

EXECUTIVE SUMMARY

OF

ENVIRONMENTAL IMPACT ASSESSMENT REPORT AND ENVIRONMENT MANAGEMENT PLAN

FOR

PUBLIC HEARING

OF

Kuraloi-A North Coal Block, IB Valley Coal Field

(ML Area: 965.58 Ha)

with Targeted Coal Production Capacity: 8.0 Million TPA

At

**Villages: Pipilimal, Dhauramunda, Kuraloi,
Belpahar, Banjari & Bartap, Tehsil: Lakhanpur,
District: Jharsuguda, State: Odisha**

APPLICANT



M/s. Vedanta Ltd.

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EXECUTIVE SUMMARY

1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION OF PROJECT PROPONENT

- Vedanta Limited, incorporated in India under the Companies Act, 1956 with corporate identify number L13209MH1965PLC291394 whose registered office is at 1st floor, C Wing, Unit 103, Corporate Avenue Atul Projects, Chakala, Andheri (East) Mumbai, Mumbai City, Maharashtra 400093, India and principal place of business is at Core-6, 3rd Floor, SCOPE Complex, 7 Lodhi Road, New Delhi, Delhi 110003 (the “successful bidder”).
- Vedanta Limited, a subsidiary of Vedanta Resources Limited, is one of the world’s leading Oil & Gas and Metals company with significant operations in Oil & Gas, Zinc, Lead, Silver, Copper, Iron Ore, Steel, and Aluminum & Power across India, South Africa and Namibia.
- For two decades, Vedanta has been contributing significantly to nation building. Governance and sustainable development are at the core of Vedanta's strategy, with a strong focus on health, safety, and environment. Vedanta has put in place a comprehensive framework to be the ESG leader in the natural resources sector. Vedanta is committed to reducing carbon emissions to zero by 2050 or sooner and has pledged \$5 billion over the next 10 years to accelerate the transition to net zero operations.

1.2 STATUS OF PROJECT

M/s. Vedanta Ltd. is proposing Kuraloi-A North Coal Block, IB Valley Coalfield (ML Area: 965.58 Ha) with a Targeted Coal Production Capacity: 8.0 Million TPA located at Villages: Pipilimal, Dhauramunda, Kuraloi, Belpahar, Banjari, Bartap, Tehsil: Lakhanpur, District: Jharsuguda, State: Odisha.

The block with an area of 965.58 ha has been allocated by Ministry of Coal, Govt. of India, Allocation order No: NA-104/1/2021-NA dated 03.09.2021, to Vedanta Ltd. The coal block is allotted for commercial coal sale including sale to affiliates, captive consumption, coal gasification, coal liquefaction and export of coal. The proposed production capacity through opencast mining is 8.0 Million TPA as stipulated in CBDPA. Tech studies are proposed to establish feasibility of lower coal seams mining by underground methods.

Mining Plan and Mine Closure Plan has been approved by Ministry of Coal vide letter no. Kuraloi (A) North Coal Mine ORJH/APP0080/2021, dated 05.08.2022.

Application for Environment Clearance was submitted on Parivesh Web Portal on 02.09.2022 for which ToR has been issued by MoEF&CC, dated 25.10.2022.

As per EIA Notification dated 14th September, 2006 as amended from time to time, the project falls under Category “A” (>500 ha) Project or Activity 1(a) for mining of minerals (Coal Mining). ToR for the project has been granted by MoEF&CC, New Delhi dated 25.10.2022.

1.3 NEED OF THE PROJECT

The demand for Coal is increasing due to rapid industrialization and growth in infrastructure.

The Coal Block has been auctioned in 1st Tranche for Commercial Mining (11th Tranche of Coal auction) which will be used for the purpose of sale of coal, including sale to affiliates and related parties, utilization of coal for any purpose including but not limited to captive consumption, Coal Gasification, Coal Liquefaction and Export of coal.

Due to gap in the domestic demand & supply of coal, substantial quantity of thermal coal is being imported by our country leading to loss of valuable foreign exchange. Recognizing the fact that economies of scale leading to cheaper power can be secured only through development of large size power projects and to bridge this gap, Ministry of Coal, Govt. of India has come up with a new policy which allows the private participation for commercial exploitation of coal in the country.

Therefore, to meet the requirement of coal for end users' plants, Vedanta limited had participated in the commercial coal block auction which was held in 2021 and became the successful bidder of Kuraloi -A North Coal block.

1.4 BRIEF DESCRIPTION OF THE PROJECT

Table - 1
Brief Description of the Project

S. No.	Particular	Details
A.	Nature of the project	Fully Mechanized Opencast Mining
B.	Size of the project	
1.	Project Block/ Lease/Geological Area	Total Area: 965.58 Ha (Pvt. Land: 502.90 ha, Govt. Land: 249.31 ha, Forest Land: 213.
2.	Proposed Production capacity	Targeted Coal Production Capacity 8.0 Million TPA
C.	Project Location	
1.	Villages	Pipilimal, Dhauramunda, Kuraloi, Belpahar, Banjari & Bartap
2.	Tehsil	Lakhanpur
3.	District	Jharsuguda
4.	State	Odisha
5.	Latitude	21°47'58" N to 21°50'21" N
6.	Longitude	83°48'14" E to 83°50'41" E
7.	Toposheet No.	Core Zone: F44R13 Buffer Zone: F44R9, F44R10, F44R13 & F44R14
D.	Environmental Settings Details (with approx. aerial distance & direction from the mine boundary)	
1.	Nearest Town	Belpahar Town (~0.60 km in East Direction)
2.	Nearest Highway	➤ NH-49 adjacent in East direction ➤ Old NH 200 adjacent in NE direction
3.	Nearest Railway Station	➤ Belpahar Railway Station (~0.5 km in ENE direction) ➤ Brajranjagar Railway Station (~8.5 km in ENE direction) ➤ Hemagiri Railway Station (~9.5 km in WNW direction)
4.	Nearest Airport	Veer Surendra Sai Airport Jharsuguda (~23 km in NE Direction)
5.	National Parks, Wild Life Sanctuaries, Biosphere Reserves etc. within 10 Km radius study area	No National Park, Wild Life Sanctuaries, Biosphere Reserves, Wildlife corridors, Tiger/Elephant Reserves etc. within 10 km radius study area
6.	Reserved/ Protected Forests within 10 km	12 Reserved Forest

S. No.	Particular	Details
	radius of study area	<ul style="list-style-type: none"> ➤ Bikramkhol RF (~0.2 km in SW Direction) ➤ Bikramkhol RF (~1.0 km in NE Direction) ➤ Rajpur RF (~2.0 km in NE direction) ➤ Singaribahal RF (~5.75 km in WNW direction) ➤ Thungopahar RF (~4.0 km in North direction) ➤ Makarachata RF (~6.0 km in North direction) ➤ Reserved Forest (~7.5 km in South direction) ➤ Bhanwarkhol RF (~8.0 km in WSW direction) ➤ Remendra RF (~8.0 km in SSW direction) ➤ Giripahar RF (~8.0 km in NNW direction) ➤ Dekhnapani RF (~9.0 km in West direction) ➤ Betjharan RF (~9.5 km in WSW direction) <p>4 Protected Forest</p> <ul style="list-style-type: none"> ➤ Bandbahal PF (~3.5 km in NNW direction) ➤ Kaudarha PF (~5.0 km in NNW direction) ➤ Tilia PF (~5.5 km in WNW direction) ➤ Chhengapahar PF (~6.5 km in NW direction)
7.	Water Bodies within 10 km radius	<p>River</p> <ul style="list-style-type: none"> ➤ IB River (~8.5 km in ESE direction) <p>Nallah</p> <ul style="list-style-type: none"> ➤ Lilari Nallah Passing through Mining Lease Area ➤ Bichna Nallah (~6.0 km in North direction) ➤ Bagmora Nallah (~6.0 km in NNE direction) ➤ Bhesrakharu Nallah (~6.5 km in WNW direction) <p>Jhor</p> <ul style="list-style-type: none"> ➤ Hinjankharu Jhor Passing through Mining Lease Area ➤ Puri Jhor (~3.0 km in South direction) ➤ Bagdia Jhor (~5.0 km in WSW direction) ➤ Khairol Jhor (~6.0 km in NE direction) ➤ Pandren Jhor (~6.5 km in SE direction) ➤ Bagachhopa Jhor (~6.5 km in ENE Direction) ➤ Kanak Jhor (~7.5 km in SSW direction) ➤ Kulfhari Jhor (~8.0 km in West direction) ➤ Ghuradigha Jhor (~8.5 km in NNE direction) ➤ Mandia Jhor (~8.5 km in ENE direction) ➤ Kandhai Jhor (~8.5 km in SE direction) ➤ Kuljhari Jhor (~9.0 km in WSW direction)
8.	Seismic Zone	Zone – III as per IS: 1893 (Part-I): 2002
E.	Cost Details	
1.	Project Cost	Rs 2000 Crores
2.	Cost for Environmental Protection Measures	Rs. 23.61 Crore (Capital Cost) Rs. 2.72 Crore (Recurring Cost)

Source: Site Visit, Google Earth Pro & Pre- Feasibility Report

1.5 LOCATION MAP

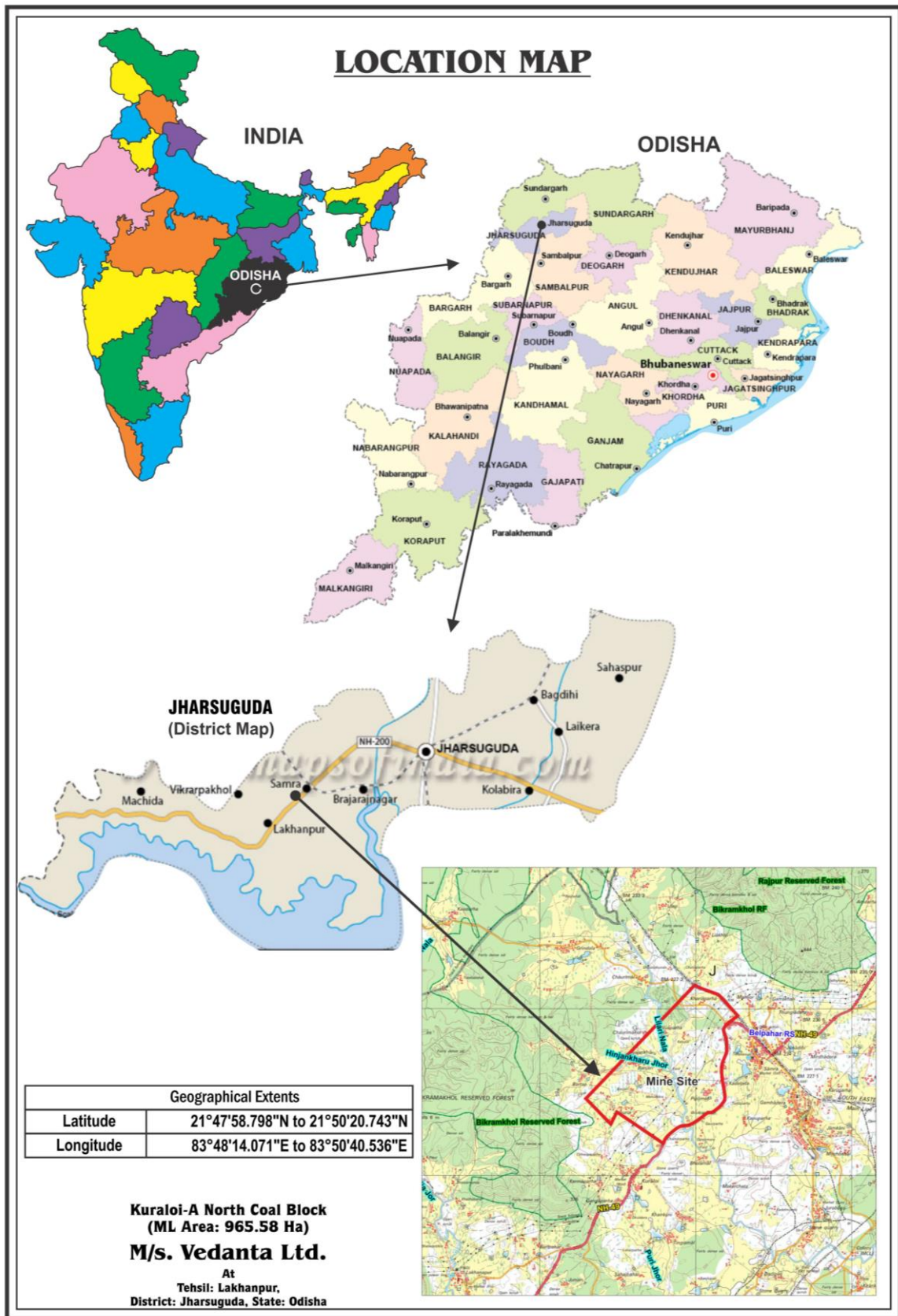


Figure 1: Location map (Showing general as well as specific location of the Coal Block Area)

1.6 MINE DESCRIPTION

1.6.1 MINING LEASE STATUS

- Vedanta Limited has been awarded Kuraloi-A North Coal block of Commercial Coal Block Auction on 10.06.2021.
- Signed the Coal Mine Development & Production Agreement with the Government of India on 14.07.2021.
- Allocation order No: NA-104/1/2021-NA dated 03.09.2021, to Vedanta Ltd. The coal block is allotted for commercial coal sale including sale to affiliates, captive consumption, coal gasification, coal liquefaction and export of coal. The proposed production capacity through opencast mining is 8.0 Million TPA as stipulated in CBDPA.

1.6.2 MINING DETAILS

Table - 2
Mining Details

S. No.	Particular	Details
1.	Mining Method	Opencast Mining by shovel-dumper combination (OB) & Surface Miner (for extraction of Coal)
2.	Net Geological Reserves	1680.22 Million Tonnes
3.	Total Mineable Reserves	148.29 Million Tones
4.	Extractable Reserves	Open Cast 145.32 Million Tonnes (upto depth of 200 mts)
5.	Life of Mine	23 years including 2 years of construction
6.	Seams Number	Total 45 Seams, out of which working Seams are 18 (OC: Seam Raniganj 2, Raniganj 1, Local 15, Local 14, Belpahar Top Top, Belpahar Top Bot, Belpahar Top Comb, Belpahar Bot, Local 13, Local 12, Local 11, Local 10, Local 9, Parkhani Top Top, Parkhani Top Bot, Parkhani Top Comb, Parkhani Bot and Local 07)
7.	Max. thickness of Seams	Belpahar Bot: (1.84 m to 8.20m)
8.	Elevation Range	202 mRL to 250 mRL
9.	Water Level	Pre-Monsoon: 5.80 to 7.71 m bgl & Post-Monsoon: 2.65 to 6.10 m bgl
10.	Ultimate Working Depth	10 to 220 m bgl
11.	Stripping Ratio: (Coal: OB) (Tonnes/m ³)	1:4.79
12.	No of working days/annum	330
13.	Number of shifts per day	3 Shifts

Source: Derived from Approved Mining Plan along with Mine Closure Plan

There is total 45 coal seams in Kuraloi (A) North Coal block upto the depth of +600mts, but it is technically computed that the mineable area that can be partially mined by OC up to maximum 220m depth. Also, it has been noted that complete mining till 220m is also difficult due to very high external dump area requirement, which is not available in the proposed lease area. So, considering mining up to 220 mts depth, out of 45 seams only 18 seams will be workable by OC method. Tech studies are proposed to establish feasibility of lower coal seams mining by underground methods.

1.6.3 MINING METHOD

It is proposed to adopt mechanized opencast method on three shift basis with the deployment of Opencast Mining by shovel-dumper combination (OB) & Surface Miner (for extraction of Coal), drill machines, loaders, shovels, dumpers etc. Coal will be transported from mine to Jharsugada, Aluminum Plant of Vedanta Ltd. initially by road and later on via rail after commissioning of railway siding. Railway siding will be developed within 2 years from the start of the mining operation.

1.6.4 YEAR WISE PRODUCTION & EXCAVATION DETAILS

Table - 3

Calendar Programme of Mining by Opencast Method

Year	Calendar Year	Coal "Mt"			Waste (MM ³)	SR "MM ³ /t"
		UG	OC	Total		
1	2025-26	Construction & Developmental Stage				
2	2026-27					
3	2027-28	-	2.32	2.32	8.00	3.45
4	2028-29	-	5.00	5.00	20.00	4.00
5	2029-30	-	8.00	8.00	32.00	4.00
6	2030-31	-	8.00	8.00	32.00	4.00
7	2031-32	-	8.00	8.00	32.00	4.00
8	2032-33	-	8.00	8.00	32.00	4.00
9	2033-34	-	8.00	8.00	41.00	5.13
10	2034-35	-	8.00	8.00	41.00	5.13
11	2035-36	-	8.00	8.00	41.00	5.13
12	2036-37	-	8.00	8.00	41.00	5.13
13	2037-38	-	8.00	8.00	41.00	5.13
14	2038-39	-	8.00	8.00	41.00	5.13
15	2039-40	-	8.00	8.00	41.00	5.13
16	2040-41	-	8.00	8.00	41.00	5.13
17	2041-42	-	8.00	8.00	41.00	5.13
18	2042-43	-	8.00	8.00	41.00	5.13
19	2043-44	-	8.00	8.00	41.00	5.13
20	2044-45	-	8.00	8.00	41.00	5.13
21	2045-46	-	5.00	5.00	25.00	5.00
22	2046-47	-	2.50	2.50	15.00	6.00
23	2047-48	-	2.50	2.50	8.00	3.20
Total		-	145.32	145.32	696.00	4.79

Source: Approved Mining Plan with Mine Closure Plan

(Note: Feasibility of lower seams mining by UG/OC means will further increase mine life)

2.0 DESCRIPTION OF THE ENVIRONMENT

PRESENTATION OF RESULTS (AIR, NOISE, WATER & SOIL)

Baseline study of the study area was conducted during Summer Season March to May, 2022.

2.1 Ambient Air Quality

The concentrations of PM_{2.5} and PM₁₀ for all the 10 AAQM stations were found between 46.3 to 105.4 µg/m³ and 28.1 to 56.3 µg/m³ respectively. The concentrations of SO₂ and NO₂ were found in range of 5.1 to 14.3 µg/m³ and 7.5 to 27.9 µg/m³ respectively. Maximum concentration of PM₁₀ & PM_{2.5} as well as SO₂ & NO₂ were found at Brijrajnagar and Kirarama due to Industrial and transportation activities whereas minimum concentration was found at Village Grindola as there is no major source of pollution. The concentrations of AAQ at all monitoring locations were found well within the prescribed standards of NAAQS.

2.2 Noise Levels

Ambient noise levels were measured at 10 locations around the Kuraloi Coal Block during the day & night time. Noise levels varied from 50.2 to 62.4 Leq dB(A) during day time and from 40.3 to 50.2 Leq dB(A) during night time. Maximum noise level recorded at Brijrajnagar and Belpahar during day time and night time due to Industrial activities, transportation and mining activities; whereas the minimum noise level recorded at Grindola and Chutiparha during day and night time as there is no major source of noise pollution. The noise levels in the study area are well within the limits as prescribed by the Noise Pollution (Regulation and Control) Rules, 2000.

2.3 Surface Water Quality

Surface Water Monitoring has been carried out for 8 sampling stations. The pH of the water bodies ranges from 7.05 to 7.54 indicating slightly alkaline in nature. The water bodies are rich in Calcium, silica, potassium, magnesium and bicarbonates. The odour was found agreeable at all the locations.

Total Hardness (34.6 to 89.1 mg/l), Total Dissolved solids (54 to 126 mg/l), Alkalinity (19.0 to 71.25 mg/l) and Conductivity (82.5 to 232.5 µS/cm), Fluoride (0.11 to 0.57 mg/l) were found to be within standards in water samples. The COD (8.0 to 28 mg/l) and BOD (1.7 to 7.4 mg/l) were found. The nutrients were also found in sufficient quantity viz. Sulphate (1.86 to 14.7 mg/l), Nitrate (1.41 to 18.48 mg/l), Calcium (9.9 to 25.7 mg/l), Magnesium (1.2 to 7.24 mg/l), Iron (0.09 to 0.33 mg/l) indicated clean water bodies. Dissolved oxygen (6.6 to 7.4 mg/l) indicated that the water bodies are safe for aquatic biodiversity.

2.4 Ground Water Quality

The pH of the water samples ranged from 6.12 to 8.41 indicating slightly alkaline and maximum pH was recorded at Kuraloi Village. The odour and taste were agreeable at all sampling locations. The values of total hardness (103.9 to 178.2mg/l), alkalinity (80.7 to 190.0 mg/l) and total dissolved solids (146 to 261 mg/l) were found medium; moreover, maximum hardness was found in the sample of Village Kirarma. The analysis of all groundwater samples show that the concentration of chlorides (22.5 to 44.59 mg/l) and sulphates (6.32 to 19.06 mg/l) found respectively. The concentrations of other micro and macro nutrients were also at low level i.e. nitrate (1.22 to 4.24

mg/l), calcium (17.8 to 39.60 mg/l), magnesium (0.5 to 20.04 mg/l), and iron (0.08 to 0.36 mg/l). The fluoride (0.16 to 0.44 mg/l) concentration is at par with optimum level for the dental health, however, Village Lakhanpur maximum level of fluoride was found (0.44 mg/l).

Thus, it can be concluded from the baseline sampling results for groundwater that all the samples, were observed to be within the permissible limits and complies to the drinking water standard (IS: 10500-2012).

2.5 Soil Quality

The soil was Dark brownish, light brownish, greyish and Reddish Brownish in colour indicating well drained soil. The texture of soil is sandy loam. Soil has slightly acidic in nature having pH ranging from 5.62 to 6.84. Water holding capacity (34.78 % to 40.57%) and bulk density (1.44 to 1.55 g/cc) is ideal for the crops. Physical quality of soil samples is good for the plantation.

All the major nutrients were present, i.e. organic matter ranges from 0.52 % to 0.91 %, Nitrogen is found to be in moderate amount as it ranges from 86.80 kg/ha to 212.60 kg/ha and Phosphorous found in BDL, whereas the Potassium is found to be ranging from 239.40 kg/ha to 592.40kg/ha. This indicates that soil fertility is average with nitrogen, phosphorus and potassium in average quantity in some soil samples in the study area. Other nutrients were present in the soil, namely calcium (305.97 to 760.14 mg/kg), magnesium (100.97 to 250.85 mg/kg), zinc (77.3 to 96.7 mg/kg). The above discussion indicates that the soil in study area, in general physical and chemical quality is good & fertile with slight requirement of addition of NPK rich manure. The soil is suitable for plantation and greenbelt.

3.0 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

3.1 Air Environment

The key air emissions from the mining activities (drilling, blasting, loading, unloading and transportation) are Particulate Matter, Oxides of Nitrogen (NO₂) and Sulphur dioxide (SO₂). Gaseous emissions will be generated from HEMM & transportation of vehicles.

In the study area, predominant wind direction is from South As per the data, pre-dominant wind direction throughout year was observed from South West, according to which, the locations for ambient air quality monitoring were selected. Impact prediction modelling through AERMOD will be done on air quality considering all the meteorological features of the mine site.

Proper mitigation measures will be taken like wet drilling, controlled blasting, water sprinkling before drilling and development of greenbelt/plantation area to attenuate the pollutants/ fugitive emission. Better maintenance of equipment & HEMMs, PUC checking of mining equipment & vehicles helps to reduce emissions. Transportation by road shall be carried out initially for 2 years. Later, coal is proposed to be transported through road (within ML area) cum rail mode (feasibility study has been completed). Development of green belt & plantation around the mining activity & other areas will be carried out. Ambient Air Quality monitoring will be carried out regularly.

3.2 Water Environment

- Waste-water generated from mine office, rest shelters, Canteen etc. will be treated in STP and treated water will be used for greenbelt/ plantation development.

- Waste water from the HEMM washing/ workshop will be treated in ETP. After treatment, water will be reused in dust suppression.
- The Lilari nallah shall be diverted for along the ML periphery and will be connected to its original course in the south east part of the coal block. Beside this easterly flowing seasonal Hinjankharu Jhor which joins Lilari Nallah at the centre of the block will also be reorganized. The proposed Nallah Diversion will be implemented subject to approval from and Water Resources Department of the State of Odisha.
- Garland drains will be developed along the periphery of the mine to channelize the surface run-off.
- Check dams will be constructed at required locations to arrest eroded materials.
- Settling ponds will be constructed to treat mine discharge water.
- Proper profiling of working benches of pits and dumps will be done to channelize dewatering water garland drains & sumps.
- In the Block area the ground water level is ranging from 2.65 m bgl to 7.71 m bgl. Total water requirement is estimated 1100 KLD. During initial stage, total water requirement is 1100 KLD, same will be sourced from Lilari Nallah and Borewells. Prior permission before withdrawal & abstracting the surface & ground water will be taken from the competent authority.
- Surface water quality of Lilari Nallah and Ground water quality & level will be monitored regularly.

3.3 Noise & Vibration

Major noise generating sources of the mining activities are drilling, blasting and HEMM deployed for loading & transportation of mineral. DGMS guidelines will be followed strictly to reduce the impact of blasting on nearby habitation. Controlled blasting techniques through proper blast design and explosive selection will be used to reduce the vibrations to a greater extent. PPEs like earplugs/earmuffs will be provided to mine workers. HEMMs will be equipped with air-conditioned cabins to protect the operators from noise. Proper maintenance, oiling & greasing of HEMMs will be done. Development of green belt/plantation along the mine periphery and mining activity will help in attenuation of noise level. Noise level & Ground Vibrations monitoring will be carried out regularly.

3.4 Solid Waste Generation and Management

No space outside the block is available /envisaged for dumping of overburden. Entire overburden generated during the life of the mine shall be dumped inside the block boundary. Initially, top soil will be stripped from the excavation area and will be stacked in top soil dump. The north sector is proposed to commence in Y6 from the in-crop of Belpahar seam from the south eastern side. The pit bottom will follow the floor of Local-07 seam. Total 696.44 Million CuM waste will be generated till end of the life of mine. The pit will progress to a maximum depth of ~220m. A temporary topsoil stack with an area of 25 Ha is proposed in the northern side of the pit and it is proposed to accommodate 1.88 Million CuM of topsoil. The waste generated from north sector is proposed to be handled initially in the void of the south sector, 61 Million CuM of waste from

north sector is proposed to be accommodated in the south sector pit up to a height of 120m from OGL. A temporary waste dump (TD₂) with an area of 80 Ha is proposed in the northern side of the pit and it is proposed to accommodate the remaining waste (48 Million CuM) generated in the north sector till the pit reaches the ultimate pit depth. The waste will be re-handled back into the pit once the pit reached the ultimate depth. Top soil will be spread over the in-pit dump concurrently after backfilling commences. The height of the in-pit dump planned is 120m from OGL.

3.5 Land Environment

The land use of the mine area will be altered from agricultural land to mining area including pits, temporary dumps, slopes and batter, greenbelt etc. but will not have any significant effect on the surface features of the surrounding areas.

Total block area is 965.58 ha out of which be 635.50 ha, out of which 449.81 ha will be backfilled (rehabilitated by plantation/regrassing), total excavated void area is 185.69 ha out of which 17.0 ha will be converted into water reservoir and 168.69 ha converted into Plantation. Out of the 449.81 ha of backfilled area, (Agriculture: 20ha, Plantation: 329.81ha & of Forest Land to be returned: 100ha).

At conceptual stage, 553.77 ha area will be covered under greenbelt/plantation with 1384375 nos of trees will be planted on 553.37 ha area @ 2500 plants per ha. Rs. 27.68 crore have been earmarked for greenbelt & plantation till the end of life of mine @ Rs 200/sapling.

4.0 ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

As this is a site-specific mining project and the location of the proposed project is restricted to the geology and coal deposition of the particular area. Kuraloi-A North Coal Block is in southern part of IB Valley coalfield in Jharsuguda District of Odisha State. The block with an area of 965.58 ha has been allocated by Ministry of Coal, Govt. of India, Allocation order No: NA-104/1/2021-NA dated 03.09.2021, to Vedanta Ltd. The coal block is allotted for commercial coal sale including sale to affiliates, captive consumption, coal gasification, coal liquefaction and export of coal. The targeted production capacity of opencast mine is 8.0 Million TPA as stipulated in CBDPA. Therefore, no alternative site has been selected.

5.0 POST PROJECT ENVIRONMENTAL MONITORING PROGRAMME

Table – 4
 Post Project Environmental Monitoring Programme

S. No.	Description	Frequency of Monitoring
1.	Micro-Meteorological Data	Hourly
2.	Ambient Air Quality Monitoring	Online CAAQMS & Manual as per CPCB Guideline
3.	Personal Dust Monitoring & Free Silica Analysis/Area dust sampling /Static dust sampling/Fugitive Emission	Monthly/ As per DGMS
4.	Ground Water Quality & Level Monitoring	Quarterly & As per CGWA NOC condition
5.	Surface Water Monitoring	Monthly & as per EC & CTO condition

6.	Mine Seepage Water	Monthly & as per EC & CTO condition
7.	Treated Waste Water Inlet & Outlet – ETP/STP	Monthly & as per EC & CTO condition
8.	Ambient Noise Level Monitoring	Monthly & as per EC/CTO/ Continuous Hourly for 24 hrs
9.	Occupational Noise Level Monitoring	Monthly/ As per DGMS
10.	Ground Vibration & whole Body Vibration (WBV) of HEMMS Monitoring	As per DGMS & other norms
11.	Soil Quality Monitoring	Half Yearly
12.	Medical Checkup of employees	Annually

6.0 ADDITIONAL STUDIES

Additional Studies i.e. Land Use Land Cover Study, Hydro–Geological Study, Biological Study & Wild Life Conservation Plan, Rehabilitation and Resettlement Plan and Risk Assessment & Disaster Management Plan are covered in Draft EIA/EMP Report as per the Terms of References issued letter no. J-11015/34/2022-IA.II (M) dated 25.10.2022

6.1 Hydro-Geological Study

Total water requirement will be 1100 KLD. Water will be sourced either from mine seepage or Lilari Nallah for mine operation and for drinking purpose through Borewells. Prior permission before withdrawal & abstracting the surface & ground water will be taken from the competent authority. The annual average rainfall in the region is 1383.48 mm.

Depth to water level in the study area was found to vary between 4.3 m to 2.7 m bgl during post monsoon season and 5.6 mbgl to 3.4 mbgl during pre-monsoon indicating water level to be relatively good availability of ground water. The minimum and maximum surface elevation of monitoring points in the study area is found to vary between 261 mRL to 197 mRL respectively. The groundwater flow follows the general slope of ground surface in the area.

Possible Impact and Mitigation Measures required for Groundwater Regime:

1. Acid Mine Drainage (AMD), Mitigation includes, use of alkaline materials such as lime, limestone or sodium hydroxide to neutralize the acidity of the mine water before it is discharged into the environment, Construction of settling ponds and wetlands for the treatment of mine water, where the heavy metals are removed through precipitation and filtration processes.
2. Contamination with Heavy Metals, Mitigation includes, Implementation of best management practices for handling and disposal of mine waste materials to prevent the release of heavy metals into groundwater, Monitoring the water quality at the discharge points of the mine and treatment facilities to ensure the heavy metal concentration is within the acceptable limit.
3. Groundwater depletion, Mitigation includes, implementing water conservation measures to minimize the use of groundwater for mining operations, implementing alternative water sources such as rainwater harvesting or using treated wastewater.

4. Soil and rock disturbance, Mitigation includes, implementing proper soil conservation practices to prevent soil erosion and sedimentation in nearby waterways, Encouraging the use of environmentally friendly mining practices such as strip mining, which involves removing the topsoil and overburden to access the coal seams
5. Coal waste disposal, Mitigation includes, implementing proper mine waste disposal techniques such as impoundment design, liner systems, and proper waste management practices to prevent the contamination of groundwater.
6. Seepage of toxic substances, Mitigation includes, implementing best management practices for mine sealing to prevent the seepage of toxic substances into groundwater, Regular monitoring of the groundwater quality at and around the mine site to detect any contamination and implementing corrective measures.
7. Transportation and storage of coal, Mitigation includes, implementing best management practices for the transportation and storage of coal to prevent spills and contamination of nearby water sources. • Implementing emergency response plans to deal with any accidental spills or contamination.
8. Methane and other gases, Mitigation includes, implementing proper ventilation systems in the mine to prevent the accumulation of methane gas. Encouraging the use of alternative energy sources to reduce the reliance on coal.

6.2 Nallah Diversion Study

One perennial nalla namely Lilari and one seasonal Hanjankharu nalla flows over the proposed mine lease area from North-West to South- East direction and discharge in Ib-River.

Lilari nallah flowing in North-West to South-East direction, initially crossing the Block at North-Western Boundary and flowing away through dip side boundary to merge into the Ib-River. The Lilari nallah originates from nearby hills and has a total length of traverse of 18.17km till mines lease boundary and length of traverse inside mines lease is 3.16 km. The catchment area of Lilari nallah is measured to be 98.1723 sq km. Hanjankharu Nallah flowing in North-West and South-East direction, initially crosses at Rise (North) side boundary and then flows away through the block to merge into the Lilari nallah at the middle of the Block. The catchment area of the nallah is 11.175sqkm.

The study comprises of collection of hydrological, Rainfall data, Storm Water generation data, Individual Drainage study, Longitudinal & Cross Section of Nalla study, Flood Hydrograph estimation, identification of Check dams/storage structures.

As per the study the best and feasible alternative is proposed to divert the Nalla by making it flow along the western side of the Mining lease boundary towards the Southern side and later later joining it to the main channel at the South-Eastern Boundary.

From the study and adopting the above alternative as suitable option, it has been concluded that there would be no impact of hydrological regime of Lilari Nallah due to diversion and coal mining activities. Considering the life of mine, the diverted channel is designed for safe passage of 50-year chance flood with adequate freeboard to accommodate 100 year chance flood.

6.3 Biological Environment

Dominant species of trees and shrubs prevailing in the core and buffer area are Sal (*Shorea robusta*), Teak (*Tectona grandis*) Mango (*Mangifera indica*), Cashew (*Anacardium occidentale*), Neem (*Azadirachta indica*), Gulmohar (*Delonix regia*), Seena simea, Lantana camera, Bamboo etc. There is no National Park, Wildlife Sanctuary, Biosphere Reserves, Tiger Reserves, Wildlife Corridors etc. within 10 km radius of study area. There are 12 Reserved Forest and 4 Protected Forest fall within the study area. According to (IWPA) Indian Wildlife Protection Act, 1972, as amended on 20th Dec. 2022, 10 schedule- I species *Canis aureus* (Asiatic jackal), *Rusas unicolor* (Sambar), *Felis chaus* (Jungle Cat), *Hyaena hyaena* (Hyaena), *Hystrix indica* (Porcupine), *Chamaeleo zeylanicus* (Indian Chameleon), *Naja naja kothia* (Indian Cobra), *Naja tripudians* (Common cobra), *Accipiter badius dussumieri* (Shikra), *Haliastur Indus* (Brahminy kite), were found in the study area during field survey.

6.4 Resettlement & Rehabilitation

The area of proposed mine is 965.58 ha which falls in villages Pipilimal, Dhauramunda, Kuraloi, Belpahar, Banjari, Bartap. Out of total mining lease area, 502.90 ha is Private Land, 249.31 ha is Govt. Land and 213.37 ha is Forest Land. Rehabilitation & Resettlement Plan (RRP) for the affected families of this proposed Coal Mine project follows the guidelines of the LARR Act, 2013 and state Government.

6.5 Land Use and Land Cover Study

Land Use/Land Cover classes that were identified are Agriculture Land, Forest Land, Water Bodies and Built-up Land.

Core Area:

- **Water bodies:** There are many ponds and lakes within the study area. Lilari Nallah is passing through ML boundary and will be connected to its original course in the south east part of the coal block. Beside this easterly flowing seasonal Hinjankharu Jhor which joins Lilari Nala at the centre of the block will also be reorganized.
- Core are mainly comprising of Agriculture (506.75 ha), Vegetation/Plantation (120.04 ha), Forest (213.37 ha), Settlement (42.74 ha), Open Scrub (39.10 ha), Road (23.94 ha), Surface water bodies (18.43 ha) and Railway (1.21 ha) with 52.48%, 12.43%, 22.10%, 4.43%, 4.05%, 2.48%, 1.91% & 0.12% area falling under respectively. There is no National Park, Wild Life Sanctuary, Biosphere Reserve, Reserved Forest etc. falling within the core area.
- Major part of the mine area is agriculture land, which makes 52.48% of the core zone.
- As this is a Greenfield project, it will eventually result in increased built-up area in terms of rainwater harvesting structures, office/workplace, haul roads, workshop etc.

Buffer Zone:

- The study area mainly comprises of Agriculture land (12567.75 ha), Forest (10980.87 ha), Open Scrub (725.95 ha), Vegetation/Plantation (6079.55 ha) with 27.73%, 24.23%, 1.60%, 13.41%, of area falling under respectively.

- Built up area is represented by Settlements (3.30%) and Industries (0.18%).
- Surface water bodies, Roads and Railway Line cover 724.32 ha, 604.73 ha and 138.92 ha area which makes 1.60%, 1.33% and 0.31% of the total study area.
- Mine Quarry covers 5.75% of the study area.
- There is no National Park, Wild Life Sanctuary and Biosphere Reserve etc. within 10 km radius of the study area.
- 12 Reserved Forest and 4 Protected Forests falling within the 10 km radius of the study area.

7.0 PROJECT BENEFITS

The proposed project will have positive employment effect, directly as well as indirectly. Total manpower required will be around 1235 persons for mining operation. Skilled, Unskilled/ Semi-Skilled person will be employed and preference will be given to the local for employment as per their requirement & eligibility.

Beside this, indirect employment opportunities also be generated by way of transportation, workshops, plantation & horticulture, petty contractors; shopkeepers, network of retailers throughout the state and in its marketing regions. Mining activities also result in numerous indirect employment avenues for the people such as drivers, repair shops, tea-stalls, horticulturist etc.

The project activity will help in meeting the growing demand of coal & hence help in the economic growth of the country. The mine shall be contributing around Rs. 445.14 Crore every year to the State and Central Govt. exchequer by way of mining revenue (Royalty, DMF, NMET & Premium tax). Proposed mine will result in growth of the surrounding areas by community development to be undertaken by the company.

8.0 ENVIRONMENT MANAGEMENT PLAN

Vedanta has a full-fledged Environmental Management Cell (EMC) for environmental monitoring and control. The roles and responsibilities of various personnel, who manage, perform and verify the activities having effect on environment and have been fixed by the Top Management. Total cost of the project is Rs. 2000 crores. Capital cost for Environment Protection measures is Rs. 23.61 crores and recurring cost for the EMP is Rs. 2.72 crore/annum also envisaged for implementation of the proposed project.

9.0 CONCLUSION

The EIA/ EMP study is prepared in compliance of ToR issued by MoEF&CC. Baseline data of land, air, water, noise, biological and socio-economic environment were duly assessed by conducting field investigation as well as by having an access to the available secondary information. The prediction of impacts was identified & evaluated and EMP is suggested to mitigate the environmental concerns arising from the proposed project.

The project will prove beneficial to the local people as direct and indirect employment (1235) opportunity will be generated. There will be increase in revenue generation to the government by way of royalty, excise and government taxes etc. Further improvement in infrastructure will take place like education, roads, availability of drinking water, medical facilities in adjacent villages.

There will be increase in earnings of local villagers, as they will get employment in the coal mine, which ultimately will result in better standard of living of the villagers. There will be no significant pollution of air, water, soil and noise. Regular monitoring of all the components of environment will be done. Increased social welfare measures taken by the company will bring development in the near-by villages.

