclamation monitoring during the year 2022-23:

- **Cluster II** (Block II Colliery, Jamunia OCP, Shatabdi OCP, Muraidih OCP, Phularitand OCP)
- **Cluster VI** (East Bassuriya Colliery, Bassuriya Colliery, Gondudih Khaskusunda Colliery, Godhur Colliery)
- **Cluster XIV** (Lohapatti Colliery)
- **Cluster XV** (Kharkharee Colliery, Madhuband Colliery, Phularitand Colliery, Dharmaband Colliery)
- **Cluster XVI** (Dahibari Basantimata OCP, Basantimata UG mine, New Laikdih OCP (including Dahibari Coal Washery), Laikdih Deep UG, Chanch UG)

4.2 Cluster wise Land Reclamation status of above mentioned clusters in BCCL is given in Table 1 and also shown graphically in Fig 1. Area statistics of different land use classes present in the mine leasehold of the above clusters for the year 2022 are shown in Table 2. Land use maps derived from the satellite data are shown in Plate 1 - 5. Different land use classes based on satellite data are depicted in bar charts in Fig. 3 - 7.

4.3 Study reveals that out of total mine leasehold area of 8140.24 Ha. of the 5 clusters of mines (Underground + Opencast) of BCCL mentioned above taken for this study in 2022-23, total excavated area is 1030.85 Ha. out of which 115.10 Ha. (11.17%) has been planted (*Biologically Reclaimed*), 621.40 Ha. (60.28%) is under backfilling (*Technically Reclaimed*) and balance 294.35 Ha. (28.55%) is under active mining.

4.4 Land reclamation monitoring for cluster XV of BCCL is taken up for the first time in the year 2022-23. Hence comparison of this cluster in year 2022 has

not been made with respect to year 2019. The data thus generated in the year 2022 will be considered as base data for further comparison of land reclamation of this cluster of mines.

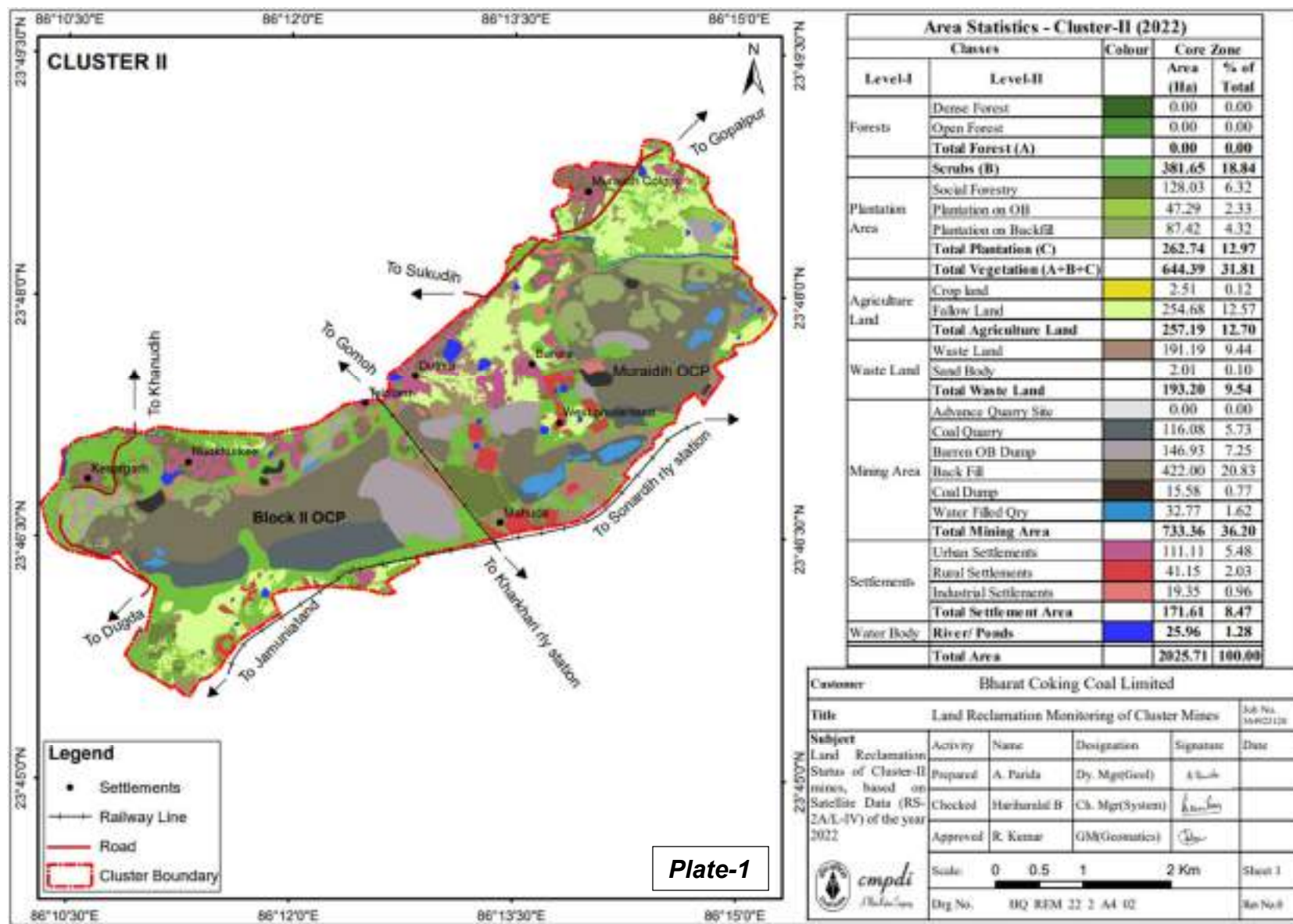
- 4.5** It is seen that technical reclamation in the above clusters has decreased from 624.23 Ha. (Yr 2019) to 621.40 Ha. (Yr 2022). This is due to increase in biological reclamation in cluster II and cluster XVI.
- 4.6** Study indicates that cluster II and cluster XVI of BCCL considered for this study in the year 2022-23 indicate increasing trend in Biological Reclamation (plantation on backfill) with respect to the year 2019. Area under plantation on backfill has increased from 86.42 Ha. (Yr 2019) to 87.42 Ha. (Yr 2022) in cluster II and from 25.36 Ha. (Yr 2019) to 27.68 Ha. (Yr 2022) in cluster XVI. As cluster XIV & cluster XV comprise of underground mines, there is no biological reclamation.
- 4.7** On comparing the status of plantation on OB dumps for the year 2022 with respect to the year 2019 in all cluster of mines of BCCL considered for land reclamation monitoring in the year 2022-23, it is evident from the analysis that area under plantation on OB dumps has increased from 43.28 Ha. (Yr 2019) to 47.29 Ha. (Yr 2022) in cluster II and from 5.89 Ha. (Yr 2019) to 9.70 Ha. (Yr 2022) in cluster VI. This is due to the sincere effort made by BCCL towards environmental protection in OC projects. Cluster XIV and Cluster XV consist of UG mines, so there is no plantation on OB. In cluster XVI there is no change or plantation on OB is static during the last three-year duration.
- 4.8** It is seen that plantation under social forestry has decreased from 154.37 Ha. (Yr 2019) to 128.03 Ha. (Yr 2022) in cluster II and from 74.13 Ha. (Yr 2019) to 72.42 Ha. (Yr 2022) in cluster XIV. This decrease of 26.34 Ha. area in cluster II and 1.71 Ha. in cluster XIV is due to change in shape and area of these clusters.

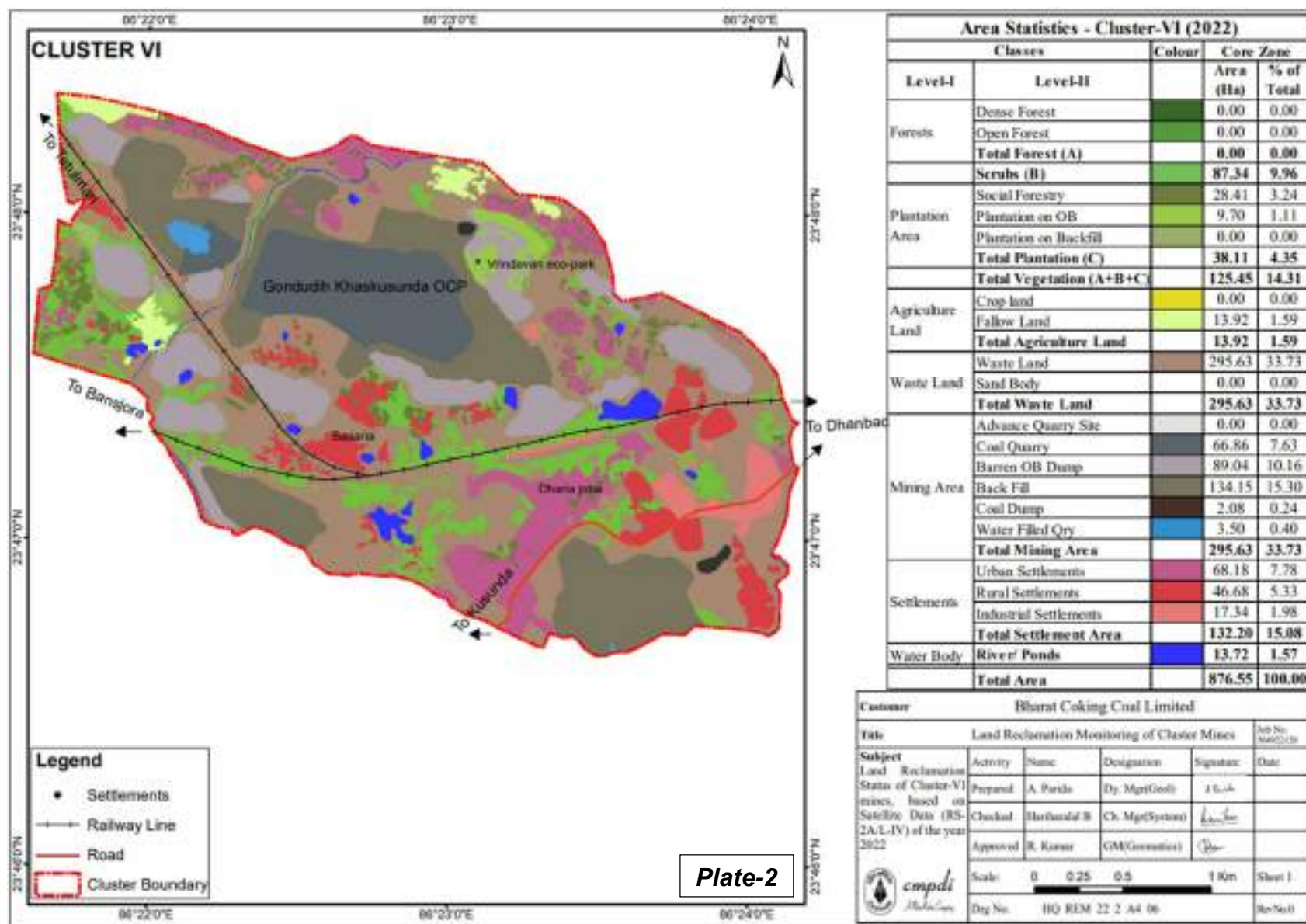
- 4.9** In Cluster VI, it is seen that total excavated area has decreased from 211.90 Ha. (Yr 2019) to 204.51 Ha. (Yr 2022). This decrease of 7.39 Ha. area is due to reduction in area under active mining which is due to change in shape and area of this cluster. The cluster boundary is updated as per EC.
- 4.10** After analyzing the satellite data of the year 2019 vs 2022, it reveals that area under total plantation (Green cover) carried out on backfilled area, OB dumps as well as under social forestry in the above clusters of BCCL has increased from 480.81 Ha. (7.38%) to 546.24 Ha. (6.71%) in span of last three years. This significant increase of 65.43 Ha. area under total plantation (Green Cover) in the leasehold boundary during three years is due to increase in plantation on OB dumps in cluster II and cluster VI, increase in plantation under social forestry in cluster VI and plantation on backfill in cluster II and cluster XVI and also due to addition of cluster-XV.
- 4.11** On comparing the status of land reclamation for the year 2022 with respect to the year 2019 in all cluster of mines of BCCL considered for land reclamation in the year 2022-23, it is evident from the analysis that area under total land reclamation has increased from 736.01 Ha. (Yr 2019) to 736.50 Ha. (Yr 2022).
- 4.12** Out of the 5 Clusters in BCCL considered for satellite data based land reclamation monitoring in year 2022, Cluster II tops with 77.39% reclamation followed by Cluster VI with 65.60% and Cluster XVI with 55.29%. Cluster XIV and Cluster XV consist of UG mines, so there is no reclamation activity.
- 4.13** The area under total plantation (Green Cover) is maximum in Cluster II (12.97%) followed by Cluster XV with (4.76%), Cluster XVI with (4.70%), Cluster XIV with (4.59%) and Cluster VI with (4.35%).

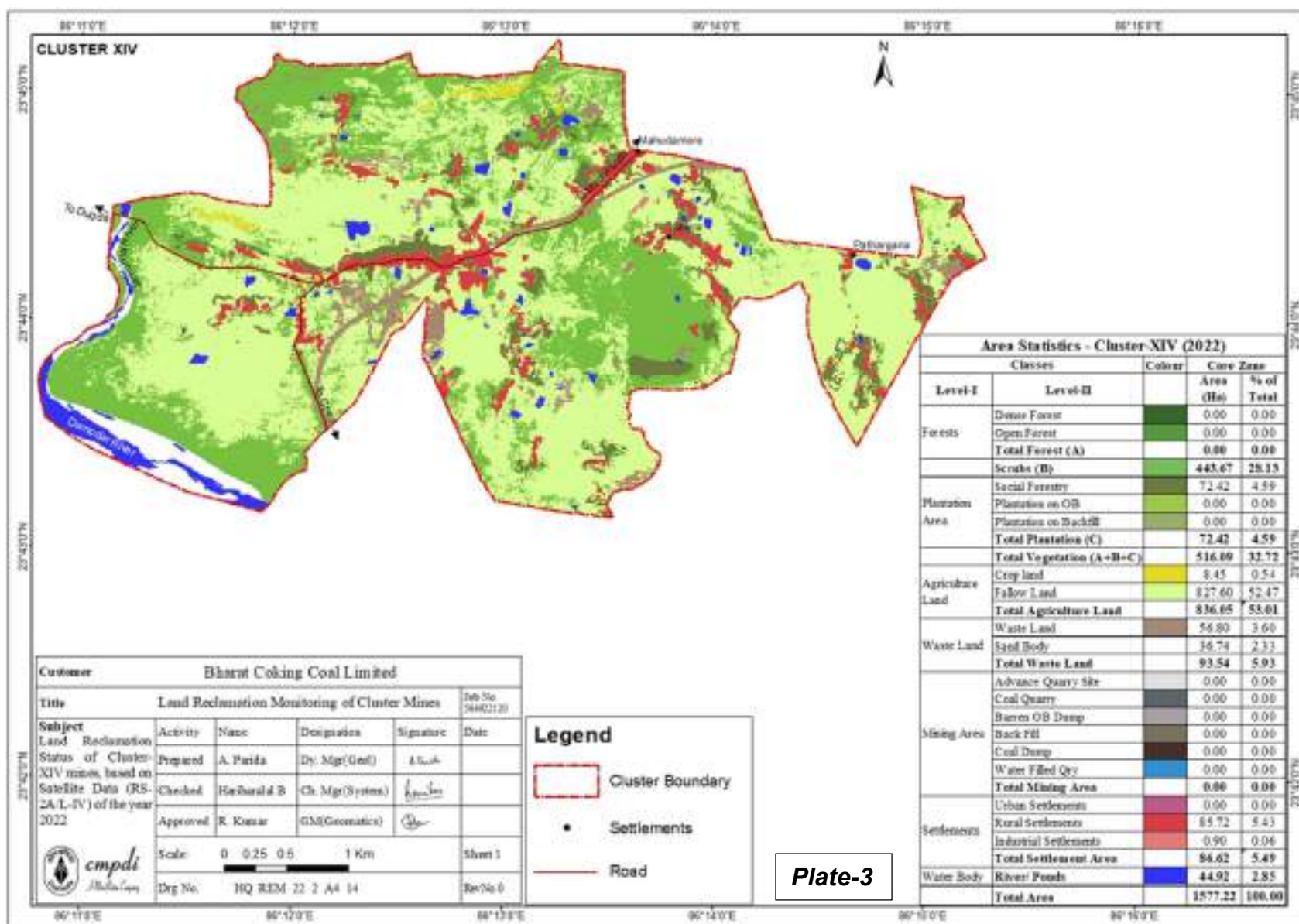
Table 2

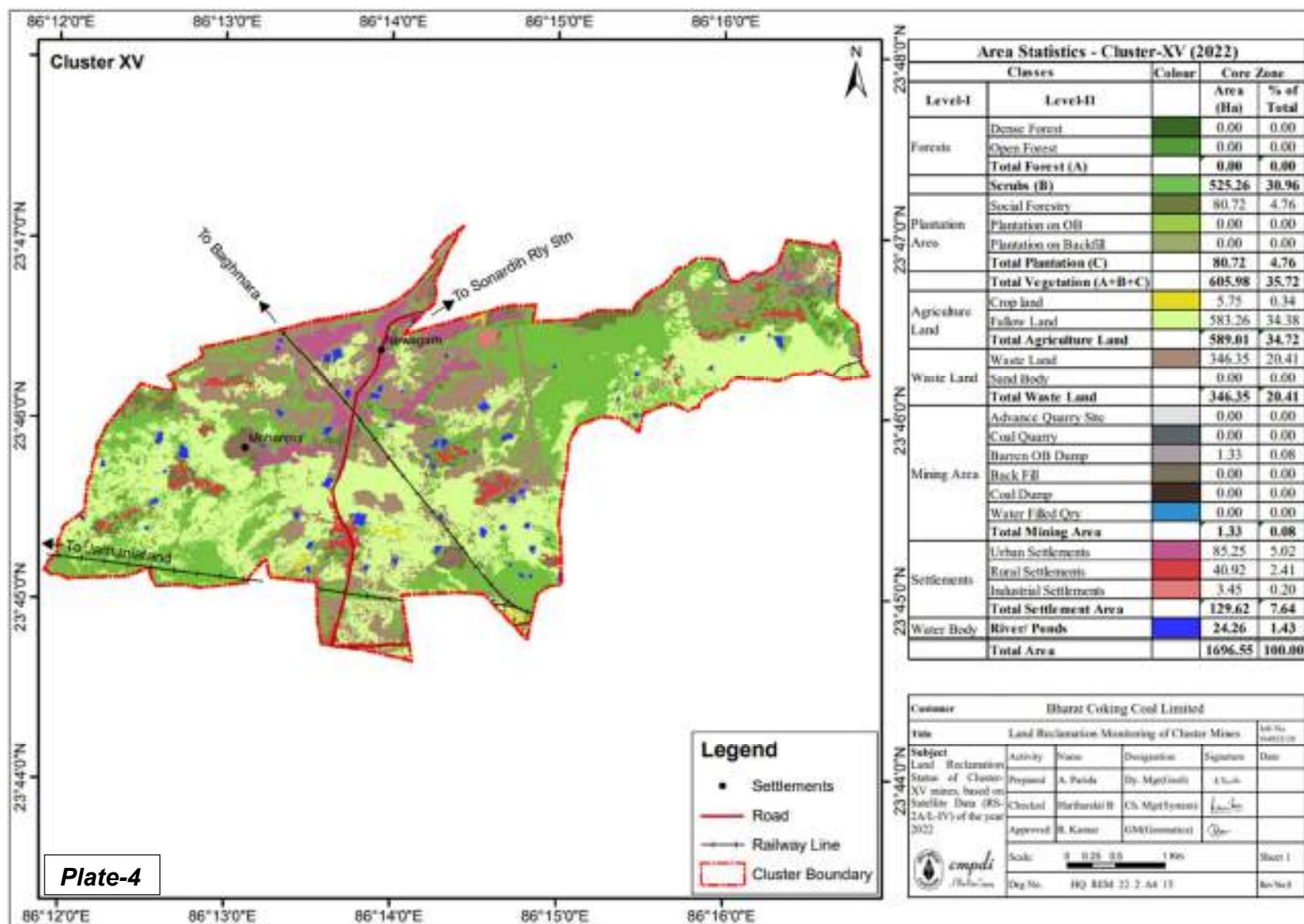
**Cluster wise Area Statistics of Land Use/ Cover classes in five Clusters of
(OC+UG) mines of BCCL based on Satellite Data of the year 2022**

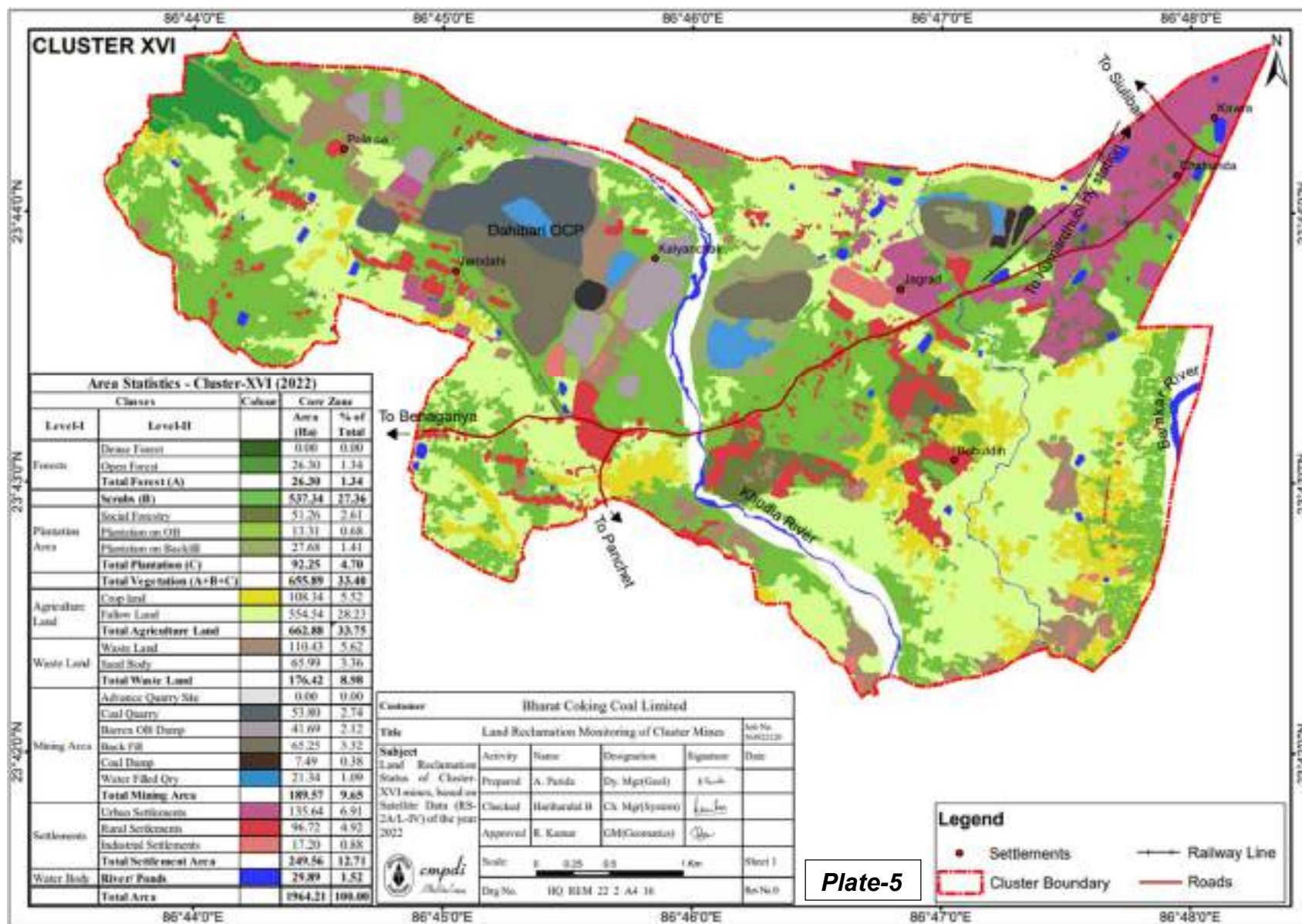
(Area in Hectare)													
		CLUSTER II		CLUSTER VI		CLUSTER XIV		CLUSTER XV		CLUSTER XVI		TOTAL	
		Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
FORESTS	Dense Forest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Open Forest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.30	1.34	26.30	0.32
	Total Forest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.30	1.34	26.30	0.32
SCRUBS	Scrubs	381.65	18.84	87.34	9.96	443.67	28.13	525.26	30.96	537.34	27.36	1975.26	24.27
PLANTATION	Social Forestry/Avenue Plantation	128.03	6.32	28.41	3.24	72.42	4.59	80.72	4.76	51.26	2.61	360.84	4.43
	Plantation on OB Dump	47.29	2.33	9.70	1.11	0.00	0.00	0.00	0.00	13.31	0.68	70.30	0.86
	Plantation on Backfill (Biological Reclamation)	87.42	4.32	0.00	0.00	0.00	0.00	0.00	0.00	27.68	1.41	115.10	1.41
	Total Plantation	262.74	12.97	38.11	4.35	72.42	4.59	80.72	4.76	92.25	4.70	546.24	6.71
Total Vegetation		644.39	31.81	125.45	14.31	516.09	32.72	605.98	35.72	655.89	33.40	2547.80	31.30
ACTIVE MINING	Coal Dump	15.58	0.77	2.08	0.24	0.00	0.00	0.00	0.00	7.49	0.38	25.15	0.31
	Coal Quarry	116.08	5.73	66.86	7.63	0.00	0.00	0.00	0.00	53.80	2.74	236.74	2.91
	Advance Quarry Site	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Quarry Filled With Water	32.77	1.62	3.50	0.40	0.00	0.00	0.00	0.00	21.34	1.09	57.61	0.71
	Total Area under Active Mining	148.85	7.35	70.36	8.03	0.00	0.00	0.00	0.00	75.14	3.83	294.35	3.62
	Barren OB Dump	146.93	7.25	89.04	10.16	0.00	0.00	1.33	0.08	41.69	2.12	278.99	3.43
RECLAIMED	Area Under Backfilling (Technical Reclamation)	422.00	20.83	134.15	15.30	0.00	0.00	0.00	0.00	65.25	3.32	621.40	7.63
	Total Area under Technical Reclamation	422.00	20.83	134.15	15.30	0.00	0.00	0.00	0.00	65.25	3.32	621.40	7.63
	Total Area under Mine Operation	733.36	36.20	295.63	33.73	0.00	0.00	1.33	0.08	189.57	9.65	1219.89	14.99
WASTELAND	Waste Lands	191.19	9.44	295.63	33.73	56.80	3.60	346.35	20.41	110.43	5.62	1000.40	12.29
	Fly Ash Pond / Sand Body	2.01	0.10	0.00	0.00	36.74	2.33	0.00	0.00	65.99	3.36	104.74	1.29
	Total Wasteland	193.20	9.54	295.63	33.73	93.54	5.93	346.35	20.41	176.42	8.98	1105.14	13.58
WATERBODIES	Reservoir, nallah, ponds	25.96	1.28	13.72	1.57	44.92	2.85	24.26	1.43	29.89	1.52	138.75	1.70
	Total Waterbodies	25.96	1.28	13.72	1.57	44.92	2.85	24.26	1.43	29.89	1.52	138.75	1.70
AGRICULTURE	Crop Lands	2.51	0.12	0.00	0.00	8.45	0.54	5.75	0.34	108.34	5.52	125.05	1.54
	Fallow Lands	254.68	12.57	13.92	1.59	827.60	52.47	583.26	34.38	554.54	28.23	2234.00	27.44
	Total Agriculture	257.19	12.70	13.92	1.59	836.05	53.01	589.01	34.72	662.88	33.75	2359.05	28.98
SETTLEMENTS	Urban Settlement	111.11	5.48	68.18	7.78	0.00	0.00	85.25	5.02	135.64	6.91	400.18	4.92
	Rural Settlement	41.15	2.03	46.68	5.33	85.72	5.43	40.92	2.41	96.72	4.92	311.19	3.82
	Industrial Settlement	19.35	0.96	17.34	1.98	0.90	0.06	3.45	0.20	17.20	0.88	58.24	0.72
	Total Settlement	171.61	8.47	132.20	15.08	86.62	5.49	129.62	7.64	249.56	12.71	769.61	9.45
Grand Total		2025.71	100.00	876.55	100.00	1577.22	100.00	1696.55	100.00	1964.21	100.00	8140.24	100.00











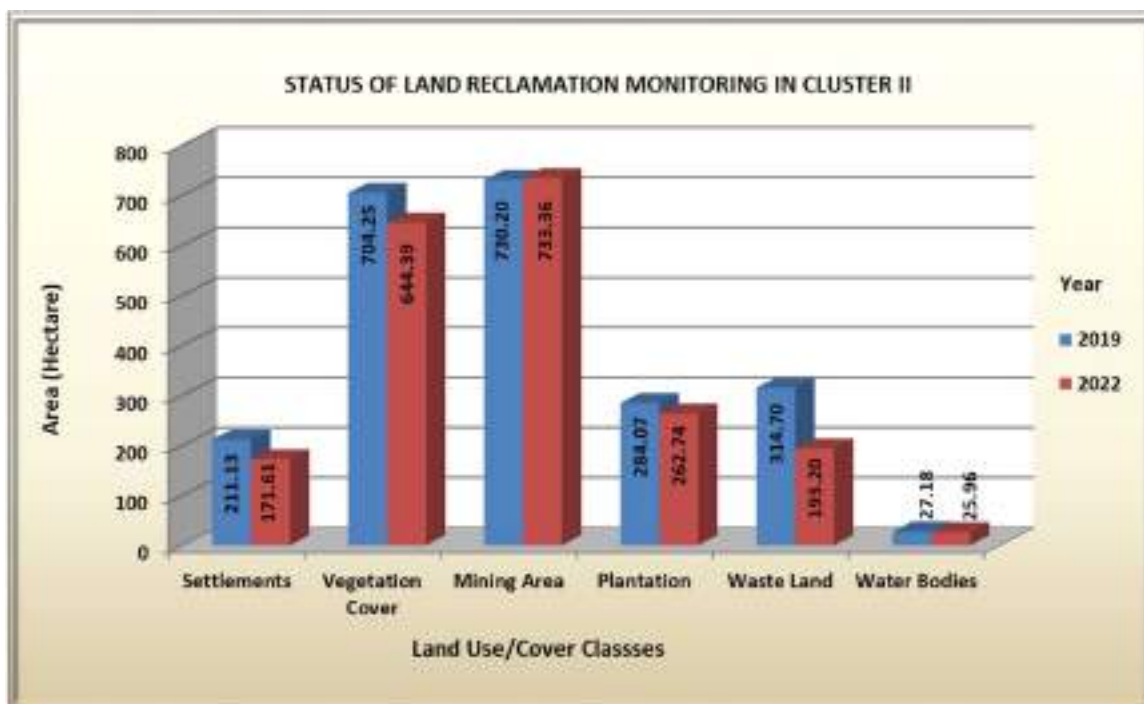


Fig. 3: Land Reclamation Status of Cluster II

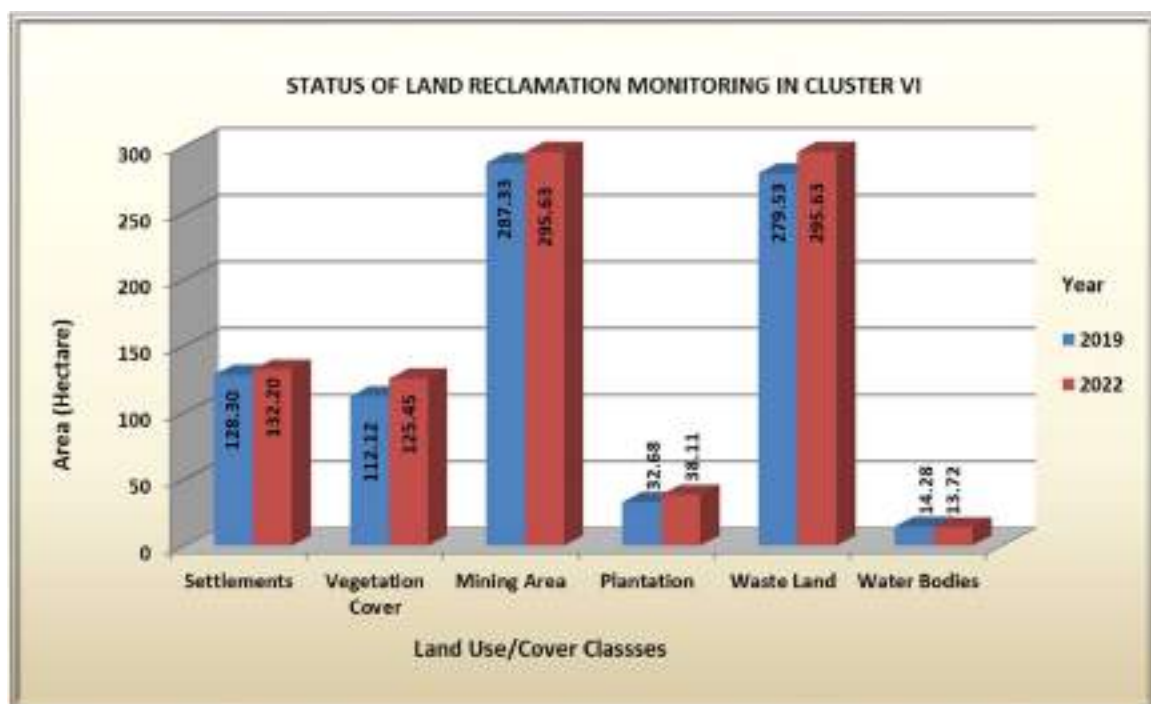


Fig. 4: Land Reclamation Status of Cluster VI

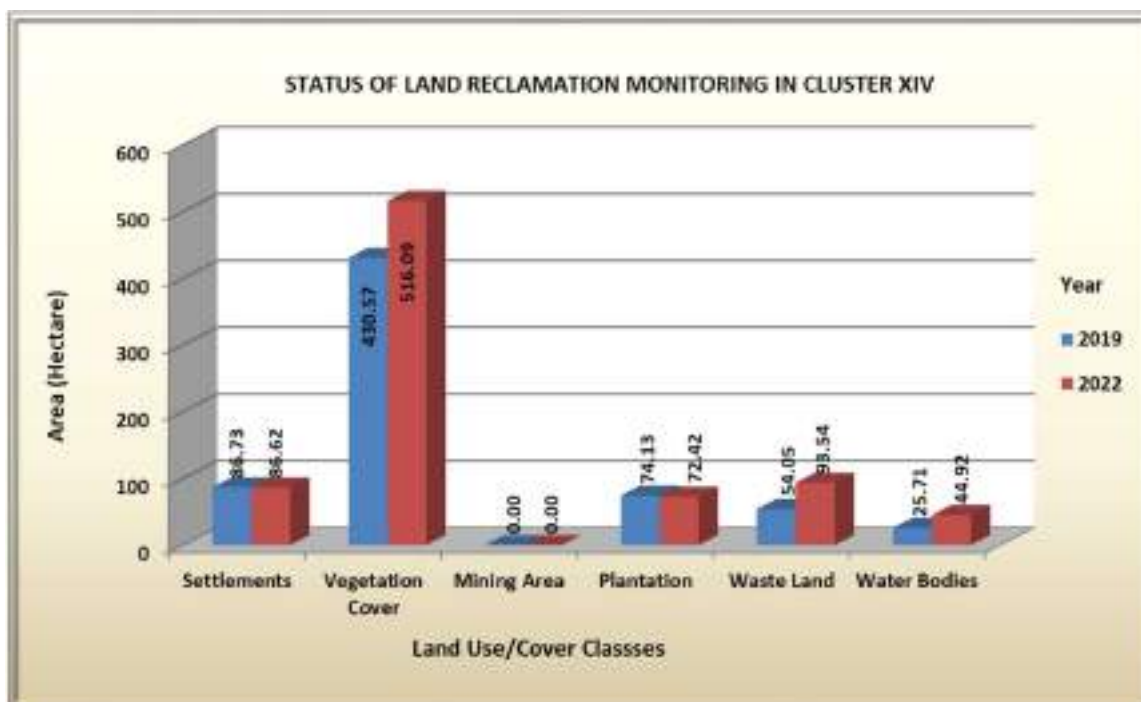


Fig. 5: Land Reclamation Status of Cluster XIV

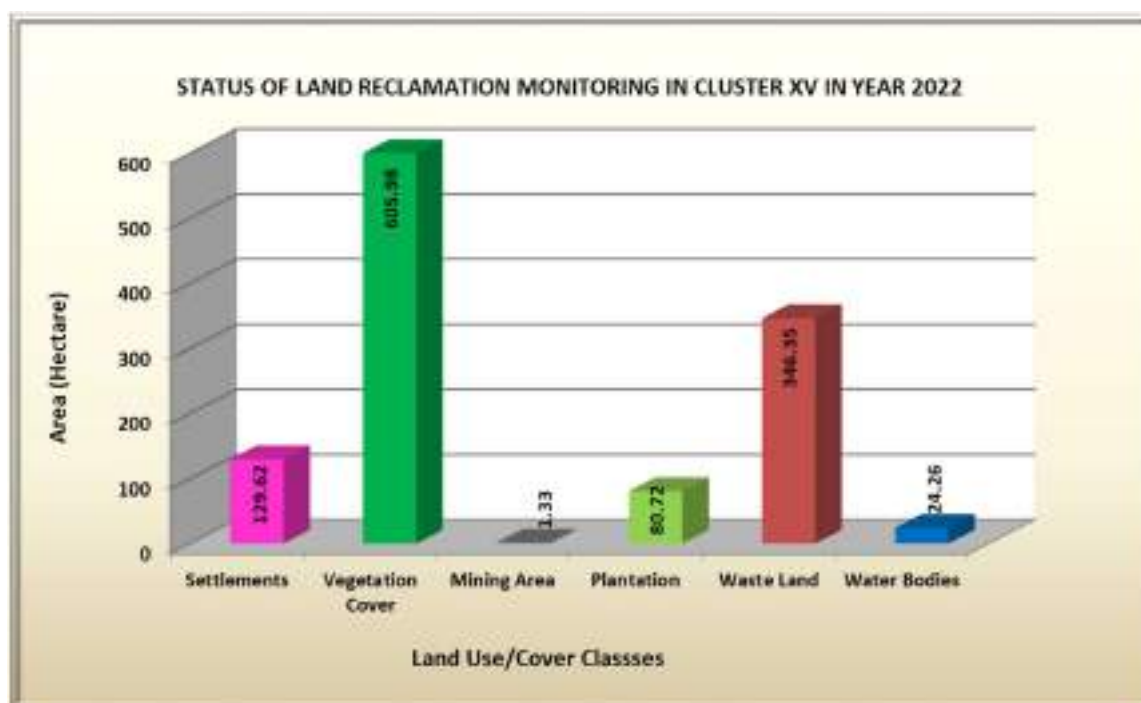


Fig. 6: Land Reclamation Status of Cluster XV

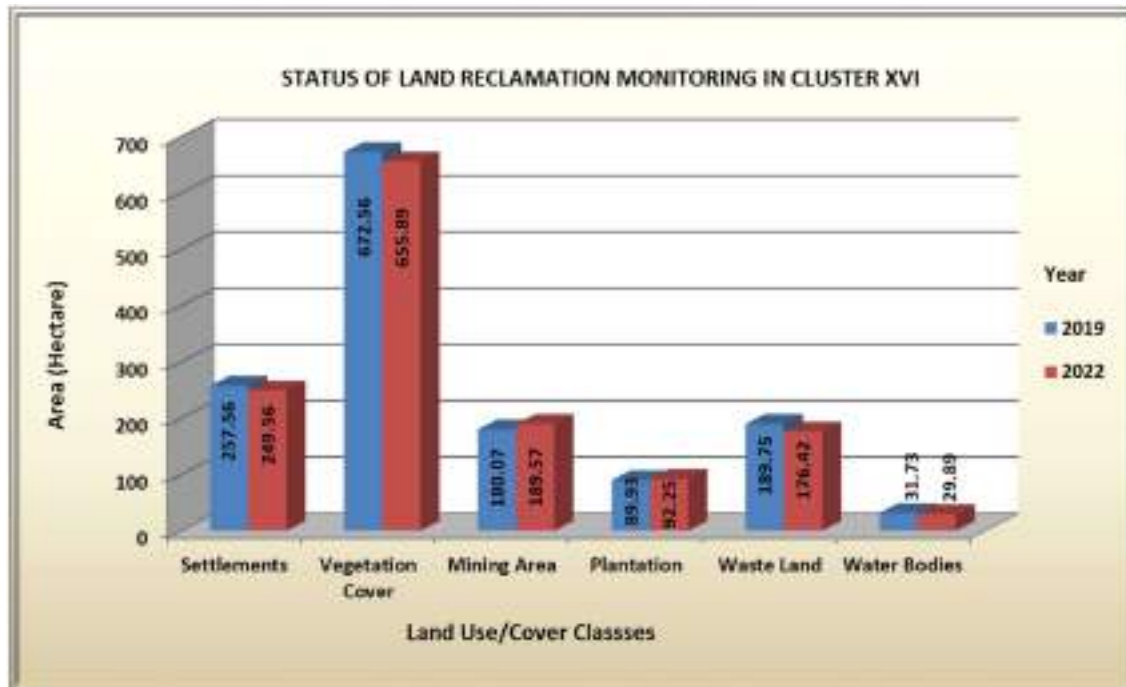


Fig. 7: Land Reclamation Status of Cluster XVI



Photo 1: Plantation on Backfill in Muraidih OCP, Cluster II



Photo 2: Plantation on OB Dump in Block II OCP, Cluster II



Photo 3: Vrindavan Ecopark in Cluster VI



Photo 4: Plantation on Backfill in Cluster XVI

ABBREVIATIONS

Sol	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 Satellites
LISS - 4	Linear Imaging and Self Scanning Sensor
FCC	False Colour 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 (Stabilised 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.
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



Central Mine Planning & Design Institute Ltd.

(A Subsidiary of Coal India Ltd.)

Gondwana Place, Kanke Road, Ranchi 834031, Jharkhand

Phone : (+91) 651 2230001, 2230002, 2230483, FAX (+91) 651 2231447, 2231851

Website : www.cmpdi.co.in, Email : cmpdihq@cmpdi.co.in



BHARAT COKING COAL LIMITED
(A Subsidiary of Coal India Limited)

Finance Directorate

Fund Section, Koyla Bhawan, Koyla Nagar, Dhanbad - 826 005

CORPORATE IDENTITY NO (CIN): U10101JH1972GOI000918

Ref No. BCCL/FUND/2023-24/1137

Dated: 28/03/2024

To
The AGM
State Bank of India
Dhanbad Main Branch
Bank More
DHANBAD - 826 001

Sub: Transfer of Fund

Dear Sir,

Kindly arrange to transfer by NEFT/RTGS a sum of Rs. **66,50,83,083.00** (Rupees Sixty Six Crore Fifty Lakh Eighty Three Thousand Eighty Three only) to A/c No. **00150200006463** of "**Bharat Coking Coal Limited**" maintained with Bank of Baroda, Bank More, Dhanbad, **IFSC Code No. BARBODHANBA** on date for credit to the above account with the corresponding debit to our A/c No. **35160317947** maintained with your branch.

Yours faithfully

Chief Manager (Fin) Fund
Fund Section
BCCL, Koyla Bhawan

Chief Manager (Fin)
B.C.C.L.
28/3/2024

CC:

1. Chief Manager, **Bank of Baroda (Bank More) Dhanbad.** - With request to transfer the above sum from A/c No. **00150200006463** (Mother A/c) to the respective ESCROW A/c (Child A/c) as per enclosed list.

2. HOD (Fin) / CA & T: For kind information.

✓ 3. GM (P&P): For kind information.

Copy to GM (P&P)
28/3

5 people

Not for Payment

GM (P&P)
697/L
29-3-24

BHARAT COKING COAL LIMITED

DEPOSIT OF AMOUNT IN ESCROW ACCOUNT WITH BANK OF BARODA FOR FY 2023-24

SL No	Name of Mine	ACCOUNT NUMBER	Amount in Rupees (Rs.)
1	BHUTGORIA UG	00150100008818	1209000.00
2	HURRLADIH UG	00150100008820	1120000.00
3	BURRAGARH UG	00150100008821	1086000.00
4	Amal. East Bhaugatdih Simlabahal Colliery	00150100008822	15497380.00
5	JOGIDIH COLLIERY	00150100008823	1332000.00
6	KHARKHAREE COLLIERY	00150100008824	2609000.00
7	NICHITPUR COLLIERY	00150100008825	7849700.00
8	LOYABAD COLLIERY	00150100008826	3061000.00
9	BASANTIMATA COLLIERY	00150100008827	4483000.00
10	DAHIBARI BASANTIMATA OCP	00150100008828	20943000.00
11	MUDIDIH COLLIERY	00150100008829	450900.00
12	BHOWRA(S) GRP OF MINES	00150100008830	14380100.00
13	NAKC	00150100008831	9870000.00
14	SENDRA BANSJORA COLLIERY	00150100008832	8511000.00
15	BLOCK IV Colliery	00150100008834	16424000.00
16	GOVINDPUR Colliery	00150100008835	3352000.00
17	MAHESHPUR COLLIERY	00150100008836	2457000.00
18	BHOWRA(N) GRP OF MINES	00150100008868	860000.00
19	DAMODA GRP OF MINES	00150100008869	4934200.00
20	KUSUNDA OCP	00150100008870	16911100.00
21	GONDUDIH/KHAS KUSUNDA OC	00150100008875	21892500.00
22	EAST BASSURIYA OC	00150100008876	4407600.00
23	BASTACOLLA COLLIERY	00150100008877	22518200.00
24	RAJAPUR S/JHARIA OCP	00150100008937	21459100.00
25	ENA OCP	00150100008938	13223200.00
26	DHANSAR(ADIC)	00150100008939	5635200.00
27	KUJAMA COLLIERY	00150100008941	7410600.00
28	MOONIDIH UG PROJECT	00150100008943	9919300.00
29	BASSURIYA UG MINE	00150100008944	917300.00
30	KALYANESHWARI GRP OF MINES	00150100009042	53081200.00

[Signature]

[Signature]
 Chief Manager (Fin) Fund
 Fund Section
 BCCL, Koyla Bhawan

[Signature]
 Chief Manager (Fin.)
 B.C.C.L

31	LOHAPATTY COLLIERY	00150100009043	20688700.00
32	AMAL BLOCK II MINE	00150100009044	28779300.00
33	PB GRP OF MINES	00150100009045	5321400.00
34	NT-ST-JEENAGORA GRP OF MINES	00150100009046	63129800.00
35	MURLIDIH 20/21 PIT COLLIERY	00150100009047	5116400.00
36	GODHUR GRP OF MINES	00150100009048	8996600.00
37	SALANPUR Colliery	00150100009050	1623600.00
38	AKWMC	00150100009051	17873900.00
39	AARC	00150100009053	13034500.00
40	KATRAS CHAITUDIH	00150100010086	11136873.00
41	GOPALCHOK MINE	00150100010972	8276300.00
42	KANKANEE COLLIERY	00150100010973	21634200.00
43	AMALGAMATED JOYRAMPUR OC	00150100011026	74667700.00
44	KENDWADIH OC MINE	00150100011209	7243600.00
45	AMALGAMATED SUDAMDIH PATHERDIH	00150100011524	5797000.00
46	BANSDEOPUR COLLIERY	00150100011831	10576100.00
47	AMAL MURAIH PHULARITAND PART	00150100012014	39156000.00
48	Amalgamated Bera Dobari Kuya Ghanoodih Colliery	00150100015511	24226530.00
GRAND TOTAL			665083083.00

[Signature]

Chief Manager (Fin) Fund
Fund Section
BCCL, Koyla Bhawan

[Signature]

[Signature]

[Signature]

Chief Manager (Fin.)
B.C.C.L



Vehicle search

Vehicle Number	JH10CR7550
Owner Name	*A*S* *R*N*L*N* *N* *O*I*T*C*
Registering Authority	DHANBAD, Jharkhand
Vehicle Class	Goods Carrier(HGV)
Fuel Type	DIESEL
Emission Norm	BHARAT STAGE VI
Vehicle Age	0 Years & 11 months
Vehicle Status	ACTIVE

Tap to Check the Vehicle Impound and Seizure
Document Status

Registration Date	07-Jun-2023
Fitness Valid UpTo	06-Jun-2025
Tax Valid UpTo	03-Jun-2024
Insurance Valid UpTo	03-Jun-2024
PUCC Valid Upto	06-Jun-2024
Permit Valid UpTo	08-Jun-2028

Create Virtual RC

View Challan



Vehicle search

Vehicle Number	JH10CR9686
Owner Name	*A*S* *R*N*L*N* *N* *O*I*T*C*
Registering Authority	DHANBAD, Jharkhand
Vehicle Class	Goods Carrier(HGV)
Fuel Type	DIESEL
Emission Norm	BHARAT STAGE VI
Vehicle Age	0 Years & 11 months
Vehicle Status	ACTIVE

Tap to Check the Vehicle Impound and Seizure
Document Status

Registration Date	07-Jun-2023
Fitness Valid UpTo	06-Jun-2025
Tax Valid UpTo	03-Jun-2024
Insurance Valid UpTo	03-Jun-2024
PUCC Valid Upto	06-Jun-2024
Permit Valid UpTo	08-Jun-2028

Create Virtual RC

View Challan



Vehicle search

Vehicle Number	JH10CR9193
Owner Name	*A*S* *R*N*L*N* *N* *O*I*T*C*
Registering Authority	DHANBAD, Jharkhand
Vehicle Class	Goods Carrier(HGV)
Fuel Type	DIESEL
Emission Norm	BHARAT STAGE VI
Vehicle Age	0 Years & 11 months
Vehicle Status	ACTIVE

Tap to Check the Vehicle Impound and Seizure
Document Status

Registration Date	07-Jun-2023
Fitness Valid UpTo	06-Jun-2025
Tax Valid UpTo	03-Jun-2024
Insurance Valid UpTo	03-Jun-2024
PUCC Valid Upto	06-Jun-2024
Permit Valid UpTo	08-Jun-2028

Create Virtual RC

View Challan



Vehicle search

Vehicle Number	JH10CR7544
Owner Name	*A*S* *R*N*L*N* *N* *O* *T*C*
Registering Authority	DHANBAD, Jharkhand
Vehicle Class	Goods Carrier(HGV)
Fuel Type	DIESEL
Emission Norm	BHARAT STAGE VI
Vehicle Age	0 Years & 9 months
Vehicle Status	ACTIVE

Tap to Check the Vehicle Impound and Seizure
Document Status

Registration Date	12-Jul-2023
Fitness Valid UpTo	11-Jul-2025
Tax Valid UpTo	29-Jun-2024
Insurance Valid UpTo	11-Jul-2024
PUCC Valid Upto	11-Jul-2024
Permit Valid UpTo	12-Jul-2028

Create Virtual RC

View Challan



Vehicle search

Vehicle Number	JH10CR8764
Owner Name	*A*S* *R*N*L*N* *N* *O*I*T*C*
Registering Authority	DHANBAD, Jharkhand
Vehicle Class	Goods Carrier(HGV)
Fuel Type	DIESEL
Emission Norm	BHARAT STAGE VI
Vehicle Age	0 Years & 11 months
Vehicle Status	ACTIVE

Tap to Check the Vehicle Impound and Seizure
Document Status

Registration Date	07-Jun-2023
Fitness Valid UpTo	06-Jun-2025
Tax Valid UpTo	03-Jun-2024
Insurance Valid UpTo	03-Jun-2024
PUCC Valid Upto	06-Jun-2024
Permit Valid UpTo	08-Jun-2028

Create Virtual RC

View Challan



Vehicle search

Vehicle Number	JH10CR1359
Owner Name	*A*S* *R*N*L*N* *N* *O*I*T*C*
Registering Authority	DHANBAD, Jharkhand
Vehicle Class	Goods Carrier(HGV)
Fuel Type	DIESEL
Emission Norm	BHARAT STAGE VI
Vehicle Age	0 Years & 9 months
Vehicle Status	ACTIVE

[Tap to Check the Vehicle Impound and Seizure Document Status](#)

Registration Date	12-Jul-2023
Fitness Valid UpTo	11-Jul-2025
Tax Valid UpTo	06-Jul-2024
Insurance Valid UpTo	11-Jul-2024
PUCC Valid Upto	11-Jul-2024
Permit Valid UpTo	12-Jul-2028

Create Virtual RC

View Challan



Vehicle search

Vehicle Number	JH10AN9519
Owner Name	*R*I*D* *I*G*
Registering Authority	DHANBAD, Jharkhand
Vehicle Class	Goods Carrier(HGV)
Fuel Type	DIESEL
Emission Norm	BHARAT STAGE III
Vehicle Age	10 Years & 2 months
Vehicle Status	ACTIVE

Tap to Check the Vehicle Impound and Seizure
Document Status

Registration Date	21-Feb-2014
Fitness Valid UpTo	10-Jan-2025
Tax Valid UpTo	20-May-2024
Insurance Valid UpTo	17-Feb-2025
PUCC Valid Upto	28-May-2024
Permit Valid UpTo	25-Jun-2024

Create Virtual RC

View Challan



Vehicle search

Vehicle Number	JH10CT0407
Owner Name	*A*S* *R*N*L*N* *N* *O* *T*C*
Registering Authority	DHANBAD, Jharkhand
Vehicle Class	Goods Carrier(HGV)
Fuel Type	DIESEL
Emission Norm	BHARAT STAGE VI
Vehicle Age	0 Years & 6 months
Vehicle Status	ACTIVE

Tap to Check the Vehicle Impound and Seizure
Document Status

Registration Date	07-Nov-2023
Fitness Valid UpTo	06-Nov-2025
Tax Valid UpTo	06-May-2024
Insurance Valid UpTo	05-Nov-2024
PUCC Valid Upto	06-Nov-2024
Permit Valid UpTo	08-Nov-2028

Create Virtual RC

View Challan



Vehicle search

Vehicle Number	JH10CT7451
Owner Name	*A*S* *R*N*L*N* *N* *O*I*T*C*
Registering Authority	DHANBAD, Jharkhand
Vehicle Class	Goods Carrier(HGV)
Fuel Type	DIESEL
Emission Norm	BHARAT STAGE VI
Vehicle Age	0 Years & 5 months
Vehicle Status	ACTIVE

Tap to Check the Vehicle Impound and Seizure
Document Status

Registration Date	10-Nov-2023
Fitness Valid UpTo	09-Nov-2025
Tax Valid UpTo	08-May-2024
Insurance Valid UpTo	09-Nov-2024
PUCC Valid Upto	09-Nov-2024
Permit Valid UpTo	15-Nov-2028

Create Virtual RC

View Challan



Vehicle search

Vehicle Number	JH10CT6532
Owner Name	*A*S* *R*N*L*N* *N* *O*I*T*C*
Registering Authority	DHANBAD, Jharkhand
Vehicle Class	Goods Carrier(HGV)
Fuel Type	DIESEL
Emission Norm	BHARAT STAGE VI
Vehicle Age	0 Years & 5 months
Vehicle Status	ACTIVE

[Tap to Check the Vehicle Impound and Seizure Document Status](#)

Registration Date	09-Nov-2023
Fitness Valid UpTo	08-Nov-2025
Tax Valid UpTo	05-May-2024
Insurance Valid UpTo	05-Nov-2024
PUCC Valid Upto	09-Mar-2025
Permit Valid UpTo	13-Nov-2028

Create Virtual RC

View Challan



Vehicle search

Vehicle Number	JH10CT5242
Owner Name	*A*S* *R*N*L*N* *N* *O*I*T*C*
Registering Authority	DHANBAD, Jharkhand
Vehicle Class	Goods Carrier(HGV)
Fuel Type	DIESEL
Emission Norm	BHARAT STAGE VI
Vehicle Age	0 Years & 5 months
Vehicle Status	ACTIVE

Tap to Check the Vehicle Impound and Seizure
Document Status

Registration Date	10-Nov-2023
Fitness Valid UpTo	09-Nov-2025
Tax Valid UpTo	29-Jul-2024
Insurance Valid UpTo	09-Nov-2024
PUCC Valid Upto	09-Nov-2024
Permit Valid UpTo	15-Nov-2028

Create Virtual RC

View Challan



KHEMKA CARRIERS

REGD. OFFICE: 10/10, DHANSAI POLICE STATION, DHANSAI, DHANBAD - 826 106 (JHARKHAND)
e-mail: apay.khemka@gmail.com

To

Date :-28.04.24

The Project Officer,

ABOCP Mine, Block-II Area,
BCCL, Dhanbad.

Sub :- Hiring of equipment for removal of overburden and extraction and transportation of coal from XI/XII, VIIIIC/IX/X, VIIIB,VIIIA & V/VI/VII seams including partial excavation of OB & Coal by vertical rippers or equivalent at "NEW NUDKHURKEE PATCH" at Amalgamated Block-II OCP, Block-II Area, BCCL".

WO No :- GM/B-II/WO/NEW NUDKHURKEE PATCH/KC/2022-23/2097

Dt: 19.01.2023

LOA No. :- BCCL/CMC/71/New Nudkhurkee Patch/LOA/Block-II 2022/483

Dt: 18.10.2022

NIT Ref No. :- BCCL/CMC/H-HEMM/71 e-Tender/2022/350

Dt: 01.08.2022

Permission Period: 01.05.2024 to 31.05.2024

Route :-

1. NEW NUDKHURKEE PATCH to KKC Main Siding Via NOCP Feeder Breaker
2. NEW NUDKHURKEE PATCH to Kessurgarh siding via KG Feeder Breaker
3. NEW NUDKHURKEE PATCH to NK SSY Coal Dump via Weighbridge
4. MOBILE CRUSHER DISCHARGE END TO NEW MADHUBAN COAL WASHERY RAW COAL HOPPER.

Respected Sir,

Kindly allow the under noted Vehicle to ply for coal transportation crushing & wagon loading work at Block-II Area against the said work order and said period on round 'O' clock including Sundays & holidays: -

Vehicles Reg. No-

✓ 1.JH10BT 3342	✓ 2.JH10CH 5765	3.JH10AA 9801	✓ 4. JH10BY 4006	✓ 5.JH10CH 1536
✓ 6.JH10CG 0838	✓ 7.JH10BY 2769	8.JH10CV 1057 (MPTRBJ 1623)	9.BR09GB 1961	
✓ 10.JH10BC 6948				

Payloader

1.JH10AY 9849	2.JH10BB 7338	3.SL No :- HYNHL950TP0000002	4.JH10W 8361

Other

1.JH10CG 1620	2.JH10CP 0638	3.JH10AS 6905	4.JH10AE 7051
5.JH10AY 8559	6.JH10AV 6560	7.JH10BB 5453	8.JH10CB 3535 9.JH10CV 0725

We certify that the above Vehicle are genuine and will be ply on assigned route with in Block-II Area as per the work orders in Compliance of norms of BCCL in case of change of Vehicle from one route to other, we will obtain Prior Permission from concerned officer. For our regular Maintenance Diesel filling job at Dumra Pump & Trade Point the said vehicle will ply in & out Empty 6.00 am to 9.00 pm through NOCP F/B CISF check post.

Thus, we request you to kindly grant permission of vehicle to ply in said work for the said period on round 'O' clock including Sunday & Holiday within Block-II Area of BCCL.

Your's Faithfully

Khemka Carriers

28/04/2024

N. C. S. S.
CISF Inspector
for NA 01 PLS SDP
28/4/24

PROJECT OFFICER
ABOCP MINE

GPS device fitted and activated as per
activation rule.

TEN (10) vehicle
only

30/4/24
GPS activation
as per rule

कृपया,
नग्न गारि,
नग्न गारि,
कमनी कमाण्डर
Coy Commander
कमनी, बी.टी.सी.एल, धनबाद
प्र.ब. धनबाद, बी.टी.सी.एल, धनबाद
"Area" BCCL, Block-II Area, BCCL

Pollution Under Control Certificate

Authorised By :

Government of Jharkhand

Date : 13/03/2024

Time : 16:55:21 PM

Validity upto : 12/03/2025



Certificate SL No. : JH01001400005382
 Registration No. : JH10BY2769
 Date of Registration : 20/Jan/2020
 Month & Year of Manufacturing : July-2019
 Valid Mobile Number : *****0300
 Emission Norms : BHARAT STAGE IV
 Fuel : DIESEL
 PUC Code : JH0100140
 GSTIN :
 Fees : Rs.300.0
 MIL observation : No

Vehicle Photo with Registration plate
60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High idling emissions	CO	percentage (%)		
	RPM	RPM	2500 ± 200	
	Lambda	-	1 ± 0.03	
Smoke Density	Light absorption coefficient	1/metre	1.62	0.44

This PUC certificate is system generated through the national register of Motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://vahan.parivahan.gov.in>

Authorised Signature with stamp of PUC operator
60mm x 20 mm

Pollution Under Control Certificate

Authorised By :

Government of Jharkhand

Date : 29/02/2024

Time : 17:09:26 PM

Validity upto : 27/02/2025



Certificate SL. No. : JH01001400005307
 Registration No. : JH10BY4006
 Date of Registration : 20/Jan/2020
 Month & Year of Manufacturing : August-2019
 Valid Mobile Number : *****7484
 Emission Norms : BHARAT STAGE IV
 Fuel : DIESEL
 PUC Code : JH0100140
 GSTIN :
 Fees : Rs.300.0
 MIL observation : No

Vehicle Photo with Registration plate
60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High idling emissions	CO	percentage (%)		
	RPM	RPM	2500 ± 200	
	Lambda	-	1 ± 0.03	
Smoke Density	Light absorption coefficient	1/metre	1.62	0.42

This PUC certificate is system generated through the national register of Motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://vahan.parivahan.gov.in>

Authorised Signature with stamp of PUC operator
60mm x 20 mm

Pollution Under Control Certificate

Authorised By :

Government of Jharkhand

Date : 11/11/2023
 Time : 14:44:59 PM
 Validity upto : 10/11/2024



Certificate SL. No. : JH01000710002303
 Registration No. : JH10CH1536
 Date of Registration : 09/Nov/2021
 Month & Year of Manufacturing : October-2021
 Valid Mobile Number : *****0440
 Emission Norms : BHARAT STAGE VI
 Fuel : DIESEL
 PUC Code : JH0100071
 GSTIN :
 Fees : Rs.300.00
 (GST to be paid extra as applicable)
 MIL observation : No

Vehicle Photo with Registration plate
 60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High idling emissions	CO	percentage (%)		
	RPM	RPM	2500 ± 200	
	Lambda	-	1 ± 0.03	
Smoke Density	Light absorption coefficient	1/metre	0.7	0.39

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://puc.parivahan.gov.in>

Authorised Signature with stamp of PUC operator
 60mm x 20 mm



Form 59

[See rules 115 (2)]

Pollution Under Control Certificate

Authorised By :

Government of Jharkhand

Date : 07/05/2024
Time : 17:33:22 PM
Validity upto : 06/05/2025



Certificate SL. No. : JH01001400005565
 Registration No. : JH10CH5765
 Date of Registration : 10/Dec/2021
 Month & Year of Manufacturing : October-2021
 Valid Mobile Number : *****7178
 Emission Norms : BHARAT STAGE VI
 Fuel : DIESEL
 PUC Code : JH0100140
 GSTIN :
 Fees : Rs.300.00
 MIL observation : No

Vehicle Photo with Registration plate
 60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High idling emissions	CO	percentage (%)		
	RPM	RPM	2500 ± 200	
	Lambda	-	1 ± 0.03	
Smoke Density	Light absorption coefficient	1/metre	0.7	0.49

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://puc.parivahan.gov.in>

Authorised Signature with stamp of PUC operator
 60mm x 20 mm

Form 59

(See rules 115 (2))

Pollution Under Control Certificate

Authorised By

Government of Jharkhand

Date

Time

Validity upto

02/02/2024

16:23:48 PM

01/02/2025



Certificate St. No.

Registration No.

Date of Registration

Month & Year of Manufacturing

Vest Mobile Number

Emission Norms

Fuel

PUC Code

GSTIN

Fees

JH01000090016425

JH10BT3342

09/Mar/2019

July 2018

*****1111

BHARAT STAGE IV

DIESEL

JH0100009

Rs.300.00

(GST to be paid extra as applicable)

Nil

NIL observation

Vehicle Photo with Registration plate
60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High idling emissions	CO	percentage (%)		
	RPM	RPM	2500 $\pm$ 200	
	Lambda	-	1 $\pm$ 0.03	
Smoke Density	Light absorption coefficient	1/metre	1.62	0.66

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://puc.parivahan.gov.in>

Authorised Signature with stamp of PUC operator
60mm x 20 mm

[See rules 115 (2)]

Pollution Under Control Certificate

Authorised By :

Government of Jharkhand

Date : 25/10/2023
 Time : 11:00:52 AM
 Validity upto : 24/10/2024



Certificate St. No. : JH01000710002268
 Registration No. : JH10CG0838
 Date of Registration : 08/Oct/2021
 Month & Year of Manufacturing : March-2021
 Valid Mobile Number : *****2747
 Emission Norms : BHARAT STAGE VI
 Fuel : DIESEL
 PUC Code : JH0100071
 GSTIN :
 Fees : Rs.300.00
 ML observation : No

Vehicle Photo with Registration plate
 60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High idling emissions	CO	percentage (%)		
	RPM	RPM	2500 ± 200	
	Lambda	-	1 ± 0.03	
Smoke Density	Light absorption coefficient	1/metre	0.7	0.4

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://puc.parivahan.gov.in>

Authorised Signatory with stamp of PUC operator

6102/082
 08/10/2023

(See rules 115 (2))

Pollution Under Control Certificate

Authorised By :

Government of Jharkhand

Date : 07/05/2024
 Time : 17:35:56 PM
 Validity upto : 06/11/2024



Certificate SL. No. : JH01001400005566
 Registration No. : JH10BC6948
 Date of Registration : 17/Dec/2016
 Month & Year of Manufacturing : October-2016
 Valid Mobile Number : *****7484
 Emission Norms : BHARAT STAGE III
 Fuel : DIESEL
 PUC Code : JH0100140
 GSTIN :
 Fees : Rs.300.00
 MIL observation : No

Vehicle Photo with Registration plate
 60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High Idling emissions	CO	percentage (%)		
	RPM	RPM	2500 $\pm$ 200	
	Lambda	-	1 $\pm$ 0.03	
Smoke Density	Light absorption coefficient	1/metre	2.45	0.3

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://puc.parivahan.gov.in>

Authorised Signature with stamp of PUC operator

60mm x 20 mm

< Vehicle search

Vehicle Number	JH10CV1057
Owner Name	*A*j*y* *D*O* *R*v*t* *I*+E*
Registering Authority	DHANBAD, Jharkhand
Vehicle Class	Goods Carrier(HGV)
Fuel Type	DIESEL
Emission Norm	BHARAT STAGE VI
Vehicle Age	0 Years & 3 months
Vehicle Status	ACTIVE

Tap to Check the Vehicle Impound and Seizure Document Status

Registration Date	29-Jan-2024
Fitness Valid UpTo	28-Jan-2026
Tax Valid UpTo	23-Jun-2024
Insurance Valid UpTo	23-Dec-2024
PUC Valid Upto	28-Jan-2025
Permit Valid UpTo	30-Jan-2029

Create Virtual RC

View Challan



KHEMKA CARRIERS

COAL TRANSPORT POLICE STATION DHANBAD, DHANBAD, JHARKHAND
E-mail: khemka.springs@gmail.com

Mob: 9234456200

To
The Project Officer,
Block II Area,
BCCL, Dhanbad.

Date: 28.04.2024

Sub: - Permission for Plying of Tipper for the work "Transportation of Coal from Coal Face to Different destination including hiring of crusher for crushing of coal & allied jobs under Block II Area of BCCL for a period of 1095 days".

Against LOA No. - BCCL/CMC/LOA/Tptn-46/B-II/LOA/2022/138

Dt. 25.03.2022

Against Work Order No.- GM/B-II/WO/Coal-Tptn/KC/2022-23/226

Dt. 02.05.2022

Route :-

1. DL Face to KC Crusher(19 No.)
2. KC Crusher to KKC Main Siding
3. KC Crusher to Kessurgarh Siding
4. MOBILE CRUSHER DISCHARGE END TO NEW MADHUBAN COAL WASHERY RAW COAL HOPPER.

Permission Period: 01.05.2024 to 31.05.2024

Respected Sir,

Kindly allow the under noted Vehicle to ply for coal transportation crushing & wagon loading work at Block-II Area against the said work order and said period on round 'O' clock including Sundays & holidays:-

Vehicles Reg. No.-

✓ 1.JH10CG 8285

✓ 2. JH10CH 6126

3. OD09P 0500

✓ 4. JH10CQ 2997

✓ 5. JH10CU 7723

✓ 6. JH10CQ 1221

✓ 7. JH10CV 0190

8. JH10AV 0156

✓ 9. JH10BU 5945

Excavator

1. HYUNDAI 360

2. JH10CG 3855 (ICB Rock Breaker)

Payloader

1. JH10BA 6596

2. JH10AD 5031

3. JH10BA 1118

4. CG12U 2801

5. CLG856H 850289

6. SDLG- C1060025810

Other

1. JH10S 9621

2. JH10AY 9290

3. JH10CA 9689

4. JH09L 8271

5. JH10CD 4876

We certify that the above Vehicle are genuine and will be ply on assigned route with in Block-II Area as per the work orders in Compliance of norms of BCCL in case of change of Vehicle from one route to other, we will obtain Prior Permission from concerned officer. For our regular Maintenance Diesel filling job at Dumra Pump & Trade Point the said vehicle will ply in & out Empty 6.00 am to 9.00 pm through NOCP F/B CISF check post.

Thus, we request you to kindly grant permission of vehicle to ply in said work for the said period on round 'O' clock including Sunday & Holiday within Block-II Area of BCCL.

Your's Faithfully

28/04/2024
Khemka Carriers

CISF Control Room

30/4/24
Addl General Manager
Block II Area, BCCL

28/4/2024
PROJECT OFFICER
AROC MINE

Control Room
for NA as per SOP

28.4.24
NOLE 17

अपना दि. - 31.05.24

रक 24/04/24

कम्पनी कमाण्डर प्र device filled in above mentioned
Coy Commander,
को. सी. सी. एस.
Unit BCCL, Dhanbad
" Area BK-II
Rajni
28/04/24
CISF Control Room

Pollution Under Control Certificate

Authorised By :

Government of Jharkhand

Date : 25/10/2023
 Time : 10:58:56 AM
 Validity upto : 24/10/2024



Certificate SL No. : JH01000710002267
 Registration No. : JH10CG8286
 Date of Registration : 08/Oct/2021
 Month & Year of Manufacturing : March-2021
 Valid Mobile Number : *****2747
 Emission Norms : BHARAT STAGE V
 Fuel : DIESEL
 PUC Code : JH0100071
 GSTIN :
 Fees : Rs.300.00
 MIL observation : No

Vehicle Photo with Registration plate
 60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High idling emissions	CO	percentage (%)		
	RPM	RPM	2500 ± 200	
	Lambda	-	1 ± 0.03	
Smoke Density	Light absorption coefficient	1/metre	0.7	0.4

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://pus.parivahan.gov.in>

Authorised Signature with stamp of
 60mm x 20 mm



Form 59

[See rules 115 (2)]

Pollution Under Control Certificate

Authorised By :

Government of Jharkhand

Date : 07/05/2024
Time : 17:41:51 PM
Validity upto : 06/05/2025



Certificate SL. No. : JH01001400005568
 Registration No. : JH10CQ1221
 Date of Registration : 11/Mar/2023
 Month & Year of Manufacturing : January-2023
 Valid Mobile Number : *****7484
 Emission Norms : BHARAT STAGE VI
 Fuel : DIESEL
 PUC Code : JH0100140
 GSTIN :
 Fees : Rs. 300.00
 MIL observation : No

Vehicle Photo with Registration plate
 60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High idling emissions	CO	percentage (%)		
	RPM	RPM	2500 $\pm$ 200	
	Lambda	-	1 $\pm$ 0.03	
Smoke Density	Light absorption coefficient	1/metre	0.7	0.24

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://puc.parivahan.gov.in>

Authorised Signature with stamp of PUC operator
 60mm x 20 mm

< Vehicle search

Vehicle Number	JH10CV0190
Owner Name	*A*J*Y* *D*O* *R*V*T* *I*I*E*
Registering Authority	DHANBAD, Jharkhand
Vehicle Class	Goods Carrier(HGV)
Fuel Type	DIESEL
Emission Norm	BHARAT STAGE VI
Vehicle Age	0 Years & 2 months
Vehicle Status	ACTIVE

Tap to Check the Vehicle Impound and Seizure Document Status

Registration Date	17-Feb-2024
Fitness Valid UpTo	16-Feb-2026
Tax Valid UpTo	23-Mar-2024
Insurance Valid UpTo	08-Dec-2024
PUC Valid Upto	16-Feb-2025
Permit Valid UpTo	25-Feb-2029

Create Virtual RC

View Challan

< Vehicle search

Vehicle Number	JH10CU7723
Owner Name	*A*j*Y* *D*O* *V*.* *T*.*
Registering Authority	DHANBAD, Jharkhand
Vehicle Class	Goods Carrier(HGV)
Fuel Type	DIESEL
Emission Norm	BHARAT STAGE VI
Vehicle Age	0 Years & 4 months
Vehicle Status	ACTIVE

Tap to Check the Vehicle Impound and Seizure Document Status

Registration Date	15-Dec-2023
Fitness Valid UpTo	14-Dec-2025
Tax Valid UpTo	08-Aug-2024
Insurance Valid UpTo	13-Dec-2024
PUC Valid UpTo	14-Dec-2024
Permit Valid UpTo	17-Dec-2028

Create Virtual RC

View Challan

Form 59

(See rules 115 (2))

Pollution Under Control Certificate

Authorised By :
Government of Jharkhand

Date : 11/11/2023
Time : 15:20:11 PM
Validity upto : 10/11/2024



Certificate SL. No. : JH01000710002305
Registration No. : JH10CH6126
Date of Registration : 09/Nov/2021
Month & Year of Manufacturing : October-2021
Valid Mobile Number : *****5440
Emission Norms : BHARAT STAGE VI
Fuel : DIESEL
PUC Code : JH0100071
GSTIN :
Fees : Rs.300.00
ML observation : (GST to be paid extra as applicable)
No

Vehicle Photo with Registration plate
60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High idling emissions	CO	percentage (%)		
	RPM	RPM	2500 ± 200	
	Lambda	-	1 ± 0.03	
Smoke Density	Light absorption coefficient	1/metre	0.7	0.39

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://puc.parivahan.gov.in>

Authorised Signature with stamp of PUC operator
60mm x 20 mm



Pollution Under Control Certificate

Authorised By :

Government of Jharkhand

Date : 07/05/2024

Time : 17:39:29 PM

Validity upto : 06/05/2025



Certificate SL No. : JH01001400005567
 Registration No. : JH10CQ2997
 Date of Registration : 11/Mar/2023
 Month & Year of Manufacturing : January-2023
 Valid Mobile Number : *****7484
 Emission Norms : BHARAT STAGE VI
 Fuel : DIESEL
 PUC Code : JH0100140
 GSTIN :
 Fees : Rs.300.00
 MIL observation : No

Vehicle Photo with Registration plate
60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High idling emissions	CO	percentage (%)		
	RPM	RPM	2500 $\pm$ 200	
	Lambda	-	1 $\pm$ 0.03	
Smoke Density	Light absorption coefficient	1/metre	0.7	0.32
This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.				

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://puc.parivahan.gov.in>

Authorised Signature with stamp of PUC operator
60mm x 20 mm

Pollution Under Control Certificate

Authorised By :
Government of Jharkhand

Date : 07/05/2024
Time : 16:55:33 PM
Validity upto : 06/05/2025



Certificate Sl. No. : JH01000710002790
Registration No. : JH10BT1397
Date of Registration : 03/Apr/2019
Month & Year of Manufacturing : January-2019
Valid Mobile Number : *****5622
Emission Norms : BHARAT STAGE IV
Fuel : DIESEL
PUC Code : JH0100071
GSTIN :
Fees : Rs.300.00
NIL observation : No

Vehicle Photo with Registration plate
60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High idling emissions	CO	percentage (%)		
	RPM	RPM	2500 $\pm$ 200	
	Lambda	-	1 $\pm$ 0.03	
Smoke Density	Light absorption coefficient	1/metre	1.62	0.4

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://puc.parivahan.gov.in>

Authorised Signature with stamp of PUC operator
60mm x 20 mm



Form 59

Date rules 11/5/20

Pollution Under Control Certificate

Authorized By

Government of Jharkhand

Date : 04/05/2024
 Time : 10:53:40 AM
 Validity upto : 03/05/2025



Certificate No. : JH01000710002776
 Registration No. : JH10BR908
 Date of Registration : 08/Dec/2018
 Make & Year of Manufacturing : September 2018
 Valid Mobile Number : 99999927
 Emission Norm : BHARAT STAGE IV
 Fuel : DIESEL
 PUC Code : JH0100071
 GDI :
 Year :
 Fee : Rs. 700.00
 Nil observation : No

Vehicle Photo with Registration plate
 60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Using Exhausted	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/MC)	ppm		
High speed emissions	CO	percentage (%)		
	SPM	RPM	2500 ± 200	
Low speed emissions	Leakage		1 ± 0.03	
	Light absorption coefficient	1/metre	1.62	0.21
Smoke Density ppm				

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note: 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to maharajapannanjan.gov.in

Authorized Signature with stamp of PUC operator.
 60mm x 20 mm

Pollution Under Control Certificate

Authorised By :
Government of Jharkhand

Date : 07/05/2024
Time : 16:14:42 PM
Validity upto : 06/05/2025



Certificate SL. No. : JH01000710002788
Registration No. : JH10BR5950
Date of Registration : 08/Dec/2018
Month & Year of Manufacturing : October-2018
Valid Mobile Number : *****9374
Emission Norms : BHARAT STAGE IV
Fuel : DIESEL
PUC Code : JH0100071
GSTIN :
Fees : Rs.300.00
MIL observation : No

Vehicle Photo with Registration plate
60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High idling emissions	CO	percentage (%)		
	RPM	RPM	2500 $\pm$ 200	
	Lambda	-	1 $\pm$ 0.03	
Smoke Density	Light absorption coefficient	1/metre	1.62	0.4

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://puc.parivahan.gov.in>

Authorised Signature with stamp of PUC
60mm x 20 mm



Pollution Under Control Certificate

Authorised By :

Government of Jharkhand

Date : 07/05/2024
 Time : 15:16:19 PM
 Validity upto : 06/05/2025



Certificate SL. No. : JH01000710002787
 Registration No. : JH10BQ1052
 Date of Registration : 30/Oct/2018
 Month & Year of Manufacturing : May-2018
 Valid Mobile Number : *****4389
 Emission Norms : BHARAT STAGE IV
 Fuel : DIESEL
 PUC Code : JH0100071
 GSTIN :
 Fees : Rs.300.00
 MIL observation : No

Vehicle Photo with Registration plate
 60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High idling emissions	CO	percentage (%)		
	RPM	RPM	2500 $\pm$ 200	
	Lambda	-	1 $\pm$ 0.03	
Smoke Density	Light absorption coefficient	1/metre	1.62	0.39

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://puc.parivahan.gov.in>

Authorised Signature and stamp of PUC operator
 60mm x 20 mm



Form 59

[See rules 115 (2)]

Pollution Under Control Certificate

Authorised By :

Government of Jharkhand

Date : 25/10/2023

Time : 18:35:54 PM

Validity upto : 24/10/2024



Certificate SL No. : JH01000650002698
 Registration No. : BR28GA0905
 Date of Registration : 29/Nov/2017
 Month & Year of Manufacturing : April-2017
 Valid Mobile Number : *****0411
 Emission Norms : BHARAT STAGE IV
 Fuel : DIESEL
 PUC Code : JH0100065
 GSTIN :
 Fees : Rs.300.00
 (GST to be paid extra as applicable)
 MIL observation : No

Vehicle Photo with Registration plate
60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High idling emissions	CO	percentage (%)		
	RPM	RPM	2500 ± 200	
	Lambda	-	1 ± 0.03	
Smoke Density	Light absorption coefficient	1/metre	1.62	0.92

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://puc.parivahan.gov.in>

Authorised Signature with stamp of PUC operator
60mm x 20 mm

Date:-28.04.2024

5th vehicle (6) only

Longan
30/11/2024
C/ps control room
B. D. Mee

GOVERNMENT OF JHARKHAND

State Transport Department
[DHANBAD]

VEHICLE PARTICULARS (FOR INTERNAL USE)

JH24032624344748

SANJAY UDYOG PRIVATE
LIMITED

Goods Carrier

12/2023

4354593

CUMMIS

U/C SANJAY KHEMKA, NA

MAT566006P3P33243

TITANIUM_WHITE

Body Type:

Seat(inc. driver):

Tax Amount:

Wheel Base

Regn Valid upto:

Fitness upto:

Registration No.

Son/Wife/Daughter of:

Vehicle Maker:

Ownership Type:

Speed Governor Fitted On:

Engine No:

Vehicle Status

TIPPER

2

9600

6750

27-Mar-2039

27-Mar-2026

Last Alteration of Vehicle on

JH10CV6843

NA

TATA MOTORS LTD

FIRM

07-MAR-2024

B6.7B62300D05132M64352571

ACTIVE

No of Cylinders:

Unladen Wt(kg):

Cubic Capacity:

Floor Area

Tax Paid upto:

Vehicle Norms

6

17061

6702.00

0.000

26-Jun-2024

BHARAT STAGE VI

and Address on:

Ins Royal Sundaram General Insurance Co. Ltd vide policy certificate/covemote no is valid from 07-Mar-2024 to 06-Mar-2025.

INDRA MAHINDRA FINANCIAL SER LTD, DHANBAD, Dhanbad-826001

28-Mar-2024

8763474390

PUCU Upto:

Email Id:

27-Mar-2025

Previous RegNo

Entry Date

Conversion Date

Number, Desc & size of

16&11.00R20 RIB 16PR

16&11.00R20 RIB 16PR

16&11.00R20 RIB 16PR

16&11.00R20 RIB 16PR

16&11.00R20 RIB 16PR

Regd. Axle Weight(in kgs)

14000

33500

0

0

Signature of Registering Auth

DHANBAD [JHARKHAND]

Printed On: 28-Mar-2024 11:33:05



State Transport Department
[DHANBAD]

Name	SANARY JUYOG PVT LTD	Registration No.	JH10CV0127
Goods Carrier		SanWife Daughter of	NA
Vehicle Maker	TATA MOTORS LTD	Ownership Type	FIRM
Chassis No.	KASHIAND GOVINDPUR, Disturbed, Parkhand-826001	Engine No.	B67B5Z300005132M84351396
Body Type	WHITE	Vehicle Status	ACTIVE
Seating Capacity	2	No of Cylinders	6
Gross Weight	47500	Unladen Wt(kg)	17061
Cubic Capacity	6702.00	Cubic Capacity	6702.00
Floor Area	0.000	Floor Area	0.000
Model	SIGNA 4830 TK BSVI		
Regn Valid upto	28-Apr-2024	Tax Paid upto	28-Apr-2024
Vehicle Norms	BHARAT STAGE VI		

PURTY Insurance From MACHADO GENERAL INSURANCE CO. LTD vide policy certificate/coversafe no

WANK LTD. GRAVESEND Dumbod-826001

Turn	25-Jan-2024	PLCC Upd	28-Jan-2025
	8271820000	Email Id	

Abstract Extraction Details

Previous RegNo
Entry Date
Cancellation Date

Number	Desc & size of	Regd. Axle Weight (lb) (q5)
2	2X10X30	14000
5	5X10X30	33500
2		0
4		0

Signature of Registering Authority
DHANBAD (JHARKHAND)

Printed On: 29-Jan-2024 12:50:56



GOVERNMENT OF JHARKHAND

State Transport Department

[DHANBAD]

VEHICLE PARTICULARS (FOR INTERNAL USE)

Registration No.	JH2401/9558/10227	Registration No.	JH10CV8538
Owner Name	SANJAY LOYDGO PVT LTD	Serial/Chassis No.	NA
Vehicle Class	Goods Carrier	Vehicle Make	TATA MOTORS LTD
Vehicle No.	1250033	Ownership Type	FIRM
Manufacturer's Brand	NABHITAND GOVINDPUR, Dhanbad, Jharkhand-826109	Engine No.	BB 70523000051321864351270
Model	MAT26600RP2K36024	Vehicle Status	ACTIVE
Color	TITANIUM WHITE	Body Type	TIPPER
Seating Capacity	2	Seating Capacity (driver)	2
Tax Amount	5600	Wheel Base	8750
Regd. Valid upto	28-Jan-2025	Unladen Weight	17061
Insurance Valid upto	28-Jan-2025	Cubic Capacity	6702.00
Insurance Policy No.	28-Jan-2025	Floor Area	0.000
Insurance Company	MAHATMA GENERAL INSURANCE CO. LTD	Tax Paid upto	28-Apr-2024
Insurance Valid from	27-Jan-2024 to 28-Jan-2025	Vehicle Norms	BHARAT STAGE VI
Insurance Policy Certificate/Cover Note No.		Vehicle Norms	

Vehicle No. 1250033, Dhanbad, Jharkhand-826109

28-Jan-2025

5271820001

PUCC Up to

28-Jan-2025

Previous RegNo.

Entry Date

Conversion Date

Number, Design & size of

2X10X20

8X10X20

2

4

Regd. Axle Weight (in kgs)

14000

33500

0

0

Signature of Registering Authority
DHANBAD [JHARKHAND]

Printed On: 29-Jan-2024 13:00:16

realme Shot by Satya Narayan

2024-01-29 13:15

GOVERNMENT OF JHARKHAND

State Transport Department [DHANBAD]

VEHICLE PARTICULARS (FOR INTERNAL USE)

Application No: JH24032814343376 Registration No: JH10CV8422
Owner Name: ONEIRIC CARRIER WAYS PVT LTD Son/Wife/Daughter of: NA
Vehicle Class: Goods Carrier Vehicle Maker: TATA MOTORS LTD
Month/Year of Manuf.: 12/2023 Ownership Type: FIRM
Speed Governor No: 4354593 Speed Governor Fitted On: 11-MAR-2024
Speed Governor Manuf.: CUMMICS
Present Address: U/C ANIL DUTT BALLI, 4TH FLOOR O RELIABLE SIGNATURE, TOWERS KATRAS ROAD
MATKIRIA, Dhanbad, Jharkhand-826001
Chassis No: MAT566006P3P38818 Engine No: B6.7B82300D05132M64352374
Color: TITANIUM_WHITE Vehicle Status: ACTIVE
Owner Serial No: 1 Body Type: TIPPER No of Cylinders: 6
Horse Power(BHP): 300.16 Seat(Incl. driver): 2 Unladen Wt(kg): 17061
Laden Wt(kg): 47500 Tax Amount: 9600 Cubic Capacity: 6702.00
Vehicle Model: SIGMA 4830.TK BSVI Wheel Base: 6750 Floor Area: 0.000
10X4HD 29BX
Registration Date: 28-Mar-2024 Regn Valid upto: 27-Mar-2039 Tax Paid upto: 28-Jun-2024
Fuel: DIESEL Fitness upto: 27-Mar-2026 Vehicle Norms: BHARAT STAGE VI
Last Change of Address on: Last Alteration of Vehicle on
Insurance From Shriram General Insurance Co. Ltd. vide policy certificate/covernote no is valid from 11-Mar-2024 to 10-Mar-2025.

HP Dils:

1. Hypothecation-HDB FINANCIAL SERVICES LTD, DHANBAD, Dhanbad-826001

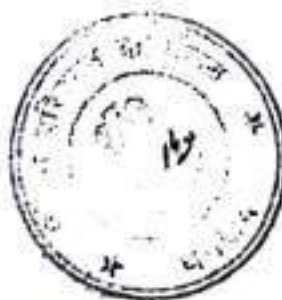
PUCF From: 28-Mar-2024 PUCF Upto: 27-Mar-2025
Mobile No: 8054747711 Email Id:
Other State/Transfer/Conversion Details
Previous Owner :
Old State :
Transfer Date :
Conversion Date :

Additional Particulars

	Number, Desc & size of	Regd. Axle Weight(In kgs)
a) Front:	16&11.00R20 RIB 16PR	14000
b) Rear:	16&11.00R20 RIB 16PR	33500
c) Other:	16&11.00R20 RIB 16PR	0
d) Tandem:	16&11.00R20 RIB 16PR	0

Signature of Registering Authority
DHANBAD [JHARKHAND]

Printed On: 28-Mar-2024 11:30:17



See rules 115 (2)

Pollution Under Control Certificate

Authorised By :
Government of Jharkhand

Date : 24/01/2024
Time : 17:01:29 PM
Validity upto : 23/01/2025



Certificate SL. No. : JH01002580010840
Registration No. : JH10BR7439
Date of Registration : 26/Nov/2018
Month & Year of Manufacturing : October-2018
Valid Mobile Number : *****0000
Emission Norms : BHARAT STAGE IV
Fuel : DIESEL
PUC Code : JH0100258
GSTIN :
Fees : Rs.300.00
(GST to be paid extra as applicable)
MIL observation : No

Vehicle Photo with Registration plate
60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High idling emissions	CO	percentage (%)		
	RPM	RPM	2500 ± 200	
	Lambda	-	1 ± 0.03	
Smoke Density	Light absorption coefficient	1/metre	1.62	0.47

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://puc.parivahan.gov.in>

Authorised Signature with stamp of PUC operator
60mm x 20 mm

Pollution Under Control Certificate

Issued By
Name of the person

Date
Time
Place

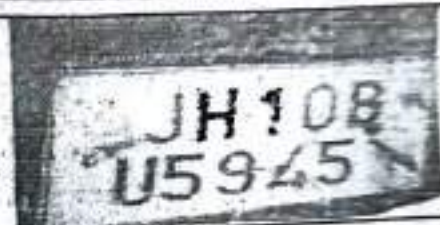
25/01/2024
13:05:46 PM
24/01/2025



JH01000710002528
JH010BU5945
11/Jan/2019
Age: 019
00000000
BHARAT STAGE IV
DIESEL
JH0100071

Rs. 300.00
(GST to be paid extra as applicable)
No

Photo with Registration plate
Size: 50 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
	2	3	4	5
	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon (THC/HC)	ppm		
	CO	percentage (%)		
	RPM	RPM	2500 ± 200	
	Lambda		1 ± 0.03	
	Light absorption coefficient	1/metre	1.62	0.4

This Pollution Under Control Certificate is system generated through the national register of motor vehicles and does not require any signature.

Vehicle owners to link their vehicle to registered vehicle by logging to <https://puc.parivahan.gov.in>



Form 59

(See rules 115 (2))

Pollution Under Control Certificate

Authorised By :
Government of Jharkhand

Date : 24/01/2024
Time : 15:43:43 PM
Validity upto : 23/01/2025



Certificate SL. No. : JH01002580010838
Registration No. : JH10BM7984
Date of Registration : 21/Apr/2018
Month & Year of Manufacturing : March-2018
Valid Mobile Number : *****0000
Emission Norms : BHARAT STAGE IV
Fuel : DIESEL
PUC Code : JH0100258
GSTIN :
Fees : Rs.300.00
(GST to be paid extra as applicable)
MIL observation : No

Vehicle Photo with Registration plate
60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High idling emissions	CO	percentage (%)		
	RPM	RPM	2500 ± 200	
	Lambda	-	1 ± 0.03	
Smoke Density	Light absorption coefficient	1/metre	1.62	0.24

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://puc.parivahan.gov.in>

Authorised Signature with stamp of PUC operator
60mm x 20 mm

Pollution Under Control Certificate

Authorised By :
Government of Jharkhand

Date : 07/06/2023
Time : 15:49:54 PM
Validity upto : 06/06/2024



Certificate SL. No. : JH01002580006433
Registration No. : JH10BU9355
Date of Registration : 11/Jun/2019
Month & Year of Manufacturing : April-2019
Valid Mobile Number : *****0000
Emission Norms : BHARAT STAGE IV
Fuel : DIESEL
PUC Code : JH0100258
GSTIN :
Fees : Rs.300.00
(GST to be paid extra as applicable)
MIL observation : No

Vehicle Photo with Registration plate
60 mm x 30 mm



Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High idling emissions	CO	percentage (%)		
	RPM	RPM	2500 ± 200	
	Lambda	-	1 ± 0.03	
Smoke Density	Light absorption coefficient	1/metre	1.62	0.23

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://puc.parivahan.gov.in>

Authorised Signature with stamp of PUC operator
60mm x 20 mm

GVTC Performance report for the month of March 2024

Name of GVTC: - GVTC Barora, Barora Area

Combined Report of Barora and Block- II Areas

1. Training as per MVT Rules, 1966 :-								
Types of Training (Departmental)	Duration (in Days)	Monthly Target	This Month Achievement (Training Completed)	Cumulative Target	Achievement (Training Completed)			
Basic / Initial	12 / 18-48	APNE	17	APNE	105			
Refresher	12	00	17	481	527			
2. Special Training as per MVT Rules: -								
Types of Training	Duration In Days	Target (Annual)	This Month Achievement		Cumulative Achievement			
Reorientation	12	As Reqd.	01		02			
Trg. for change of job	12	As Reqd.	04		22			
Shot firing	01	20	00		27			
Personnel Handling Explosives	01	20	00		30			
Trg. on Gas Testing	01	20	00		18			
First Aid	01	25	00		30			
3. Training as per Safety Conference Recommendation: -								
Name of the Training Programme	Duration In days	Target (Yearly)	Achievement (This month)					Total Cumulative
			Exe.	O/M	M/S	F/M	Worker	
St.Trg. for Tech. Supv.	01	20						30
Fire Fighting	01	30						39
Roof Support	01	10						11
Solid Blasting	01	10						09
Safety Committee Member	01	20						38
HEMM Workers	01	30						39
Traffic Rule	01	20						20
Training on LOTO	01							18
Training on the Road Map to Zero Harm	1/2							29
Safety Management Plan		As	23	6	0	6	14	66
Gas testing (Degree/Diploma) /apprentices	7 days							32
SMP and other Safety Matters	01	Reqd						26
Contractors' Workers Basic (Surface)	12	As Reqd	00					06
Contractors' Workers Basic(OCP)	18	As Reqd	02					127
Contractors' Workers Basic(UG)	48	As Reqd	00					00
Contractors' Workers Refresher Training	12	As Reqd	00					07

[Signature]
30.03.24
Group Training Officer
GVTC Barora, Barora Area

Details of Departmental Refresher Training, March 2024
 Name of GVTC: - GVTC Barora, Name of Area: - Barora Area
 Specific categories of Open Cast Workers / Supervisors

Types of training	Duration In days	This month Achievement	Cumulative Achievement
Drillers	12	00	13
Blasting Crew	12	00	15
Dumper Operators	12	09	75
Shovel Operators	12	02	33
Dozer Operators	12	01	17
Dragline Operators	12	00	03
Fitter / Mechanics	12	01	103
Electricians	12	00	18
Auto Electricians	12	00	04
Others	12	03	119
Total (Open Cast)		16	400

1. Specific Categories of Underground Workers / Supervisors: -

Types of Training	Duration in days	This Month Achievement	Cumulative Achievement
Trammer	12	00	25
Track Layers	12	00	06
Drillers	12	00	08
Support Personnel	12	00	11
Persons handling Explosive	12	00	09
Fitter / Mechanics	12	00	13
Electricians	12	00	05
Machine Operators/Drivers	12	00	15
Welders & Gas Cutters	12	00	01
Ventilation Gang	12	00	00
Fan Attendants	12	00	00
Winding Engine Drivers	12	00	00
Banksman / Onsetter	12	00	01
Others	12	01	33
Total (Underground)		01	127

Hsingh
30.03.24

Group Training Officer
GVTC Barora, Barora Area

Additional Monthly Report (Ref.: - G.R.I. Guideline) for the Month of March 2024

Name of GVTC: GVTC Barora, Barora Area				Month: <u>March</u>		Year: 2024		
(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)
Course Name	From --To	No. of Days	Nos. of Participants	Male Participants	Female Participants	Total Man days (373)		Total Training Hours
All trainings	01.03.2024 To 30.03.2024	25	90	90	00	Male	Female	2804
						373	00	

(9)		(10)		(11)		(12)				(13)	
Total Training Hours		Executive Participants		Non-Executive Participants		S/C Participants		S/T Participants		OBC Participants	
Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
2804	00	23	0	67	00	11	00	03	0	44	00

Training of Contractual Workers:

Basic	Surface		Opencast		UG		Mandays	
	This Month	Cumulative	This Month	Cumulative	This Month	Cumulative	This Month	Cumulative
	0	06	02	127	00	00	OC = 24	Surface=36 OC = 1524 Total = 1560

Refresher	This Month	Cumulative	Mandays		Training Hours	
			This Month	Cumulative	This Month	Cumulative
	00	07	00	42	00	308

Total Training Completed and Certificate issued up to March 2024 = 140

Contractual Basic = 133

Contractual Refresher = 07

S. N.	Type of Training	SC	ST	OBC	General	Male	Female	Total This Month	Cumulative
1	Initial	00	00	02	00	02	00	02	133
2	Refresher	00	00	00	00	0	00	00	07

H. Singh
30.03.24
Group Training Officer
GVTC Barora, Barora

GVTC Barora Report for the Month of March 2024.

Date: 30.03.2024

Name of Areas: Barora and Block - II					
	Type of Training	Target	Current month Achievement	Cumulative	
Special training as per MVT rule	Departmental Basic	APNE	17	105	
	Departmental Refresher	41480 ⁰	17	527	
	Others		00	17	
	Reorientation	As reqd.	01	02	
	Gas Testing	20	00	50	
	Shot firing	20	00	27	
	Persons Handling Exp.	20	00	30	
	Change of Job	As reqd.	04	22	
	First Aid	25	0	30	
	Others		0	0	
Training as per Safety Conference recommendations	St. Trg. M/S, O/M	20	0	30	
	Fire fighting	30	0	39	
	Roof Support	10	00	11	
	Solid Blasting	10	00	9	
	Traffic Rules	20	00	20	
	Safety Committee	20	00	38	
	HEMM Workers	30	0	39	
	Contractors workers Surface (Basic)	As req.	0	06	
	Contractors workers UG (Basic)	As req.	0	0	
	Contractors Workers OCP (Basic)	As req.	02	127	
	Contractors Workers (Refresher)	As req.	00	07	
Grand Total			41	1136	
All Trainings	Category	Category wise number		Mandays	
		This month	Cumulative	This month	Cumulative
	SC	11	220	64	1223
	ST	03	81	18	436
	OBC	44	678	234	3931
	General	32	192	57	906
	Male	89	1147	367	5163
	Female	0	23	12	138

Haringh
30.03.24
Group Training Officer
GVTC Barora, Barora Area

GVTC Barora, Barora Area

Summary of Monthly Performance Report of March 2024

S N	Course Name	Target	Total Participants	Days	Mandays			Total Trg	Part Profile by Sex			Part profile by Cadre						Part profile by caste						Details of Executives, Supervisors & Workers							
					M	F	Total		M	F	Total	Exe.		Non- Exe.		SC		ST		OBC		Gen									
1	Departmental Basic	As Reqd	17	12	168	0	168	1236	17	0	17	0	0	17	0	0	05	0	01	0	11	0	0	0	0	0	0	0	0	0	Workmen
2	Departmental Refresher	00	17	12	102	0	102	780	17	0	17	0	0	17	0	0	02	0	01	0	09	0	05	0	0	0	0	0	0	0	Workmen
3	Reorientation	As Reqd	1	6	06	0	06	44	01	0	01	0	0	01	0	0	0	0	0	0	01	0	0	0	0	0	0	0	0	0	Workmen
4	Contractual Basic	As Reqd	02	18	24	0	24	176	02	0	02	0	0	02	0	0	0	0	0	0	02	0	0	0	0	0	0	0	0	0	Workmen
5	Change of Job	As Reqd	04	12	24	0	24	176	04	0	04	0	0	04	0	0	0	0	01	0	03	0	0	0	0	0	0	0	0	0	Workmen
6	Safety Management Plan	As Reqd	49	01	49	0	49	392	49	0	49	23	0	26	0	4	0	0	0	0	18	0	27	0							Executive & workmen

Prin Singh
22.03.24

Group Training Officer
GVTC Barora, Barora Area



BHARAT COKING COAL LIMITED
(A Subsidiary of Coal India Limited)
OFFICE OF THE GENERAL MANAGER
BLOCK-II AREA, PO NAWA GARH, JHARKHAND-831004
CHANDRI, JHARKHAND
Tel. No-0326-230186/ Fax No-0326-230110

Ref: COAL/HR/PO/05/5

Date: 24.10.2018

To:
The Manager
District (Forest) Gwalior

Sub: Regarding submission of EC form of Cluster-II groups of mines, BCLL.
Ref: EC form no. J-1118732811-AN/PO/05/06.02.2017

Dear Sir,
As per operational clearance of Cluster-II groups of mines, BCLL has granted by Ministry of Environment, Forest and Climate Change vide EC form no. J-1118732811-AN/PO/05/06.02.2017. As per general condition of EC form, please find enclosed herewith the above referred letter. This is for your kind information and record.

Best Regards

Yours Sincerely

General Manager
Block-II Area

Copy to:
1. Dy. GM (HR), Nawa Garh.

Received
General Manager
24/10/18
श्रीमान जनरल मैनेजर
ब्लॉक-2, नवागढ़

Forwarded by Coordination



BHARAT COKING COAL LIMITED
(A Subsidiary of Coal India Limited)
OFFICE OF THE GENERAL MANAGER
BLOCK-II AREA, PO NAWA GARH, JHARKHAND-831004
CHANDRI, JHARKHAND
Tel. No-0326-230186/ Fax No-0326-230110

Ref: COAL/HR/PO/05/5

Date: 26.10.2018

To:
The Manager
District (Forest) Gwalior

Sub: Regarding submission of EC form of Cluster-II groups of mines, BCLL.
Ref: EC form no. J-1118732811-AN/PO/05/06.02.2017

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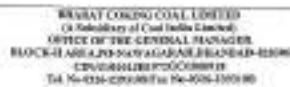
Best Regards

Yours Sincerely

General Manager
Block-II Area

Copy to:
1. Dy. GM (HR), Nawa Garh.

Received
Nawa Garh Singh
26/10/18
श्रीमान जनरल मैनेजर
ब्लॉक-2, नवागढ़



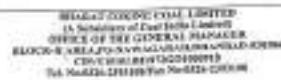
1998: 24, 90, 100.

Re: OC letter no. 1118WV02611A (B) & M 11/3/17

Black & White photos

Copied to:
1. Mr. G.M. [illegible] Station

सरोज देवी
12 जे. एम. ए.
मुंबई
कानून महाविद्यालय



page 24/28/94

Int. J. Cancer 1997; 71: 1131-1135

End Notes

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Handwritten signature and date: 10/10/2019