



भारत सरकार, खान मंत्रालय  
GOVERNMENT OF INDIA, MINISTRY OF MINES  
भारतीय खान ब्यूरो, क्षेत्रीय खान नियंत्रक कार्यालय- भुवनेश्वर  
INDIAN BUREAU OF MINES, OFFICE OF REGIONAL CONTROLLER OF MINES- BHUBANESWAR  
प्लॉट न-149, पोखरीपुट - भुवनेश्वर Plot no.149, Pokhariput, Bhubaneswar  
PIN-751020, Phone-0674-2352 463 /490, ईमेल- ro.bhubaneshwar@ibm.gov.in



File No. MP/A/21-ORI/BHU/2021-22

Date: 11.01.2022

सेवामे- <sup>1414</sup> Shri Debabrata Behera, Managing Director,  
M/s Kashvi Power & Steel Pvt Ltd,  
Plot No 1234/P, Govinda Prasad,  
Bomikhal, Bhubaneswar-751010  
Email: groupkashvi@gmail.com

विषय: Approval of Mining Plan of Dholta Pahar Iron Ore Block along with Progressive Mine Closure Plan (PMCP), over an area of 60.508 ha in Sundargarh district of Odisha State, submitted by M/s Kashvi Power & Steel Pvt Ltd under Rule 16 of Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016.

- संदर्भ:- i) Your letter No. KPSL/DHO/2021-22/09 dated 07.12.2021 received on 14.12.2021.  
ii) This office letter of even no. dated 14.12.2021.  
iii) This office letter of even no. dated 23.12.2021.  
iv) Your letter No. KPSL/DHO/2021-22/13 dated 30.12.2021.

महोदय,

In exercise of the power delegated to me vide Gazette Notification No. S.O. 1857(E) dated 18.05.2016, I hereby Approve the Mining Plan including Progressive Mine Closure Plan of Dholta Pahar Iron Ore Block over an area of 60.508 ha in Sundargarh district of Odisha State, submitted by M/s Kashvi Power & Steel Pvt Ltd under Rule 16 of Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016. This approval is subject to the following conditions:

- I. The Mining Plan is approved without prejudice to any other law applicable to the mine area from time to time whether made by the Central Government, State Government or any other authority and without prejudice to any order or direction from any court of competent jurisdiction.
- II. The proposals shown on the plates and/or given in the document is based on the lease map /sketch submitted by the applicant/ lessee and is applicable from the date of approval.
- III. It is clarified that the approval of aforesaid Mining Plan does not in any way imply the approval of the Government in terms of any other provision of Mines & Minerals (Development & Regulation) Act, 1957, or the Mineral Concession Rules, 2016 and any other laws including Forest (Conservation) Act, 1980, Environment (Protection) Act, 1986 or the rules made there under, the Occupational Safety, Health and Working Conditions Code, 2020 and Rule & Regulations made there under.

File No. MP/A/21-ORI/BHU/2021-22

- IV. Indian Bureau of Mines has not undertaken verification of the mining lease boundary on the ground and does not undertake any responsibility regarding correctness of the boundaries of the leasehold shown on the ground with reference to lease map & other plans furnished by the applicant / lessee.
- V. At any stage, if it is observed that the information furnished, data incorporated in the document are incorrect or misrepresent facts, the approval of the document shall be revoked with immediate effect.
- VI. If this approval conflicts with any other law or court order/ Direction under any statute, it shall be revoked immediately.
- VII. Validity of excavation proposal of this document shall expire within 5 (five) financial year from execution of the mining lease.
- VIII. The pre-feasibility report considered for reserve/resource estimation as per UNFC is submitted by the preferred bidder / lessee which is prepared based on the current data as reported and it may not establishes the future economic viability of mining project, which may be affected by the market dynamics and other related factors.
- IX. Drone survey to be carried out after issue of the standard operating procedure for carrying out the drone survey by the Indian Bureau of Mines and the data shall submitted in the specified form to this office before commencement of mining operation.
- X. Copy of the Lease deed, MDPA signed and performance security deposited to the State Government to be submitted before commencement of mining operation.

Encl: - One copy of Mining Plan

भवदीय  
BABULAL GURJAR  
Digitally signed by  
BABULAL GURJAR  
Date: 2022.01.11  
12:09:40 +05'30'

(बाबुलाल गुर्जर)

क्षेत्रीय खान नियंत्रक

भारतीय खान ब्यूरो, भुवनेश्वर

Copy for kind information to:-

1. The Director of Mines, Directorate of Mines, Government of Odisha, Heads of the Department Building, Bhubaneswar- 751001, Odisha along with one copy of Mining Plan by **REGISTERED PARCEL**.
2. ShriPradeeptMohapatra, World Consultany Services, At-Telengapentha, Dist- Cuttack, Odisha-754001. Email: pmohapatra\_07@yahoo.com

BABULAL GURJAR  
Digitally signed by  
BABULAL GURJAR  
Date: 2022.01.11 12:10:25  
+05'30'

क्षेत्रीय खान नियंत्रक

भारतीय खान ब्यूरो, भुवनेश्वर

Book-2

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**TEXT**

## **MINING PLAN**

(Submitted under Rule 16(1) of MCR 2016)

ALONGWITH

## **PROGRESSIVE MINE CLOSURE PLAN**

(Submitted under Rule, 23 of MCDR, 2017)



*In respect of*

### **DHOLTA PAHAR BLOCK**

**FOR IRON ORE OVER AN AREA OF 60.508HA NEAR DENGULA VILLAGE, KOIRA  
TAHASIL OF SUNDARGARH DISTRICT, ODISHA**

MINERAL	LAND DETAILS		CATEGORY OF PROPOSED MINE
	RESERVE FOREST	NON-FOREST	
IRON ORE	60.508HA	NIL	'A' FULLY MECHANISED

**(THE IRON ORE BLOCK HAS BEEN ALLOTTED THROUGH AUCTION  
AS PER MMDR AMENDMENT ACT, 2015)**

**M/S. KASHVI POWER AND STEEL PVT LTD**

(APPLICANT)

**PLOT NO 1234/P, GOVINDA PRASAD, BOMIKHAL, BHUBANESWAR**

Email: [groupkashvi@gmail.com](mailto:groupkashvi@gmail.com)

Mob: 9437094843



***Prepared By***

**SRI PRADEEPT MOHAPATRA, MSc in Geology**

(Qualified person)

**WORLD CONSULTANCY SERVICES**

**Plot No -766, Konark Centre Office Premises,  
Beside NH- 16, 2nd Floor, Above Usha International,**

**Telengapentha, Cuttack - 754001**

Email id: [pmohapatra\\_07@yahoo.com](mailto:pmohapatra_07@yahoo.com)

Phone No: 9438149715

Approved Mole letter NO:-  
MS/19/21-22/8441 2021-22  
Dated 11.01.2022

# MINING PLAN

(Submitted under Rule 16(1) of MCR 2016)

ALONGWITH

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In respect of

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Email: [groupkashvi@gmail.com](mailto:groupkashvi@gmail.com)

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*Prepared By*

**SRI PRADEEPT MOHAPATRA, MSc in Geology**  
(Qualified person)

### WORLD CONSULTANCY SERVICES

Plot No -766, Konark Centre Office Premises,  
Beside NH- 16, 2nd Floor, Above Usha International,  
Telengapentha, Cuttack - 754001  
Email id: [pmohapatra\\_07@yahoo.com](mailto:pmohapatra_07@yahoo.com)  
Phone No: 9438149715

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## INTRODUCTORY NOTE

### BACKGROUND

Pursuant to the Mines and Minerals (Development and Regulation) ACT, 1957 and The Mineral Auction Rules, 2015, Govt of Odisha issued the notice inviting tender dated 07.07 2021 for commencement of the auction process to grant the mining Lease for **Dhotta Pahar iron ore Block** located in Koira Tahasil of Sundargarh district of Odisha. The e-auction process was conducted in accordance with the tender document and the mineral auction rule, 2015 for said mineral block and **M/s Kashvi Power & Steel pvt Ltd** was declared as the **preferred Bidder under Rule 9(9) (iii) or Rule 10(A) of Auction Rules having quoted a final price offer of 126.55%**

Further, **M/s Kashvi Power & Steel pvt Ltd** has made payment of **Rs 6,99,89,587** (Rupees Six crore Ninety Nine lakhs Eighty Nine thousand Five hundred Eighty seven only) through treasury challan on dated 21.10 2021 against the first installment being twenty percent of the upfront money. Accordingly, the Government of Odisha has issued letter of Intent (copy enclosed as **Annexure-III**) under Rule 10(2) of Mineral Auction Rules 2015 to **M/s Kashvi Power & Steel pvt Ltd** for grant of Mining Lease for **Dhotta Pahar Block for iron ore over an area of 60.508Ha** near Dengula village, Koira Tahasil of Sundargarh district of Odisha for a period of 50 years.

This letter of intent is valid subject to the provision of the Act and the Rules made there under as amended from time to time and **M/s Kashvi Power & Steel pvt Ltd** shall be designated as the **Successful Bidder** and the **subsequently granted the mining lease** only upon satisfactory completion of all the requirements under the Act and Rules made there under.

**(A) M/s Kashvi Power & Steel pvt Ltd shall be considered to be successful bidder upon**

- (i) Continuing to be in compliance with all the terms and conditions of eligibility.
- (ii) Payment of second installment being twenty percent of the upfront payment.
- (iii) Furnishing an irrevocable and unconditional performance security to the state govt from an acceptable Bank and Payable at Bhubaneswar, Odisha pursuant to the Auction Rule.
- (iv) Satisfying the conditions specified in clause (b) of sub section (2) of section 5 of the Act with respect to Mining Plan.

**(B) Signing of Mine Development and Production Agreement (MDPA)**

**M/s Kashvi Power & Steel pvt Ltd** shall sign the **Mine Development and Production Agreement (MDPA)** with the Government of Odisha upon obtaining all consents, approvals, permits, NOC and the like as may be required under applicable laws for commencement of Mining operation

**(C) Grant of Mining Lease**

Subsequent to signing of the **MDPA**, **M/s Kashvi Power & Steel pvt Ltd** shall make payment of the third installment being the sixty percent of the upfront value and thereafter Government of Odisha shall grant the said Mining Lease

Hence, it is worth mentioning here that the successful bidder i.e **M/s Kashvi Power & Steel pvt Ltd** is required to obtain following statutory clearances for signing of **MDPA and grant of Mining Lease**

Name of the statutory clearances	Authority from which clearances to be obtained	Status of statutory clearances
Approval of Mining Plan	Indian Bureau of Mines, GOI	It is under process for approval
Forest Clearance	Ministry of Environment and Forest, GOI	On the application for forest clearance, has been submitted on 27.12.2021
Environment Clearance	Ministry of Environment, Forest & Climate Change GOI	EC Application and TOR will be submitted shortly.
Surface Right	Collector Sundargarh	After execution of the lease surface right will be granted
Consent to Establish	State Pollution Control Board Odisha	After getting approved mining plan, EC and FC, order from SPCB for Consent to Established will be obtained
Consent to Operate	State Pollution Control Board, Odisha	After getting approved mining plan, EC, FC and CIL order from SPCB for Consent to Operate will be obtained

As part of the statutory clearance, this **Mining Plan and Progressive Mine Closure Plan** is prepared under **Rule 16(1) of MCR, 2016 and Rule 23 of MCDR, 2017** respectively for a period of 5 years from the date of opening of the mine for grant of Mining Lease in favor of **M/s Kashvi Power & Steel pvt Ltd**

#### UTILIZATION OF IRON ORE

**M/s Kashvi Power & Steel pvt Ltd** is a part of Kashvi group and one of the growing company in Odisha. **Kashvi Power & Steel Private Limited** operates as a manufacturer of sponge iron, billet and ingots and exporter of minerals. Orissa based Kashvi group was founded by Mr. Debabrata Behera, a first generation entrepreneur. Mr. Behera has more than two and half decades of experience in the business of iron ore trading and exporting, manufacturing of sponge iron, billet and ingots. Iron ore produced from the Dholta Pahar block will mostly be utilized in their sponge iron plant. However, as per the market demand, part of the iron ore may be sold to the consumers

## Annexure - I

## MINING PLAN/ REVIEW OF MINING PLAN AT GLANCE



1	Name of the lessee	M/s Kashv Power & Steel Ltd.
2	IBM Registration no.	IBM/78*5/2011
3	Address of lessee	Pot No 1234/P Govind Prasad Bomikhal Bhubaneswar
4	Name of Mine	Dholapahar Iron Ore Block
5	Mine code	Not Obtained
6	Lease area in hec.	60.508
7	Forest area	60.508 Ha.
8	Name of Mineral	Iron Ore
9	Lease period from - to	LOI issued vide no 8725/IV(B) SM- 52/2021/SM Bhubaneswar dated 28.10.2021 50 years W E F date of execution of lease deed
10	Plan proposal period.	5 year w e f date of execution of lease deed
11	Mineral Reserve(111,121&122) in tonnes	111-0 121-0 22-23921613 Total-23921613
12	Mineral Resource(211,221,222,331,332,333&334) in tonnes	211-0 221-0 222-0 331-0 332-23921613 333-0 334-0 Total -23921613
13	Total (reserve resource) in tonne	23921613
14	Reserve estimation as on	Date-Date of execution of lease deed
15	Explored area in ha	G1 - 0 G2- 60.508 G3-0 Explored and found Non-mineralized area - 20.508 Un - explored area -Nil Total - 60.508
16	Exploration proposal Year wise No. of Bore Holes	1st year - 2 nos 2nd year - 2 nos 3rd year - nil 4th year - nil 5th year - nil
17	Production proposal Rom in tonnes	1st year - 1999999 2nd year - 1999999 3rd year - 2000000 4th year - 1999999

		5th year - 2000000
18	OB/Waste handling proposal CUM	1st year - 73250 2nd year - 282550 3rd year - 338600 4th year - 234550 5th year - 470700
19	Present: EC permission in tonnes	Since it is a fresh lease, the lessee will obtain EC before Execution of the lease deed
20	Present: Forest clearance area in ha	Since it is a fresh lease, the lessee will obtain FC before Execution of the lease deed
21	Plantation Proposal in five years in numbers	1st year - 230 2nd year - 230 3rd year - 1126 4th year - 230 5th year - 230 Total Plantation- 2046
22	Plantation Proposal in five years (ha)	1st year - 0.25 2nd year - 0.25 3rd year - 1.52 4th year - 0.25 5th year - 0.25 Total Area- 2.52
23	Back filling proposal in hectares in five years (years wise)	Not Applicable
24	Check Dams numbers in five years	3nos
25	Garland drain in meters five years (years wise)	1st year - 320 2nd year - 105 3rd year - 0.0 4th year - 0.0 5th year - 0.0
25	Settling ponds (Numbers) (years wise)	1st year - 2 2nd year - 1 3rd year - 0 4th year - 0 5th year - 0
27	Total Area put to use in mining and allied activity at end of five years in ha	2.52
28	Bank Guarantee Amount: Rs	Not Applicable
29	Validity of BG up to	Not Applicable

**CHAPTER 1**  
**GENERAL INFORMATION**

**1.1 : Lease Details**

IBM Registration Number:	BM/7815/2011
Lease Code:	Not allotted since Lease deed has not been executed
Mine Code:	Not Allotted
Name of Lessee:	Kashy Power and Steel Pvt. Ltd
Address of Lessee:	Plot No. 234/P, Govinda Prasad, Bomikha, Bhubaneswar
Type of Lessee :	Pvt Limited company
Name of Mining Lease:	Dholta Panna Iron ore Block
State:	Odisha
District:	Sundargarh
Tehsil/ Taluk/ Mandal:	Kota
Village:	Near Deng-la village
Lease Area (Ha):	60.608
Forest Area (Ha):	60.608
Name of Minerals:	Iron
Name of associated minerals:	Nil
Type :	Auction Block
Five Year Block (Financial Year)	1 <sup>st</sup> year (from the date of the execution of the lease deed) to 5 <sup>th</sup> year
Type of working:	Open cast
Nature of Use:	Non-captive
Category of Mine:	Category A



**1.1.1: Initial/subsequent Lease grant details**

Grant	From	To	Lease deed execution date	Lease registration date
LOI issued vide no 8725/IV(B) SM-52/2021/SM Bhubaneswar, dated 28.10.2021	Date of Execution of the Lease deed	50 Years from Date of Execution of the Lease deed	28/10/2021	

**1.1.2: Mining Plan Submission Criteria Details**

Type of document	Mining Plan
Reason/s for modification	Not Applicable
Period for which modification is proposed	Not Applicable
LOI Number:	8725/SM/IV(B)SM-52/2021
Date:	28.10.2021

**अनुमोदित**  
**APPROVED**

*[Signature]*  
11/1/2022  
**क्षेत्रीय उद्यम नियंत्रक**  
**Regional Controller of Mines**  
**भारतीय राज्य खनो**  
**Indian Bureau of Mines**  
**Bhubaneswar**

**1.2: LAND OWNERSHIP DETAILS - Refer Annexure - V**

S.No.	Village	Taluka	Area (Ha)	Khasra No/ Compartment No.	Type of Land
1		Kota	60.608	Forest Khata	Reserve Forest Govt. land

**1.3: EXISTING LEASE -**

Date of Execution	Not Applicable
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**1.3.1: Approval of earlier Mining Plan & Its Subsequent Review In Chronological Order -**

Sl. No.	Letter no.	Date	Period From To	Type Of Approved Document
Not applicable as this lease is yet to be executed.				

### 1.3.2: Partial Surrendered Area during Stages of Operations in Chronological Order -

Sl. No.	Date	Supplementary Surrender order Letter Number	Supplementary Lease Deed Date	Final Retained Area over which Current Mining Plan is Prepared (Ha)
			Not Applicable	

### 1.3.3: Transfer of Lease Area Subsequent to Grant -

Sl. No.	Transfer of lease deed Number	Date of execution of Transfer lease deed	Name of Transferor	Nature of block transferred
				Granted through auction other than through auction for captive use
				Not Applicable

### 1.3.4: Statutory Compliances: The Preferred bidder will obtain all the statutory clearance before execution of lease deed.

Applicable	
Letter No	
Date	
Validity	
ROM Mineral in tonnes	

### 1.3.4.1: Environment Clearance - The Preferred bidder will obtain Environment clearance before execution of lease deed.

Applicable	
Letter No	
Date	
Validity	
ROM Mineral in tonnes	

### 1.3.4.2: SPCB Approvals - The Preferred bidder will obtain SPCB Approvals before execution of lease deed.

Letter No	
Date	
Validity	
ROM Mineral in tonnes	

### 1.3.4.3: Forest Clearance - The Preferred bidder will obtain Forest Clearance before execution of lease deed.

Applicable	
Letter No	
Date	
Validity	
Area (Ha)	

### 1.3.4.4: Land Acquisition Details -

Total Area acquired/purchased so far	Not Applicable
Total Amount Paid (INR)	Not Applicable

### 1.3.5: Mine Location Details -

Toposheet Number:	F45N1 73-G/1 on a scale of 1:50,000
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**1.3.5.1: Location of Boundary Pillars – (add additional Row for subsequent pillars)**

Pillar No.	Pillar Latitude (dd°mm'55.55)	Pillar Longitude (dd°mm'55.55)
1	N21°50'11.13855"	E85°10'43.79375"
2	N21°50'34.0886"	E85°10'43.53749"
3	N21°50'34.57354"	E85°11'14.26745"
4	N21°50'29.91054"	E85°11'14.63437"
5	N21°50'29.9012"	E85°10'58.24074"
6	N21°50'29.66351"	E85°10'57.67967"

**1.3.6: Owner/Nominated Owner Details–**

Name	PAN of Nominated Owner	Address of Nominated Owner	Mobile Number	Email	Please attach Minutes of Board Resolution in case of Nominated Owner
Debabrata Behera	AAZPB2315N	Kashvi Power & Steel (P) Ltd Plot No 1234/P, Gowda Prasad Bomikhal, Bhubaneswar	9337004495	<a href="mailto:groupkashvi@gmail.com">groupkashvi@gmail.com</a>	(Copy of Board resolution and Certificate of Incorporation is enclosed as Annexure-VI & VII respectively).

**1.3.7: Qualified Person Details as per (OAHCEM) MCR, 2016– Copy of Certificate and Experience attached as Annexure-XIV**

Sl No	Prefix	Name	PAN of QP	Address	Mobile no.	Qualification	Experience in years as prescribed under the rule	Email
1	M	Pradeep Mohapatra	AUGPM 5786.1	World Consultancy Services, C/o. Konark Construction and Engineering Ltd. At: Po - Temapapentha Cutack, Odisha 753001	9438149715	M.Sc Geology	18	pmohapatra_07@yahoo.com

## CHAPTER 2 GEOLOGY & EXPLORATION



### 2.1: GEOLOGY

#### 2.1.1: Topography -

**Terrain** Exhibits a rugged terrain represented by steep rising hi ranges (Dhona pahar) with intervening steep gorges and narrow valleys.

#### RELIEF

Highest Level (m) from MSL 842m	Lowest Level (m) from MSL 574m	Average Level (m) from MSL 769m
<b>Drainage Pattern</b> Dendritic	<b>Order of Stream</b> 3 <sup>rd</sup> order	<b>Minimum Distance of Stream from Lease Area (m)</b> Sarkanda Nadi- 2km Kurahi Nadi - 4.5km

#### 2.1.2: Details of Physiographic features and Infrastructures available in and around the lease/ block area -

Description	Location if existing Within the lease/block area	Distance from boundary periphery in kms, if existing outside the lease/block area. (within 5.00Kms)	Remark if any
River/Nallah/Reservoir	Not applicable	2.50	Few ephemeral first order nallas originate at mid contours of the main hill in the intervening valleys that follows the natural gradient feeding to the regional Karo and Sarkanda Nadi draining the area. The Sarkanda Nadi is named as Kurahi Nadi in the downstream.
Public roads (Tar road, cart road)	Not applicable	Koira- Road -4kms	The area can be approached from Koira by fair-weather road. Koira-Tensa road is 4km away from the block. The nearest Rly station Barsuan is at a distance of 22 km from Dengula.
Railway track	Not applicable	Not available within 5km	Barsuan Railway station is at a distance of 22km from the block.
Human settlements	Not applicable	Not available within 5km	Dengula Village, 6km
Archaeological monuments/ places of worship/ public utilities etc.	Not applicable	Not available within 5km	---
Wild life sanctuaries/ national parks	Not applicable	Not available within 5km	---
Coastal Regulation Zone (CRZ)	Not applicable	Not available within 5km	---
Power transmission lines/telephone lines	Not applicable	Not available within 5km	---
Firing range	Not applicable	Not available within 5km	---
Ordinance factory	Not applicable	Not available within 5km	---
grazing land/ burial ground or cremation ground	Not applicable	Not available within 5km	---
Any other specify	---	---	---

Particulars	Distance from lease boundary in kms
Nearby village	Dengula
Nearest Railway station	Barsuan-22 Km.
Nearest Port	Jharsuguda-170km
Distance of SJVNI from lease area	NH 520 -13 Km

### 2.1.3: Regional Geology -

#### Regional Geology-

Dholta Pahar Block under discussion forms a part of the Singhbhum-Keonjhar-Bonaib group of iron ore is located in the western flank of the eastern limb of the horse shoe shaped Bonaisynclinalorium which was recognized by Jones H. C. in 1934. The pre Cambrian schistose rock in which the whole clan of the deposits are nested and which includes schist, tuffs, phyllite, basic rock. BHQ/BHJ have been classified as Iron Ore Series (IOS). The iron bearing formation of the Bonaib range are correlated with similar iron bearing formation e.g. Bailadila iron ore series in Madhya Pradesh and Bellary Hospet group of iron ore deposits of Karnataka. The regional stratigraphic successions of the pre Cambrian rocks have undergone revision by various geologists like J. A. Dunn, S. N. Sarkar, A. K. Saha etc. The latest revised one is by S. N. Sarkar and A. K. Saha (1977), along with hitherto and widely accepted sequence given by Dunn (1941) is as below

#### Regional Stratigraphic Succession

South of copper belt thrust zone in Singhbhum, North Mayurbhanj and North Keonjhar

----- End of Singhbhumorogenic cycle (c. 850 M.Y.) -----

Newer Dolerite

Mayurbhanj Granite

Gabbro-Anorthosite

Ultramafic intrusion

Unconformity

Dhanjori Group/Jagannathpur Lavas, Dhanjori Similpal Lavas

Unconformity

Chalibasa formation

Unconformity

Singhbhum Granite

Iron ore orogeny

Iron ore group

Unconformity

Older metamorphic gneiss

O. M. group

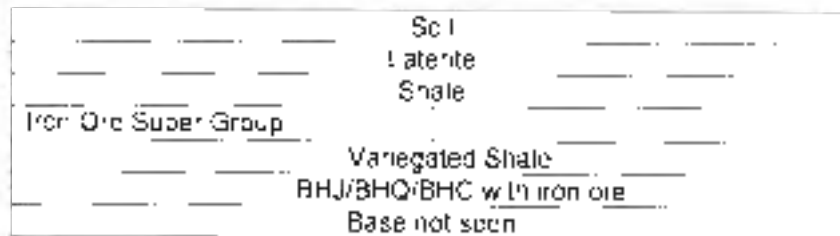
Older metamorphic group



## 2.1.4: Local Geology & Structure -

### 2.1.4.1 Local Geology

The area under exploration forms a part of the Iron Ore Super Group featured in the SW limb, close to inner edge of the closure of Horse Shoe Synclinorium represented by quartzite, variegated shale and varieties of iron ores like HLO, SLO, blue dust limonitic ore overlain by laterite, float ores concealed under soil and alluvial cover at places. Basing on mutual relationship of the involved lithounits, geo-spatial dispositions and structural setup the local stratigraphy of the area can be suggested as follows.



### 2.1.4.2: Structure -

In general the Iron Ore Super Group represented by the Bonai-Keonjhar Belt in Koira basin is disposed in the form of an 'Omega' and referred to as —Horse shoe synclinorium (Jones, 1934). This belt is 60 km long and 25 km wide extending from south of Malangtoli in Keonjhar district up to Chakradharpur in West Singhbhum district (Jharkhand). The structural fabrics in the above feebly metamorphosed volcano-sedimentary litho-sequence indicate at least two phases of deformation and folding. The earlier phase is the most prominent and resulted in formation of two synclines intervened by an anticline trending NNE-SSW with a low north-north easterly plunge. The western limb is slightly overturned to the east and dip westerly ( $65^{\circ}$ - $75^{\circ}$ ) whereas the eastern limb is a normal one with moderate to low ( $30^{\circ}$ - $45^{\circ}$ ) westerly dip. This phase of folding is affected by a later NW-SE to WNW-ESE trending fold axis resulting in broad warps and formation of structural domes and basins in the area. The western syncline known as Koira syncline, due to steep dip and overturned nature of its limb forms a deeper basin with thick sequence of younger shales in the core region. On the other hand, the eastern syncline known as Bamebar syncline is a shallower basin and exposes younger litho members within the core region as outliers. The Upper shale unit within the Koira syncline is more or less continuous. The following structural elements have been recorded during course of exploration.

#### Bedding:

Bedding is represented by compositional banding in BHQ/BHJ/BHC and shale. The beds strike in NNE-NE to SSW-SW dipping at  $20^{\circ}$  -  $55^{\circ}$  to NW. Variation in strike noticed in iron ore band of BHQ & BHJ is due to tight folding. The underlying morpho structures depict the structural configuration of the overlying BIF which has been attested from BHs data.

#### Fold:

BHQ/BHJ exhibit symmetrical and asymmetrical mesoscopic tight folding which are sympathetic to the regional fold pattern. Penecontemporaneous folds observed in BHJ exhibit plunge at an angle of  $45^{\circ}$  in S-BW direction. The morpho structure is also validated from the cross sections.

#### Joints:

The rock types of the area are traversed (i) Strike joint & (ii) Dip joint.

J1=N $20^{\circ}$ E - S $20^{\circ}$ W/ $70^{\circ}$ SE (Strike joint)

J2=N $70^{\circ}$ W - S $70^{\circ}$ E/ $80^{\circ}$ NE (Dip joint)

### 2.1.4.3: Lithology, Petrographic & Mineralogical Description for Major, Associated & Indicator Minerals

The main rock types such as Laterite, Hematite, shale, BHJ found in the Dholta Pahar Iron ore Block of M/s Kashvi Power and Steel Pvt Ltd are of iron ore series of Singhbhum. The disposition of various litho units are explained below:

### **Banded Haematite Jasper / Banded Haematite Quartzite /Banded Haematite Chert (BIF):**

The BHJ/BHQ/BHC represents siliceous members of the BIF. But only exposures of BHJ are delineated on the surface in the southern part while BHQ and BHC mark the sub surface limit of the iron ore bands and are intersected in the boreholes located in the eastern part. Megascopically, the BHJ/BHQ comprises alternate bands (thickness less than 0.3cm to 2.5cm thickness) of haematite and dark brown to red jasper/quartzite/chert. Sedimentary features like wavy laminations, current ripples, brecciation, slumping and pods are noticed in BIF at different localities. Though Banded Haematite Chert are not found on the surface but occurs as small bands in few boreholes like BH- 11,12 &13. The general strike of BHJ/BHQ varies from NE-SW to NW-SE with dip of  $25^{\circ}$  to  $30^{\circ}$  due NW and NE. Such swinging of strike may be attributed to the regional folding which are also deciphered in the sub-surface signifying intensities of deformation. The BHQ and BHJ encountered in the bottom of BHs follows the regional fold patterns as deciphered from the bore hole data. BHQ/BHJ/BHC usually provides the basement of iron ore deposits. As all the three units are considered as non ore bearing siliceous BIF, these have been depicted as BHQ in section and plans.

### **Shale:**

Shale of different hues though not exposed but intersected in boreholes varying in thickness from less than half meter to maximum of 58.4m. Shale has been intersected at subsurface in the boreholes present in the NE and NW part of the block, which mainly represents the valley region of the area. It is represented by a finely laminated rock with different hues varying from purple to white and yellow. Banded Iron Formation is overlain and underlain by shale in few boreholes. Ferruginous shale with or without lateritisation has been encountered. Lateritisation of shale at places has given rise to patchy occurrence of limonite at depth. The influence areas of the boreholes where shale has been encountered in the subsurface have been considered as non mineralized zones.

### **Iron ore:**

Detailed surface geological mapping and correlation of the litho-units encountered in the boreholes implies the iron ore in the area occur as stratiform deposits of regular habit being affected by multiphase deformations and cataclasis. The ore bands represented by Hard Laminated Ore (HLO), Soft Laminated Ore (SLO), Blue Dust, Lateritic Ore of varied thickness and the associated litho types like variegated shale have also been pene-contemporaneously distorted with synformal anticlines and antiformal synclines along with sympathetically sheared and folded underlying BHQ units. All the lithotypes have suffered from weathering and erosion rendering accumulation of high grade float ore in the residuum.

Soft laminated haematite constitute the major iron ore horizons in the area which are mostly masked by float ore. HLO though not exposed but has been encountered in the borehole cuttings. Few isolated exposures of SLO have been delineated in the central ridge that extends for a length of 414m and width of 130m. Nevertheless, thick bands of SLO were intersected in most of the boreholes at different depths as revealed from the lithologs. HLO encountered only in 2 BHs (DIOP-1 & 5) has a gradational contact with SLO. Being dense and compact, it contains more Fe. Blue Dust is powdery form of ore encountered at depth in few boreholes. It contains lensoidal lumps of iron ore. Its colour varies from dark grey to bluish grey. Blue Dust is terminated against BHQ or shale in the boreholes and the ore is of very high grade. Lateritic ore has been encountered at subsurface in some boreholes at shallow levels. The general strike of iron ore in this occurrence is NNE-SSW with  $20^{\circ}$  -  $40^{\circ}$  dip towards west with local swings.

Iron ore float zone overlying in situ laminated ore occur widely in the scarp & slopes in the SE & SW parts of Dholtapanar and comprises laterite, SLO and BHJ. The thickness of float varies from 0.5 to 2m. Size of the floats varies from boulder to gravel which have been partially stabilized by a ferruginous lateritic soil.

#### **Laterite:**

Major parts of the area particularly the higher contours are capped by laterite. Due to sub-tropical weathering and alteration of the involved litho units, both ferruginous and aluminous laterites have been developed either on the surface or at shallow depth levels. The laterite has been developed mostly over the shale unit or low grade iron ores of the area and depending upon the composition of the shale, those rich in alumina has given rise to aluminous laterite and those rich in iron graded to ferruginous laterite. Even at certain depths, enrichment of iron renders the laterite to be considered as lateritic iron ore. Ferruginous laterite with few patches of aluminous laterite occupies most of the high lands capping the BIF. A thick lateritic profile of 13.2m has been encountered in the bore hole (BH-4).

#### **Soil/ Alluvium:**

The low lying areas, nala banks etc are filled up with alluvial soil derived from the in situ erosion of the litho units.

#### **2.1.4.4: Mode of Occurrence & Controls of Mineralization -**

(i) **Lithological control:** Iron ore has a strong lithological control as deposits are hosted by BIF at higher level and formed by supergene enrichment process.

(ii) **Structural control:** Structural features play a vital role for enrichment of iron ore. Thickening of the ore band is more pronounced in the central region which pinches into both sides & follows the bottom profile of BHJ & BHQ as the case may be. The iron ore bodies are conformable to the regional fold & resultant strike.

#### **2.1.4.5: Extent of Weathering/ Alteration-**

The weathering has led to the formation of Laterite which is highly erratic in nature. Hence irregular/discontinuous pockets of Laterite is a common feature in the iron ore deposits.

#### **2.1.4.6: Nature/Form of Mineral -**

Massive ore, friable ore, float ore

#### **2.1.4.7: Extent of Mineralization -**

##### **Drilling:**

Iron ore in the block occur as bedded stratiform deposit of regular habit with intercalations of shale and BIF, representing BHJ/BHQ/BHC. Since it is a stratiform type of regular habit, boreholes plans have been done at 200 m X 100 m grid spacing to comply the provisions of General Exploration of MEMC Rule-2015, accommodating the DIOP series holes drilled in 2006-08. The borehole locations are shown in the geological map of the Block. Dry core drilling was adopted by TC bits and as per drillers site report, virtually there was negligible loss in core recovery during core drilling. The core recovery has been recorded for all ore types are found to be 100%. A total of 18 vertical boreholes were drilled by rig KME-300 series & LTE-575 in the block, out of which 5 BHs were drilled during F.S. 2006-08 and 14 BHs were drilled during 2017-18 for cumulative drilling meterage of 982.5 m. These boreholes are drilled at strike intervals of 200m and 100m spacing along dip direction. Depth of boreholes varies from 19.5m (BH-12) to 82.00m (BH-9). The Borehole BH-10, BH-11, BH-13 & BH-14 were shifted to 100m north of N200/W400, 74m north of N400/W400, 22m south of N500 and 50m north of S100 grid location respectively due to steep scarp sections and high gradient lines. These BH points were located in the escarpment, which are quite steep and inhospitable for platform and inaccessible. The borehole BH-5, BH-9, DIOP-4 & DIOP-5 have been shifted 12m south of N100/E400, 14 m south of N300/E200, 14 m south of N100/E200 and 10m north of N100/W200 respectively due to vegetation (tall & thick trees) on the grid points. Due to escarpment and steep slope at grid location S200, the bore hole could not be accomplished. So a pit of 2m x 2m x 2.5m had been excavated to ascertain existence of ore body which revealed existence of in situ SLO below a 2m thick iron ore float zone. The boreholes were closed either in BHJ/BHQ/BHC or after thick shale horizon where there is least possibility of further continuation of iron ore. Based on the findings of the borehole data, out of total area of 0.605 sq km of the block, mineralised area comprises 0.405 sq km and non mineralised area 0.2 sq km.

### Results of drilling:

The overburden comprises of laterite, shale and soil attains maximum thickness of 51.4 m (DIOP-2), though it contains 18.6 m high green powdery ore. Basing on the observations of the lithology of bore holes and assay log of the BH-5, 6, 12 & 13 non mineralised zone area has been demarcated in which mineable ore zone has not been intersected. Out of the total area of 0.605 sq km, the mineralised area is found to be 40.50ha while 20.008 ha is non mineralised.

### Mineralisation details

The maximum thickness of ore bodies intersected at  $\geq 55\%$  Fe cut off is 20.75 m in (BH-3) and minimum thickness is 0.5m in (BH-4) having average iron content of 61.863% Fe. The maximum thickness of low grade ore zone ( $45 < 55\%$  Fe) intersected in the boreholes is 13.6m (DIOP-4) and minimum thickness of 0.7m (DIOP-1) having average iron content of 49.251%. Variegated shale and BHJ are found in the foot wall side which limits the mineralization where as lateritised shale occurs as overburden. The ore types includes soft laminated types towards top and grades in to hard laminated while blue dust is localised in the bottom horizon. The ore bodies are often capped by laterite on surface. Though outcrops of soft laminated ore, and float ore are exposed on the surface but soft laminated ore and blue dust constitutes the bulk thickness of the ore zone as evidenced from drill cores.

Co-relation of the involved litho units encountered in the BHs indicates that the geometry of the horizons follows the substratum morpho-structure i.e. the ferro-arenaceous facies of rocks have undergone deformation of different magnitude giving rise to anticline, synclinalum with development of sub barriers in which the supergene enrichment of iron ore has taken place in shape of type fold patterns. Maximum enrichment has taken place in the axial zone particularly in the east-central part of the area and denit of supply of sediments accompanied by the accumulated stress given rise to pinching of the ore bodies on either side following the fold geometry.

#### 2.1.4.6: Deposit Type (as per MEMC Rule) -

Iron ore occurs as Bedded deposit of homogenous nature with regular metasedimentary type without significant structural deformations iron ore

Strike / Trend of the Ore Body: NNE to SSW

Amount of dip of Orebody:  $20^\circ$  to  $55^\circ$

Dip Direction of the Ore Body: NW

Plunge of Mineral Body (degree) (if any): BHJ exhibit plunge at an angle of  $45^\circ$

Direction of plunge:  $S18^\circ W$

### 2.2: Exploration -

#### 2.2.1: Summary of The Previous Exploration (for fresh grant)

##### Name of the Agency -

Directorate of Geology, Govt of Odisha

##### 2.2.1.1: Geological Mapping -

The area under exploration has been explored by detailed geological mapping, drilling and sampling in line with the MEMC, Rules 2015. Detailed geological mapping on 1:2000 scale was carried out over an area of 0.605 sq km and the litho units exposed in the mapped area comprise soft laminated ore, BHJ/BHQ, float, laterite and soil. In order to facilitate geological mapping and fixation of boreholes, a base line was laid in  $N45^\circ W - S45^\circ E$  direction across the general strike with the help of theodolite taking O/O point on the Borehole No. DIOP-1 of F.S. 2006-07 & 2007-08 and off set grid lines were laid at 50 m interval at right angles to the baseline to facilitate large scale geological mapping. Contouring of the entire area was carried out at 2m interval with the help of dumpy level & prismatic compass.

Sl. No.	Year	Scale	Area Covered (Hect/km <sup>2</sup> )
1	2006-07	1:2500	0.605sq. km

### 2.2.1.2: Airborne Geophysical Survey – Not Carried out

Sl. No.	Type of Survey	Spacing (m)	Total line (km)	Area Covered (Ha/km <sup>2</sup> )	Latitude		Longitude	
					To	From	To	From
				NIL				

### 2.2.1.4: Geochemical Survey –Not Carried out

Sl. No.	Type of Sample	No of Samples	Analysis report	Area Covered (Ha/km <sup>2</sup> )
		NIL		

### 2.2.1.5: Pitting – No. of pits:

Sl. No.	Year	Pit ID	Length of Pit (m)	Width of Pit (m)	Depth of Pit (m)	Depth (front)	Depth (back)	Running meters	Litro units exposed	Name of the radicle	As Grade (m %)	Lat (dd °)	Lon (gg °)
1	2006-07	Pit 1	2		2.5	14.12	17.62	2m	SLD			21°25'04"	24°58'30"

### 2.2.1.6: TRENCHING – Not Done

No. of trenches: Not Applicable

### 2.2.1.6.1: SPACING – Not Applicable

Min (m)	Max (m)	Avg (m)

Sl. No.	Year	Trench ID	Length of Trench (m)	Width of Trench (m)	Depth of Trench (m)	Depth (m)	Running meters	Litro units exposed	Name of the radicle	Avg grade	Latitude (dd °)	Longitude (gg °)

### 2.2.1.7 Exploratory Drilling (Core/non-Core) –

Sl. No.	Year	Exploration agency	Core holes		Non-core (RC/DTH)		Grand total	
			Number of boreholes drilled	Total meter	Number of boreholes drilled	Total meter	Total boreholes	Attach log sheet of each borehole in excel format.
1	2006-06	Directorate of Geology Govt of Odisha	5	282.25			5	Log sheet attached as Annexure -IV and soft copy of Log Sheet in Excel format submitted separately
2	2017-18		14	302.25			14	
Total			19	582.50			19	

### 2.2.1.8: Exploratory Mining –

Sl. No.	Pit/Adit ID	Length in Mtr	Width in Mtr	Depth in mtrs	Volume (m <sup>3</sup> )
	Pit	2	2	2.5	10

### 2.2.1.9: SAMPLING –

Sl No	Type of sample	No of samples collected	Number of samples analyzed	Location		Remark if any
				Latitude	Longitude	
1	Drill core	32	32	312280.0573	2416172.583	BH 1
2	Drill core	19	19	312132.3824	2416308.871	BH 2
3	Drill core	28	28	312072.3095	2415591.46	BH 3
4	Drill core	12	12	312340.7176	2416388.137	BH 4
5	Drill core	0	0	312540.8705	2416460.4	BH 5
6	Drill core	26	26	311998.5048	2416158.287	BH 6
7	Drill core	14	14	312058.4703	2416373.535	BH 7
8	Drill core	3	3	311824.3757	2416225.457	BH 8
9	Drill core	15	15	312260.4704	2416447.537	BH 9
10	Drill core	24	24	312005.7716	2416017.552	BH 10
11	Drill core	6	6	311840.7342	2416133.277	BH 11
12	Drill core	0	0	311850.3100	2416292.461	BH 12
13	Drill core	0	0	311969.8708	2416424.726	BH 13
14	Drill core	36	36	312350.1278	2416072.313	BH 14
15	Drill core	57	57	312356.8265	2416103.629	CIDP 1
16	Drill core	15	15	312208.5147	2416237.054	CIDP 2
17	Drill core	28	28	312222.5765	2416066.401	CIDP 3

18	Drill core	26	26	312425 1934	2416311 648	DIDP 4
19	Drill core	24	24	312139 5354	2416030 318	DIDP 5
20	Chips	-	1	312504 5301	2416070 169	DIDP 1

#### 2.2.1.10: Chemical Analysis –

Sample ID	Minerals	Radical with grade in %								Name of Agency	Type of Agency	Attachment
		LO %	SiO <sub>2</sub> %	Al <sub>2</sub> O <sub>3</sub> %	FeO %	MnO %	CaO %	P <sub>2</sub> O <sub>5</sub> %	S %			
B-1 (1-32)	sp	1.76-11.55	0.77-30.72	0.37-24	0.41-16	Nil	45.92-36.25	0.012-0.020	0.073-0.01	Director of Mines	NABL accredited	Chemical analysis certificate is attached as Annexure IV
B-7 (1-12)	sp	5.11-14	0.6-6.35	1.46-34.43	0.32-2.2	Nil	47.04-62.05	0.005-0.008	0.007-0.005		NABL accredited	
B-2 (1-25)	sp	0.35-5.5	0.8-5.46	0.75-4.34	Nil	Nil	46.43-65.52	0.001-0.008	0.004-0.010		NABL accredited	
B-4 (1-12)	sp	5.2-20.37	0.33-11.7	8.73-18.4	1.4-2.5	Nil	45.57-57.34	0.002-0.008	0.004-0.006		NABL accredited	
B-5 (1-23)	sp	1.35-13.21	1.1-4.75	0.13-11.7	0.10-1.42	Nil	45.44-66.34	0.004-0.01	0.003-0.01		NABL accredited	
B-7 (1-14)	sp	5.11-14	0.6-6.35	1.46-34.43	0.32-2.2	Nil	47.04-62.05	0.005-0.008	0.007-0.005	Director of Mines	NABL accredited	
B-8 (1-31)	sp	7.10-12.57	0.48-27.74	12.42-15.35	0.55-0.96	Nil	45.92	0.006-0.005	0.003-0.004		NABL accredited	
B-9 (1-12)	sp	4.42-9.38	1.32-10.56	5.3-15.57	0.15-0.96	Nil	45.82-55.88	0.002-0.008	0.002-0.008		NABL accredited	
B-10 (1-26)	sp	2.43-9.18	0.05-24.54	0.55-15.11	0.10-0.72	Nil	45.56-61.11	0.002-0.005	0.002-0.008		NABL accredited	
B-11 (1-6)	sp	5.40-11.5	11.1-15.6	8.65-14.77	0.56-0.8	Nil	45.57-50.05	0.001-0.005	0.005-0.004		NABL accredited	
B-12 (1-10)	sp	...	...	...	...	...	...	...	...	Director of Mines	NABL accredited	
B-13 (1-30)	sp	4.7-11.7	0.54-6.54	0.43-11.95	0.2-0.36	Nil	44.56-62	0.005-0.005	0.002-0.008		NABL accredited	
DIDP 1 (1-10)	sp	1.82-15.4	0.15-22.1	0.17-20.65	...	Nil	45.92-57.1	0.004-0.007	0.004-0.01		NABL accredited	
DIDP 2 (1-15)	sp	1.01-18.03	0.45-11.03	0.01-22.05	...	0.15	47.6-67.78	0.002-0.014	0.005-0.013		NABL accredited	
DIDP 3 (1-20)	sp	1.84-8.09	0.48-12.01	0.1-11.35	0.12-0.2	...	49.14-55.58	0.004-0.018	0.008-0.1		NABL accredited	
DIDP 4 (1-26)	sp	2.11-11.37	0.1-15.1	0.1-22.7	...	0.10-0.61	49.78-54.54	0.012-0.12	0.01-0.06	Director of Mines	NABL accredited	
DIDP 5 (1-24)	sp	2.13-13.44	0.25-31.45	0.17-32	...	0.1-0.52	47.45-54.48	0.002-0.15	0.013-0.02		NABL accredited	
BIT-1	sp	...	...	...	...	...	...	...	...		NABL accredited	

**Note –** As per Geological Report provided by State Govt Total 366 samples are analysed by Wet-cum- Instrument method in the Departmental Government Laboratory of the Directorate of Mines. Out of which 23 check samples of drillcore of various ore types (High grade ore zones as well as low grade ore zones; of different boreholes were analysed in the NABL accredited Laboratories of M/s Earth & Environment Laboratory, Bhubaneswar

#### 2.2.1.11: Petrology & Mineralogical Studies – Not carried out

Sl. No.	Type of Sample	Number of Sample Drawn	Number of Sample Analyzed	Petrographic Study Report
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#### 2.2.1.12: Beneficiation Studies – Not carried out

Sl. No.	Type of Beneficiation	Number of Samples	Attach
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#### 2.2.1.13: Bulk Density Study as per M (EMC) Rules, 2016 and SOP of CGPB –

##### Method adopted for calculating bulk density of ore and waste

5 core samples of various ore types were subjected to bulk density determination in the Laboratories of M/s Superintendence Company of India (Private) Ltd. an ISO 9001: 2000 certified laboratories by following the procedure for bulk density determination of by Bureau of Indian Standards – ISI 5842 (1986) Viz: The weight of the empty container was determined. The length, width and height of the container were measured and the volume was calculated. The sample was discharged carefully within the container in such a manner as to minimize the breakage. In filling the container, due care was taken to avoid obvious segregation of lumps and fines. The container was shaken for light packing of the materials with due care. Again the filled in container was reweighed and the bulk density was calculated according to the following formula—

$$\text{Bulk density} = (M1 - M0) / V$$

M1= Mass of the container and the sample

M0= Mass of the empty container

V= Volume of the container

The bulk density test of the natural air dried material was carried out twice to check the accuracy level.

Sl. No.	Nature of Ore/OB	Mineral	Number of samples	Bulk Density Established (t/m <sup>3</sup> )
1	Iron ore	Blue dust	1	3.32
		H.C	1	3.02
		SLO (~55% Fe)	1	2.95
		SLO (45-55% Fe)	1	2.56
		Lateral ore	1	2.45
3	Waste			2.0

Copy of Bulk density Report is attached as Annexure-IV. However a fresh bulk density study will be carried out by the preferred bidder after the resumption of Mining operation.

#### 2.2.1.14: Area Covered under Exploration -

Level of exploration	Area in Ha		Total area in Ha.
	Forest	Non-forest	
G-1	--	--	--
G-2	60.508	00	60.508
G-3	--	--	--
G-4	--	--	--
Area proved as Non-mineralized	20.008	0	20.008
Area to be explored*	60.508	--	60.508
Total	60.508	00	60.508

\* Area will be explored under G1 level during plan period.

#### 2.2.2: Summary of the Previous Exploration (Before Last Plan Period - Not Applicable since it is a fresh lease

Name of Agency:

##### 2.2.2.1: Geological Mapping - Not Applicable

Sl. No.	Year	Scale	Area Covered (ha)
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##### 2.2.2.2: Airborne Geophysical Survey -Not Applicable

Sl. No.	Type of Survey	Spacing (m)	Total line (km)	Area Covered (ha)	Latitude	Longitude
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##### 2.2.2.3: Ground Geophysical Survey - Not Applicable

Sl. No.	Type of Survey	Spacing (m)	Total line (km)	Area Covered (ha)	Latitude	Longitude
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##### 2.2.2.4: Geochemical Survey - Not Applicable

Sl. No.	Type of Sample	No of Samples
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##### 2.2.2.5: Pitting -Not Applicable

Sl. No.	Pit ID	Length of Pit (m)	Width of Pit (m)	Depth of Pit (m)	Litho Unit Exposed	Litho Unit From (m)	Litho Unit To (m)	Average Grade	Running Meters (m)	Latitude	Longitude
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**2.2.2.6: TRENCHING – Not Applicable**

Number of Trenches	SPACING		Avg (m)
	Min (m)	Max (m)	

Area Covered Under Trenching – Not Applicable

Co-ordinates -

Latitude	Longitude
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Sl. No	Trench ID	Length of Trench (m)	Width of Trench (m)	Depth of Trench (m)	Length of Unit Exposed	Average Grade (%)	Running Vectors (m)	From Longitude	From Latitude	To Longitude	To Latitude
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**2.2.2.7: EXPLORATORY Drilling – Not Applicable****2.2.1.7.1: Core/Non-core Drilling – Not Applicable****2.2.2.8: Exploratory Mining – Not Applicable**

Sl. No.	Pit ID	Volume (m <sup>3</sup> )
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**2.2.2.9: SAMPLING – Not Applicable****2.2.2.10: Chemical Analysis – Not Applicable****2.2.2.11: Petrology & Mineralogical Studies – Not Carried out**

Sl. No.	Type of Sample	Number of Sample Drawn	Number of Sample Analyzed	Petrographic Study Report
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**2.2.2.12: Beneficiation Test – Not Carried out**

Sl. No.	Type of Beneficiation	Number of Samples
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**2.2.2.13: Bulk Density – Not Applicable**

Sl. No.	Rock Types	Number of Samples	Minerals	Bulk Density Established (t/m <sup>3</sup> )
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**2.2.2.14: Area Covered under Exploration – Not Applicable (Since it is a Fresh Grant)**

G1 (Ha)									
G2 (Ha)									
G3 (Ha)									
G4 (Ha)									
G1+G2+G3+G4 (Ha)									

Year	Area converted to G1 from G2, G3 & G4	% increase in G-1 Area	Remaining Area % in G2	Remaining Area % in G3	Remaining Area % in G4	Remaining Area in G2	Remaining Area in G3	Remaining Area in G4

Potentially Mineralized area (Ha) – 40.50

### 2.2.3: ORE BODY GEOMETRY & GRADE -

St. No.	Name of the ore band	General Strike / Trend	Dip Of Mineral Body	Average Strike Length (m)	Average Width (m)	Average Depth (m)	Chemical parameters			
							Name of the radical	Min Grade (%)	Max Grade (%)	Avg. Grade (%)
1	Iron Ore	NE-SW	20°-40°NW	800	750	50	Fe	45.57	67.17	58
							SiO <sub>2</sub>	0.22	42.52	3.48
							Al <sub>2</sub> O <sub>3</sub>	0.01	38.8	0.133
							Mn	0.12	0.82	0.2
							P	0.002	0.27	0.004
							S	0.002	0.15	0.002

### 2.2.4: Reserve / Resource Estimation Method -

#### 2.2.4.1: Methodology -

Resource / Reserve Estimation Method	Section area method
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#### Methodology -

The cross sectional area method of resource estimation was adopted for the ore zone intersected in the boreholes. The correlation of bore holes with respect to each cross section line is shown in Plates (IV A to D). All total 4 section lines were prepared at 200 m interval incorporating the BHs. Lithological correlation of boreholes have been done with some assumptions viz (a) Continuation of surface geology following the profile pattern with the initial intersected ore zone of borehole (b) Matching of high grade ore zones - i.e. +55% Fe content top and bottom surface of two successive boreholes. (c) If the low grade zone - i.e. 45% to <55% Fe iron ore band or shale is continuous, similar method as above has been followed, (d) If ore zone is not intersected in the adjacent borehole (22 m) apart, the 50% influence i.e. 50m dip influence of the ore body or as the case may be have been taken from the borehole, in which the orebody intersected (e) Correlation has been made for intercalated ore zones or shale or BHC band if any, which are intersected in the boreholes. The influence length has been calculated as per disposition of the section lines. The resource has been estimated up to 672 m RL from the surface for section lines AA' to DD'. The geometry of the ore zones of different grades and ore types has been reconstructed by correlation of the available borehole intersection data. In case of small intercalations of shale within a continuous high grade ore zone, it has been included in the ore zone taking Fe value as zero for shale while calculating the weighted average. The area along individual cross sections is calculated graphically considering nature of ore bodies by using Auto-CAD software. The tonnage has been calculated by considering the bulk density determined for various types of ore, maximum being 3.32 for Blue dust, 3.02 for HLO, 2.95 for SLO (+55% Fe), 2.56 for SLO (+45% Fe) and 2.45 for lateritic ore.

# 2.2.4.2: RESOURCE CALCULATION -

Sl. No.	Cross section/Block	Sectional Area/Block area (sq mtr)	Influence (m)	Recovery (%)	Volume (m <sup>3</sup> )	Bulk Density (t/m <sup>3</sup> )	Resource Quantity (t)	Level of Exploration	Type of Land	Name of the mineral	Grade (%)	Method used for resource estimation
1	AA1(SLO)	4132	200	90	813,660	2.55	1664038	G2	FOREST	Fe	55 to 55.8 Fe	Sectional Area Method
	AA2(ROI)	7576	200	90	1622220	2.45	1366198	G2	FOREST	Fe	55.5% Fe	Sectional Area Method
	AA3(ROI)	0	200	-	0	3.02	0	G2	FOREST	Fe	55.5% Fe	Sectional Area Method
	AA4(ROI)	0	200	-	0	3.33	0	G2	FOREST	Fe	55.8% Fe	Sectional Area Method
	AA5(FOREST OR)	0	200	-	0	2.43	0	G2	FOREST	Fe	45 to 55% Fe	Sectional Area Method
2	AA1(LOW OR)	0	200	-	0	2.95	0	G2	FOREST	Fe	45 to 55% Fe	Sectional Area Method
	BB1(SLO)	1667	200	90	1003060	2.58	768154	G2	FOREST	Fe	45 to 55% Fe	Sectional Area Method
	BB2(ROI)	1396	200	90	1331280	2.95	3427246	G2	FOREST	Fe	45.5% Fe	Sectional Area Method
	BB3(ROI)	871	200	90	147780	3.02	440286	G2	FOREST	Fe	55% Fe	Sectional Area Method
	BB4(FOREST OR)	1308	200	80	529280	3.32	1752210	G2	FOREST	Fe	55% Fe	Sectional Area Method
3	BB1(LOW OR)	0	200	-	0	2.45	0	G2	FOREST	Fe	45 to 55% Fe	Sectional Area Method
	BB2(LOW OR)	50	200	40	7200	2.05	31340	G2	FOREST	Fe	45 to 55% Fe	Sectional Area Method
	CC1(SLO)	4663	200	90	842060	2.56	3153554	G2	FOREST	Fe	45 to 55% Fe	Sectional Area Method
	CC2(ROI)	10583	200	90	1977660	2.05	5854397	G2	FOREST	Fe	55% Fe	Sectional Area Method
	CC3(ROI)	47	200	90	8500	3.02	25563	G2	FOREST	Fe	45 to 55% Fe	Sectional Area Method
4	CC1(LOW OR)	1575	200	80	243020	3.32	806893	G2	FOREST	Fe	55% Fe	Sectional Area Method
	CC2(LOW OR)	113	200	90	20520	3.45	50174	G2	FOREST	Fe	55 to 55.8 Fe	Sectional Area Method
	CC3(LOW OR)	912	200	40	72980	2.95	211232	G2	FOREST	Fe	45 to 55.8 Fe	Sectional Area Method
	DD1(SLO)	4868	200	90	876240	2.55	2243174	G2	FOREST	Fe	45 to 55.8 Fe	Sectional Area Method
	DD2(ROI)	1486	200	90	248400	2.25	711760	G2	FOREST	Fe	50% Fe	Sectional Area Method
5	DD1(LOW OR)	3	200	90	0	3.02	0	G2	FOREST	Fe	45.5% Fe	Sectional Area Method
	DD2(SLO)	2921	200	80	467490	1.12	1451613	G2	FOREST	Fe	50% Fe	Sectional Area Method
	DD3(FOREST OR)	152	200	90	27000	2.45	66250	G2	FOREST	Fe	45 to 52% Fe	Sectional Area Method
	DD4(LOW OR)	230	200	40	18400	2.45	54280	G2	FOREST	Fe	45 to 55% Fe	Sectional Area Method
	TOTAL						23921613					

Note:- As per geological report the recovery percentage considered for SLO, HLO and Latent ore is 90%

BD is 80%

Float ore is 40%

#### 2.2.4.3: Mineral Resource Estimate for Conversion to Mineral Reserve -

As per the bore hole results, there will be no blockage of iron ore during life of the mine.

#### 2.2.4.4: Threshold value & Cut off Parameters -

Threshold	45% Fe
Cut-off grade	55% Fe

#### 2.2.4.5: Mining Factors or Assumptions -

S/No	Salient features	Description
1:	Method of Mining	Fully Mechanized (FM)
2:	Proposed production	2.0 M. per Tonnes
3:	Type of ore	Lateralite form ore, Hard Laminated ore, Soft Laminated ore, Blue dust
4:	Proposed Means of raising	Drilling, Blasting, excavation, screening, crushing, loading etc.
5:	Proposed Bench height and width	Height- 10m Width - More than the height
6:	Proposed Stripping ratio (m <sup>3</sup> /m <sup>3</sup> ) (Ord. OR)	1.0:28
7:	Over all slope	28° - 37.5°
8:	Transportation ore to the stacking yard	Through dumper
9:	Nature of overburden/interburden	Generally consists of Brn. shale, and laterites
10:	Drilling	10mm dia dr. hole
11:	Blasting	Deep hole blasting using slurry/Emuls or, explosives & NONEL& Electric Detonator

#### 2.2.4.6: Metallurgical Factors or Assumptions

The metallurgical characterization of any ore is critical in terms of describing or identifying any factors that may have a negative impact on product quality and recovery. Frequently Metallurgical recoveries are based on historical data or test work based on limited sample sites that do not always reflect the natural variability in most ore bodies. If the metallurgical inputs are not properly considered, inaccurate recoveries may be used resulting in either lower or higher plant recoveries, thus potentially impacting on the accuracy of the reporting of Mineral Reserves.

Metallurgical considerations include the metallurgical process or method, equipment plant capacity, efficiencies and personnel requirements. In this regard the nature, scope and representativeness of metallurgical test work will be undertaken and the recovery factors will be used.

#### 2.2.4.7: Cost & Revenue Factors

The financial viability of a project is a critical factor - in order for a Mineral Reserve to be declared, the project must be economically feasible, proving the deposit is mineable. The commodity prices have been declared and are relevant to the product quality and volume to be sold/ usable and related to the market.

Iron ore produced from the block will be used in the own plant of preferred bidder. However, as per the market demand, considering the feasibility of the project the preferred bidder will sell material to different buyers.

During use a detail market condition will be taken into consideration. Detail capital and operating costs, revenue inputs, royalties, and cut-off grades will be taken into consideration. The method used to estimate the commodity price profiles used for cut-off grade calculation, economic analysis and project valuation including applicable taxes, inflation indices, and exchange rates will be taken into consideration. The product price assumptions are reasonable based on the average sale price of iron ore. A detail cost on transportation, treatment, penalties, marketing, and other costs will be taken into consideration during the evaluation of project. A detailed cash flow analysis includes a summary of taxes, royalties, and other government levies. However, all the data/ figures of cash-flow statement are tentative. It may vary depend upon the market condition.

#### 2.2.4.8: Market Assessment

There will not be any marketing issue of iron ore. Since the preferred bidder has its own plant. However, the consideration of the supply, demand, and stock situation for iron ore and its consumption trends and factors likely to affect supply and demand will be studied during the operation

#### 2.2.4.9: Other Modifying Factors –

##### Legal factor

There is no legal issues exist that could negatively affect the project. The preferred bidder will obtain all the statutory clearances before operating the mines.

##### Environmental factor

The preferred bidder will take necessary Environment clearances from SEIAA, Odisha. During the process of obtaining Environment Clearance, Environment Impact Assessment study will be conducted and accordingly Environment Management Plan will be prepared

##### Social Factor

Local environmental laws and processes will be taken into account. Information that materially increases or decreases the risk that the necessary legal rights will be obtained and will be publicly disclosed. It is recognized that the legal environment may change over time and that such changes may have an impact on the Mineral Reserve estimate. If obstacles arise or are eliminated, the Mineral Reserve estimates must be adjusted accordingly

##### Government Factor

All the necessary permission will be obtained from the competent authorities to run the mine.

#### 2.2.4.10: Classification

##### Justification of Mineral Resource (332)

E1 (Economic)	F3 (Pre-feasibility study)	G2 (General exploration)	code
Detailed geological study and general explanation has been made. Rough estimates of tonnage and grades are known. General idea about forest/non-forest and land use status is known. Economic Viability categories however cannot in general be defined from the Geological Study because of the lack of data necessary for an Economic Viability evaluation. The resource quantities estimated may indicate that the deposit is of intrinsic economic interest, i.e. in the range of economic to potentially economic (E-3).	The area under investigation is well within the existing mining belt. The geographical conditions are favourable. Infrastructures like public utilities, roads & railways and manpower exists in the area. Geological study under G-2 stage has been carried out and can be sufficient for deciding whether a Pre-feasibility Study and Detailed Exploration are warranted. Hence the Feasibility axis can be F-3.	The present work is under General Exploration which involves initial delineation of the pre-deposit. Large scale mapping (1:2000 scale) and contour surveying are carried out at 2 m interval. Core sampling at 1 m interval have been done. Boreholes are widely spaced (200mX100m). Tonnage, grade and mineral content estimated with reasonable level of confidence. Hence the present exploration in the geological axis may be put under G-2 category. Based on the inputs of the General Exploration and assessment thereof, the resource thus estimated can be categorized as indicated resource (332 stage) of UNFC as per Minerals (Exploration and Mineral Content) Rules, 2015 which follows UNFC and CRISCO norms.	332

## JUSTIFICATION OF MINEABLE RESERVE (122)

E1 (Economic)	F2 (Pre-feasibility study)	G2 (General exploration)
<p><b>1. Exploration</b>                      This 19 boreholes within the block area have been taken into consideration for estimation of resources under G2 categories. The depth of the bore hole where the mineralization ends has been considered as the depth of indicated ore zone (G2). However, the thickness of the ore body is variable from section to section. The geological map has been prepared on a scale of 1:2000. Based on the borehole data, and surface geology, indicated resource has been estimated.</p> <p><b>2. Mining report/mining plan</b>                      Pre-feasibility study conducted. The details of proposed mining method and bench parameter, deployment of equipment, manpower, and infrastructure have been envisaged in this mining plan.</p> <p><b>3. Specific end - use grades of reserves (above economic cut - off grade).</b>                      Threshold value of iron ore has been kept at 45%Fe where as the cut off grade has been kept at 55%Fe based on the GR provided by the state Govt. The end use product of the mines i.e. 5-8 mm, 10-30mm and fines (screening and crushing material) containing 155% Fe will be utilized in the own plant of lessee.</p> <p><b>4. Specific knowledge of forest/non-forest and other land use data.</b>                      Reserve Forest: - 60508 Ha.</p> <p><b>5. Cost Benefit Analysis</b>                      Cost analysis has been carried out in the pre-feasibility study report. Therefore, the reserve of iron ore has been kept under E1 category.</p>	<p>Geological information has been detailed. Part of the block area has been explored in detail through bore holes and by exposures in the existing quarry. The level of exploration in this part is high and hence falls under G2 category.</p> <p>Pre-feasibility study has been undertaken based on the following factors:</p> <ol style="list-style-type: none"> <li><b>1. Mining:</b>                          The details of proposed mining method and bench parameter, deployment of equipment, manpower, and infrastructure have been envisaged in this mining plan.</li> <li><b>2. Processing:</b>                          Mineral processing will be done by deploying crushing and screen plant to obtain the product i.e. 5-8 mm, 10-30mm and fines.</li> <li><b>3. Costing:</b>                          Cost analysis has been carried out in the Pre-feasibility study report.</li> <li><b>4. Statutory Clearances</b>                          LOI vide number 8725/SM dated 28.10.2021 has been granted by Govt of Odisha. The preferred bidder will obtain necessary statutory clearance to start the mining operation.</li> </ol> <p>Since the resource has been established under G2 category, a pre-feasibility study has been conducted the mineable reserve has been established under F2 category.</p>	<p>The present work is under General Exploration which involves initial delineation of the deposit, large scale mapping (1:4000 scale), and contour surveying are carried out at 2 m interval. Core sampling at 1 m interval have been done. Boreholes are widely spaced (200m X 400m). Low grade and mineral content estimated with reasonable level of confidence. Hence the present exploration in the geological axis may be put under G2 category.</p> <p>Based on the inputs of the General Exploration, and assessment thereof the resource thus estimated can be categorized as indicated resource (G2 stage) of UNFC as per Minerals (Evidence and Mineral Content) Rules 2015 which follows UNFC and CRISCO norms.</p>

Refer Annexure No - XV for Pre- Feasibility report

2.2.4.11: Calculation of blocked resources – Nil

2.2.4.12: Calculation of Reserves –

Sl. No.	Cross section/Block	Sectional Area/Block area (sq.mtr)	Influence (m)	Recovery(%)	Volume (m <sup>3</sup> )	Bulk Density (t/m <sup>3</sup> )	Resource Quantity (t)	UNFC	Type of Land	Name of the roadcut	Grade (%)	Method used for resource estimation
1	AA(SLO)	4.337	200	90	341360	2.56	874000.0	122	FOREST	FC	45 to 55% to	Sectional Area Method
	AA(LO)	2934	200	90	663300	2.95	1366290	122	FOREST	FC	45% to	Sectional Area Method
	AA(HI)	0	200		0	3.02	0	122	FOREST	FC	45% to	Sectional Area Method
	AA(HI)	0	200		0	3.42	0	122	FOREST	FC	45% to	Sectional Area Method
	AA(LO) & FOREST	0	200		0	2.95	0	122	FOREST	FC	45 to 55% to	Sectional Area Method
	AA(FOREST)	0	200		0	2.95	0	122	FOREST	FC		Sectional Area Method
	BB(SLO)	1667	200	90	500000	2.56	1280000	122	FOREST	FC	45 to 55% to	Sectional Area Method
		7306	200	90	1331280	2.56	3422276	122	FOREST	FC	45% to	Sectional Area Method
	BB(LO)	821	200	70	147700	3.02	446290	122	FOREST	FC	45% to	Sectional Area Method
	BB(HI)	3339	200	80	573580	3.53	1757210	122	FOREST	FC	45% to	Sectional Area Method
2	BB(LO)	0	200		0	2.43	0	122	FOREST	FC	45 to 55% to	Sectional Area Method
	BB(FOREST)	90	200	90	7790	2.95	23260	122	FOREST	FC		Sectional Area Method
	CC(SLO)	4357	200	90	800000	2.56	2050000	122	FOREST	FC	45 to 55% to	Sectional Area Method
		10937	200	90	1577350	2.56	5834097	122	FOREST	FC	45% to	Sectional Area Method
	CC(LO)	47	200	60	8760	3.02	26460	122	FOREST	FC	45% to	Sectional Area Method
	CC(HI)	2539	200	80	243050	3.42	833500	122	FOREST	FC	45 to 55% to	Sectional Area Method
	CC(LO) & FOREST	224	200	90	20520	2.46	50724	122	FOREST	FC	45 to 55% to	Sectional Area Method
	CC(FOREST)	512	200	40	72560	2.95	212332	122	FOREST	FC		Sectional Area Method
	CC(SLO)	9858	200	90	870240	2.56	2247104	122	FOREST	FC	45 to 55% to	Sectional Area Method
		1380	200	90	208400	2.95	614780	122	FOREST	FC	45% to	Sectional Area Method
3	DD(LO)	3	200	90	0	3.02	0	122	FOREST	FC	45% to	Sectional Area Method
	DD(BD)	2922	200	80	467360	3.52	1646848	122	FOREST	FC	45% to	Sectional Area Method
	DD(LO) & FOREST	100	200	90	37300	2.43	91100	122	FOREST	FC	45 to 55% to	Sectional Area Method
	DD(FOREST)	250	200	40	19280	2.95	56280	122	FOREST	FC	45% to	Sectional Area Method
	TOTAL						23921813					

Note:- As per geological report the recovery percentage considered for - SLO, HLO and Laterite ore is 90%

- BD is 80%

- Float ore is 40%

## 2.2.4.13

Mineral

Reserves/ Resources estimated as on  
UNIT of estimation

Iron Ore

1.11.2021

Tonnes

Classification	Code	Quantity			Grade	Non-Forest
		Forest	Non-Forest	Total		
<b>A. Mineral Reserve</b>		<b>23921614</b>	<b>Nil</b>	<b>23921614</b>		<b>Nil</b>
1. Proved Mineral Reserve (A)	11 (In situ)	Nil	Nil	Nil	+45%Fe	Nil
	111 (lost)	Nil	Nil	Nil	Nil	Nil
	122 (In situ)	Nil	Nil	Nil	Nil	Nil
2. Probable Mineral Reserve (A)	21	Nil	Nil	Nil	Nil	Nil
3. Probable Mineral Reserve (A)	122 (In situ)	16448530	Nil	Nil	+55%Fe	Nil
		7182332	Nil	Nil	45-55%Fe	Nil
		250752	Nil	Nil	+55%Fe	Nil
	122 (Forest)	Nil	Nil	Nil	Nil	Nil
<b>B. Remaining Resources</b>		<b>Nil</b>	<b>Nil</b>	<b>Nil</b>		<b>Nil</b>
1. Feasibility Mineral Resource (B)	211 (In situ)	Nil	Nil	Nil	Nil	Nil
		Nil	Nil	Nil	Nil	Nil
	211 (lost)	Nil	Nil	Nil	Nil	Nil
		Nil	Nil	Nil	Nil	Nil
2. Prefeasibility Mineral Resource (B)	221	Nil	Nil	Nil	Nil	Nil
3. Prefeasibility Mineral Resource (B)	222	Nil	Nil	Nil	Nil	Nil
4. Measured Mineral Resource (B)	331	Nil	Nil	Nil	Nil	Nil
5. Indicated Mineral Resource (B)	332	Nil	Nil	Nil	Nil	Nil
6. Inferred Mineral Resource (B)	333	Nil	Nil	Nil	Nil	Nil
7. Reconnaissance Mineral Resource (B)	334	Nil	Nil	Nil	Nil	Nil
<b>Total Mineral Resources (A+B)</b>		<b>23921614</b>	<b>Nil</b>	<b>23921614</b>	<b>145%Fe</b>	<b>Nil</b>

\*\* Additional tables may be added for associated minerals

## 2.2.5: Future Exploration Proposal -

## 2.2.5.1: Geological Mapping -

Sl. No.	Year	Scale	Area Covered (ha)
1	1 <sup>st</sup> year	1:2000	60.508
2	2 <sup>nd</sup> year	1:2000	60.508

## 2.2.5.2: Ground Geophysical Survey - Not proposed

Sl. No.	Type of Survey	Spacing (m)	Total line (km)	Area Covered (ha)	Latitude	Longitude
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## 2.2.5.3: Pitting - Not proposed

Number of pits
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Sl. No.	Year	Land type	Pit ID	Length of Pit (m)	Width of Pit (m)	Depth of Pit (m)	Latitude	Longitude
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## 2.2.5.3: TRENCHING - Not Proposed

Number of Trenches -

## 2.2.5.4.1 -SPACING

SPACING		
Min (m)	Max (m)	Avg (m)

## 2.2.5.4.2 Area Covered Under Trenching - Not Applicable

Co-ordinates -

Sl. No.	Trench ID	Latitude			Longitude				
		Length of Trench (m)	Width of Trench (m)	Depth of Trench (m)	Litho Unit Exposed	Average Grade (%)	Running Meters (m)	From Longitude	To Longitude

## 2.2.5.5: EXPLORATORY Drilling -

### 2.2.5.5.1: Core/Non-core Drilling -

S. No.	Year	In Forest area				In Non-Forest Area				Total borehole	Total Mtr	Attachment
		No. of boreholes	Total mtr	Type of borehole	Grid interval	No. of boreholes	Total mtr	Type of borehole	Grid interval			
1	1 <sup>st</sup> YEAR	PB-I NO-1	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	Hel p 212 No-V
2		PB-I NO-2	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	
3		PB-I NO-3	300 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	300 or upto end of the Mineralisation	
4		PB-I NO-4	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	
5		PB-I NO-5	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	
6		PB-I NO-6	300 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	300 or upto end of the Mineralisation	
7		PB-I NO-7	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	
8		PB-I NO-8	300 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	300 or upto end of the Mineralisation	
9		PB-I NO-9	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	
10		PB-I NO-10	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	
11		PB-I NO-11	300 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	300 or upto end of the Mineralisation	
12		PB-I NO-12	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	
13		PB-I NO-13	300 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	300 or upto end of the Mineralisation	
14		PB-I NO-14	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	
15		PB-I NO-15	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	
16	2 <sup>nd</sup> YEAR	PB-I NO-16	300 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	300 or upto end of the Mineralisation	
17		PB-I NO-17	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	
18		PB-I NO-18	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	
19		PB-I NO-19	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	
20		PB-I NO-20	300 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	300 or upto end of the Mineralisation	
21		PB-I NO-21	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	
22		PB-I NO-22	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	
23		PB-I NO-23	300 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	300 or upto end of the Mineralisation	
24		PB-I NO-24	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	
25		PB-I NO-25	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	
26		PB-I NO-26	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	
27		PB-I NO-27	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	
28		PB-I NO-28	400 or upto end of the Mineralisation	Core	100m	..	..	..	..	1	400 or upto end of the Mineralisation	





28		1 CC	312138 8554	2410185 3430
29		1 CC	312213 5573	2410058 2839
30		1 CC	312288 0258	2418055 0644
31		1 CC	312382 2439	2415905 9650
32		1 CC	312436 3821	2416558 8455
33		1 CC	312795 2335	2415889 9451
34		1 CC	311818 0023	2416183 0432
35		1 CC	311930 8882	2416083 2262
36		1 CC	312080 0134	2415860 2289
37		1 CC	312154 5855	2415883 1102
38		1 CC	311863 5475	2416009 1357
39		1 CC	311938 2197	2415942 6170
40		1 CC	312012 8918	2415878 0883
41		1 CC	311700 4259	2415935 0051
42		1 CC	311871 0980	2415855 4864

**2.2.6.8: Petrology & Mineralogical Studies** – A detail petrological and mineralogical study will be conducted once the mining operation is started

Sl. No.	Type of Sample	Number of Sample proposed
1	Latent iron ore	2
2	Hard Lam. nated ore	2
3	Soft Lam. nated ore	2
4	Blue dust	2

**CHAPTER 3:**  
**MINERAL BENEFICIATION / PROCESSING**



Name of The Ore/Mineral \_\_\_\_\_ Iron ore

3.1: Mineralogy of the ROM ore/ Mineral: Not carried out.

Sl. No.	Valuable Mineral Name	Approx. Mineral %	Gangue Mineral/s Name	Approx. Gangue Mineral %
	Hematite			

3.2: Complete Chemical Analysis of the ROM Ore/Mineral: Refer Page No-12 of Geological Report (Anexure - )

Sl. No.	Radicals	Wt. %
1	Fe at +56 Cut off	67.983%
2	Silica	2.892%
3	Alumina	3.133%

3.3: Crushing Section:

3.3.1: Primary Crushing

Sl. No.	Type of Crusher	Make	Capacity of Crusher (tph)	Feed Size (mm)	Product Size (mm)
1	Jaw Crusher, C120	Metso/Sandvik	350	0-800	0-80
2	Jaw Crusher	Metso/Sandvik	250	0-500	0-80

3.3.2: Secondary Crushing:

Sl. No.	Type of Crusher	Make	Capacity of Crusher (tph)	Feed Size (mm)	Product Size (mm)
1	Cone Cr	Metso/Sandvik	350	0-80	5'-8 0-5mm
2	Cone Cr	Metso/Sandvik	250	0-80	5'-8 0-5mm

3.3.3: Tertiary Crushing: NIL

Sl. No.	Type of Crusher	Make	Capacity of Crusher (tph)	Feed Size (mm)	Product Size (mm)

3.4: Grinding Section: NIL

3.4.1: Dry Grinding:

S.N	Type of Mill	Stages	Make of the mill	Feed Flow Rate (tph)	Feed Size (mm)	Product Size Mill Discharge (mm)	Type of screen

Table continued .

S.N	Make	Aperture Size of Screen/Classifier (mm), if applicable	Classifier/Screen undersize (tph)	Classifier/Screen oversize (tph)

3.4.2: Wet Grinding: NIL

S.N	Type of Mill	Stages	Make of the mill	Feed Flow Rate (tph)	Feed Size (mm)	Product Size (mm)	Type of screen/ Classifier

Table continued....

S.N	Aperture Size of Screen/ Classifier (mm), if applicable	Classifier/ Screen Undersize (tph)	Classifier/ Screen oversize (tph)	Water Requirement (lit)	Fresh Water Requirement (lit)	Recirculated Water (lit)



### 3.5: Dry Processing:

#### 3.5.1: Screening and Classification:

S.N	Type of screen/ classifiers	Stages	Make	Capacity (tph)	Aperture Size of Screen/Classifier (mm), if any	Feed Size (mm)	Product Size (mm)	Product quality (if applicable)
1	Dry screen	Two	Sarvik /Metso	250	30.10	0-300	0-10, 5-18, 10-30, 30+	+55 to +55 % Fe
2	Dry screen		/Horizon	200	30.10	0-300	0-10, 5-18, 10-30, 30+	+55 to +55 % Fe
	Dry screen			150	30.10	0-300	0-10, 5-18, 10-30, 30+	+55 to +55 % Fe

#### 3.5.2: Other Operations: Not Applicable

S.N	Type of equipment /operation	Stages if applicable	Make	Capacity (tph)	Feed Size (mm)	Product Size (mm)	Product-Mid (tph), if available	Product-Tail (tph)
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#### 3.5.3: Product Quality:

Products	Wt%	In tonnes	Size(range)mm	CompleteChemical Analysis
Reject	25	505000	(0-10)mm	45.55% Fe.

### 3.6: Wet Processing: Not Applicable

#### 3.6.1: Scrubbing / Washing:

S.N	Type of Scrubbers /washers	Stages, if applicable	Make	Capacity(tph)	FeedSize(mm)	ProductSize(mm)	Productquality(if applicable)
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table continued ..

S.N	Water Requirement(l/h)	Fresh Water Requirement (l/h)	Recirculated water(l/h)
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#### 3.6.2: Screening and Classification:

S.N	Type of screen classifiers	Stages, if applicable	Make	Capacity (tph)	Aperture Size Of Screen/ Classifier (mm),if applicable	Feed Size (mm)	Product Size (mm)
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Table continued ..

S.N	Product quality (if applicable)	Water Requirement (l/h)	Fresh Water Requirement (l/h)	Recirculated Water (l/h)
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#### 3.6.3: Gravity Separation: Not Applicable

S.N	Type of separators (fig.table, spiral,	Stages, if applicable	Make	Capacity(tph)	FeedSize(mm)	Product (Conc) (tph)	Product-Mid(tph),if available
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Table continued ..

S.N	Product-Tail (tph)	Water Requirement (l/h)	Fresh Water Requirement (l/h)	Recirculated water (l/h)
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#### 3.6.4: Magnetic Separation: Not Applicable

Sl. No.	Type of magnetic separators (magnetic intensity)	Stages,if applicable	Make	Capacity (tph)	Feed Size (mm)	Product-Mag(tph)	Product-Mid (tph),if available
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table continued ..

Sl. No.	Product non-Mag(tph)	Water Requirement (l/h)	Fresh Water Requirement (l/h)	Recirculated water(l/h)
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### 3.6.5: Flotation: Not Applicable

S. N	Type of flotation equipment	Stages(rougher/ cleaner, etc), if applicable	Make	Capacity (tph)	Feed Size (mm)	Product-Float (tph)	Product non-Float (tph)
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Table continued. ...

S.N	Water Requirement(l/h)	Fresh Water Requirement(l/h)	Recirculated water(l/h)
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### 3.6.6: Other Operations: Not Applicable

S.N	Type of equipment /operation	Stages, if applicable	Make	Capacity(tph)	Feed Size (mm)	Product-Conc(tph)	Product-Mid (tph), if available
-----	------------------------------	-----------------------	------	---------------	----------------	-------------------	---------------------------------

Table continued. ...

S.N	Product-Tail (tph)	Water Requirement (l/h)	Fresh Water Requirement (l/h)	Recirculated water(l/h)
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### 3.6.7: Product Quality (wet processing)

Products	Wt%	In tonnes	Size(range)mm	Complete chemical analysis
Concentrate				
Sub-grade				
Rejects				

### 3.7: Overall Product Quality (Dry cum Wet Processing) Not Applicable

Products	Wt %	In tonnes	Size (range) mm	Complete chemical analysis
Concentrate				
Sub-grade				
Rejects				

### 3.8: Disposal Method for tailing/ rejects:-Not Applicable

a) Explain the disposal method for tailing or reject from processing plant with detail chemical / mineral analysis of tailing	
b) Size and capacity of tailing pond, toxic effect of such tailings, process adopted to neutralize its effect (if any)	
c) Any other data (if available)	

### 3.9: Overall water requirement of mining and mineral processing

Indicate quantity, source of supply, disposal of water and extent of recycling and chemical analysis of water	200 cum/day (Processed) Water Balance Chart Attached as Annexure - X
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### 3.10: Flow sheets and charts

Water balance chart of mineral processing plant(s) (each stage of process)	Attach as Annexure--XI
Attach flow sheet of beneficiation of part(s)	Not Applicable
Any other data (if applicable)	Not Applicable

## Chapter 4: MINING OPERATIONS

### **4.1: MINING METHOD (Opencast)**

#### **4.1.1: Existing Method of Mining–** Not Applicable since it is a fresh lease

*Specify in the space below*

Not Applicable

#### **4.1.2: Proposed Method of Mining- Mechanized/Manual**

*Specify in the space below*

Deployment of HEMM with deep hole drilling & blasting

During the plan period, it has been Proposed to produce 2.0 MTPA iron ore per annum. The mine will be developed by opencast mining method with mechanized means deploying machinery like wagon drill machine, rock breaker, hydraulic / diesel operated shovel, dumper/tipper etc

#### **Justification of site selection for Mining:**

As per borehole result from BH-1, BH- 3, BH-14, DIOP -1, 2, 3, 4 & 5, there exist sufficient reserve of iron ore to obtain the production @ 2.0 MTPA during plan period. Further considering the topography and accessibility the proposed area is suitable for immediate development within the block

#### **Strategy for Development :**

It has been planned develop the area in a such a way by which both high grade and low grade iron ore production can be obtained for suitable blending purpose to make the material usable. The height and width of the proposed benches has been kept 10 and 15 meter respectively

#### **Haul Road:**

The layout of roads for haulage of ore/ waste and access to different installation in the mine will be developed complying with the statutory regulations stipulated in the Metalliferous Mines Regulations, 1961. Overburden and Mineral reject will be transported to the respective site of dumping and stacking located in the lease area. Fifteen meter wide haul road will be developed in the lease area as per need at a gradient up to 1:16.

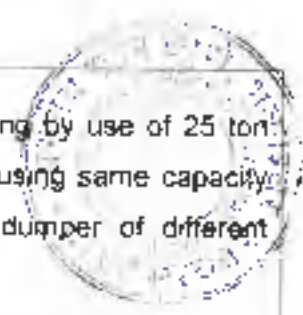
#### **Site Services:**

As far as day to day mine operation is concerned, the infrastructure such as site office, weigh bridge, rest shed, First-aid centre, blasting shed security house, magazine, guard house etc will be established before mining operation in the lease area.

#### **Machineries to be deployed.**

The mine will be operated in a three shift basis. Process of excavation and loading of overburden/waste will be done by deploying hydraulic excavators and dumpers. Excavators of 0.9 - 2 m<sup>3</sup> capacities will be deployed for excavation & loading of ROM ore and dumpers of 25t capacity shall be deployed for transportation of ore and OB. Hard iron ore will be loosened through drilling & blasting. For the purpose, DTH drill of 115mm dia, compressor of 450cfm etc will be used during ensuing scheme period to achieve the targeted production. For maintenance of OB dumps dozers will be deployed. Loading & unloading of sorted & sized ore is loaded by mechanized method





### Transportation

Ore will be transported from quarry site to screen and crushing site for processing by use of 25 ton dumpers and waste materials will be dispatched from quarry to dumping site by using same capacity dumpers. From the stock yard saleable material will be despatch by using dumper of different capacities.

Reasons for proposed changes – Not Applicable

### 4.2: Operational Parameters-

#### 4.2.1: Inventory of Existing Pits & Dumps-

##### 4.2.1.1: PITS

S. No.	Pit ID	Pit Status	Area Covered by Pit (Ha)	Pit Dimension (m x m x m)

##### 4.2.1.2: DUMPS & STACK

##### 4.2.1.2.1: DUMP DETAILS

Not Applicable since it is a fresh lease

##### 4.2.1.2.2: STACK DETAILS

Not Applicable since it is a fresh lease

##### 4.2.1.3: DETAILS OF STABILIZED DUMPS.-

Not Applicable since it is a fresh lease

### 4.2.2: Opencast Mining

#### 4.2.2.1: Bench Parameters

Year	Max Height of the Bench or Over Burden (m)	Min Width of the Bench or Over Burden (m)	Slope of the Bench or Over Burden (degree)	Max Height of the Bench or Over Burden (m)	Min Width of the Bench or Over Burden (m)	Slope of the Bench or Over Burden (degree)	Slope of the Bench or Over Burden (degree)	Number of Benches in Top Soil	Number of Benches in Over Burden	Number of Benches in Mineral	Max Depth of Workings (m)	Depth of Water Table (m)	Max Slope Angle of Main Road (degree)	Plan View Development & Production Plan	Plan View Development & Production Section
1st	5m	10m	25-30°	10	15m	25-30°	30°	1	1	2	25	1.10	1.10	1000000 (Plan no. 1000000)	(Plan no. 1000000)
2nd	5m	10m	25-30°	10	15m	25-30°	30°	1	1	2	25	1.10	1.10	1000000 (Plan no. 1000000)	(Plan no. 1000000)
3rd	5m	10m	25-30°	10	15m	25-30°	30°	1	1	2	25	1.10	1.10	1000000 (Plan no. 1000000)	(Plan no. 1000000)
4th	5m	10m	25-30°	10	15m	25-30°	30°	1	1	2	25	1.10	1.10	1000000 (Plan no. 1000000)	(Plan no. 1000000)
5th	5m	10m	25-30°	10	15m	25-30°	30°	1	1	2	25	1.10	1.10	1000000 (Plan no. 1000000)	(Plan no. 1000000)

# 4.2.2.2: Year wise Open cast Development

S. No	Year	Pit ID	Bench	Direction	Bulk Density of Overburden (BD) (t/m <sup>3</sup> )	Bulk Density of Mineral (BD <sub>m</sub> ) (t/m <sup>3</sup> )	Top Soil volume (Length x Width x Height) (m <sup>3</sup> )	Waste Quantity (t)	RCM Volume (Length x Width x Height) (m <sup>3</sup> )	RCM Quantity (t)	Runway	Mineral Rejected (t)	Production Associated (t)	Local or Off Advancement	Overall Rate (per m <sup>3</sup> )
2	2 <sup>nd</sup>	Proposed Quarry (Initial)	800-800	Down North	2	10.10 (overburden), 2.26 (mineral)	Nil	26040	677972	1362128	MR 28%, MP 24%	414515	148754	312136, 312725	10.754
		Proposed Quarry (Final)	500	South	2	10.10 (overburden), 2.26 (mineral)	Nil	47250	12640	317870	100%	Nil	53878	2415888, 2416200	10.003
3	3 <sup>rd</sup>	Proposed Quarry (Initial)	700-600	Down North	2	10.10 (overburden), 2.26 (mineral)	Nil	250550	691180	987504	MAIN 77%, MR 27%	551950	425719	312136, 312725	10.078
		Proposed Quarry (Final)	800	South	2	10.10 (overburden), 2.26 (mineral)	Nil	30000	1600	22470	100%	Nil	27400	2415888, 2416200	10.007
4	4 <sup>th</sup>	Proposed Quarry (Initial)	700-600	Down North	2	10.10 (overburden), 2.26 (mineral)	Nil	520000	102751	1574040	MR 77%, MP 23%	460684	1513356	312136, 312725	10.361
		Proposed Quarry (Final)	600	South	2	10.10 (overburden), 2.26 (mineral)	Nil	5000	8000	21050	100%	Nil	24400	2415888, 2416200	10.017
5	5 <sup>th</sup>	Proposed Quarry (Initial)	700-600	Down North	2	10.10 (overburden), 2.26 (mineral)	Nil	234530	609050	930556	MAIN 74%, MR 26%	507447	1479551	312136, 312725	10.059
		Proposed Quarry (Final)	500	South	2	10.10 (overburden), 2.26 (mineral)	Nil	214600	889044	1492329	MR 100%	520447	1479551	2415888, 2416200	10.085
6	6 <sup>th</sup>	Proposed Quarry (Initial)	700-600	Down North	2	10.10 (overburden), 2.26 (mineral)	Nil	470700	884764	2000000	MAIN 81%, MR 18%	570644	1629066	312136, 312725	10.342
		Proposed Quarry (Final)	500	South	2	10.10 (overburden), 2.26 (mineral)	Nil	470750	684084	2000000	MR 100%	570644	1629066	2415888, 2416200	10.047
TOTAL															10.047



# Tentative Calculation Summary

YEAR	PRODUCTION MAIN (in Tonne)	MINERAL REJECT (in Tonne)	ROM (in Tonne)	WASTE (in Tonne)
1ST	1525464	474535	1999999	146500
2ND	1448139	561860	1999999	565700
3RD	539315	460885	2000000	677200
4TH	1479551	520447	9999998	469100
5TH	1629066	370944	2000000	947400
GRAND TOTAL	7621525	2378471	9999998	2799300

Copy of the recovery test report in Insitu and Float Ore zone and bulk density report attached as Annexure - IV

S.No.	PR ID	Total Topsoil Volume (m <sup>3</sup> )	Total Waste Volume (m <sup>3</sup> )	Total Waste Quantity (t)	Total ROM Volume (m <sup>3</sup> )	Total ROM Quantity (t)
1	Quarry	Nil	1399650	2799300	3464495	9999996
	Total	Nil	1399650	2799300	3464495	9999996

Note: 40% of waste will be utilized for road maintenance both inside and outside the lease. Necessary permission will be obtained from competent authority for taking the waste outside the lease.

अनुमोदित  
APPROVED

क्षेत्रीय खान निर्वहक  
Regional Controller of Mines  
भारतीय खान भूरे  
Indian Bureau of Mines  
भुवनेश्वर/Bhubaneswar

11/1/2022



#### 4.2.2.3: Transportation & Hauling Equipment

S. No.	Type	Make	Capacity (m <sup>3</sup> )	No. of Equipments
	Tractor/dumper	Volvo/BELML	2.5	24

#### 4.3: Material Handling Summary

Slope Stability Study Report	Yes/No	Will be conducted after the during the plan period
Recovery Study Report	Yes/No	(Ref Annexure- V) however for G1 level Resource assessment recovery study proposed during plan period
Hydrological Study Report	Yes/No	Will be conducted after the during the plan period
Mineral Beneficiation Study Report	Yes/No	Will be conducted after the during the plan period
Underground Rock Displacement Study Report	Yes/No	Not Applicable
Subsidence Study Report	Yes/No	Not Applicable
Geotechnical Study Report	Yes/No	Not Proposed
Any Other Study Report	Yes/No	During plan period following study will conducted.
		<ul style="list-style-type: none"> <li>- Rain water Harvesting</li> <li>- Biodiversity Study</li> <li>- Socioeconomic study</li> </ul>
Bulk Density Study Report	Yes/No	(Ref Annexure- IV) however for G1 level Resource assessment; bulk density study proposed during plan period.

#### 4.3.2: INSITU MINING

Sl. No.	Year	Total Handling (t)	Waste Quantity (t)	ROM Quantity (t)	ROM Quantity Saleable Mineral (t)	ROM Quantity Mineral Reject (t)	Ore to OB Ratio (ROM Quantity / Waste Quantity)	Grade Range (%)
1	1 <sup>st</sup>	2146499	146500	1999999	1525175	453161	1:0.073	45% Fe to +65 % Fe
2	2 <sup>nd</sup>	2565099	565100	1999999	1448139	551860	1:0.283	45% Fe to +65 % Fe
3	3 <sup>rd</sup>	2677200	677200	2000000	1539315	460684	1:0.339	45% Fe to +65 % Fe
4	4 <sup>th</sup>	2469099	469100	1999999	1479551	520447	1:0.235	45% Fe to +65 % Fe
5	5 <sup>th</sup>	2941400	241400	2000000	1629056	370944	1:0.471	45% Fe to +65 % Fe
<b>Total</b>		<b>12799297</b>	<b>2799300</b>	<b>9999997</b>	<b>7621236</b>	<b>2357096</b>	<b>1:0.280</b>	<b>45% Fe to +65 % Fe</b>

#### 4.3.3: Dump workings: Not Applicable

Sl No	Year	Dump No	Location Latitude	Location Longitude	Area (m <sup>2</sup> )	Avg Height of Dump (m)	Volume (m <sup>3</sup> )	Total Dump Quantity (t)	Proposed Dump Handling Quantity (t) (A)	Proposed Recovery of Saleable Mineral (t) (B)	Proposed Waste Quantity (t) (A-B)	Grade Range (%)	Justification

#### 4.3.4: Calculation Summary

Year	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	Total
(A) Total ROM quantity (t)	1999999	1999999	2000000	1999999	2000000	9999997
(B) Saleable ore from ROM (t)	1525175	1448139	1539315	1479551	1629056	7621236
(C) Proposed Dump Handling Quantity (t)	0	0	0	0	0	0
(D) Saleable Ore recovered from dump workings (t)	0	0	0	0	0	
(E) Total Saleable Ore (t) (=B+D)	1525175	1448139	1539315	1479551	1629056	7621236
(F) Total Quantity Handled (t) (=A+C)	1999999	1999999	2000000	1999999	2000000	9999997

#### 4.4: Machine Calculation

##### 4.4.1: Machine Requirement Summary

Number of Average Working Days in One Year (A)	300
Number of Shifts per Day (B)	2
Material Handling Required per Day (t) ((D)=Largest of (Q1-Q5)/(A))	9866mt
Material to be Handled per Shift (t) ((E)=(D)/(B))	4833mt
Handling Required per Hour (t) ((F)=(E)/8 hours)	372mt
Effective Shift Time	6 Hrs 30 min.

##### 4.4.2: Shovel / Excavator Requirement

Effective Shift Time:	6 Hrs	30 min
-----------------------	-------	--------

Sl No	Type	Bucket Capacity (m <sup>3</sup> )(A)	Bucket Fill Factor (B)	Swell Factor (C)	Tonnage Factor (t/m <sup>3</sup> )(D)	Machine Utilization Factor (%) (U)	Efficiency (%) (T)	Cycle time (sec) (F)	(G) TPH (G) = (2800 x A x B x C x D x E x U) / (F)	Total Hours (H) - Number of working days x Number of shifts/day x Effective shift hours	Yearly handling by one Excavator (t) ((I)=(G x H)	Maximum handling of the material by this machine during the clock period (t) (J)	Number of excavator machines required (K) = (J / I)	Stand by excavator (L)
1	Excavator	2	0.8	0.7	2.4	80	80	60	123.86	3780	436202.1	2947400	5.282 (say 6)	2

##### 4.4.3: Dumper Requirement

Effective Shift Time:		Hrs							mins					
Sl No	Total Hours x Number of working days (W) x Number of shifts/day x Effective shift hours (Machine Requirement Summary) (A)	Capacity of Dumper (t) (B)	Speed of the dumper (KMPH) (C)	Lead Distance (KM) (d)	Time taken to cover distance in minutes (t) = (d/C) x 60	Queueing Loading Time at Shovel (min) (w)	Queueing Unloading Time during unloading (min) (v)	Total Time to complete one trip (w) + (v) + (t)	No of Trips (hr) = (60 / (w+v+t))	Total transportation per hour = B x (w+v+t)	Yearly handling by one dumper (ix) = A x TPH	Maximum handling of the material by this machine during the clock period (t) (x)	Number of dumpers will be (xi) = (J / I x (x))	Plus Stand by dumper (xii)
1	2780	25	10	0.2	19.2	10	6	35.2	1.7	42.5	164475	294740	17.88 (say 18)	6

##### 4.4.4: Drill Machine Requirement

Effective Shift Time:			6 hrs			30 mins								
S No	Type of Drill	Depth of Hole including Sub-grade Drilling (m)	Spacing (m)	Burden (m)	Bulk Density of Waste (gm <sup>3</sup> )	Bulk Density of Mineral (gm <sup>3</sup> )	Yield per Hole (t)	Yield per Meter (mm)	Annular Target Known (t)	Drilling Requirement per Day (t)	Drilling Requirement per Shift (t)	Rate of Drilling per Hour (m/hr)	Required Number of Drills (mici)	Stand by Drill
1	Pneumatic DTH	11	3.25	0.5	2.2	3.1	281.312	21.93	17400.00	284	132	0	2	1

#### 4.4.5: Machine Deployment Details

##### 4.4.5.1: Excavator & Loading Equipment

Sl.No.	Type	Make	Capacity	No. of Equipments
1	Excavator	Hitachi	2.0	1
2	Excavator for part feeding	Volvo	2.0	3-4
		Komatsu	0.9	5-6
		SDLG	3.0	2
		Lilung	2.5	3
3	Loader	Cat	4.5	2+
4	DTH	Sandvik (D1550)	10mm Dia	2+
5	Cumper	Volvo	25MT	15+5
6	Water tanker	Volvo	20000 Litre	2
7	Mobile Crushing unit	SANDVIK/METSO	250 TPH	(Stand by)
	Fix Crushing unit	SANDVIK IM-150	150TPH	1
		SANDVIK/METSO	350TPH	1
8	Mobile Screen plant	Horizon	250TPH	1
		SANDVIK/METSO	200TPH	1
		Horizon	150TPH	1
9	Dozer	Cat	264 HP	2
10	Grader	Komatsu 725	260 HP	1
11	Rock Breaker	Hitachi	25MT	1
12	Ambulance	...	...	1
13	Staff bus	Force	...	1
14	Cumper	Manindra	...	2
15	Bolero	Manindra	...	4

##### 4.4.5.2: Dozers Details

S.No.	Type	Make	Capacity (m <sup>3</sup> )	No. of Equipments
1	Dozer	CAT	260HP	2

##### 4.4.5.3: Drilling Details

S.No.	Type	Make	Capacity (t)	Diameter of Hole (mm)
1	DTH	Sandvik (D1550)	...	110

#### 4.5 Blasting Requirement:

##### 4.5.1 Blasting & Explosive Requirement in Waste/Development

S.N	Drill Pattern / Spacing of Holes (m)	Burden of Holes (m)	Number of Rows / Rings	Yield per Holes in Waste (m <sup>3</sup> )	Frequency of Blasting in a Week	Maximum Number of Holes Blasted in a Round	Charge per Hole (kg)	Charge per Round (kg)	Explosive Requirement Per Month in Development (kg)	Powder Factor in Development / Waste (kg/t)	Depth of hole
1	3.25	2.5	2	40	2.5	70	22.5	1575	3150	4.94	5

##### 4.5.2 Blasting & Explosive Requirement in Mineral / Ore

Type of Explosive	Type of Explosives used / to be Used
Class 2	Slurry and emulsion (25mm and 83mm Dia Catridge explosive)
Class 6 (Div-III)	Electric Detonator, Delay Detonator Relay and NONEL
Class 6 (Div-II)	Detonating Fuse

S.N.	Total ROM proposed to be handled in CUM/annum	Total ROM proposed to be handled in CUM/day	Spacing of Holes (m)	Burden of Holes (m)	Number of Rows	Yield per Holes in ROM Zone (m <sup>3</sup> )	Frequency of Blasting in a Week	Maximum Number of Holes Blasted in a Round	No. of Holes Required to be Blasted per Round	Charge per Hole (kg)
1	415771	1386	3.25	2.5	3	81	2	70	52	50

Table continued

S.N.	Charge per Round (kg)	Explosive Requirement Per Month for ROM Zone Blasting (kg)	Powder Factor in Ore (kg/t)	Pop Shooting (no of Boulders)	Plaster Shooting (no of Boulders)	Use of Rockbreaker	Capacity	Secondary Blasting Requirement	Depth Of Hole
1	3500	28000	4.8	..	..	1	25W	..	..

#### 4.6: Man Power Deployment

##### 4.6.1: Managerial

Sr. No	Particulars	Number of Persons in Shift 1	Number of Persons in Shift 2	Number of Persons in Shift 3	Number of Persons in General Shift	Total No. of Persons per day
1	1st Class Mines Manager	..	..	..	2	2
2	Mining Engineer	..	..	..	1	1
3	2nd Class Mines Manager	1	1	..	..	3
4	Geologist	..	..	..	2	2
5	Surveyor	..	..	..	2	2
6	Mechanical Engineer	1	1	..	1	3
7	Electrical Engineer/Electrical supervisor	1	1	..	..	3

##### 4.6.2: Supervisory

Sl. No	Particulars	Number of Person in Shift 1	Number of Person in Shift 2	Number of Person in Shift 3	Number of Person in General Shift	Total Number of Person per Day
1	Foreman	2	2	..	1	5
2	Mining Male	4	4	..	1	9

##### 4.6.3: Skilled Workers / Operators

Sr No	Particulars	Number of Persons in Shift 1	Number of Persons in Shift 2	Number of Persons in Shift 3	Number of Persons in General Shift	Total No. of Persons per day
1	Skilled Workers / Operators	50	50	..	..	100

##### 4.6.4: Semi-skilled Workers

S.No	Number of Persons in Shift 1	Number of Persons in Shift 2	Number of Persons in Shift 3	Number of Persons in General Shift	Total No. of Persons per day
1	10	10	..	10	30

##### 4.6.5: Unskilled Workers

S.No	Number of Persons in Shift 1	Number of Persons in Shift 2	Number of Persons in Shift 3	Number of Persons in General Shift	Total No. of Persons per day
1	5	5	0	5	15

##### 4.6.6: Others Specify

S.N	Particulars	Number of Persons in Shift 1	Number of Persons in Shift 2	Number of Persons in Shift 3	Number of Persons in General Shift	Total No. of Persons per day
1	Security	2	2	10	..	52
2	Quality	5	5	..	..	10
3	W.B	4	4	4	..	12

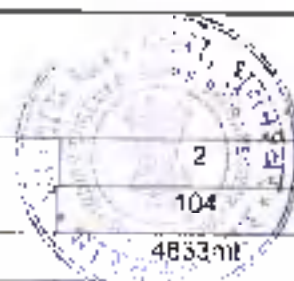
##### 4.6.7: No of Persons Engaged per Day

Number of Persons in Shift 1	Number of Persons in Shift 2	Number of Persons in Shift 3	Number of Persons in General Shift	Total No. of Persons per day
104	104	4	28	250

No of Shifts per Day ((A) = Machine Requirement Summary (B):

Average Daily Employment per Shift ((B) = (Total Number of Person per Day) / (A))

Material to be Handled per Shift ((C) = Machine Requirement Summary (E):



#### 4.6.8: Supervision

Sl No.	Particulars	Qualification	Requirement / Proposed	In Position / Existing Strength	(- Shortage / (+) Excess	Remarks
1	Mining Foreman	Foreman Competency Certificate	5	--	NIL	--
2	Mining Mate	Mate / Blaster Competency Certificate	9	--	NIL	--

#### 4.7: Waste Management

##### 4.7.1: Existing Dump

Sl. No.	Dump Id	Type of Dump	Area (ha)	Height (m)	Total Dump Quantity (m <sup>3</sup> )	Existing Dump Location
NIL						

##### 4.7.2: New Dump

Sl. No.	Year	Dump Id	Type of Dump	Proposed Area (ha)	Height (m)	Total Dump Quantity (m³)	New Dump Location
1	1 <sup>st</sup>	Waste Dump-1	Waste	0.512	3.5	43950	2416412N-2416492N 311933E-312309E
2	2 <sup>nd</sup>			1.23	4	169530	2416349N-2416633N 311872E-312349E
3	3 <sup>rd</sup>			1.25	4	203160	2416342N-2416534N 311868E-312075E
4	4 <sup>th</sup>			1.20	9	140730	2416342N-2416534N 311868E-312075E
5	5 <sup>th</sup>			0.912	10	282420	2416342N-2416534N 311868E-312075E
TOTAL						639790	

Note: 40% of generated waste will be utilized for road maintenance.

##### 4.7.3: Existing Stack Nil

Sl. No.	Stack ID	Type of Stack	Area (ha)	Height (m)	Total Stack Quantity (t)	Existing Stack Location
1					NIL	

##### 7.4: New Stack

Sl. No.	Year	Stack ID	Type of Stack	Proposed Area (ha)	Max. Height (m)	Total Stack Quantity (t)	New Stack Location
1	1 <sup>st</sup>	Stack-1	Ore stack	5.5	3	165000	2416059N-2416269N 312041E-312371E
1	2 <sup>nd</sup>	Stack-1	Ore stack	3.94	3	118200	2416070N-2416349N 312041E-312347E
2		Stack-2	Ore stack	1.60	3	48000	2415928N-2416063N 311916E-312120E
3		Stack-3	Ore stack	1.39	3	41700	2415920N-2416082N 312127E-312302E
4		Stack-4	Ore stack	2.32	3	69800	2416000N-2416217N 312215E-312440E
1	3 <sup>rd</sup>	Stack-1	Ore stack	3.06	3	91800	2416050N-2416349N 31241E-312317E
2		Stack-2	Ore stack	1.60	3	48000	2415926N-2416063N 311816E-312120E
3		Stack-3	Ore stack	1.28	3	38400	2415920N-2416068N 312138E-312289E
4		Stack-4	Ore stack	1.35	3	40500	2416017N-2416208N 312252E-312400E
5		Stack-5	Ore Stack	1.67	3	50100	2416207N-2416385N 31244E-312544E

1	4 <sup>th</sup>	Stack-1	Ore stack	2.19	3	55700	2416081N-2416331N 312041E-312314E
		Stack-2	Ore stack	1.60	3	48000	2415926N-2416063N 311916E-312120E
2		Stack-3	Ore stack	4.17	3	125700	2415908N-2416223N 312110E-312400E
3		Stack-4	Ore stack	0.584	3	19920	2416163N-2416318N 312480E-312583E
1	5 <sup>th</sup>	Stack-1	Ore stack	1.92	3	57500	2416089N-2415375N 312014E-312292E
		Stack-2	Ore stack	1.60	3	48000	2415926N-2416063N 311916E-312120E
2		Stack-3	Ore stack	4.17	3	123600	2415960N-2416400N 312154E-312500E
3		Stack-4	Ore stack	0.004	3	19920	2416162N-2416315N 312480E-312583E

#### 4.8: Mineral Waste Handling To Utilize As Minor Mineral:- Not Applicable

Sl. No.	Year	Dump Id	Type of Dump	Proposed Area (ha)	Quantity Handled (t)	Quantity Recovered (t)	Name Of Minor Mineral	Alternative Waste Utilization (m <sup>3</sup> )

#### 4.9: Use of Minerals

S.N.	Proposed Use Of Mineral	Name Of Mineral	Relevant Use Of Mineral	Physical Specifications		Chemical Specifications		
				Constituent	DRI Grade	Constituents	DRI Grade	Sinter grade
1	Captive use in own industry & Direct Selling	Iron Ore	DRI and SINTER	Size	15 - 210 mm	Fe	60% Fe to 63.5% Fe	60% to 63.5%
				Size	0-10mm	SiO <sub>2</sub> + Al <sub>2</sub> O <sub>3</sub>	1% Max	5% Max
				Size	10mm	CaO + MgO	2% Max	-
				Size	100 Mesh	P	0.07% Max	0.07% Max
						S	0.03% Max	0.07% Max

## Chapter 5: SUSTAINABLE MINING



### 5.1: Sustainable Mining and SDF Implementations in Compliance of Rule 35 of MCDR 2017-

Compliance of Vishakha Committee Guidelines for prevention of women harassment at workplace:

Not implemented

### 5.2: CSR INITIATIVES

#### 5.2.1: YEAR 1

Details of Work Proposed during the Year / Measures Planned for the Affected Segment	Cumulative Work done / Measures Taken
--	---------------------------------------

##### 5.2.1.1: Area to be Developed for Recreation

Area (Ha) <input type="text" value="0"/>	Area (Ha) <input type="text" value="0"/>
--	--

##### 5.2.1.2: Area for Water Storage & Recharge Facility

Area (Ha) <input type="text" value="0"/>	Area (Ha) <input type="text" value="0"/>
--	--

##### 5.2.1.3: Efforts Made towards Housing for Local Communities

Number of Houses <input type="text" value="0"/>	Number of Houses <input type="text" value="0"/>
---	---

##### 5.2.1.4: Efforts Made towards Providing Transport to Local Communities

Number of Beneficiaries <input type="text" value="0"/>	Number of Beneficiaries <input type="text" value="0"/>
--	--

##### 5.2.1.5: Efforts Made towards Providing Healthcare to Local Communities

Number of Beneficiaries <input type="text" value="0"/>	Number of Beneficiaries <input type="text" value="0"/>
--	--

##### 5.2.1.6: Efforts Made towards Providing Hygiene & Sanitation to Local Communities

Number of Beneficiaries <input type="text" value="0"/>	Number of Beneficiaries <input type="text" value="0"/>
--	--

##### 5.2.1.7: Efforts Made towards Skill Development Programs to Local Communities

Number of Beneficiaries <input type="text" value="0"/>	Number of Beneficiaries <input type="text" value="0"/>
--	--

##### 5.2.1.8: Efforts Made to Promote Education & Knowledge Based Initiatives

Number of Beneficiaries <input type="text" value="0"/>	Number of Beneficiaries <input type="text" value="0"/>
--	--

##### 5.2.1.9: Communication Facilities Provided to Local Communities

Number of Beneficiaries <input type="text" value="0"/>	Number of Beneficiaries <input type="text" value="0"/>
--	--

##### 5.2.1.10: Any Other Steps Taken for Improving the Socio-Economic Standard of Local Communities

Number of Beneficiaries <input type="text" value="0"/>	Number of Beneficiaries <input type="text" value="0"/>
--	--

##### 5.2.1.11: Adoption of ODF

Number of Toilets Built inside the Lease Area: <input type="text" value="4"/>	Number of Toilets Built outside the Lease Area: <input type="text" value="0"/>	Number of Beneficiaries: <input type="text" value="50"/>
---	--	--

##### 5.2.1.12: Awareness Program among Mine Workers for Swatchata

Number of Swatchata Programmes proposed: <input type="text" value="0"/>	Number of Swatchata Programmes Held: <input type="text" value="0"/>
---	---

##### 5.2.1.13: Efforts for green energy

Total energy consumption (KWh): <input type="text" value="20"/>	Green energy consumption (% of total): <input type="text" value="0"/>	
Total water consumption (KLD): <input type="text" value="200"/>	Water recycled (% of total): <input type="text" value="0"/>	

**5.2.2: YEAR 2****Details of Work Proposed during the Year / Measures Planned for the Affected Segment****Cumulative Work done / Measures Taken****5.2.2.1: Area to be Developed for Recreation**

Area (Ha)

Area (Ha)

**5.2.2.2: Area for Water Storage & Recharge Facility**

Area (Ha)

Area (Ha)

**5.2.2.3: Efforts Made towards Housing for Local Communities**

Number of Houses

Number of Houses

**5.2.2.4: Efforts Made towards Providing Transport to Local Communities**

Number of Beneficiaries

Number of Beneficiaries

**5.2.2.5: Efforts Made towards Providing Healthcare to Local Communities**

Number of Beneficiaries

Number of Beneficiaries

**5.2.2.6: Efforts Made towards Providing Hygiene & Sanitation to Local Communities**

Number of Beneficiaries

Number of Beneficiaries

**5.2.2.7: Efforts Made towards Skill Development Programs to Local Communities**

Number of Beneficiaries

Number of Beneficiaries

**5.2.2.8: Efforts Made to Promote Education & Knowledge Based Initiatives**

Number of Beneficiaries

Number of Beneficiaries

**5.2.2.9: Communication Facilities Provided to Local Communities**

Number of Beneficiaries

Number of Beneficiaries

**5.2.2.10: Any Other Steps Taken for Improving the Socio-Economic Standard of Local Communities**

Number of Beneficiaries

Number of Beneficiaries

**5.2.2.11: Adoption of QDF**

Number of Toilets Built inside the Lease Area:

Number of Toilets Built outside the Lease Area.

Number of Beneficiaries

**5.2.2.12: Awareness Program among Mine Workers for Swatchata**

Number of Swatchata Programmes proposed

0

Number of Swatchata Programmes Held

Nil

**5.2.2.13: Efforts for green energy**

Total energy consumption (KWh)

23

Green energy consumption (% of total)

0

**5.2.2.14: Water & recycled use**

Total water consumption (KLD)

200

Water recycled (% of total)

10

**5.2.3: YEAR 3****Details of Work Proposed during the Year / Measures Planned for the Affected Segment****5.2.3.1: Area to be Developed for Recreation**

Area (Ha)

0

Area (Ha)

Nil

**5.2.3.2: Area for Water Storage & Recharge Facility**

Area (Ha)

0

Area (Ha)

Nil

**5.2.3.3: Efforts Made towards Housing for Local Communities**

Number of Houses

5

Number of Houses

5

**5.2.3.4: Efforts Made towards Providing Transport to Local Communities**

Number of Beneficiaries

30

Number of Beneficiaries

30

**5.2.3.5: Efforts Made towards Providing Healthcare to Local Communities**

Number of Beneficiaries

200

Number of Beneficiaries

200

**5.2.3.6: Efforts Made towards Providing Hygiene & Sanitation to Local Communities**

Number of Beneficiaries

300

Number of Beneficiaries

300

**5.2.3.7: Efforts Made towards Skill Development Programs to Local Communities**

Number of Beneficiaries

30

Number of Beneficiaries

30

**5.2.3.8: Efforts Made to Promote Education & Knowledge Based Initiatives**

Number of Beneficiaries

100

Number of Beneficiaries

100

**5.2.3.9: Communication Facilities Provided to Local Communities**

Number of Beneficiaries

200

Number of Beneficiaries

200

**5.2.3.10: Any Other Steps Taken for improving the Socio-Economic Standard of Local Communities**

Number of Beneficiaries

10

Number of Beneficiaries

10

### 5.2.3.11: Adoption of ODF

Number of Toilets Built inside the Lease Area

2

Number of Toilets Built outside the Lease Area.

5

Number of Beneficiaries

125

### 5.2.3.12: Awareness Program among Mine Workers for Swatchata

Number of Swatchata Programmes proposed

2

Number of Swatchata Programmes Held.

2

### 5.2.3.13: Efforts for green energy

Total energy consumption (KWh)

25

Green energy consumption (% of total)

0

### 5.2.3.14: Water & recycled use

Total water consumption (KLD)

200

Water recycled (% of total)

10

### 5.2.4: YEAR 4

Details of Work Proposed during the Year / Measures Planned for the Affected Segment

Cumulative Work done / Measures Taken

#### 5.2.4.1: Area to be Developed for Recreation

Area (Ha)

0.007

Area (Ha)

0.007

#### 5.2.4.2: Area for Water Storage & Recharge Facility

Area (Ha)

0.10

Area (Ha)

0.10

#### 5.2.4.3: Efforts Made towards Housing for Local Communities

Number of Houses

5

Number of Houses

10

#### 5.2.4.4: Efforts Made towards Providing Transport to Local Communities

Number of Beneficiaries

30

Number of Beneficiaries

60

#### 5.2.4.5: Efforts Made towards Providing Healthcare to Local Communities

Number of Beneficiaries

150

Number of Beneficiaries

350

#### 5.2.4.6: Efforts Made towards Providing Hygiene & Sanitation to Local Communities

Number of Beneficiaries

100

Number of Beneficiaries

400

#### 5.2.4.7: Efforts Made towards Skill Development Programs to Local Communities

Number of Beneficiaries

40

Number of Beneficiaries

70

**5.2.4.8: Efforts Made to Promote Education & Knowledge Based Initiatives**

Number of Beneficiaries

100

Number of  
Beneficiaries

200

**5.2.4.9: Communication Facilities Provided to Local Communities**

Number of Beneficiaries

200

Number of  
Beneficiaries

400

**5.2.4.10: Any Other Steps Taken for Improving the Socio-Economic Standard of Local Communities**

Number of Beneficiaries

20

Number of  
Beneficiaries

30

**5.2.4.11: Adoption of ODF**Number of Toilets Built inside the Lease  
Area

0

Number of  
Toilets Built  
outside the  
Lease Area

5

Number of  
Beneficiaries

150

**5.2.4.12: Awareness Program among Mine Workers for Swatchata**Number of Swatchata Programmes  
proposed:

2

Number of  
Swatchata  
Programmes Held

4

**5.2.4.13: Efforts for green energy**

Total energy consumption (KWh)

26

Green energy  
consumption (%  
of total)

0

**5.2.4.14: Water & recycled use**

Total water consumption (KLD)

200

Water recycled  
(% of total)

10

**5.2.5: YEAR 5**Details of Work Proposed during the Year /  
Measures Planned for the Affected Segment

Cumulative Work done / Measures Taken

**5.2.5.1: Area to be Developed for Recreation**

Area (Ha)

0.10

Area (Ha)

0.107

**5.2.5.2: Area for Water Storage & Recharge Facility**

Area (Ha)

0.10

Area (Ha)

0.23

**5.2.5.3: Efforts Made towards Housing for Local Communities**

Number of Houses

0

Number of Houses

10

**5.2.5.4: Efforts Made towards Providing Transport to Local Communities**

Number of Beneficiaries

30

Number of  
Beneficiaries

90

**5.2.5.5: Efforts Made towards Providing Healthcare to Local Communities**

Number of Beneficiaries

100

Number of  
Beneficiaries

450

**5.2.4.6: Efforts Made towards Providing Hygiene & Sanitation to Local Communities**

Number of Beneficiaries

50

Number of  
Beneficiaries

450

**5.2.5.7: Efforts Made towards Skill Development Programs to Local Communities**

Number of Beneficiaries

40

Number of  
Beneficiaries

110

**5.2.5.8: Efforts Made to Promote Education & Knowledge Based Initiatives**

Number of Beneficiaries

100

Number of  
Beneficiaries

300

**5.2.5.9: Communication Facilities Provided to Local Communities**

Number of Beneficiaries

100

Number of  
Beneficiaries

500

**5.2.5.10: Any Other Steps Taken for Improving the Socio-Economic Standard of Local Communities**

Number of Beneficiaries

25

Number of  
Beneficiaries

55

**5.2.5.11: Adoption of ODF**

Number of Toilets Built inside the Lease Area

0

Number of  
Toilets Built  
outside the  
Lease Area:

10

Number of  
Beneficiaries

30

**5.2.5.12: Awareness Program among Mine Workers for Swatchata**Number of Swatchata Programmes  
proposed:

2

Number of  
Swatchata  
Programmes  
Held:

10

**5.2.5.13: Efforts for green energy**

Total energy consumption (KWh)

25

Green energy  
consumption (%  
of total)

7.8

**5.2.5.14: Water & recycled use**

Total water consumption (KLO)

200

Water recycled  
(% of total)

10

**5.3: REHABILITATION & RESETTLEMENT OF AFFECTED PERSONS:- Not Applicable**

Particular

Proposed Number of Project Affected Persons (PAP)

Proposed Number of Person for Alternate Arrangement for Sustainable Livelihood

Proposed Number of Person for Skill Training

Proposed Number of Person Likely to get Direct Employment

Proposed Number of Person Likely to get Indirect Employment

Proposed Project Affected Families Skilled and Absorbed

Proposed Number of Project Affected Families

Not Applicable

## Chapter 6: PROGRESSIVE MINE CLOSURE PLAN

### 6.1: Status of Land:

Total Area Degraded					Total mined out area Reclaimed and Rehabilitated			Other Areas Reclaimed and Rehabilitated	
Total area under excavation in the lease		Area under Dumps (in hect)	Area under utility Services (in hect)	Area under Stock yards (in hect)	Mined out Area Reclaimed but not rehabilitated (in hect)	Mined out Area fully Rehabilitated from Reclaimed area (in hect)	Area under Water Reservoir considered Rehabilitated (in hect)	Stabilized Waste Dump Rehabilitated (in hect)	Virgin land under Green Belt (in hect)
Area under mining operation	Mined Out area in the lease								
Nil	Nil	Nil	Nil	Nil			Not Applicable		

### 6.2: Progressive Reclamation and Rehabilitation Plan

#### 6.2.1: Back-filling: Not Proposed

Quantity of Waste / Fill Material Available at Site (m <sup>3</sup> )	
Availability of Top Soil for Spreading (m <sup>3</sup> )	
Spread Area (m <sup>2</sup> )	

Year Wise Proposal						
Sr No	Year	Pit ID	Area (m <sup>2</sup> )	Top RL	Bottom RL	Estimated Expenditure (INR)
NOT APPLICABLE						

#### 6.2.2: Water Reservoir: Not Proposed

Average Rainfall of The Area (mm)	---
Proposed Area under Water Storage	---

#### 6.2.2.1: Preparations for Ground Water Recharging: -Not Proposed

##### 6.2.2.1.1: Drilling Holes

Year	Proposed no of Holes to be Drilled
1 <sup>st</sup>	
2 <sup>nd</sup>	
3 <sup>rd</sup>	
4 <sup>th</sup>	
5 <sup>th</sup>	

##### 6.2.2.1.2: Preparation of Course Gravel Bed :- Not Proposed

Year	Proposed Area of Bed (LxW)
1 <sup>st</sup>	
2 <sup>nd</sup>	
3 <sup>rd</sup>	
4 <sup>th</sup>	
5 <sup>th</sup>	

Please specify, if others-

#### 6.2.2.2: Protective measures (Please specify running meter)

##### 6.2.2.2.1: Fencing:-

Year	Proposed Fencing Length (m)	Co-ordinates from	Co-ordinates to
1 <sup>st</sup>	439 (Around the Safetyzone of Magazine)	E= 311937 N= 2416533	E= 311905 N= 2416533
2 <sup>nd</sup>	573	E= 311905 N= 2416533	N= 312478 N= 2416536
3 <sup>rd</sup>	880	E= 311785 N= 2415842	E= 312658 N= 2415886
4 <sup>th</sup>	585	E= 311905 N= 2416533	E= 311787 N= 2416417
5 <sup>th</sup>	651	E= 312858 N= 2415896	E= 312855 N= 2416537

#### 6.2.2.2: Retaining Wall

Year	Proposed Wall Length (m)	Co-ordinates from	Co-ordinates to
1 <sup>ST</sup>	65	E = 311972 N = 2416410	E = 311929 N = 2416447
	346	E=312026 N=2416098	E= 312249 N= 2416309
	254	E=2416309 N=2416061	E= 312007 N= 2416274
2 <sup>ND</sup>	100	E=311938 N= 2416340	E= 311858 N= 2416403
3 <sup>RD</sup>	Maintenance	Maintenance	Maintenance
4 <sup>TH</sup>	Maintenance	Maintenance	Maintenance
5 <sup>TH</sup>	Maintenance	Maintenance	Maintenance

#### 6.2.2.3: Garland Drains

Year	Proposed Bund Length (m)	Co-ordinates from	Co-ordinates to
1 <sup>ST</sup>	70	E = 311973 N = 2416411	E = 311930 N = 2416450
	250	E=2416310 N=2416065	E= 312010 N= 2416277
	105	E = 311937 N = 2416338	E = 311855 N = 2416398
2 <sup>ND</sup>	Maintenance	Maintenance	Maintenance
3 <sup>RD</sup>	Maintenance	Maintenance	Maintenance
4 <sup>TH</sup>	Maintenance	Maintenance	Maintenance
5 <sup>TH</sup>	Maintenance	Maintenance	Maintenance

#### 6.2.3: Green Belt Development

##### 6.2.3.1: Cumulative work done (upto end of previous block of five years)-NIL

Sr. No	Total Expenditure Incurred up to Last Year (INR)	Area Covered (Ha)	Number of Plants	Survival Rate (%)
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##### 6.2.3.2: Year Wise Proposal (Gap Filling Plantation)

Sr. No	Year	Green Belt Location (%)	Area Proposed to be Covered (Ha)	Number of Plants Proposed	Expected Survival Rate (%)	Estimated Expenditure (INR)
1	1 <sup>st</sup>	Safety zone (MLB)	0.25	230	85%	30000
2	2 <sup>nd</sup>	Safety zone (MLB)	0.25	230	85%	30000
3	3 <sup>rd</sup>	Safety zone (MLB and Magazine)	1.52	1126	85%	80000
4	4 <sup>th</sup>	Safety zone (MLB)	0.25	230	85%	30000
5	5 <sup>th</sup>	Safety zone (MLB)	0.25	230	85%	30000

#### 6.2.4: Use of shallow pits:-Not Applicable

##### 6.2.4.1: Cumulative work done (upto end of previous block of five years)

Sr. No	Pit ID	Work Done	Area covered (m <sup>2</sup> )	Total Expenditure Incurred (up to last five year block) (INR)
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#### 6.2.4.2: Year Wise Proposal: Not Applicable

Sr. No	Year	Pit ID	Total Area (Ha)	Area Proposed for Crops (Ha)	Suitable Crops	Area Proposed for Grass (Ha)	Total Proposed Expenditure (INR)	Location (Is)	Remarks
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#### 6.2.5: PISCICULTURE:- Not Applicable

##### 6.2.5.1: Total Expenditure incurred as on Date (INR)

##### 6.2.5.2: Cumulative work done as on Date: Not Applicable

Sr. No	Pit ID	Area (m <sup>2</sup> )	Expenditure (INR)
--------	--------	------------------------	-------------------

##### 6.2.5.3: Year Wise Proposal: Not Applicable

Sr. No	Year	Pit ID	Area (m <sup>2</sup> )	Estimated Expenditure (INR)
1				
2				

##### 6.2.5.4: Source of Water for Pisciculture: Not Applicable

##### 6.2.5.5: Whether the quality of water has been assessed & found to be suitable for Pisciculture

#### 6.2.6: Recreational Facility- Not Applicable

##### 6.2.6.1: Total Expenditure Incurred (up to last five year block) (INR)

##### 6.2.6.2: Cumulative work done as on Date: Not Applicable

Sr. No	Pit ID	Area (m <sup>2</sup> )	Expenditure (INR)
--------	--------	------------------------	-------------------

##### 6.2.6.3: Year Wise Proposal: Not Applicable

Sr No	Year	Type of Recreational Facility	Area Covered (Ha)	Location	Estimated Expenditure (INR)
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#### 6.2.7: Dump Area Stabilization & Development

Sr No	Year	Dump ID	No of Terraces	Average height of Terraces (m)	Length of Top Wall (m)	Length of Gutter Drain (m)	Area Stabilized (Ha)	Method of Stabilization	Estimated Expenditure (INR)	No of Check Dams
1	1ST YEAR	WASTE DUMP-1	4	3	65	70	Nil	NA	NA	NA
2	2ND YEAR		4	4	100	105	Nil	NA	NA	NA
3	3RD YEAR		1	4	Nil	Nil	Nil	NA	NA	NA
4	4TH YEAR		1	9	Nil	Nil	Nil	NA	NA	NA
5	5TH YEAR		1	10	Nil	Nil	Nil	NA	NA	NA

#### 6.2.8: Other Form of Reclaiming the Area: - Not Proposed

##### 6.2.8.1: Cumulative work done as on Date

Sr. No	Total Expenditure incurred as on Date (INR)	Work Done
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### 6.2.9.2: Year Wise Proposal : Not Applicable

Sr. No	Year	Work Proposals	Estimated Expenditure (INR)
1	1 <sup>ST</sup> YEAR		
2	2 <sup>ND</sup> YEAR		
3	3 <sup>RD</sup> YEAR		
4	4 <sup>TH</sup> YEAR		
5	5 <sup>TH</sup> YEAR		

### 6.2.9: TOPSOIL MANAGEMENT:- Not Applicable

#### 6.2.9.1: Cumulative Work Done as on Date

Sl. No.	Top Soil Generated (m <sup>3</sup> )	Top Soil Utilized (m <sup>3</sup> )	Topsoil Stored (m <sup>3</sup> )	Total expenditure incurred as on date (₹)

#### 6.2.9.2: Year Wise Proposal:-Not Applicable

Year	Topsoil Generated (m <sup>3</sup> ) (A)	Topsoil Utilized (m <sup>3</sup> ) (B)	Topsoil Stored (m <sup>3</sup> ) (A-B)	Estimated Expenditure (INR)
1 <sup>st</sup>				
2 <sup>nd</sup>				
3 <sup>rd</sup>				
4 <sup>th</sup>				
5 <sup>th</sup>				

### 6.2.10: TAILINGS DAM MANAGEMENT:-Not Applicable

Year	Yearly generation of Tailing (m <sup>3</sup> ) (A)	Total capacity of Tailing Pond (m <sup>3</sup> )	Measures Proposed for Periodic Desilting	Yearly Utilization of Tailing (m <sup>3</sup> ) (B)	Disposal of Tailing to Tailing Pond (m <sup>3</sup> ) (A-B)	Tailing Dam Design	Structural Stability Studies
1 <sup>st</sup>							
2 <sup>nd</sup>							
3 <sup>rd</sup>							
4 <sup>th</sup>							
5 <sup>th</sup>							

### 6.2.11 LAND USE OF LEASE AREA AT THE EXPIRY OF LEASE PERIOD (CONCEPTUAL STAGE)

Total Area Degraded				Non Degraded area	Total mined out area Reclaimed and Rehabilitated			Other Areas Reclaimed and Rehabilitated			
Mined Out area in the lease	Area under Dumps (in hect)	Area under the Tailing Dam	Area under utility services (in hect)	Area under scrub/forest	Mined out Area Reclaimed but not rehabilitated (in hect)	Mined out Area fully Rehabilitated from Reclaimed area (in hect)	Area under Water Reservoir considered rehabilitated (in hect)	Stabilized Waste Dump Rehabilitated (in hect)	Virgin area under Green Belt (in hect)	Rehabilitated Area under utility services (in hect)	Rehabilitated Area under Tailing dam (in hect)
43.211	11.438 (include temporary Ore stock)	0.003	2.042	3.817	43.211 (including 3.817 ha area under scrub/forest)	0.003	0.000	11.436 (Permanent)	11.482 (12.335 ha Safety zone)	2.042	0.003

**Chapter 7: FINANCIAL ASSURANCE/ PERFORMANCE SURETY  
(AREA PUT TO USE)**

**7.1 YEAR 1-5 (Separate form for each year as below)**

**1<sup>st</sup> year**

Sl. No.	Particular	Area put to use at Start of Year (ha) (A)*	Additional Requirement (ha) (B)*	Total (ha) (C = A + B)
1	Area under Mining	0.00	4.082	4.082
2	Topsoil stacking	0.00	0.000	0.000
3	Overburden/Waste Dumping	0.00	0.354	0.354
4	Mineral Storage	0.00	7.767	7.767
5	Infrastructure (Workshop, Administrative Building, Magazine with safety zone, Parking Plaza and safety zone)	0.00	4.096	4.096
6	Roads	0.00	4.291	4.291
7	Railways	0.00	0.000	0.000
8	Tailing Pond	0.00	0.000	0.000
9	Effluent Treatment Plant	0.00	0.000	0.000
10	Mineral Separation Plant	0.00	0.957	0.957
11	Township Area	0.00	0.000	0.000
12	Others to Specify (Check Dam)	0.00	0.098	0.098
	<b>Total</b>	<b>0.00</b>	<b>21.685</b>	<b>21.685</b>

**2<sup>nd</sup> year**

Sl. No.	Particular	Area put to use at Start of Year (ha) (A)*	Additional Requirement (ha) (B)*	Total (ha) (C = A + B)
1	Area under Mining	4.082	3.257	7.339
2	Topsoil stacking	0.000		0
3	Overburden/Waste Dumping	0.354	1.160	1.514
4	Mineral Storage	7.767	(-)1.357	6.41
5	Infrastructure (Workshop, Administrative Building, Magazine with safety zone, Parking Plaza and safety zone)	4.096	0.764	4.86
6	Roads	4.291	(-)0.023	4.268
7	Railways	0.000	0.000	0
8	Tailing Pond	0.000	0.000	0
9	Effluent Treatment Plant	0.000	0.000	0
10	Mineral Separation Plant	0.957	0.000	0.957
11	Township Area	0.000	0.000	0
12	Others to Specify (Check Dam)	0.098	0.000	0.098
	<b>Total</b>	<b>21.685</b>	<b>3.801</b>	<b>25.486</b>

3<sup>rd</sup> year

Sl. No.	Particular	Area put to use at Start of Year (ha) (A) <sup>1</sup>	Additional Requirement (ha) (B) <sup>2</sup>	Total (ha) (C = A + B)
1	Area under Mining	7.329	3.787	11.126
2	Topsoil stacking	0	0	0
3	Overburden/Waste Dumping	1.554	0.590	2.144
4	Mineral Storage	5.41	(-)0.829	5.581
5	Infrastructure (Workshop, Administrative Building, Magazine with safety zone, Parking Plaza and safety zone.)	4.86	(-)1.536	3.324
6	Roads	4.268	(-)1.350	2.918
7	Railways	0	0	0
8	Tailing Pond	0	0	0
9	Effluent Treatment Plant	0	0	0
10	Mineral Separation Plant	0.957	0	0.957
11	Township Area	0	0	0
12	Others to Specify (Check Dam)	0.098	0	0.098
Total		26.486	0.662	26.148

4<sup>th</sup> year

Sl. No.	Particular	Area put to use at Start of Year (ha) (A) <sup>1</sup>	Additional Requirement (ha) (B) <sup>2</sup>	Total (ha) (C = A + B)
1	Area under Mining	11.126	0.754	11.88
2	Topsoil stacking	0	0	0
3	Overburden/Waste Dumping	2.144	0.565	2.709
4	Mineral Storage	5.581	0.664	6.245
5	Infrastructure (Workshop, Administrative Building, Magazine with safety zone, Parking Plaza and safety zone.)	3.324	0	3.324
6	Roads	2.918	0	2.918
7	Railways	0	0	0
8	Tailing Pond	0	0	0
9	Effluent Treatment Plant	0	0	0
10	Mineral Separation Plant	0.957	0	0.957
11	Township Area	0	0	0
12	Others to Specify (Check Dam)	0.098	0	0.098
Total		26.148	1.983	28.131

5<sup>th</sup> year

Sl. No.	Particular	Area put to use at Start of Year (ha) (A)	Additional Requirement (ha) (B)	Total (ha) (C = A + B)
1	Area under Mining	11.88	1.326	13.206
2	Topsoil stacking	0	0	0
3	Overburden/Waste Dumping	2.709	0	2.709
4	Mineral Storage	6.245	10.205	6.040
5	Infrastructure (Workshop, Administrative Building, Magazine with safety zone, Parking Plaza and safety zone.)	3.324	0	3.324
6	Roads	2.918	0	2.918
7	Railways	0	0	0
8	Tailing Pond	0	0	0
9	Effluent Treatment Plant	0	0	0
10	Mineral Separation Plant	0.957	0	0.957
11	Township Area	0	0	0
12	Others to Specify (Check Dam)	0.098	0	0.098
	<b>Total</b>	<b>28.131</b>	<b>1.121</b>	<b>29.252</b>

**7.2 FINANCIAL ASSURANCE:- Not Applicable****Category-A Mining Lease**

Total Area Proposed to be put to use in hect	Amount of Bank Guarantee (Lac NR)	Valid till (dd/mm/yyyy)	Upload copy of Bank Guarantee
Mineral block granted through auction therefore BiG is not applicable			

**7.3 PERFORMANCE SECURITY:-**

Lease Category (A/B)	Total Resources in tonnes for calculation of Performance Surety	Existing Performance security amount in Rs	Valid till (dd/mm/yyyy)	Upload copy of existing Performance Security
A	23921614	349547933 (To be paid)	For five years	

**APPROVED**

Regional Controller of Mines  
भारतीय खान ब्यूरो  
Indian Bureau of Mines  
धुबनगर/Dhubaneswar

**Chapter 8: Review of Previous Proposals**  
(Not applicable for fresh grant)



**8.1: General:**

**8.1.1: LEASE AREA UTILISATION**

S1. No.	Type of land use (in ha)	Area at the beginning of the proposal period	Area proposed under activity	Actual Area utilized in the proposal period	Deviation	Reasons for deviation
1	Mining					
2	Mineral Storage					
3	Mineral Beneficiation plant					
4	Township					
5	Tailing Pond					
6	Railways					
7	Roads					
8	Infrastructure (Workshop, administrative building etc.)					
9	OB/waste dump					
10	Top soil preservation					
11	Others					
12	Total area put to use					
13	Excavated area reclaimed					
14	Waste dump area reclaimed					

**8.1.2: SDF and CSR Expenditures: Not proposed in previous Approved Mining Plan.**

Activity	Proposals	Achievement	Deviation	Reasons for deviation
<p>Total expenditure incurred for implementation of SDF at mine level including:</p> <ul style="list-style-type: none"> <li>- Environment Protection</li> <li>- CSR &amp; other welfare activities in peripheral area</li> </ul> <p>(Explanation: Expenditure is not over and above the statutory levels imposed by the Government. However, THIS EXCLUDES CONTRIBUTION TO DMF &amp; NMET and is over and above the statutory levels imposed by the Government.)</p> <p>CSR (Corporate Social Responsibility) spending at the mine level in Proposal Period (as per Companies Act, 2013 or otherwise)</p>				

**8.2: Technical Details**

**8.2.1: Exploration**

Particulars	Proposals	Achievement	Deviation	Reasons for deviation
Number of Boreholes/Pits/Trenches				
Boreholes Meterage (If Boreholes seeded in first row) (m)				
Grid				
Grids Upgradation during Proposal Period as per guidelines of MEMC Rule 2015)				
Area converted under G1 from G2/G3				

### 8.2.2: Mine Development (Opencast/ Dump Mining)

Particulars	Proposed	Actual	Deviation	Reasons for deviation
<b>8.2.2.1: Generation of Ore/Waste While Development</b>				
Ore				EC for 1.5 MTPA obtained on 03.01.2020. Before to this the EC was 0.8MTPA.
Waste				
Generated Waste while ROM recovery				
Dumping Site (For Surface)				
Removal of waste/ over burden in cubic meters				
Generated Waste while ROM recovery				
Dumping site of waste/ overburden				

### 8.2.2.2: Excavation

Lateral extent	
Vertical extent	

### 8.2.3: Mining operation: Dump Mining Not Applicable

Particulars	Proposals	Achievement	Deviation	Reasons for deviation
Handling of Material				
Waste Generated post recovery				
Dumping site for waste				

### 8.2.4: Zero Waste Mining:-Not Applicable

Particulars	Proposals	Achievement	Deviation	Reasons for deviation
Alternative use / Disposal of Waste Generated (excluding top soil)	Nil			

### 8.2.5: Backfilling:-Not Applicable

Particulars	Proposals	Achievement	Deviation	Reasons for deviation
Site (Co-ordinates)				
Area				
Depth				
Volume Backfilled (CuM)				
Backfilled Area available for Reclamation and Rehabilitation				
Backfilled Area Reclaimed and Rehabilitated				
Balance Backfilled Area				

### 8.2.6: Production of Mineral(s):

Particulars	Proposals	Achievement	Deviation	Reasons for deviation
<b>8.2.6.1: ROM</b>				
Opencast				
<b>8.2.6.2: Cleaned Ore</b>				
Opencast				
Dump Mining	NA	NA	NA	
Recovery from Mineral Rejects or Tailings	---	---	---	
Total				

### 8.2.7: Handling of Mineral Rejects/ Sub-Grade

Particulars	Proposals	Achievement	Deviation	Reasons for deviation
<b>Generation of mineral rejects</b>				
Opencast				
Dump mining				
Other recovery				
Stacking of mineral rejects/ sub-grade mining				
Blending of mineral rejects/ sub-grade				

### 8.2.8: Environment Compliances

Particulars	Proposals	Achievement	Deviation	Reasons for deviation
<b>8.2.8.1: Top soil - Not Applicable</b>				
Generation				
Utilization				
Stacking / Dump (d)				
Reclamation				
Rehabilitation				

### 8.2.8.2: Afforestation (Dumps/Benches/Backfilled Area etc.): - Not Applicable


### 8.2.8.3: Afforestation (Green Belt)


Construction of check dams	No Proposal			
Construction of garland drains				
Construction of retaining walls				

### 8.2.8.4: Tailings:- Not Applicable

Generation				
Utilization (Auto 1:1 from production)				
Disposal				

### 8.3: Socio-Economic Review:-

#### 8.3.1: Rehabilitation & Resettlement for Project Affected People

Particulars	Proposals	Actual	Deviation	Reasons for deviation
No. of Project Affected People (PAP)				
%age of PAP for whom alternate arrangements made for sustained livelihood				
% of project affected families given employment				
% of project affected families who have been skilled by the lessee and absorbed (% of total employment given to				

affected families)

**8.3.2: Grievance Redressal**

Grievances Received

Grievances Redressed

**8.3.3: Welfare and socio-economic development programs for local communities**

**8.3.3.1: Support for Drinking Water & Agriculture**

No. of Water Storage Tanks constructed

Drinking Water Facilities provided (Bore wells/ Pumps etc.)

Irrigation Support provided (Canals/ Pumps etc.)

No. of Water tanks De-silted

Water Treatment facilities provided (AWA)

Amount of Water treated (in kl) (if selected A in above)

**8.3.3.2: Support to Health & Medical Services**

No. of persons identified from Occupational health diseases

No. of Health Camps/ Medicine Camps Organized

**8.3.3.3: Support to Skill development & Education**

Vocational Training Provided/ Support Provided

No. of employees undergone Vocational training

No. of other persons undergone Vocational training

Number of Literacy & Education Camps held/ Supported

**8.3.3.4: Support to Transportation Services & Infrastructure**

Expenditure on Transportation Services & Infrastructure Road development (m) in the peripheral area (not lease area)

No. of Public transport support provided (Ambulance/Buses/ School Vans etc.)

**8.3.3.5: Swatchata Programs: Creating/providing sanitation and healthy condition in and around the mine area**

Adoption of ODF within mining lease area

No. of Toilets built in the Lease Area

Adoption of ODF in nearby villages

No. of Toilets built in the villages

Provision for greenage recreational facility (Within Lease Area/ Outside)

Recreational Area Type (Picnic Spot/ tracks/ Park Etc)

Area covered (For within Lease Area or y)

Awareness program among Mine workers for Swatchata

No. of Swatchata Programmes held

## CHAPTER 9: IMPACT ASSESSMENT (FOR FRESH GRANT)

### 9.1: BASELINE INFORMATION

Whether Area falls under Forest:	(Yes)
Whether Area falls under Wildlife Sanctuary	(No)
Whether Area falls under Coastal Regulation Zone (CRZ);	(No)
Whether Area falls under Defense land	(No)
Any Other Clearance (specify)	(No)

Any Significant Objections from any Agency Involved in Stakeholder's Consultation - No

### 9.2: ENVIRONMENT PARAMETERS-

#### Air Environment:

The principal objective of the Ambient Air Quality Monitoring (AAQM) is to assess the existing ambient air quality in and around the project area. The ambient air quality depends upon the emission sources, meteorological conditions and the background concentration of specific contaminants.

The following parameters were analyzed at the selected locations in the study area.

- ❖ Particulate Matter (PM10)
- ❖ Particulate Matter (PM2.5)
- ❖ Sulphur Dioxide
- ❖ Oxides of Nitrogen
- ❖ Carbon Monoxide

#### Water Environment:

##### Major parameters for surface water (IS:2296)

Sl.No	Parameter	Unit
1	pH	
2	DO	mg/l
3	BOD	mg/l
4	COD	mg/l
5	Arsenic	
6	Fluoride	mg/l
7	Total Dissolved Solid	mg/l
8	Heavy metals Fe, Ni, Cd	mg/l

##### Major parameters for Ground water (IS:10500)

Sl.No	PHYSICAL	Unit
1	pH	mg/l
2	Total Hardness	mg/l
3	Fluoride	mg/l
4	Chloride	mg/l
5	Total Dissolved solids	mg/l
6	Turbidity	mg/l
7	Heavy metals	mg/l

## Noise Environment

Noise monitoring will be done during the baseline environmental study period. 24 hrs continuous monitoring will be carried out and average noise level for day and night will be produced.

### 9.2.1: Environmental Monitoring-

Base line study already covered	Study area	Data Collection interval	Information collected from and purpose
Ambient Air Quality	Two in predominant down ward wind direction within 500m of the ML area, and one in direction within 500m of the ML area. (Continuous monitoring)		
Surface water (Quarterly)	Water sample analysis from two different sampling locations in buffer zone (Quarterly)		
Ground water (6 monthly)	Ground Water sample analysis from three different locations, one in the core and two buffer zone; analysis as per IS 10500.		
Noise level (Monthly)	Two different locations in buffer and One location in core zone.	Monthly	Core and buffer zone to assess the Noise level.
Soil quality (Annual)	Two different locations in core and buffer zone.( Once in a year)		Core & Buffer

#### 9.2.1.1: Ambient Air Quality-

Core Zone (Quarterly Monitoring Planned)	Yes Two nos.
LOCATION	E= 318261 N= 24123'5 E= 319094 N= 24119'1
Buffer Zone (Quarterly Monitoring Planned)	Yes, 5NOS in predominant down ward wind direction
LOCATION	(TENZA) E = 316432, N= 2415006 (RAIKELA) E= 317651 N= 2415763 (DENGULA) E= 320945, N= 2415770 (TENTULIDIHI) E= 322137, N= 2415692 (KENSARA) E= 320641, N = 2409705

#### 9.2.1.2: Water Quality-

Core Zone (Quarterly Monitoring Planned)	No
Buffer Zone (Quarterly Monitoring Planned)	Three nos for surface water and three nos for ground water
	Ground Water (TENZA) E = 316432, N= 2416006 (RAIKELA) E= 317651, N= 2415763 (DENGULA) E= 320945, N= 2415770 Surface Water (SW1) E= 316393 N= 2413099 (SW2) E= 314698 N= 2409863 (SW3) E= 319177, N= 2410724

**9.2.1.3: Noise Level-**

Core Zone (Quarterly Monitoring Planned)	Two nos.
LOCATION	E= 319261,N= 2412315 E= 319094,N= 2411911
Buffer Zone (Quarterly Monitoring Planned)	Five no.
LOCATION	(TENZA) E = 316432,N= 2416036 (RAIKELA) E= 317551,N= 2415763 (DENGULA) E= 320945,N= 2415770 (TENTULIDIHI) E= 322137,N= 2415692 (KENSARA)E= 320641 N= 2409706

**9.3: IMPACT ASSESSMENT****9.3.2: LAND ENVIRONMENT**

9.3.2.1: BASE / PRESENT STATUS	
Pre Mining Use	Area(Ha)
Barren / Waste land with small bushes & shrubs	
Land under Agriculture / Crops	
Land covered with Plants	
Land under Grass Cover	
Land under Public Infrastructure / Jt lines (water bodies, roads, railways, electric lines telephone lines etc.)	
Land Under Habitat on	
Land under Monuments & places of historical importance	
Degraded by Pits & Excavation	
Degraded by Dumps & Material Staking	
Covered under Mine Infrastructure (plants, shades, buildings etc.)	Nil
Land under Forest	60.508
Historically, Culturally & Ecologically Important Places	
Any Other, please specify below	Nil
Date of Observation	

9.3.2.2: ANTICIPATED IMPACT	
Post Mining Use	Area(Ha)
Degradation by Excavation	14.630
Degradation by Dumps & Material Staking	9.131
Covered under Plants, Shades & Buildings	4.182
Covered by Roads & Approaches	3.595
Any Other, please specify below ( Safety zone)	2.335
Area left undisturbed	26.636

**9.3.2.3: MITIGATION MEASURES****9.3.2.3.1: Backfilling -**

Not Applicable during plan period

**9.3.2.3.2: Area proposed to be covered by Plantation in Backfilled Area -**

Not Applicable during plan period

**9.3.2.3.3: Proposed Area under Agriculture -**

No agricultural land in core zone. However, agricultural land in buffer area will be preserved from siltation by retaining wall, check dams, garland drain and settling ponds

#### 9.3.2.3.4: Proposed Area to be converted to Grazing Land -

Not Applicable during plan period

#### 9.3.2.3.5: Ground Water Recharging -

Rain water harvesting pond and roof top rain water harvesting management plan are being implemented

#### 9.3.2.3.6: Green Belt Development \*

The total ML area comes under reserve forest. Presently the entire area is covered with dense forest. The plan period will visualize gap plantation based on the dominance and suitability of area.

#### 9.3.2.3.7: Agriculture \*

Not Applicable during plan period

### 9.3.3: Air Environment

#### 9.3.3.1: Climate & Meteorology (Please provide average of 10 years)

Temperature (°C)		Relative Humidity (%)	Average Rainfall (mm)
Maximum	Minimum		
48	9	66% - Max 38 % - Min	1325

#### 9.3.3.2: Air Quality Details for Base line Information / Present Status

S r N o	Station Name	Season	PM10 (µg/m <sup>3</sup> )	PM10 Excess (µg/m <sup>3</sup> )	PM2.5 (µg/m <sup>3</sup> )	PM2.5 Excess (µg/m <sup>3</sup> )	SO <sub>2</sub> Value (µg/m <sup>3</sup> )	SO <sub>2</sub> Excess (µg/m <sup>3</sup> )	NO <sub>x</sub> Value (µg/m <sup>3</sup> )	NO <sub>x</sub> Excess (µg/m <sup>3</sup> )	Date of Observation	Action
1	The ambient air quality analysis will be produced after conduction of baseline studies. 8 no. of locations will be selected in predominant wind direction and environmentally sensitive areas.											

#### 9.3.3.3: Impact Assessment & Mitigation Measures

##### 9.3.3.3.1: Anticipated Impact (Give details on Prediction of fugitive dust emissions due to mining activities, crushing & cleaning plants, loading & unloading, transportation by rail, road or conveyor)

Sl no	Particulars	Unit	TSP (g/s)	NO <sub>x</sub> (g/s)	CO (g/s)
1	Mining				
a)	Excavation	370 TPH	2.11		
b)	Drilling	1 in 5 days	0.05		
3	Crushing	370 TPH	0.41		
4	Screening	370 TPH	0.4		
5	Transportation by road	0.06 g/s per vehicle	0.6	0.348	0.15

**9.3.3.3.2: Mitigation Measure Give details on measures to reduce the emissions of pollutants during mining, loading, unloading, transportation, drilling, blasting, crushing etc. to maintain the air quality**

CRITERIA	MITIGATION MEASURES
Drilling Operation	<ul style="list-style-type: none"> <li>❖ Drilling with dust extractors, usage of sharp drill bits and use of water jet for dousing the cuttings.</li> <li>❖ Usage of Drill bits in good condition</li> <li>❖ Proper maintenance of drills.</li> <li>❖ Provision of PPE's including nose mask to the workers engaged in the operation</li> <li>❖ Proposed new drills will also be fitted with dust extraction system along with wetting provision.</li> </ul>
Blasting Operation	<ul style="list-style-type: none"> <li>❖ Controlled blasting method will be practiced by controlled and delay explosion</li> <li>❖ To control ground vibrations and arrest fly rocks, advanced initiation system of NONEL is being used for blasting, etc.</li> <li>❖ Ground vibrations are also being monitored and the results are well within the norms.</li> <li>❖ Blasting with safe and optimum blast design patterns for future enhanced working will be followed.</li> </ul>
Extraction of ore and waste by Excavator, Loading operation.	<ul style="list-style-type: none"> <li>❖ Use of sharp teeth for shovels and other soil excavation equipment, and their periodical replacements</li> <li>❖ Provision of dust filters / mask to workers working at highly dust prone and affected areas, etc.</li> </ul>
Iron ore/waste transportation, movement of vehicles	<ul style="list-style-type: none"> <li>❖ Regular water sprinkling is being carried out by mobile water tankers on the mine benches, mine haul, loading and unloading points and transfer for dust suppressions</li> <li>❖ Fixed - auto water sprinkling arrangement system on the main haul road for effective dust suppression.</li> <li>❖ Provision for wheel wash system will be implemented</li> <li>❖ Ensuring that all mineral trucks are covered by tarpaulin.</li> <li>❖ No overloading of trucks by having Quick Dispatch system at the weigh bridge cum dispatch gate. Besides, this system is also provided with dry fog.</li> <li>❖ Provision of additional fixed - auto water sprinkling arrangement system for effective dust suppression</li> </ul>
Crushing & screening operation	<ul style="list-style-type: none"> <li>❖ Dry fogging system for crusher &amp; screen plants and hoods over the belt conveyors are provided.</li> <li>❖ All the conveyor belts of hooded with GI sheets.</li> <li>❖ Loading &amp; unloading points are equipped with water sprinkling arrangement system.</li> <li>❖ Fixed Sprinkling system has been provided along processing area.</li> <li>❖ The proposed additional crushers, screening plant will also be provided with enclosure all around the loading and discharge point, enclosing of conveyors, provision of dry fog system in all the feeding and discharge points.</li> </ul>

### 9.3.4: Water Environment-

#### 9.3.4.1: RAIN WATER

##### 9.3.4.1.1: Base / Present Status (Details of Rivers, Springs, Lakes, Reservoirs & Drains up to First Order in Study Area)

The project area is having undulating hilly terrain and poor permeability. The depth of water level below ground level varies depending on the local topography, geology & hydrological conditions. The nearest surface water source is Kuradi River which is flowing 6.3 km away from the western side of the mining lease. Kuradi River is the major 1<sup>st</sup> order drainage system of the area.

##### 9.3.4.1.2: Anticipated Impact (Impact on Surface Water Bodies / Groundwater Table Regime / Streams / Lake / Springs due to Mining, to be Assessed from Hydro-geological Study Give details about impact on vegetation)

The effluent from workshop and HEMM will be passed through Oil and Grease tank, equalization tank and filtration tank. The treated water will be used in dust suppression and green belt area. No effluent will be discharged outside the lease area. No anticipated impact on natural water course.

Garland drains & retaining walls will be constructed all around the dumps and plantation of native species will be carried out on the dump slopes to minimize erosion. A settling pond will be constructed to arrest silt and sediment flows from mining area during rain fall and the water so collected is being utilized for the mine area, roads, green belt development etc.

The mining area is devoid of any vegetation. Shrubs and bushes are sporadically distributed in the lease area. There will be no impact on vegetation due to proposed mining activities.

##### 9.3.4.1.3: Mitigation Measure (Possibilities of Rain Water Harvesting & Artificial Recharge with In the Mining Lease)

200 cum/day ground water is required for mining activities. To compensate the drawl of ground water Rain water harvesting structures and roof top rain water harvesting will be constructed.

#### 9.3.4.2: WATER BODY

##### 9.3.4.2.1: Base / Present Status\* (Water Bodies Existing & Water Bodies likely to be created due to Mining Activities & their Water Holding Capacity)

At present there is no existing water body, the mining activity will be carried out in such a manner which won't create any crater for water body creation.

##### 9.3.4.2.2: Anticipated Impact (Ingress of Sea Water, Particularly for Mining Projects in Coastal Areas)

Not anticipated, Area not within CRZ.

##### 9.3.4.2.3: Mitigation Measure (Steps to Minimize Impact on Water Table if Mining Intercepts Groundwater Regime)

Water table BGL is 5.30m-7.30m so there is very less probability in puncture of water table.

### 9.3.4.3: WATER BALANCE

#### 9.3.4.3.1: Base / Present Status (Water Balance (Withdrawal of Surface Water & Release of Mine Drainage Water) Water Requirement & Waste Water Generation from various Activities of Mine, including Beneficiation)

At present 200 cum/day water is required for mining operations. The required quantity will be drawn from ground water sources.

Sl. No	Purpose	Ground Water (KLD)	Recycled STP & ETP (KLD)	Total from all source
1	Dust Suppression	131	11.5	142.5
2	Domestic Use	24.5		24.5
3	Plantation	16.3	8.2	24.5
4	FTP & Workshop, Wheel Washing System	8.5		8.5
Total		180.3	19.7	200

The area experiences high rainfall, the site will generate above volume of run offs during such rainy periods. The surface run off from the uncovered site would contain high concentration of suspended matter and eroded matter which will be checked through retaining wall, check dams and settling ponds.

#### 9.3.4.3.2: Anticipated Impact (Impact of Water Drawl on Surface & Groundwater Resources Impact on Surface & Groundwater Quality due to Discharges from Mining, Tailings Pond, Workshop, Township, & Leachate from Solid Waste Dumps etc)

The effluent from workshop and HEMM will be passed through Oil and Grease tank, equalization tank and filtration tank. The treated water will be used in dust suppression and green belt area. No effluent will be discharged outside the lease area. No anticipated impact on natural water course.

Garland drains & retaining walls will be constructed all around the dumps and plantation of native species will be carried out on the dump slopes to minimize erosion. A settling pond will be constructed to arrest silt and sediment flows from mining operations and dumps and the water so collected is being utilized for the mine area, roads, green belt development etc.

#### 9.3.4.3.3: Mitigation Measure (Construction of Check Dams, Sedimentation Ponds, Settling Tanks, Retaining Walls etc. with Design & Site Features for Control of run-off Mine Water Treatment for Meeting the Prescribed Standard Waste Water Treatment for Township Sewage, Workshop(s), Tailing Pond Overflow etc)

- Wash off/runoff from the mine workings is and will be regulated using various runoff management structures.
- Presently, during rainy season, the water collected in the mine area is drained to the sump floor of each quarry. The sump acts as a good rainwater recharge structure and the collected rainwater normally seeps into the ground within few days.

- Retaining wall of 765 m, garland drain of 425 m, check dam of 112m & 3 no of settling ponds will be constructed in and around the dump and at strategic points of quarries

Year	Retaining wall			Garland drain			Check dam			Settling pond (nos)		
	L(m)	W(m)	H(m)	L(m)	W(m)	D(m)	L(m)	W(m)	D(m)	L(m)	W(m)	D(m)
1 <sup>st</sup> year	685	1	2	320	1	1.5	430		1.5	0	9	
2 <sup>nd</sup> year	130	1	2	135		5	Maintenance			10	8	
3 <sup>rd</sup> year							Maintenance					
4 <sup>th</sup> year							Maintenance					
5 <sup>th</sup> year							Maintenance					

### 9.3.5: NOISE

#### 9.3.5.1: Critical Locations Identified within Lease Area \*

No critical locations identified within lease area.

#### 9.3.5.2: Give Detail about Prediction of Noise Level by using Mathematical Modeling at Different Locations Identified \*

Noise level monitoring will be carried out continuously for 24 hours with one hour interval starting at 06.00 hrs to 06.00 hrs next day. During each hour, Leq were directly computed by the instrument based on the sound pressure levels. Lday (Ld), Lnight (Ln) and Ldn values were computed using corresponding hourly Leq of day and night respectively.

Noise levels recorded at each station with a time interval of about 60 minutes are computed for equivalent noise levels.

Equivalent noise level is a single number descriptor for describing time varying noise levels. The equivalent noise level is defined mathematically as

$$Leq = 10 \log L / T \sum (10L_n / 10)$$

Where, L = Sound pressure level at function of time dB (A)

T = Time interval of observation

Mathematically Ldn is given by

$$Ldn = 10 \log \{ 1/24 (16 \times 10(Ld/10) + 8 \times 10(Ln/10)) \}$$

Where Ld = A weighed equivalent for day time period (8am-10 pm)

Ln = A weighed equivalent for night time period (10 pm to 6 am)

#### 9.3.5.3: Measures to Minimize the Impact on Receiving Environment \*

The safety zone has been planted with green belt for noise attenuation.

Every noise generating equipment is fixed with acoustic enclosures

#### 9.3.5.4: Noise Details for Base / Present Status

Sl. No	Station Name	Season	Type of Area	Noise At Day Time:	Excess Noise At Day	Noise At Night Time:	Excess Noise at Night	Date of Observation
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The noise monitoring report will be produced after conduction of baseline studies. 6 no. of locations will be selected in environmentally sensitive areas and equivalent noise level will be monitored..

### 9.3.5.5: Impact Assessment & Mitigation Measures

#### 9.3.5.5.1: Anticipated Impact (Give details on impact on ambient noise level due to rock excavation, transportation, processing equipment's & ancillaries)

Blasting drilling, movement of vehicles, crushing, screening also produce considerable magnitude of noise. The main sources of noise and expected levels are given below:

Sl. No	Source	Inside cabin	Noise level in dB(A) at 10m from source
1	Shovel/Excavator	84-91	59-68
2	Dumpers/Tippers	87-96	75-85
3	Drill	88-95	75-83
4	Dozer	80-92	65-70
5	Crushing & Screening	85-95	75-85

Prolonged exposure to a high noise level is harmful to the human auditory system and can create mental fatigue, increase blood pressure, rebellious attitude, annoyance and carelessness, which may lead to neglect of work and also result in accidents.

Noise Levels	Adverse Effects
20-50 dB(A)	Speech impairment and annoyance
50-90 dB(A)	Hearing impairment for eight hour exposures
90-115 dB(A)	Partial deafness and nervous irritability
> 115 dB(A)	Permanent deafness
Impulsive noise (>90dB)	Frightens livestock grazing in the nearby areas

For every doubling of distance, the sound level reduces by 6 decibels (dB), and adequate green belt coverage will reduce it further; hence noise will hardly reach nearby villages.

#### 9.3.5.5.2: Mitigation Measure (Give details on measures for noise abatement including point source & line source)

- Planting trees at various places within the lease area to act as acoustic barriers.
- Proper and regular maintenance of vehicles, machinery and other equipment. All HEMM are monitored for any abnormal sound and rectified with due precaution by maintenance personnel.
- Providing in-built mechanism for reducing sound emissions.
- Providing Sound proof operator's cabin for equipment's like dumpers, shovel, tipplers, etc.
- The safe blasting practices are done and the vibrations and noise are recorded on daily basis by vibrometer.
- The Noise levels are being controlled by maintaining equipment properly, Green belt development.
- Existing DG's are provided with Acoustic sound proof and proper maintenance is carried out.
- Regular noise monitoring is carried out and the observations are within limits.
- Providing workers with earmuffs & earplugs, as a protection from exposed to higher noise level.
- Conducting regular health check-up of workers including Audiometry test for the workers engaged in noise prone area.
- Displaying the noise level status of operational machinery on the machines to know the extent of noise level and to control the time to which the worker is exposed to higher noise levels.

### 9.3.6: VIBRATION

#### 9.3.6.1: Vibration Details for Base / Present Status

S.no	Station	Season	Distance from Blasting Site(m)	Peak Particle Velocity(mm/sec)	Air over Pressure(DB)	Frequency (Hz)	Date of Observation
Blasting vibration study will be carried out from a national institution during baseline period and the details will be provided.							

**9.3.6.2.1: Anticipated Impact (Give details on impact of vibrations including damage to materials/structures due to blasting)**

Depending upon type of structure and dominant frequency, the peak particle velocity (PPV) should not exceed respective frequency.

Type of Structure	Dominant excitation frequency (Hz)		
	<8 Hz	8-25 Hz	>25 Hz
(A) Buildings/Structures not belonging to the owner			
1. Domestic houses/structures (Kuchha, brick and cement)	5	10	15
2. Industrial building	10	20	25
3. Objects of historical importance and sensitive structures	2	5	10
(B) Building belonging to owner with limited span of life			
1. Domestic houses/structures (Kuchha, brick & cement)	10	15	25
2. Industrial building (RCC and framed structures)	15	25	30

**9.3.6.2.2: Mitigation Measure (Give details on measures for noise abatement including point source & line source)**

- In loose and fractured rock mass, explosive added with additives may be used
- Proper burden and spacing should be maintained according to the bench height.
- Length of stemming column should be greater than 0.6 times the burden. For better protection, it may be taken as greater than or equal to the burden.
- Angular hole may be drilled in conformity with the slope of the bench.
- As far as possible, holes should be located beyond weak zones.
- Burden and spacing should be marked by a responsible person with the help of a surveyor, taking the condition of the face and fractures into consideration.
- Before loading, blasting officials will always check the hole depths and ensure that the holes are drilled as per the blast design.
- All loose pieces of rock from the blasting site will be cleared before charging.
- Stemming of holes is very important. All the holes should be properly stemmed using 6-8 mm size stone chips along with drill cuttings.

**9.3.7: SOCIO-ECONOMIC ENVIRONMENT**

**9.3.7.1: Demographic Profile**

**9.3.7.1.1: Anticipated Impact (Give details about impact on the cropping pattern & crop productivity in the core zone)**

There is no agricultural land within core zone.

**9.3.7.1.2: Mitigation Measure (Give details about compensation for loss of land & crops)**

Not Applicable.

### 9.3.7.2: Traditional Skills & Source of Livelihood-

#### 9.3.7.2.1: Base / Present Status (Give details about present status on traditional skills & source of livelihood)

Name	No of HH	TOT Pop	Per/ HH	TOT Work Pop	Working Pop %	Tot Work Male	Tot Working Female	Main Work Pop	Main Cultivator Person	Main HH Per	Non Work Per	Non-Working Pop%	
Tensa	376	1617	4	442	27	379	63	297	29	1	8	1175	73
Tentuldih	115	475	4	151	32	134	17	149	35	0	0	324	58
Tant gram	376	1568	4	618	39	452	166	260	32	29	9	950	61
Kensara	21	72	3	53	74	25	28	5	1	0	0	19	26

Agriculture and allied activities like selling of forest products were the main source of livelihood of inhabitants of the area. The mining operation became a prominent intervention in the livelihood system of local population in this region. Thus at present the livelihood of this region is mining and allied activities.

#### 9.3.7.2.2: Anticipated Impact (Give details about positive & negative impacts on present status of livelihood in the area)

It is seen that shifting of occupation among the local population is mostly towards mining and its related work. Mining leads to livelihood gain through creation of employment opportunities in the region. Loss of cultivable land and forest land due to mining activities which invites change in their native profession and may envisage involuntary migration of population to other region for livelihood.

#### 9.3.7.2.3: Mitigation Measure (Give details about training to locals for employment in the project training for making them self-employable or elsewhere)

This working mine has brought tremendous benefits in the area like:

- Direct employment opportunities for more than 259 persons.
- Indirect employment for more than 250 persons through various service related activities connected with the project operations.
- Improvements in infrastructure in the area like Infrastructure development Road Network, Water supply to villages through Water tankers & overhead tanks with pipe lines, Electricity facilitation, Healthcare, Education, Other Social Welfare activities.
- Improvement of the general living standard of the people in the vicinity.
- Generation of self-employment through self-help groups.
- Improvement in per capita income.
- Benefits from CSR activities, vocational training, adaptation of educational institutes and villages.

This working mining project has immensely benefitted this region in the field of potential employment, improved per capita income, improved social welfare, education, medical healthcare systems, communication, infrastructural build-up, etc.

### 9.3.7.3: Economic Profile of the Population in Core & Buffer Zone

#### 9.3.7.3.1: Base/ Present Status (Give details about economic profile of the population in core & buffer zone)

In the core zone no habitation exists. Hence, economic profile of population within core zone is not envisaged. In buffer zone, this project will help in direct employment opportunities for 259 persons and indirect employment for more than 250 persons through various service related activities connected with the project operations.

**9.3.7.3.2: Anticipated Impact (Give details about impact on community resources such as grazing and)**

There will be no impact on any community resources.

**9.3.7.3.3: Mitigation Measure (Give details about employment opportunities & access to other amenities such as education, health care facilities to be extended to locals, addressing local unemployment, tourism or recreation opportunities, efforts for sustainable development of the local community)**

As about 500 persons will be engaged directly and indirectly, which will increase their financial status. Regular health care camps, will decrease disease and improve their health conditions construction of infrastructure like roads will attract tourism and hotel industry, vocational training and better educational facilities will bring sustainable development in the area

**9.3.7.4: Human Settlement in Core & Buffer Zone**

**9.3.7.4.1: Base / Present Status (Give details about human settlement in core & buffer zone)**

There is no human settlement within the core zone. In buffer zone within 5 km radius the following villages with human settlement are given:

Name	No of HH	TOT Pop	Per HH	TOT Work Pop	Working Pop %	TOT Work Male	TOT WORKING Female	Main Work Pop	Main Cultivator	Main Agri Person	Main HH Per	Non Work Per	Non-Working Pop%
Tensa	376	1617	4	442	27	379	63	297	29	1	8	1175	73
Tentuld h	125	475	4	151	32	134	17	149	85	0	0	324	68
Tentigram	376	1568	4	618	39	452	166	260	32	29	9	950	51
Kensara	21	72	3	53	74	25	28	5	1	0	0	19	26

**9.3.7.4.2: Anticipated Impact (Give details about any displacement of human settlements during the life of the mine)**

There is no settlement within the lease area. So, displacement or rehabilitation and resettlement is not envisaged

**9.3.7.4.3: Mitigation Measure (Give details about rehabilitation & resettlement of land owners & displaced people)**

Not applicable

**9.3.7.5: Health Profile of Population in Core & Buffer Zone**

**9.3.7.5.1: Base / Present Status (Give details about health profile of population in core & buffer zone)**

The area is endemic to malaria Malnutrition among children, and child mortality is high due to traditional treatment.

**9.3.7.5.2: Anticipated Impact (Give details about any adverse impact on the general health condition of the population in core & buffer zone)**

Stagnation of water may cause breeding ground for mosquitoes and other vector borne disease carriers  
Expose to dust may cause respiratory diseases

**9.3.7.5.3: Mitigation Measure \*(Give details about avenues like dispensaries, hospitals, maternity homes if any to be created)**

Regular dewatering of pits drains will reduce mosquito breeding. regular sprinkling of water will reduce dust emission Health checkup camps for workers and nearby villages will reduce the chance of health related problems and will create awareness towards health care hygiene and nutrition

**9.3.7.6: Historically, Culturally & Ecologically Important Places in Core & Buffer Zone-**

**9.3.7.6.1: Base / Present Status\*(Give details about historically, culturally & ecologically important places in core & buffer zone)**

There are no historically, culturally & ecologically important places in core & buffer zone of the mines

**9.3.7.6.2: Anticipated Impact \*(Give details about risk profiling)**

Not applicable

**9.3.7.6.3: Mitigation Measure \*(Give details about public health benefits (e.g. clean water to aboriginal community), measure for safeguard against damage etc.)**

Not applicable



# **PRADEEPT MOHAPATRA**

**(QUALIFIED PERSON)**

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## **CERTIFICATE FROM QUALIFIED PERSON**

The provisions of the Mineral Conservation and Development Rules 2017 have been observed in the preparation of Mining Plan for Dholtapahar Iron Ore Block over an area of 60.508 Ha., of Sri Debabrat Behera, in Sarkanda Reserve Forest, ps-Koira under Sundargarh district Odisha State and whenever specific permissions are required, the applicant will approach the concerned authorities of Indian Bureau of Mines.

The information furnished in the Mining Plan is true and correct to the best of our knowledge.

**Place: Cuttack**  
**Date: 30.12.2021**

**PRADEEPT MOHAPATRA** Date: 2021.12.30  
A 10:19:24 +05'30'  
**Pradeept Mohapatra**  
**(Qualified Person)**



## **KASHVI POWER & STEEL PVT. LTD.**

Regd. Office : 1234-F, Gobindprasad, Bomkhal, Bhubaneswar - 751010, Odisha, India  
Tel/Fax : 0674-2549944, E-mail : groupkashvi@gmail.com  
CIN : U40100OR2009PTC011341

### **CONSENT LETTER/ UNDERTAKING /CERTIFICATE FORM THE LESSEE**

1.0 The Mining Plan in respect of Dholta Pahar Iron Ore Block over an area of 60.508Ha of M/s Kashvi Power and Steel pvt Ltd, near Dengula Village, P.S/Tahasil-Koira, District Sundargarh, State Odisha under rule 16 of MCR 2016 has been prepared by qualified person Shri Pradeept Mohapatra, M.Sc (Geology) having professional experiences of more than five years of working in the field of mining after obtaining the Degree as per Rule 15 of MCR, 2016.

This is to request the Regional Controller of Mines, Indian Bureau of Mines, Bhubaneswar, to make any further correspondence regarding any correction of the Mining Plan with the said qualified person at his address below:-

<b>Sri Pradeept Mohapatra</b>
World Consultancy Services
Plot No -766,
Konark Centre Office Premises, Beside NH- 16,
2nd Floor, Above Usha International, Telengapentha,
Cuttack - 754001
Mob: 9438149715 / 7978724154
E mail: pmohapatra_07@yahoo.com

I hereby undertake that all modification/ updating as made in the said Mining Plan by the said qualified person be deemed to have been made with my knowledge and consent and shall be acceptable on me and binding in all respects.

2.0 It is certified that the CCOM Circular No-2/2010 will be implemented and complied with when an authorized agency is approved by the State Government.



## KASHVI POWER & STEEL PVT. LTD.

Regd. Office: 1234-P, Gobindprasad, Bomikhal, Bhubaneswar - 751010, Odisha, India  
Tel/Fax: 0674-2549944, E-mail: groupkashvi@gmail.com  
CIN: U40100OR2008PTC011341

3.0 It is certified that the Progressive Mine Closure Plan in respect of Dholta Pahar Iron ore block over an area of 60.508 Ha, near Dengula Village, P.S/Tahasil- Koirā, District Sundargarh, State Odisha complies with all Statutory rules, Regulations, Orders made by the Central or State Government, Statutory organization, Court etc. which have been taken into consideration and wherever any specific permission is required the will approach the concerned authorities.

The information furnished in the Progressive Mine Closure Plan is true and correct to the best of my knowledge and records.

4.0 The provisions of Mines Act, Rules and Regulations made there under have been observed in the preparation of Mining Plan over an area of 60.508Ha, near Dengula village P.S/Tahasil- Koirā District- Sundargarh, State-Odisha belonging to Dholta Pahar Iron ore block, and where specific permissions are required, the applicant will approach the D.G.M.S. Further standards prescribed by D.G.M.S. in respect of miners' health will be strictly implemented.

Place: Bhubaneswar

Date: 07.12.2021

Kashvi Power And Steel Pvt. Ltd.

*Devi Ranjan*  
Managing Director  
Managing Director

M/s Kashvi Power & Steel Pvt Ltd.

