PRE-FEASIBILITY REPORT

FOR

PROPOSED 1.0 MTPA COAL MINING AT CHOTIA-II COAL MINE

AT

SALAIGOT VILLAGE, TEHSIL PODIUPRODHA, KORBA DISTRICT, CHHATTISGARH

By

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Korba-495684 Chhattisgarh

Submitted to

Ministry of Environment, Forest & Climate Change (MoEF&CC)
New Delhi

February-2016

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1.0 Executive Summary

1.1 The Company

Bharat Aluminium Company Ltd (BALCO) is a major player in non-ferrous metals having its headquarters in Delhi. BALCO was established in 1965 at Korba, Chhattisgarh, as a Government of India undertaking with integrated smelter capacity of 1,00,000 tpa and alumina refinery capacity of 2,45,000 tpa. BALCO was the first major Public Sector Organization which went through the economic reforms and disinvested 51% stake to Sterlite Group in 2001 remaining 49% stake is held by Government of India.

2.0 Preamble

This block was earlier operated by Prakash Industries Limited. Supreme Court of India, cancelled all allocated coal block in Aug 2008. Post cancellation, Govt. of India promulgated 'Coal Mines (Special Provision) Ordinance' and coal blocks were auction through a transparent electronic bidding process. BALCO won this mine in that bidding process and the said mine was handed over with the existing infrastructure to BALCO after making the required payment w.e.f 1st April, 2015.

Need for the project and its importance to the country and or region

BALCO has set up a 600 MW captive Power Plant at Korba District to meet its power requirement for manufacturing of Aluminium products. All together Rs.2519.77 Cr has been spent on construction of 600 MW Captive Power Plant. As manufacturing of Aluminium products is power guzzling process therefore Coal from Chotia-II Coal Mine is essential to start up the 600 MW Captive Power Plant and sustain the Aluminium production.

BALCO supplies Aluminium products to defence; space organizations, railway and power sector hence contributes directly to country's growth and prosperity.

3.0 Location and Accessibility

The Chotia-II Coal Mine is located in on the western side of Hasdeo River in Hasdeo-Arand Coalfield in Korba district of Chhattisgarh State. The Location map, study area map and Google Image are given in **Figure-1**, **Figure-2** and **Figure-3**.

Location

The project site is situated within the geographical grids of latitude N 22^0 50'40.6" N-22^0 51' 58.6" N-22^0 51' 33.4" N-22^0 51' 1.3" N and longitude 82^0 33' 1.2" E - 82^0 31' 57.9" E-82^0 31' 26.9" E-82^0 31' 47.7" E.

Road link

Chotia-II Coal Mine is located 13 km from Bilaspur-Chirimiri Road which bifurcates from Bilaspur-Ambikapur Road at Chotia Junction. This coal mine is well connected by road to Chirimiri (60 km), Ambikapur (100 km) Bilaspur (120 km), Korba (70 km), and Champa (100 km).

Rail link

The nearest railhead is at Korba. However, nearest railhead on Howrah-Mumbai Railway line of South-East-Central Railway is at Champa (90km).

Air link

Raipur is the nearest airport to the coal mine, which is situated around 200 km from the project site and connected by all-weather road.

Topography

Chotia-II Coal Mine exhibit rolling terrain. The ground elevation in this mine ranges from 380m to 438m.

Climate

The climate of the region is of tropical nature. During summer, the temperature often exceeds 44°C; whereas in winter the temperature falls to as low as 3°C to 5°C. The monsoon season prevails for about 3 months from middle of June to middle of September. The average rainfall is 1,200 mm per annum.

Regional Geology

Hasdeo Arand coalfield extends over an area of about 1,200 sq.km. The larger dimension, i.e. E-W direction is about 70 km and its width in N-S direction is about 25 km. This coal basin is a part of Son-Mahanadi Gondwana Basin. In Southern and South Western periphery, the contact is faulted and pre Cambrian rocks lie in juxtaposition with the Barakar Formation. The coal measures rest un-conformably over the pre Cambrian and conformably over the Talchirs. The coal measures, barring a brief intervention of basement / Talchir Formation, extended in to the Korba Coalfield located in the South.

Stratigraphic sequence as established by GSI in the western part of the Coalfield covering Tara, Morga and Chotia Blocks, on the basis of available surface and sub-surface data is given in **Table-1**.

TABLE-1
STRATIGRAPHIC SEQUENCE

Age	Formation	Thickness (max) Preserved	Lithology
Upper Cretaceous to Eocene	Deccan Trap	-	Dolerite (Sills & Dykes)
----------Unconformity----------			
Permian	Barakar Formation	484 m	Multi-storied felspathic sandstones, shale's, carbonaceous shale's, coal seams.
	---------- Transitional ----------		
	Talchir Formation	445 m	Diamicite / outwash/tillite/sandstones, shale's rythmites etc.
----------Unconformity----------			
Achaean			Porphyritic granite genesis and quartzites.

The geological succession of the Chotia-II Coal Mine based on surface and sub-surface data is given in **Table-2**.

TABLE-2
GEOLOGICAL SUCCESSION

Age	Formation		Thickness		Broad Lithology
			From	To	
Recent to Sub recent	Soil and Alluvium		0.00	6.00 (CSG -13)	Sandy/ Clayey soil, yellowish unconsolidated sand
……...Unconformity ……					
Upper Cretaceous to Eocene	Deccan Traps				Dolerite (Sills & Dykes)
……...Unconformity ……					
Lower Permian	Barakar Formation	Upper	Not present in the block		
		Middle		+30.80 m (HAC-6)	Sandstone with minor Shale, Carbonaceous Shale and thin Coal Seams
		Lower	83.10 m (HAC-8)	116.20 m. (HAC-10)	Sandstone of varying grain size with Coal Seams
Upper Carboniferous to Basal Permian	Talchir			135.45 m. (HAC-7)	Khaki Green, Grey Micaceous Silt Stone, Fine Grain Sandstone, with Pebbles,
Precambrian			Not drilled		

FIGURE-1
LOCATION MAP OF CHOTIA II COAL MINE

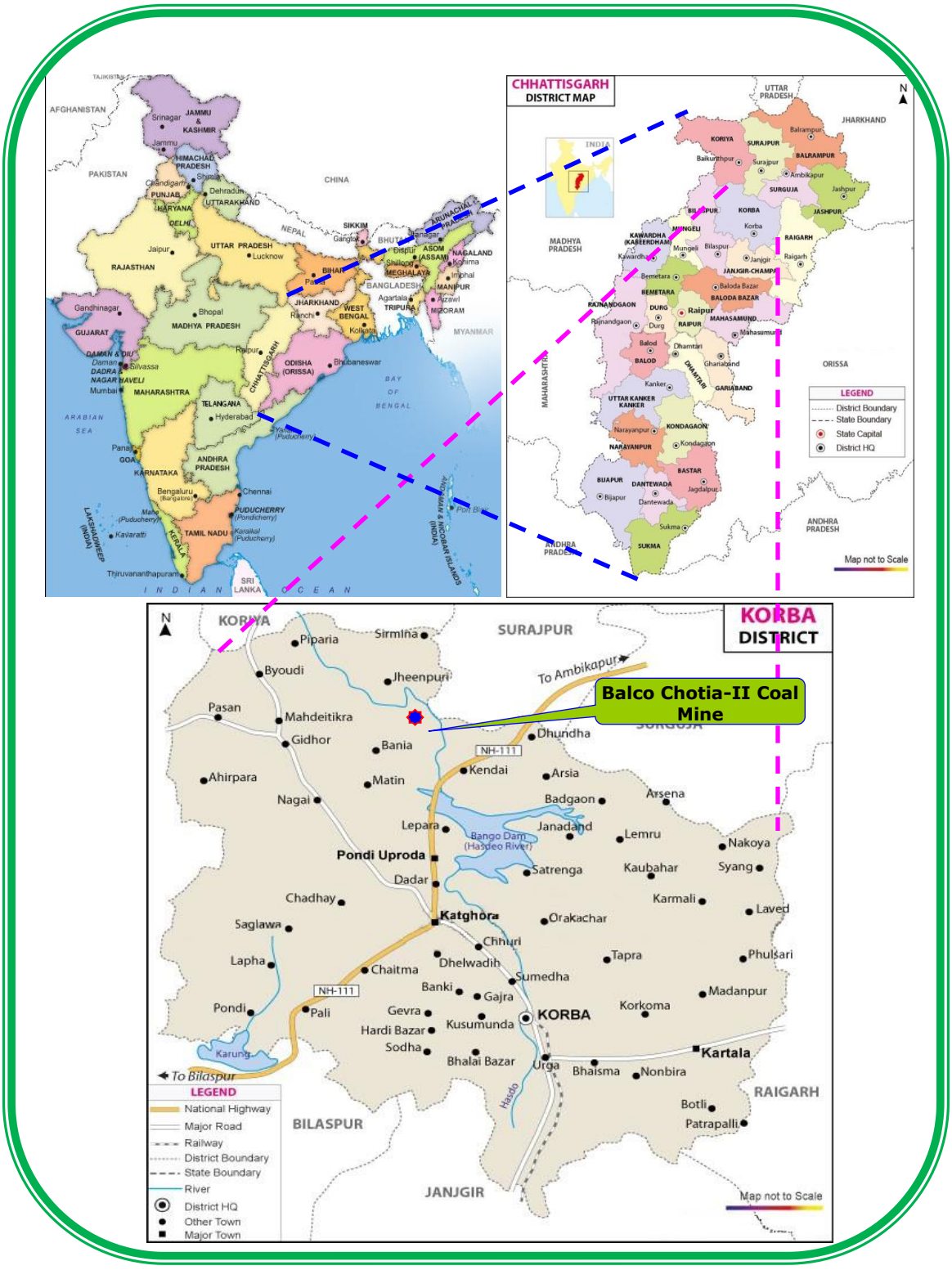

FIGURE-2
STUDY AREA MAP OF CHOTIA-II COAL MINE

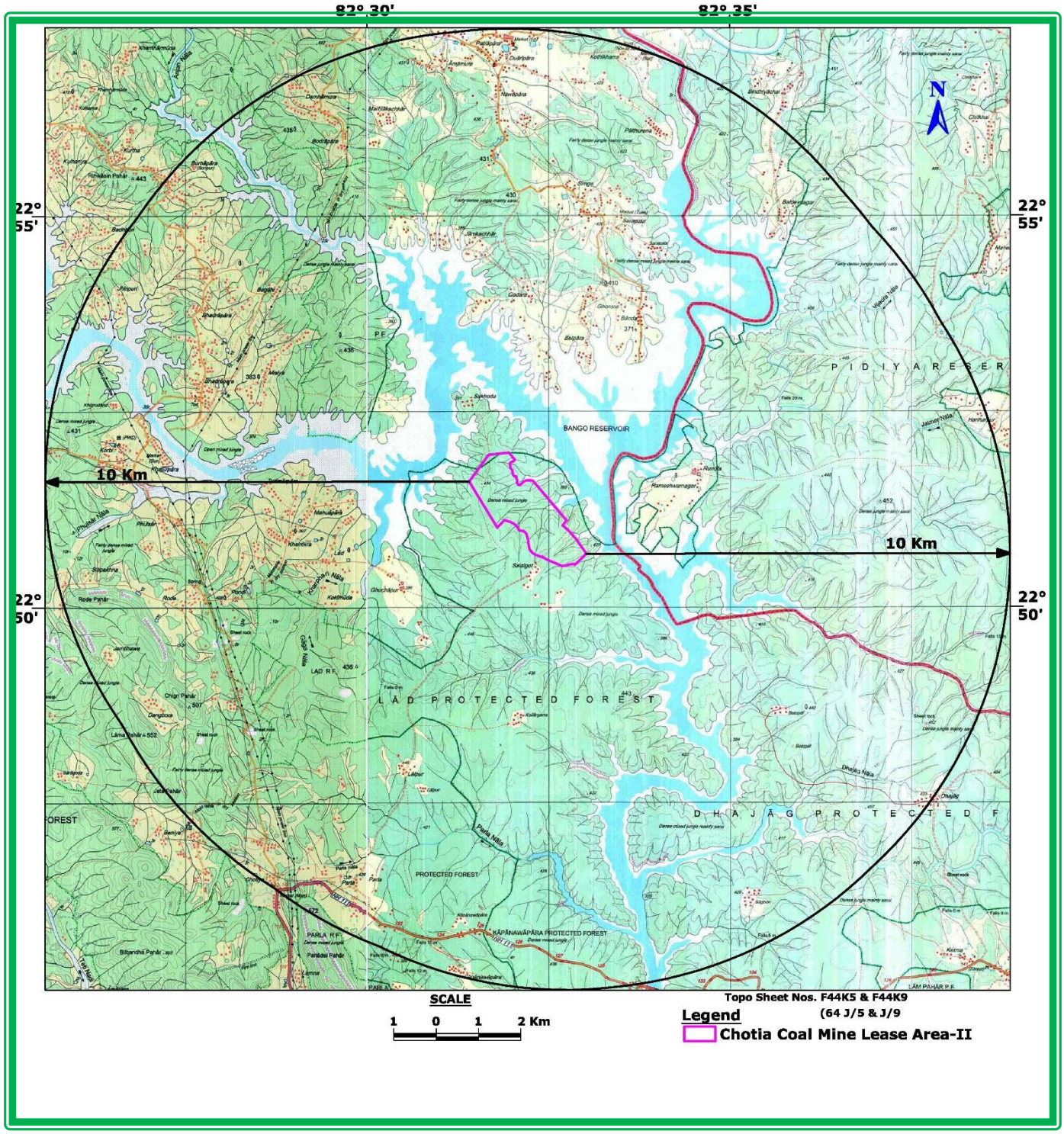

FIGURE-3
GOOGLE IMAGE OF CHOTIA-II COAL MINE

4.0 Introduction of the Project/Background Information

The Mine was awarded to BALCO through a competitive bidding process. The mine was previously operated by M/s Prakash Industries Limited. The Chotia-II coal mine having a mining lease area of 316.826 Ha.

The first Mining Plan prepared by PIL was approved by MoC in 2004 vide no. 13016/22/2003-CA dated 04.08.2004. Subsequently, PIL conducted further exploration and studies in two phases and based on the outcome, the GR was revised and accordingly Mining Plan was revised twice and subsequently approval from Ministry of Coal was obtained vide reference nos. 13016/22/2003-CA-1 dated 20th August,2007 and 13016/22/2003-CA-1 (Vol.-III) dated 22nd February, 2010. As per approved mine plan (2nd revision) combined peak production capacity is 0.50 MTPA by Opencast and Underground from Chotia II Coal Mine.

Employment Generation (Direct and Indirect) Due to the Project

More than 120 local villagers got direct employment in BALCO. In addition to this 600 direct employment and many indirect employments will also be generated in the area.

5.0 Project Description

Project Description with Process Details

Exploitation of coal could be carried out basically by two methods, one by opencast mining and the other by underground mining. Open cast mining is preferred where, there is no hard cover or the extractable coal reserve is in economical stripping limits. Coal is also extractable by UG methods, if the seam and disposition is feasible to do so.

5.1 Approved Method of Mining

Ministry of Coal has approved following method of mining:

- Open cast mining : Sector A of Chotia II block
- Underground mining: Sector B of Chotia II block

After the grant of coal block, to maintain the agreed production level, revised mine plan has already been submitted for approval to Ministry of Coal to meet the requirement of "Coal Mine Development and Production Agreement" with Ministry of Coal

5.2 Geo Mining Characteristics

Chotia-II Coal Mine is traversed by 5 faults with beds showing NE-SW, E-W and N-S strike and the dip of seam varies from 3° to 6°, the direction varying from SW, S and to E. The strike and dip over the lease is given in **Table-3** below:

TABLE-3
DIP AND STRIKE

Seam 1	Strike	Amount of dip	Direction
North	E-W	2°-3°	S
North East	NW-SE	6°	SW
South East	E-W	3°	Rolling dips
Central	N-S	Sub horizontal	Rolling
West	N-S	3°-4°	E

5.3 Sectors

Chotia-II Coal Mine is divided into two sectors viz. Sector A and Sector B is given in **Table-4.**

TABLE-4
SECTORS CHOTIA-II

Sector	Seam	Area (sq.km)	Remarks
Sector B	1	1.71	Low cover area has been demarcated as Sector A for OC mining and approved in the Mining Plan (2nd Revision)
Sector A	3, 2, 1	0.91	

5.4 Production capacity & Calendar Programme

The earlier approved Mining Plan has peak production capacity of 0.50 MTPA from Chotia II Coal Mine.

It is important to note that BALCO has to produce 1 MTPA of coal as per "Coal Mine Development and Production Agreement" with Ministry of Coal and commitment made in the Commencement Plan submitted to Ministry of Coal.

In view of above, BALCO proposes coal production from Chotia II coal mine at the rate of 1.0 MTPA.

Calendar Programme of Chotia II Coal Mine

Mine	Method	Seam	Capacity (Mtpa)	Reserve (Mt)	Y 1	Y 2	Y 3	Y 4	Y 5	Y 6	Y 7	Y 8	Y 9	Y 10	Y 11	Y 12	Y 13	Y 14	Y 15
Chotia II	OC	Seam 3, 2 & 1	1	4.98	1.0	1.0	1.0	1.0	0.8	0.2									
	UG	Seam 1	0.3	2.70						0.1	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2
Total				7.68	1.0	1.0	1.0	1.0	0.8	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2

Geo -Mining Characteristics

Geo-mining characteristics of Chotia-II is given in **Table-5**.

TABLE-5
GEO -MINING CHARACTERISTICS

Sl no	Particular	Thickness	
		Min (m)	Max (m)
A.	**Coal**		
1	Seam 3	0.06	2.7
2	Seam 2	0.12	3.5
3	Seam 1	0.08	4.08
4	Category of Excavation	Category III	
5	Quality	Seam 1- C & D grade Seam 2-E & F grade Seam 3-F & G grade	
6	Volume weight	1.57 t/m^3	
7	Dip of the seam	Dipping towards center 3 to 6 deg	
B.	**Overburden**	**Thickness (m)**	
1	Top O.B.	8-12	
2	Parting between seam 3& seam 2	5.5-30.7	
3	Parting between seam 2& seam 1	14.4-22.6	
4	Category of excavation	50% category III + 50% category IV	
5	Volume weight	2.2-2.4 t/m^3	

Opencast Mine

Combined geological coal resource of all three seams - Seam 3,2 & 1 in Sector A is 5.424 MT and mineable reserves of 4.98 MT with total overburden of 26.18 Mcum was estimated as per the Approved Revised Mining Plan (2nd Revision). The overall stripping ratio is 5.02cum/t. Entire workable coal reserves of Seam 3 and major part of Seam 2 at Sector A are within less than 15m hard cover, hence cannot be worked by underground method of mining. Therefore, from conservation point of view, Sector A is proposed to be worked by opencast mining only.

3.1 m^3 diesel hydraulic shovel in combination with 35 T dumper were deployed for mining. The existing method of working will be followed from the year 2016-17 to excavate the balance reserve in 6 years. HEMM to be used are 3.1 m^3 diesel hydraulic shovel, 35 T dumper, 115 mm drill machine, 320 hp dozer, grader, water sprinkler, mobile service van etc. HEMM to be used in Chotia-II mine

Underground Mine

Sector B of Chotia-II has only Seam 1 as workable with 5.40 Mt of net geological reserve spread over an area of 1.82 sq.km. The seam is having very mild gradient of 2^o to 3^o and the depth of cover varies from 31 m to 6 0m. Direction of dip is towards central part of the area indicating a sub-basinal structure. The seam thickness varies from 0.2 m to 3.4 m with an average of ~2.5 m. Underground, the galleries would be 4.5 m width, 2.5m in height (where coal seam is more than 2.5 m thick, the height would be the same as thickness) while pillar size would be 22 m centre to centre, as per the provisions of CMR 1957.

Two inclines would be driven from the western boundary in the centre of Sector B (near borehole no CSG-9). The inclines are placed 25 m apart. Coal raising from bottom of the incline would be by belt conveyor to surface along incline, which would also be used for traveling road. The other incline would be used for material supply & traveling. An air shaft is proposed near the incline and would be fitted with 100 m^3/sec main mechanical ventilator.

Proposed near the incline and would be fitted with 100 m^3/sec main mechanical ventilator. Once the dip headings have advanced sufficiently, panels having six level galleries with barrier at every six pillar length would be opened on either side of main dip. These galleries in the panel would be of the same size & width. Each panel would be bounded by barriers of one pillar length on rise side of 1^{st} level & dip side of 5^{th} level, while every pillar along rise / dip in the panel would form a sort of another rise / dip barrier & would have a limited 4 level entries. Panels would be developed as per projection up to boundary. Extraction of pillars will be caving by slicing. Where ever surface needs protection, partial extraction with splitting of pillars will be adopted.

Two panels will have more than 12 active faces per shift. The third panels will be prepared for next shift so that the system remains always engaged. Roof support will be done by mechanised roof bolting system. For effective ventilation auxiliary fans will be provided. The coal production will be by drilling and blasting off the solid. Drilling of holes for coal preparation will be by hand held electric coal drill.

Opencast Mining Parameters

The basic parameter of the opencast mine is given in **Table-6**.

TABLE-6
OPENCAST PARAMETERS

Parameters	Unit (m)
Maximum length of the quarry along the dip at surface	1125
Maximum length of the quarry along the dip at floor	1046
Minimum length of the quarry along dip at surface	911
Minimum length of the quarry along dip at floor	936
Maximum width of the quarry along strike at surface	870
Maximum width of the quarry along strike at floor	757
Minimum width of the quarry along strike at surface	589
Minimum width of the quarry along strike at floor	463
Minimum depth of quarry	20
Maximum depth of quarry	60
Area of excavation (ha)	79.4

6.0 Mineable Reserves

The mineable reserves in Chotia-II are given in **Table-7**.

TABLE-7
MINEABLE RESERVES

Type of Mine	Area	Geological reserve	Mineable Reserve coal
Open Cast	0.806sq.km	5.414MT	4.98 MT
Underground	1.71 Sq. Km	5.418 MT	2.70 MT
TOTAL		10.832 MT	7.68 MT

The Opencast mineable reserve of the mine was initially estimated to be 4.98 MT with corresponding OB volume of 26.18 Mcum and the stripping ratio of 5.02 cum/t.

7.0 Landform, Land Ownership and Land Use

The Chotia II coal mine lease area is 316.826 Ha. The type of land involved in the mining activity is forest land. The approval for diversion of forest land has already been obtained from MoEF&CC and the area is already physically diverted for all rights and mining rights. The land use pattern at the start of the mining operation is given in **Table-8**.

TABLE-8
MINE-WISE LAND PATTERN OF CHOTIA-II

Mine	Seam	Year of closure	Land required (ha)
UG	1	16th year	182.75
OC	3, 2 & 1	6th year	91.16
Undisturbed area			42.92
Total			**316.83**

8.0 Environmental Sensitivity

The environmental setting of the ML area within 15 Km radius is given in **Table-9.**

TABLE-9
ENVIRONMENTAL SETTING

Item	Description	Distance
Nearest Highway	NH-111	8.8 km, SSW
Nearest Railway station	Korba	58.5 km, SSE
Nearest Air port	Raipur	200 Km, SSW
Nearest village	Salaigot	
Nearest town	Korba	56.0 km, SSE
Nearest major city		
Nearest Water bodies	**Rivers**	
	Hasdo River	1 Km, E
	Gej Nadi	12.9 km, NNE
	Atem Nadi	13.1 km, NNE
Ecological Sensitive Zones within 15 Km from M.L. Boundary		Nil
National Parks/ Wild life Sanctuaries within 15 Km from M.L. Boundary		Nil
CRZ		Nil
Historical Places within 15 Km from M.L. Boundary		Nil
Any other Industrial Establishments		Nil
Nearest Forest Blocks Within 15 Km radius	**Reserve Forests and Protected Forest:**	
	Lad P.F	Within mine lease area
	Dhajag	5.7 km, SSE
	Kapanawapara P.F	7.0 km, S
	Parla P.F	9.8 km, SW
	Ladgarh P.F	12.0 km, S
	Kalna P.F	12.2 km, NNE
	Lampahar P.F	13.4 km, SSE
	Pidia R.F	1.1 km, E
	Sirmina R.F	2.8 km, NW
	Baniya R.F	10.1 km, SW

9.0 Infrastructure

Earlier the mine was operated with diesel equipment and DG sets were used for power requirement related to pumping, illumination etc. All major equipment maintenance will be taken up in outside garages and hence no full-fledged workshop or stores will be built. All the residential facilities developed earlier shall continue to be used.

The available infrastructure built up by previous allottee (PIL) which stand transferred to BALCO, will be used. Additional infrastructure including securing of power supply for the project is to be developed by BALCO. Details of infrastructure for the project are given below.

Electric power supply

Power will be drawn from the nearest CSEB source and three substations will be built to supply power to opencast mine and underground mines of Chotia II.

Electric power will be supplied for pumping and illumination for the opencast mine as the major equipment of Chotia-II opencast mines are diesel operated. The power requirement for the opencast mine will be 500KVA.

The power requirement for Chotia II UG mine is assessed as below:

- Chotia-II, Seam 1 Mine: 2,250 KVA

It is planned to receive power at 33 KV from the nearest substation of CSEB by overhead feeder and feed it to the following substations of the project:

- Chotia II Seam 1 substation: 2 x 1.6 MVA, 33KV/3.3 KV

However, metering at the single point on the incoming 33 KV feeder has been considered for economic purpose.

Initially, only one 1.6 MVA, 33 KV/3.3KV transformer will be installed for opencast mine operations and thereafter substation will be installed based on the construction schedule of the UG mine.

Roads

A road connecting Chotia II mine from the Bilaspur Chirimiri has been developed by the prior allottee. The same shall be used for connecting the sub block.

Water Supply

The drinking water supply is by existing bore wells drilled in the project area, which will be continued. Mine Seepage water would be used for dust suppression and watering plantation.

Work Shop

An existing small maintenance shop will be used for day to day minor maintenance work for operating OC mine.

Other Infrastructure

Store

An existing store will be used for opencast mining operations.

Diesel Storage

Existing diesel pump facility with capacity- 40KL (2 X 20 KL) will continue to be used.

Project Office

An existing Project Office will be used on site to cater to the needs of Manager, Mining Engineers, Geologists, Surveyors and all support service employees such as Finance, Administration, IT, HR, etc. The office will have a conference/ meeting room.

Rest Shelter

Three rest shelters will be provided for operators, maintenance crew and other employees near each mine.

Canteen

A canteen has already been constructed by previous owner in the project, area which will be restarted. Canteens will also be provided at the pit top complex of each UG mine.

First Aid Centre

A first aid room is available and it will be maintained by placing required personnel and facilities. A primary health centre has been constructed by PIL in the project area, which will be utilised by BALCO.

Vocational Training Centre

A common Vocational Training Centre has already been constructed by previous owner in the project area. Requisite personnel and facilities for providing vocational training will be employed.

Explosive Magazine

Previous Owner has established two permanent 2.5t magazine and 5 portable magazines for the opencast mine. The present set up for magazine is sufficient for the entire life of the mine.

Residential Facilities

A complex with project office and residential quarters exists, which comprises of A type (48), B type (20), C type (30) and D type (2) quarters along with guest house and bachelor's accommodation. Power from rural supply feeder of CSEB (11kV) is available for existing colony & guest house.

10.0 REHABILITATION AND RESETTLEMENT (R & R) PLAN

The proposed coal mining is planned within the existing mine lease area of Chotia-II coal mine. Hence, no rehabilitation and resettlement involved.

11.0 PROJECT SCHEDULE & COST ESTIMATES

The mining operations will be started only after getting all the clearances. The capital cost of the project is Rs.100.00 Cr. including environment protection measures.