EXECUTIVE SUMMARY

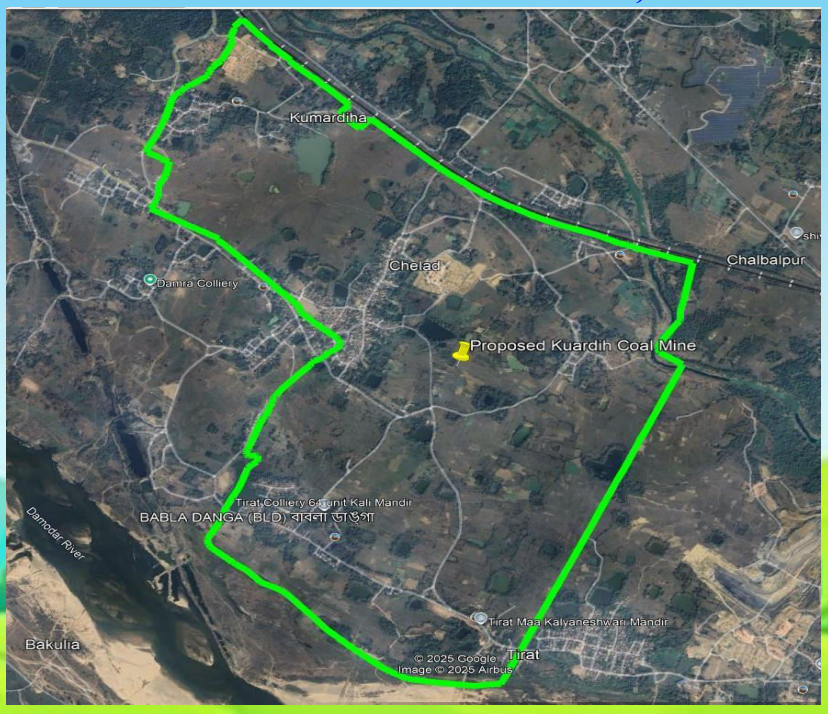
OF

Kuardih-Tirat Coal Mine for the Targeted/ Peak Production Capacity: 3.0 MTPA at villages: Kumardiha, Chalbalpur, Chelod & Tirat, P.O.- Kalipahari, P.S. & Block- Raniganj, Tehsil- Asansol, Dist.- Paschim Bardhman, West Bengal by M/s Eastern Coalfields Ltd.

TOR Letter No. and Date	TO25B0605WB5872502N, dated 13th March, 2025.
Proposal No	SIA/WB/CMIN/516176/2025,
Category of the Proposal	1 (a) [Mining of Minerals]
Lease Area	451 Ha (Non- Forest Land)
Proposed production	3.0 Million TPA
Baseline Data Collection	1st October 2024 to 31st December 2024 (Post Monsoon)
Date of Public Hearing	To be conducted
Unique ID	REPL/1a/2025/ ECL/WEST BENGAL / REV.03

PROJECT PROPONENT

M/S EASTERN COALFIELDS LIMITED, WEST BENGAL



ENVIRONMENTAL CONSULTANT

Rian Enviro Private Limited (REPL)

(QCI Accredited Cat- "A" EIA Consultant at S.No.179 as per List of Accredited Consultant Organizations on April 09, 2025)

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2025

EXECUTIVE SUMMARY

1.0 INTRODUCTION

Eastern Coalfields Limited (ECL) was founded in 1975 after nationalisation of coal mines in India. It operates coal mines in Jharkhand and West Bengal states. It inherited all the private sector coal mines of the Raniganj Coalfield including Kuardih-Tirat coal mine. At the time of nationalisation, 414 coal mines, almost wholly in the Raniganj Coalfield, came under the jurisdiction of ECL. ECL mining leasehold area is 753.75 km^2 and surface right area is 237.18 km^2

Post nationalization in 1973, coal mines in Raniganj Coalfields were brought under Coal Mines Authority Limited and subsequently, in 1975, formation of Eastern Coalfields Limited (ECL), a Subsidiary of Coal India Limited. The block belongs (Tirat & Kuardih) to the Eastern Coalfield Limited (ECL) having area 829.5 ha and was discontinued since 25/07/2017 and physical work at site not executed. M/s Eastern Coalfields Limited (ECL), being the owner of Tirat-Kuardih UG mine has now decided to reopen, salvage, rehabilitate, develop & operated this mine through Mine Operator for an area of 451 ha. Having participated in the bid conducted by ECL, the highest bidder M/s Kalinga Metalics Limited is now committed to share 13.21% of the net revenue generated by selling coal produced from the mine. "Under contractual obligation a SPV Company M/S ECL Mining Private Limited, a 100% Subsidiary of M/s Kalinga Metalics Limited has been registered under companies Act to develop and operate the mine."

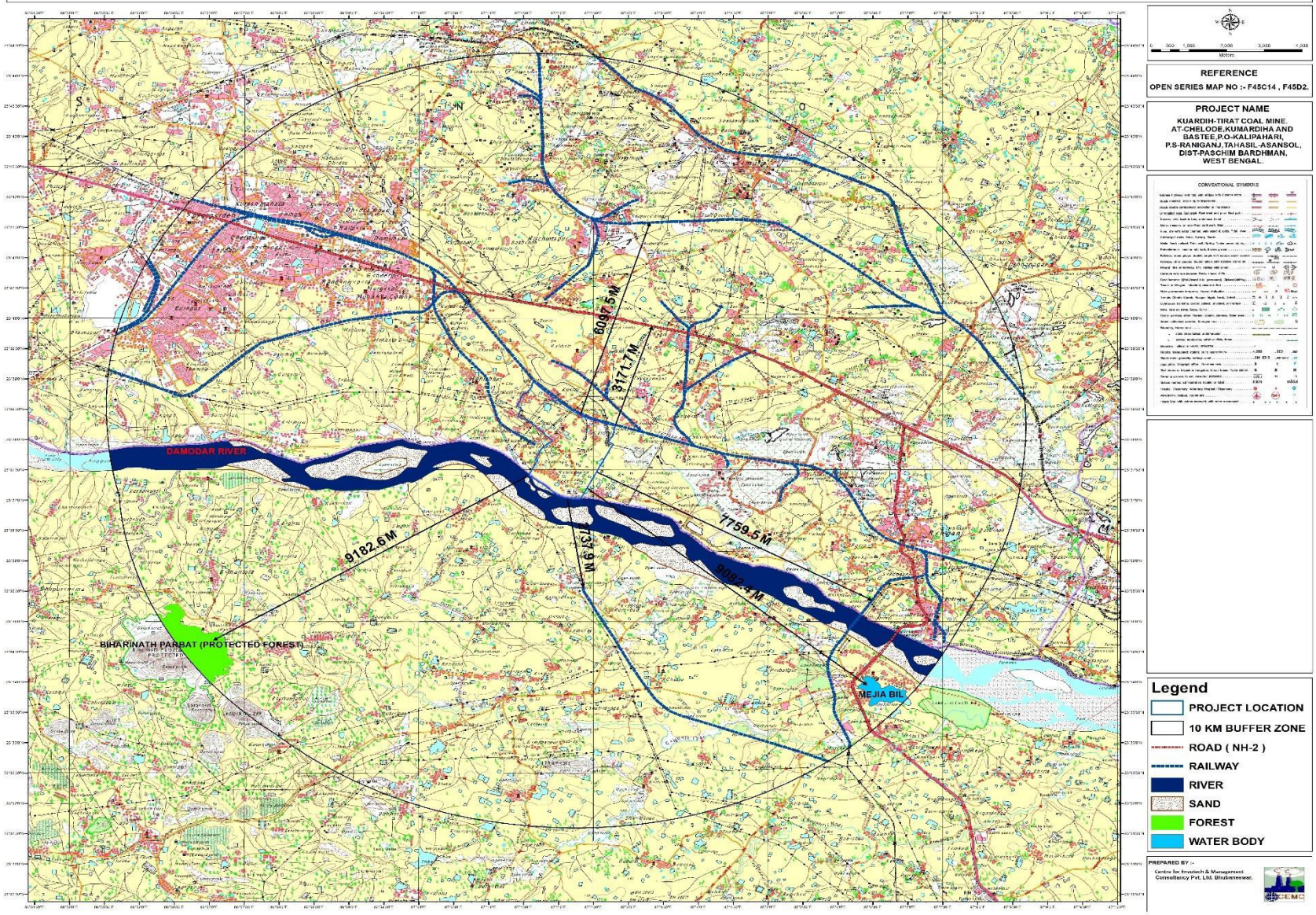
The Kuardih-Tirat Coal Mine is proposed as an opencast, underground and high wall method mining project over an area of 451 ha. The targeted/rated capacity of the mine will be 3.0 MTPA. Anticipated life of coal mine would be 25 years. The entire project area is in non-forest land. Coal from the proposed coal mine shall be used for sale in open market by e-auction. The mining operations were discontinued since 25.07.2017 and is now planned for revival through revenue sharing mode with MDO.

Project has been classified as "Category-B" Coal Mining Project as per the EIA Notification dated 14th September, 2006 and its subsequent amendments. No beneficiation is proposed within the lease area. To obtain the Environmental Clearance for the proposed mining project the Terms of Reference (ToR) was issued by SEIAA, West Bengal, vide file no. EN/T-II-1/050/2025, (ToR Identification No. – TO25B0605WB5872502N, dated 13th March, 2025.

1.1 SALIENT FEATURES

Name of the project	:	Kuardih – Tirat Coal Mine
Project Proponent	:	M/s Eastern Coalfields Limited (ECL)
Details of allotment/ vesting Order	:	M/s ECL, being the owner of Tirat-Kuardih mine has decided to reopen, salvage, rehabilitate, develop & operate this mine through Mine Operator, and awarded to M/s Kalinga Metalics Limited vide ECL's LOA ref. no. ECL/HQ/CMC/LOA/Kuardih-Tirat MDO/255, dated 3rd June, 2024

TOPO MAP
(10 KM BUFFER ZONE OF THE PROJECT LOCATION)



Total Lease area	:	451 ha. (Non-forest Land)
Life of the mine	:	25 years; OC mining: 1st year to 24th year, High-wall mining: 20th year to 24th year and UG mining: beyond 20th year)
Method & type of Mining	:	Opencast, Underground and High Wall method of Mining
Net Geological Reserve	:	134.67 million tonne
Mineable Reserves	:	100.75 million tonne
Extractable Reserve	:	81.22 million tonne
Production		Targeted /Peak Production – 3.0 MTPA
Stripping Ratio		OC: 11.18 m^3 /t; UG: Not Applicable
Grade of Coal		G6 (average); GCV ranges: 5000 to 5500 KCal/kg
Working days		330 days /annum with 3 shifts /day of 8 hours each
Mining Plan status		Approved by ECL Board on 6th January, 2025 in its 380th meeting held on 23rd December, 2024

1.2 PROJECT LOCATION

The Kuardih-Tirat Coal Mine covers an area of 451 ha in four Mouzas of Kumardiha, Chalbalpur, Chelod and Tirat, P.O.- Kalipahari, P.S. & Block- Raniganj, Tehsil- Asansol, District- Paschim Bardhaman, West Bengal for extraction of coal by opencast, underground and high wall mining method. The said Coal Block is located in the Central Part of Raniganj Coal field, in Paschim Bardhaman District. The lease area has Damodar River in the south, Kolkata – Asansol section of Eastern Railway is along the northern boundary and Damra Colliery on the SW direction.

Road: Kuardih - Tirat Mine is well connected by road. It is 10 km to the east of Asansol town and about 6km away towards south west from Kalipahari on the Grand Trunk Road (NH 19). Chelod Hanuman Mandir Road passing through the mine lease area.

Railway Line & Station: The nearest railway station, Kalipahari on Burdwan-Asansol section of the Eastern Railway is around 4 km away.

Airport: Kazi Nazrul Islam Airport, Durgapur is about 55 km away and Netaji Subhas Chandra Bose International Airport, Kolkata is at a distance of about 210 km.

1.3 YEAR WISE PRODUCTION

During the process of mining, the mine shall achieve its targeted quantity of 3 million TPA of Coal in 6thyear. The mine will be operated for 330 days in a year-round the clock i.e. three relay shift operations. Based on the coal handling capacity and available reserve, the life of the mine is estimated to be 25 years. Till the end of the life of the mines, a total of 419.45 ha of land shall be used for mining related excavation; out of the entire area, 172.5 ha will be backfilled to use as Agriculture land, 226.55 ha will be backfilled to develop plantation and 11.89 ha will be left for Public/ Company Use. The proposed year wise production of coal from the mine during shall be as per the quantity reflected in the table below;

Table: Combined Calendar Programme of Production from OC & UG Mining

Year		Coal Production Schedule (in million te)				OB (in million m^3)	SR (in cum/te)
Year of Operation	Calendar Year	OC	UG	High Wall	Total		
Y-1	2025	0.500	-	-	0.500	5.20	10.40
Y-2	2026	0.800	-	-	0.800	10.40	13.00
Y-3	2027	1.200	-	-	1.200	17.20	14.33
Y-4	2028	2.000	-	-	2.000	31.20	15.60
Y-5	2029	2.500	-	-	2.500	33.80	13.52
Y-6	2030	3.000	-	-	3.000	42.90	14.30
Y-7	2031	3.000	-	-	3.000	41.50	13.83
Y-8	2032	3.000	-	-	3.000	42.90	14.30
Y-9	2033	3.000	-	-	3.000	42.90	14.30
Y-10	2034	3.000	-	-	3.000	43.20	14.40
Y-11	2035	2.900	-	-	2.900	43.20	14.90
Y-12	2036	1.750	-	-	1.750	26.60	15.20
Y-13	2037	1.750	-	-	1.750	21.50	12.29
Y-14	2038	1.500	-	-	1.500	17.60	11.73
Y-15	2039	1.500	-	-	1.500	16.30	10.87
Y-16	2040	1.500	-	-	1.500	16.30	10.87
Y-17	2041	1.500	-	-	1.500	16.30	10.87
Y-18	2042	1.500	-	-	1.500	14.70	9.80
Y-19	2043	1.500	-	-	1.500	15.70	10.47
Y-20	2044	1.00	0.10	0.40	1.500	10.50	7.50
Y-21	2045	0.40	0.70	0.40	1.500	4.50	5.63
Y-22	2046	0.35	0.90	0.25	1.500	3.54	5.90
Y-23	2047	0.06	1.17	0.27	1.500	0.80	2.42
Y-24	2048	0.05	1.40	0.05	1.500	0.20	2.00
Y-25	2049	-	1.50		1.500	-	-
Total		**39.26**	**5.77**	**1.37**	**46.400**	**518.940**	**11.18**

Source: Section 3.1.7 of approved Mining Plan and Mine Closure Plan

1.4 TECHNOLOGY & METHOD OF MINING

The Kuardih -Tirat U/G mine was started way back in pre-nationalisation era by the Private owners which continued till 2017. The mine has worked extensively in R-IX, R-IX A & R-VIII seams with Board and pillar U/G mining, leaving the top R-X seam virgin and thickness varying from 1.09 to 3.5 m. Opencast mining method always yields much higher recovery of available reserve as compared with underground mining method.

It is proposed to start OC mining from the North side of R-XA seam and continue up to R-VIII seam. Thereafter UG mining will commence from the eastern boundary side from the floor of R-VIII seam to R-VII seam with pair of stone drift driven at 1 in 5 gradient

to negotiate the parting of 55-60 m between R-VIII and R-VII seams. Inclines shall be further deepened to touch other lower seams.

Shovel-dumper mining system has been proposed for OB removal and coal extraction. Higher productivity, conservation of coal, improved safety & environment parameters have been considered while selecting equipment for the mine. Loading and transportation of coal and OB, blast hole drilling and face preparation have been proposed to be carried out by deploying heavy earth moving machine (shovel and dumper combination). Diesel RBH drill of 160 mm diameter is proposed for drilling in OB and coal seams.

The employment opportunity will be there in various categories, viz. management, supervisory, highly skilled, skilled, semi-skilled, and unskilled workmen etc. Project is likely to generate additional 1700 nos. of indirect employment. Hence the total manpower requirement will be 1791 nos.

The water requirement at the mine site amount to be 93 KLD which is for domestic (potable) purpose, plantation, sprinkling at surface for roads and haul roads, Vehicles washing, for peripheral villages (potable) & miscellaneous. Permit for 'Mine Water Dewatering" has been obtained from Ground Water Resources Development Authority, Paschim Bardhaman vide their Permit No. P23090050054500000001PME dated 19/07/2024 for maximum withdrawal of 1200 cu.m/day of water.

1.5 LIFE OF THE MINES & DUMP MANAGEMENT

As estimated, total mineable reserve in Kuardih-Tirat Coal Mines is 100.75 million tones. With mining of 3 million TPA of coal, it is estimated that the life of the mine shall be 25 years. However, rate of production may change in future depending upon the outcomes of proposed exploratory drill holes, method of working & market demand, by which the life of the mines may also alter.

OC mining – 1st year to 24th year

High-wall mining- 20th year to 24th year and

UG mining - beyond 20th year to end of contract period

Waste generated from Kuardih-Tirat Coal Mines are mostly soil alluvium, laterite & shale. The generated waste material will be dumped over an area of 128 ha upto 30m high in 3 tires. Retreating method will be adopted for the disposal of waste at the dumping site. The maximum size will reach by 3rd year, then the waste material will be used in reclamation of the mining pit. From 10th year onwards the size of dumping area will gradually decrease. The dump will be surrounded by retaining wall of 1.5m height & 1m width. Any rain cut which may develop in dump slope is proposed to be checked by no. of small check dams. Garland drains at the toe of the dump will be connected to settling tank.

1.6 MINE CLOSURE & RECLAMATION

The Backfilling of exhausted mines will start from 5th years of mining from NW side of the lease area with the help of waste materials generated from mines. Out of the total lease area of 451 ha of Kuardih-Tirat Coal Mine, by the end of the life of the mines, 419.45 ha will be utilized by the lessee for mining, 1.02 ha for embankment along the Noonia jor, 5.0 ha. for road & infrastructure, 9.47 ha will be developed as Green belt

whereas 16.06 ha will be used as safety zone of 50m width along the Damodar river and Noonia jor.

Table: Waste Management (Figures in mm^3)

Year/Stage	OB Removal (Cumulative)			External Dump (Cumulative)		Internal Backfilling (Cumulative)		Embankment	
Up to Base Year	Top Soil	OB	Total	Top Soil	OB	Top Soil	OB	Top Soil	OB
Y-1 (2025)	0.26	4.94	5.2	0.26	3.72	0	0	0	1.22
Y-3 (2027)	0.91	32.89	33.8	0.91	31.67	0	0	0	1.22
Y-5 (2029)	2.47	96.33	98.8	2.07	85.11	0	10	0.4	1.22
Y-10 (2034)	7.18	310.02	317.2	6.78	116.16	0	192.64	0.4	1.22
Y-15 (2039)	8.09	432.11	440.2	5.76	218.52	1.93	212.37	0.4	1.22
Y-20 (2044)	8.09	487.21	495.3	5.15	0	2.54	485.99	0.4	1.22
Y-25 (2049)	8.09	510.94	518.94	0	0	7.69	509.63	0.4	1.22

The safety and security measures will be adopted during the final mine closure activities of the UG mine. All surface openings to UG work sites will be backfilled and levelled to blend with the surrounding topography. All access roads will be closed and a fence or embankment of specific standards will be built. For stability of surface structures, stowing shall be undertaken while for protection of shafts/ inclines, adequate protective barriers shall be maintained. All boreholes /exploration holes /trenches will be properly capped and sealed to prevent ingress of air into the underground workings to prevent fire due to left out coal.

2.0 DESCRIPTION OF THE ENVIRONMENT

For preparation of the EIA report, study of area, extending 10km around the proposed location, termed as buffer zone, was conducted during the period October, 2024 to December, 2024. Baseline data such as ambient air quality, surface and ground water quality, noise levels were monitored at several places in the buffer zone. Data regarding land use pattern, forests, ecology, geology, hydro geomorphology was collected from various authentic sources and satellite maps and correlated by field studies. Socio economic data, population, health, education, transport, agriculture etc was collected from census reports and district /state handbooks. Summary of the result of the studies is briefly given below;

- The Mining lease is spread over 451 hectare comprises of non-forest land only.
- **Topography:** The ML area is gently undulating with gentle dip towards north-east and south. The elevation from the Mean Sea Level varies from 109.56m to 85.19m.
- **Drainage Pattern:** Drainage is mainly controlled by Damodar River and Noonia Nala flowing eastwards along the Southern and north-eastern boundary of the mine respectively. The HFL measured in 1957, was 87.00 m near the road linking Damra Colliery to GT road. The area is dotted with a number of ponds and wells, mostly shallow in nature.
- **Climate and Meteorology:** The area experiences tropical climate. The climate of the area is hot & humid and is characterized by a hot and dry summer between the

period of March to May, winter between November to February and well-distributed rainfall between mid of June to mid of September. The rainfall in the area is because of the south western monsoon; average annual rainfall of the region is 1509mm.

- **Temperature:** A dry and hot summer with temperatures often rises above normal. During summers, the mercury rises well above 40^0 C (104^0 F). The summers start from middle of March and lasts till the middle of June. The region boasts of a high average rainfall even higher as compared to the eastern region of the dist. Winters in the region marks the mercury dropping to below 10^0 C (50^0 F). During winters, wind usually blows from the north-west direction. The winter starts from December and last till the month of February. Temperature recorded from the Meteorological station fixed in the study area during the study period indicates that the maximum and minimum temperature during the study period ranged from 34.6^0C to 10.3^0C.
- **Humidity:** Humidity is fairly high through the major part of the year. The mean relative humidity rises to above 80% during the monsoon months, particularly July to September ranging between 82-87%. The humidity during winter season is between 50-79% and in summer season it is between 40-72%. Relative humidity data was recorded in the core zone during the study period. The relative humidity varied from 20% to 96%.
- **Land Use:** In the Buffer zone, the land use pattern include Agricultural land – 41.16%, Forest (Dense & Scrub)- 11.41%, Industrial use- 16.37%, Settlement- 24.64%, Water Bodies – 4.03%, Sand bed – 1.41%, Road & Railways – 0.97%.
- **Soil Quality:** In the buffer zone, soil in general is reddish brown in colour with Lateritic in nature. The presence of organic carbon, N, P, K and good water holding capacity of the top soil indicates that the soils will support plant growth.
- **Air Quality Standards:** The ambient air-quality in the study area was found to have particulate matter (particle size >10 µg) content between 64.62 µg/m^3 to 73.22 µg/m^3 against a standard 100 µg/m^3 for residential /rural area and quantity of fine particulate matter (particle size <10 µg) is 36.08 µg/m^3 to 42.47 µg/m^3 against the standard 60 µg/m^3 for residential /rural area as per National Ambient Air Quality Standards; Sulphur dioxide level in the area is less than 9 µg/m^3 as against acceptable level of 80 µg/m^3 and Nitrogen dioxide is less than 23 µg/m^3 against the permissible limit of 80 µg/m^3.
- **Water Quality Standards:** The surface water quality complies with the CPCB standards and do not indicate any higher deviation from the norms; ground water quality confirms to the drinking water quality.
- **Noise Level:** The ambient noise levels in the study area (inluding mining lease area) revealed maximum of 54.0 dB(A) Leq during daytime and maximum of 43.8 dB(A) Leq during nighttime.
- **Flora & Fauna:** The terrestrial and aquatic flora, fauna in the area is mostly common species. The 10 km radius buffer zone of the lease area is not part of any National Park, Wildlife Sanctuary, Biosphere Reserve, Tiger Reserve and Elephant Corridor.

- **Forest Land:** The study area is characterized by tropical deciduous forests. The usual tree species of the area are Kadam, Jarul, Sissoo, Sacred Fig, Sal, Banyan, Indian Gooseberry, Java Plum, etc.
- **Agriculture:** Agriculture is the main occupation of the population. Rice and potato are the main crops of the area. The socio-economic condition & related infrastructure of the area is average to good.

3.0 ANTICIPATED ENVIRONMENTAL IMPACTS

This section discusses the environmental attributes that may be affected due to production from the mines. The matrix method has been chosen to list the potential impacts of the proposed project. The impacts whether beneficial or adverse have been analyzed in this chapter. Based on the input data, the pollution impact of various materials and process activities has been assessed. They are as follows-

- The mining activities involves various processes such as, drilling & blasting, extraction of ore, loading and unloading, movement of vehicles on haul roads and dumping of ore & OB, etc which are likely to contribute towards air pollution in the area. The effect is localized and is mostly due to fugitive emission of dust particles. Adequate control measures are therefore, proposed to be taken during mining operation, transportation and loading operations.
- Noise levels are also likely to increase due to increased movement of trucks and other diesel powered vehicles, material handling equipment, etc. mineral extraction /separation, waste backfilling, storage & transportation activities are expected to contribute to increase in noise level.
- The lease hold area is situated to the north of Damodar river and has a perennial nala 'Noonia jor' is flowing within the ML area in the NE part for a distance of 750m. Subsurface mining activities can result in release of polluted water into nearby rivers, streams. This increased sedimentation, chemical contamination, and altered pH levels which will affect the health of aquatic habitats.
- The ultimate working depth of the mining during open cast as well as underground method will intersect the ground water table. Underground coal mining also requires extensive dewatering operations to keep mine workings dry. Thus, the ground water will be affected due to the proposed mining.
- Underground Mining exposes sulfide minerals, such as pyrite, to oxygen and water, resulting in acid mine drainage (AMD)**.** AMD is characterized by low pH and elevated concentrations of heavy metals like Fe, Mn, Al, and sulfate ions. These contaminants can leach into surrounding groundwater systems, rendering them unsuitable for consumption and harming aquatic ecosystems
- Except the core zone of the mining lease area, there will not be any impact on land use pattern. After mining operation is completed, the mined-out area is backfilled by concurrent backfilling; reclaimed and rehabilitated followed by plantation.
- Dusts from drilling & blasting, excavation, loading & unloading, vehicle moments, etc the vegetation & wildlife of the surrounding area are likely to be affected. Increase in human interference may result in alterations in breeding and nesting of animals.
- The implementation of the project will considerably improve the socio economic condition of the local populace. There will be generation of employment, growth in local business, transportation and life style.

4.0 MITIGATION MEASURES

Mining in Kuardih–Tirat Coal Mine will be carried out by opencast, underground and high wall method over an area of 451 ha with production capacity of 3.0 MTPA (Targeted/Peak). This mine will help to bridge the gap of demand and supply of power grade coal of the country. The mine will also bring enhanced socio-economic benefits to the local population of the project area by way of direct and indirect employment, improvement in infrastructure and growth of ancillary facilities.

To overcome various environmental problems, mitigation measures have been worked out with a view to bring down the levels of impacts within limits. The Environmental Management Plan (EMP) has been worked out with keeping in view the mitigation measures of the adverse environmental impacts due to mining.

- The comprehensive EMP will include greenbelt development, disaster management plan and the peripheral socio-economic plan for the region apart from dealing with the possible pollution impact relating to air, water, land, noise etc.
- Use of advanced technology, process optimization, energy conservation, preventive and predictive maintenance, waste minimization and good housekeeping are all part of the EMP.
- EMP at design stage will deal with, proper dumping site, water conservation and planning, efficient dust management, noise and vibration control etc.

4.1 Air Pollution Mitigation Measures

Adequate control measures are proposed to be taken during mining operation, transportation and loading operations. A Green Belt of at least three rows of tall trees of suitable species to be planted within and along the boundary of the lease area.

4.1.1 Mitigation Measures in Opencast coal mining

Following preventive measures will be undertaken during various opencast mining related activities to control air pollution.

a. Drilling Operation:

Dust emanated during drilling operation could be reduced by;

- Providing drills with dust arrester or collector.
- Proper maintenance of drill bits.
- Drill operators and drilling mates will be provided with dust mask, if necessary, to minimize the impact of air pollution on the workers.

b. Blasting Operation:

Generation of dust during blasting would be minimized by the following measures;

- Proper burden and spacing of blast hole.
- Proper charge per delay.
- Water shall be sprayed at Quarry Faces before and after blasting.

c. Loading and Transportation:

To minimize the adverse impact on air quality due to loading/ unloading and transportation the following measure are proposed;

- Water sprinkling during loading, unloading and transportation in the haul roads.
- The unmetalled haul roads are proposed to be metaled or adequately compacted before being put into use. Repairing of haul roads & port holes are regularly filled.
- Overloading of vehicles will be avoided as spillage generates dust.

- Trucks carrying coal will be covered with tarpaulins to prevent fugitive dust generation.
- All the fossil fuel consuming vehicles & equipment shall be properly maintained as per the guideline of the manufacturer to keep the SO_2 & NO_2 level within the limit.
- Vehicles having "Pollution under Control" Certificate will be engaged in the mines.
- Regular preventive maintenance of all the mining equipment shall be carried out.

d. Dumping Area:

Once the overburden dump has reached its designed size, Coir netting will be adopted. Jute mat/ coir netting of about 25 mm X 25 mm mesh size shall be laid on slopes and anchored by pins on leveled surfaces to prevent displacement & to have intimate contact. The mat/net shall be covered with 80 mm thick agricultural soil mixed with fertilizer, pesticides and saw dust/ hay as base for vegetation along with seeds of Grass-Legume mixture.

The dump will reach its maximum size by 3rd year of mining, then the waste material generated from mining will be used in concurrent backfilling of the mining pit. From 10th year onwards the size of dumping area will gradually decrease.

e. Haul Road:

Haul roads are major sources of fugitive dust in a mine. To reduce the problem of dust generation from haul roads, following actions will be taken up:

- The prevailing practice of construction of haul roads with the layers of hard stones overlaid by laterite fines and subsequently compacted by road rollers in surrounding areas will be continued.
- These haul roads will be compacted and water spraying will be done in a number of runs. Regular maintenance of haul road to prevent fugitive dust generation.
- Regular water sprinkling especially before transportation.

f. Coal Storage Yard:

Water sprinkling will be adopted daily in coal stack yard to bring down the air borne dust. Peripheral plantation around the stack yard will also be taken up to arrest the air borne dust, if any.

4.2 Mitigation Measures in UG coal mining

a. Dust Control (PM10 & PM2.5)

- Water spraying at drilling, coal transfer, and transport points.
- Enclosure of conveyors and loading areas to reduce dust escape.
- Dust extraction systems (e.g., bag filters or scrubbers) at coal handling points.
- Paving and regular cleaning of haul roads to prevent dust re-suspension.
- Green belt development around mining and surface infrastructure.

b. Methane & Gas Management

- Methane drainage systems before and during mining to capture and use CH_4.
- Ventilation air methane (VAM) oxidation units to destroy CH_4 from vents.
- Continuous gas monitoring systems to detect and respond to dangerous concentrations of CH_4, CO, etc.
- Encourage methane-to-energy projects to convert emissions into electricity.
- Oxidation of coal in presence of air can lead to self-heating and eventual fire. Uncontrolled fires can burn for years, releasing pollutants continuously

c. Equipment Emission Reduction

- Switch to electric or battery-powered equipment underground where possible.
- Regular maintenance of diesel engines to minimize exhaust emissions.
- Use of low-emission or Tier 4 engines.
- Install exhaust after-treatment systems like diesel particulate filters (DPFs).

4.3 Measures in Highwall coal mining

a. Dust Control (PM10 & PM2.5)

- Water spraying systems on cutting heads, haul roads, stockpiles, and during coal transfer operations.
- Use chemical dust suppressants (e.g., lignosulfonates or polymer emulsions) for longer-lasting control on haul roads.
- Windbreaks & vegetation barriers around stockpiles and along the mine boundary.
- Cover coal stockpiles with tarps or enclose them in sheds.

b. Diesel Emission Control

- Use low-emission (Tier 4 or equivalent) diesel engines or retrofit older engines with diesel particulate filters (DPFs) and catalytic converters.
- Regular engine maintenance to reduce incomplete combustion & excess emissions.
- Where feasible, transition to electric or hybrid machinery, especially for stationary operations.

c. Methane & Combustion Gas Management

- Pre-mining methane drainage if CH_4 concentrations are significant.
- Continuous gas monitoring for CH_4, CO, and VOCs near the highwall face and exposed seams.
- Seal exposed coal surfaces to reduce oxidation and spontaneous combustion (e.g., with inert gas blankets or rock dust).
- Firefighting readiness for spontaneous combustion incidents (e.g., fire-retardant foam or inert gas systems).

4.2 Water Management and Water Pollution Control Measures

The salient features of the Water management (including storm water drainage) scheme are as follows;

- Green belt of 50m wide along the bank of Damodar river & Noonia jor will be created to prevent any mining related activity in that zone.
- In UG method, to prevent water inflow into mine workings and stop contamination pathways, grouting methods (cement, chemical, or bentonite) will be used to seal fractures and aquifers.
- Acid Mine Drainage can be mitigated by using chemicals like lime or sodium hydroxide to neutralize acidity and precipitate metals. Implementation of hydrogeological monitoring networks and predictive groundwater models helps in understanding the impacts of mining on water regimes.
- Sanitary sewage generated in office & rest area shall be treated in STP of 80 KLD & produces the treated sewage water which will be used for green belt development
- No mine water will be discharged into any water body near the leasehold.

The ultimate working depth of the mining during open cast as well as underground method will intersect the ground water table. Permission for 'Mine Water Dewatering" has been taken from Ground Water Resources Development Authority, Paschim Bardhaman

vide Permit No. P2309005005450000001PME, dated 19/07/2024 for maximum withdrawal of 1200 cum/day of water. It is proposed to construct a pond of 25m long X 25m side X 2.5m deep to store excess mined out water and rain water from roof top areas. The tank will have High Density Polythene coating to hold the water throughout the year. After settling of solid particles, the water will be used in plantation, water sprinkling & in mineral separation plant.

4.3 Noise Pollution Control Measures

The sources of noise in this particular project are dredging, operation of MSP, movement of vehicles, loading & unloading of materials. The following measures will be taken to reduce noise levels within the lease area;

- Diesel powered machineries which are major source of noise in open cast environment will be properly maintained as per maintenance schedule to prevent undesirable noise.
- Dredge machine operators and dumper drivers will be issued with earplugs and earmuffs. Duty hours of operators of noisy machinery will be regulated to keep their noise exposure levels within limits.
- Green belt will be developed around the mining lease, office building, training centre to reduce noise level.
- Static diesel engines shall be housed as far as possible (not made of sheet metals or surrounded by baffles). If possible they will be placed on vibration isolators.
- Provision of sound proof cabins for the workers deployed on machines producing higher level of sound like dumpers, shovels etc.

4.4 Mitigation Measures for Impact on Topography & Land Use

It is proposed to start OC mining from the North side of the lease area. Maximum spread of the quarry area will be 419.45 ha. The generated waste material will be temporary dumped over an area of 100 ha up to 30m high in 3 tires. The maximum size will reach by 3rd year, then the waste material will be used in reclamation of the mining pit. From 10th year onwards the size of dumping area will gradually decrease. Underground mines generally affect the landscape less than surface mines.

- Top soil excavated and dumped shall be protected from failure by maintaining a flatter than 30° dump slope. From 5th years onwards the top soil will be spread over embankment site to help in plantation and from 15th year onwards in internal backfilling.
- In case of UG mining, controlled mining techniques like stowing (backfilling voids), Regular monitoring of surface levels in subsidence-prone areas.
- Afforestation has been planned in a manner, which will actually increase the bio-diversity of the local ecosystem. Positive impacts on land use due to creation of subsequent artificial forest land generation, which shall come in view from 2028 when initial green belt attains height.

4.5 Solid Waste Management

During the process of mining, the only solid waste material to be produced is the over burden. The generated waste material will be dumped over an area of 100 ha up to 30m high in 3 tires. The maximum size will reach by 3rd year, then the waste material will be used in reclamation of the mining pit.

During monsoon the runoff water from the dump may likely to contaminate the down-stream water bodies. Some of the wild life habitats and very thinly covered vegetation are also likely to be lost. The nearby agricultural land may also get affected due to these waste dumps because of siltation during rainy season or due to wind the dusts blown away from the dump and deposited in the nearby agricultural field.

- Waste dump location in the mine will be decided according to topography.
- Retaining wall and drain all around the dump, at the toe shall be made so that the rain water falling over the slopes and bringing down small quantities of silt will be arrested at the toe itself and prevented from going far away to agriculture land and into the nearby nalas etc.
- Overall slope of over burden dump will be maintained around 28^0.
- The retaining walls will be made up of boulders. The walls will be of maximum 1.5m height and the top surface will be of 1m width.

4.6 Minimize Impacts on Vegetation & Wildlife

OC or UG mining impact on biodiversity is significant and multifaceted. From habitat loss and subsidence to chemical pollution and noise, a variety of factors threaten local ecosystems. A combination of proactive planning, ecological restoration, pollution control, and community engagement is essential to mitigate these impacts.

By the end of the life of the mines, a total of 253.1 ha. will be utilized for plantation of 6,32,750 nos. of saplings under green belt development programme to cover the safety zone along the entire lease boundary, backfilled quarry pit area to develop plantation, embankments along Noonia jor, 50m wide green belt along the along the bank of Damodar river and Noonia jor.

Due to presence of Indian Golden Jackal, Indian Grey Wolf, Striped hyena and Indian pangolin (some Schedule- I species), a Site-Specific Wildlife Conservation Plan has been prepared by M/s ECL for entire Raniganj Coalfield under Durgapur Division with a budgetary provision of Rs 38,72,20,000 (Thirty eight crores Seventy Two lakhs Twenty thousand) only; which has been approved by the PCCF (Wildlife)& Chief Wildlife Warden, West Bengal vide office order no. 05-CS(COR)/14-2024, dated 10.07.2024

4.7 Occupational Safety and Health

Occupational safety and health are very closely related to productivity and good employer-employee relationship. The cause of occupational health in Kuardih-Tirat Coal mining project will be mainly dust, land degradation & radiation. Safety of employees during operation and maintenance, etc. shall be as per mines rules and regulations. The following measures relating to safety & health shall also be practiced:

- Provision of rest shelters for mine workers with amenities like drinking water etc.
- All safety measures like use of safety appliances, safety awards, posters, slogans related to safety, etc.
- Limit use of diesel equipment underground.
- Periodical Medical Examination (PME) of all workers by a medical specialist so that any health hazard can be detected in its early stage.
- First aid facility in the mines including training and retraining of First aiders.

- Close surveillance of the factors in working environment and work practices, which may affect environment and worker's health.
- Working of mine as per approved mining and environmental plans.
- Mitigating fires in coal mines—both underground and open cast—requires a combination of prevention, early detection, suppression, and emergency response.

5.0 ADDITIONAL STUDIES

5.1 Public Consultation

Public Consultation is one of the important aspects of environmental impact assessment which is covered under MoEF&CC notification on environmental clearance issued on 14th September 2006. The aspect of public consultation is to be followed as per the said notification. In the present case, M/s ECL is hereby applying to SPCB, West Bengal for conducting Public Consultation. The summary of the proceedings of the public consultation and the actions taken or to be taken by the company will be added to the EIA /EMP Report to make the final report.

5.2 Disaster Management & Risk Assessment

Mining in Kuardih–Tirat Coal Mining Project will be carried out by opencast, underground and high wall method over an area of 451 ha with production capacity of 3.0 MTPA (Peak). The proposed opening and development of Kuardih–Tirat Coal mine of M/s ECL in Raniganj area generally will have problems related to occupational health, safety and disaster management. As far as the nature of deposit & method of mining is concerned, there are chances of Inundation, Slope failure, Risk due to fire, dangers due to storage and handling of explosives, etc during the mining activities. In order to take care of the hazards/ disasters, the followings will be strictly followed:

- Working of mines as per approved Review of Mining plan with Progressive Mine Closure Plan.
- All safety precautions and prevention of Mines Act,1952 will be strictly followed during all mining operations.
- Regular maintenance & testing of all mining equipment as per manufacturer's guidelines.
- Provision of adequate capacity pumps for pumping out water from the mining pit with standby arrangements.
- Checking and regular maintenance of garland drainage and earthen bunds.
- Proper number of notice boards in English /Hindi and Bengali will be placed warning: No unauthorized persons to trespass the area.
- Periodic checking of worthiness of firefighting & first aid provision in the mining area.
- Training and refresher courses for all the employees.
- Cleaning of mining faces regularly.
- As a part of disaster management plan, a rescue team will be formed by imparting specialized training to select mining staff.

5.3 Traffic Study

The proposed site is about 3 km from the Grand Trunk Road - National Highway (NH-19) connecting Agra to Kolkata but the actual road distance is about 9km. Traffic Study has been carried out from Project site to NH-19 via the connecting existing and proposed

road. From the study, it is found that the increase in Volume /Capacity ratio due to addition of traffic (the traffic expected to generate from the proposed project site) in the existing infrastructure is negligible.

The existing and proposed Level of Service (LOS) is A i.e Excellent.

5.4 Cost of Environmental Control Measures

The costs regarding implementation of EMP are presented under various headings in the Tables below. The green belt development cost includes the cost for maintenance upto 3 years.

Table: Cost of Environmental Control Measures

Particulars	Details of Capital Investment		Details of Recurring Cost	
	Existing	**Proposed**	**Existing**	**Proposed**
Air Pollution Control	---	Rs 254 lakhs	---	Rs 93 lakhs
Water Pollution Control	---	Rs 136 lakhs	---	Rs 45 lakhs
Noise Pollution Control	---	Rs 11 lakhs	---	Rs 26 lakh
Environment Monitoring and Management	---	Rs 80 lakhs	---	Rs 30 lakhs
Occupational Health	---	Rs 24 lakhs	---	Rs 23 lakhs
Green Belt Development and Maintenance	---	Rs 1022 lakhs	---	Rs 6 lakhs
Total	---	**Rs 1527 lakhs**	---	**Rs 223 lakhs/annum**

6.0 CONCLUSION

Due to production of coal, the area will saw development in economic sector with scope of employment to locals and the product find their place in industries like steel and ferro-alloys, etc, besides being used as raw material for power production. With implementation of Environmental Management Plan, pollution will be kept within norms. Hence, it is requested that necessary Environmental Clearance may kindly be accorded for implementation of the project.

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