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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

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

Phone No: 9438149715

Approved vide letter no:
MP/PA/21-OSD/BAHU/2021-22
Dated 11.01.2022

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PART: A

Index

CHAPTER	PARTICULARS	PAGE NO.
	INTRODUCTORY NOTE	3 - 4
	MINING PLAN AT A GLANCE	5 - 6
CHAPTER 1	GENERAL INFORMATION	7 - 9
CHAPTER 2	GEOLOGY & EXPLORATION	10 - 30
CHAPTER 3	MINERAL PROCESSING	31 - 33
CHAPTER 4	MINING OPERATIONS	34 – 43
CHAPTER 5	SUSTAINABLE MINING	44 – 49
CHAPTER 6	PROGRESSIVE MINE CLOUSER PLAN	50 – 53
CHAPTER 7	FINANCIAL ASSURANCE/ PERFORMANCE SURETY	54 – 56
CHAPTER 8	REVIEW OF PREVIOUS PROPOSALS	57 – 60
CHAPTER 9	IMPACT ASSESSMENT	61 - 73

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 **Dholta 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 **Dholta 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	Online application for Forest clearance has been submitted on dt.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 CTE 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 spongeiron, 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 Kashvi Power & Steel Ltd.
2	IBM Registration no.	IBM/7815/2011
3	Address of lessee	Plot No 1234/P, Govinda Prasad, Bomikhal, Bhubaneswar
4	Name of Mine	Dholtapahar Iron Ore Block
5	Mine code	Not Obtained
6	Lease area in hects.	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 50years W.E.F date of execution of lease deed
10	Plan proposal period.	5year w.e.f date of execution of lease deed
11	Mineral Reserve(111,121&122) in tonnes	111-0 121-0 122- 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 – 20.008 Un – explored area -Nil Total – 60.508
16	Exploration proposal Year wise No. of Bore Holes	1st year - 21nos 2nd year – 21 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
26	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	29.252
28	Bank Guarantee Amount Rs	Not Applicable
29	Validity pf BG up to	Not Applicable

DEBABRATA BEHERA Date: 2021.12.30 14:40:24 +05'30'

PRADEEPTA MOHAPATRA Date: 2021.12.30 10:19:24 +05'30'

CHAPTER 1
GENERAL INFORMATION

1.1 : Lease Details

IBM Registration Number:	IBM/7815/2011		
Lease Code:	Not allotted since Lease deed has not been executed		
Mine Code:	Not Allotted		
Name of Lessee:	Kashvi Power and Steel Pvt. Ltd.		
Address of Lessee:	Plot No 1234/P, Govinda Prasad, Bomikhal, Bhubaneswar		
Type of Lessee :	Pvt Limited company		
Name of Mining Lease:	Dholta Pahar Iron ore Block		
State:	Odisha		
District:	Sundargarh		
Tehsil/ Taluk/ Mandal:	Koira		
Village:	Near Dengula village		
Lease Area (Ha):	60.508		
Forest Area (Ha):	60.508		
Name of Minerals:	Iron		
Name of associated minerals:	Nil		
Type :	Auction Block		
Five Year Block (Financial Year)	1st year **(from the date of the execution of the lease deed)**	to	5th year
Type of working:	Opencast		
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	अनुमोदित APPROVED	---

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

11/11/2022
क्षेत्रीय खान नियंत्रक
Regional Controller of Mines
भारतीय खान ब्यूरो
Indian Bureau of Mines
भुवनेश्वर/Bhubaneswar

1.2: LAND OWNERSHIP DETAILS – Refer Annexure - V

S.No.	Village	Taluka	Area (Ha)	Khasra No/ Compartment No.	Type of Land	Nature of Land
1	--	Koira	60.508	Forest Khata	Reserve Forest	Govt Land

1.3: EXISTING LEASE -

Date of Execution	Not Applicable

1.3.1: Approval of earlier Mining Plan & Its Subsequent Review in Chronological Order -

Sl. No.	Letter no.	Date	Period		Type Of Approved Document
			From	To	
1	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 tonnc	

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

1.3.5.1: Location of Boundary Pillars – (add additional Row for subsequent pillars)

Pillar No.	Pillar Latitude *(dd:mm:ss.ss)*	Pillar Longitude *(dd:mm:ss.ss)*
1	N21°50'11.13855"	E85°10'43.73375"
2	N21°50'34.08851"	E85°10'43.53749"
3	N21°50'34.57854"	E85°11'14.26145"
4	N21°50'12.91054"	E85°11'14.63431"
5	N21°50'12.19012"	E85°10'58.24071"
6	N21°50'12.06361"	E85°10'57.81967"

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	AAZPB2915N	Kashvi Power & Steel (P) Ltd Plot No 1234/P, Govinda Prasad, Bomikhal, Bhubaneswar	9937004486	groupkashvi@gmail.com	(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	Mr	Pradeept Mohapatra	AUGPM5286J	World Consultancy Services. C/o Konark Construction and Engineering Ltd, At : Po - Telengapentha. Cuttack , Odisha 753051	9438149715	M.Sc Geology	18	pmohapatra_07@yahoo.com

DEBABRATA BEHERA Date: 2021.12.30 14:40:24 +05'30'

PRADEEPT MOHAPATRA Date: 2021.12.30 10:19:24 +05'30'

CHAPTER 2
GEOLOGY & EXPLORATION

2.1: GEOLOGY

2.1.1: Topography -

Terrain	Exhibits a rugged terrain represented by steep rising hill ranges (Dholta pahar) with intervening steep gorges and narrow valleys

RELIEF

Highest Level (m) from MSL	Lowest Level (m) from MSL	Average Level (m) from MSL
842m	674m	758m

Drainage Pattern	Order of Stream	Minimum Distance of Stream from Lease Area (m)
Dendritic	3rd order	Sarkunda 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 nalas 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 Kurarhi 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 worships/ 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 SH/NH from lease area	NH 520 -13 Km.

2.1.3: Regional Geology -

Regional Geology-

Dholta Pahar Block under discussion forms a part of the Singbhum-Keonjhar-Bonai group of iron ore is located in the western flank of the eastern limb of the horse shoe shaped Bonaisynclinorium 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 Bonai 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 GroupJagannathpur Lavas, DhanjoriSimilpal Lavas

_____Unconformity_____

Chaibasa formation

_____Unconformity_____

Singhbhum Granite

_____Iron ore orogeny_____

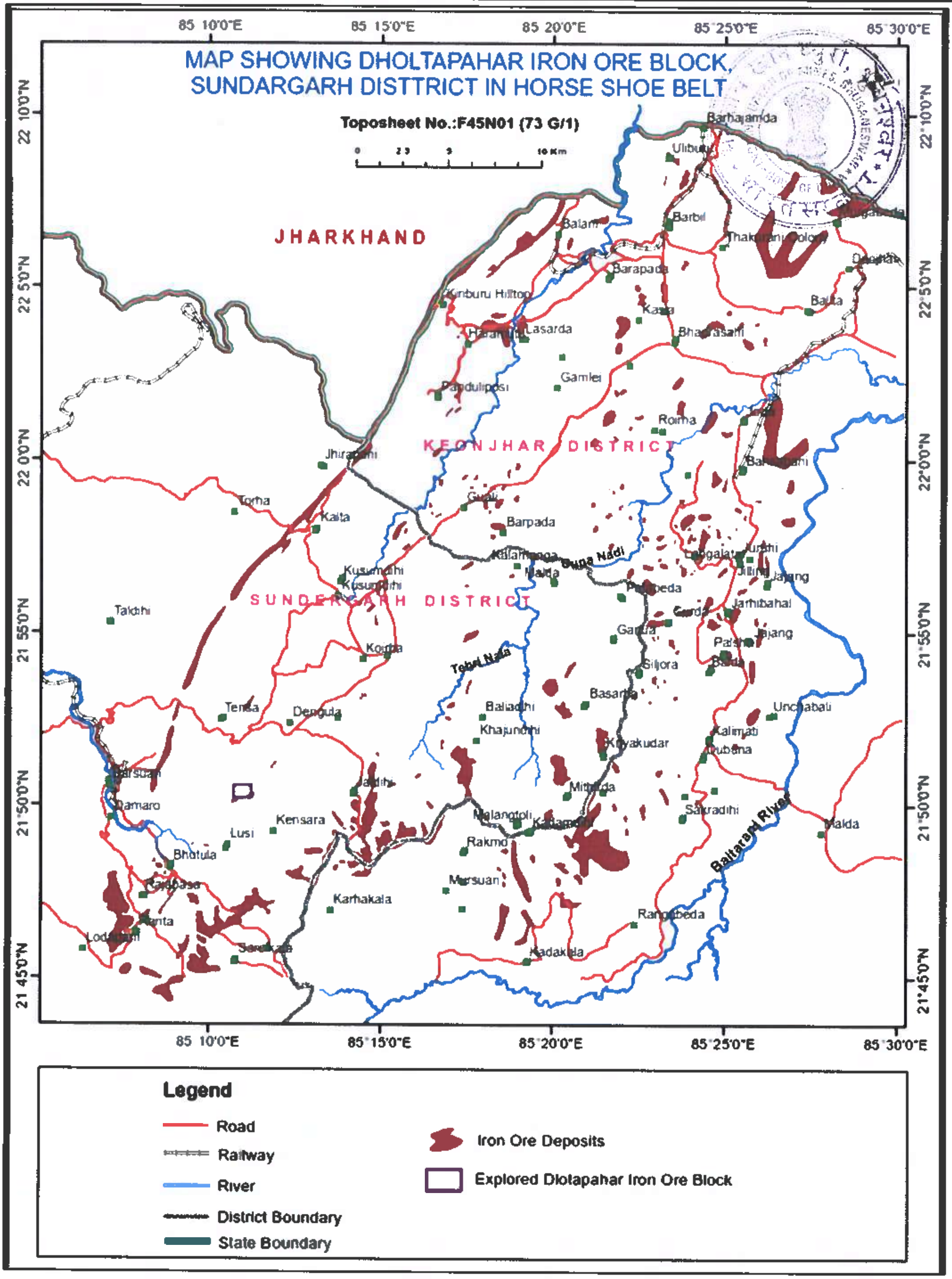
Iron ore group

_____Unconformity_____

Older metamorphic gneiss

_____O. M. group_____

Older metamorphic group


MAP SHOWING DHOLTAPAHAR IRON ORE BLOCK,
SUNDARGARH DISTTRICT IN HORSE SHOE BELT
Toposheet No.:F45N01 (73 G/1)
JHARKHAND
KEONJHAR DISTRICT
SUNDERGARH DISTRICT
Barbil
Barapada
Kasia
Lasarda
Gamlei
Roida
Jhirapani
Torha
Kalta
Barpada
Kalamanga
Nalda
Takdihi
Koira
Tensa
Dengula
Baliadihi
Khajurdihi
Kiriyakudar
Basantia
Siljora
Jajang
Jamibahal
Unchabali
Kalimati
Dubuna
Sakradihi
Malda
Baitarani River
Tebal Nala
Kensara
Lusi
Bhutula
Damaro
Karhakala
Rakma
Mithirda
Malangtoli
Kadakala
Rangabeda
Legend
Road
Railway
River
District Boundary
State Boundary
Iron Ore Deposits
Explored Diotapahar Iron Ore Block
85 10'0"E
85 15'0"E
85 20'0"E
85 25'0"E
85 30'0"E
22 10'0"N
22 5'0"N
22 0'0"N
21 55'0"N
21 50'0"N
21 45'0"N

2.1.4: Local Geology & Structure -

2.1.4.1 Local Geology

The area under exploration forms a part of the Iron Ore Super Groupfeatured in the SW limb, close to inner edge of the closureof Horse Shoe Synclinorium represented by quartzite, variegated shale, and varieties of iron ores like HLO, SLO, blue dust, limonitic ore overlained 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.

Soil
Laterite
Shale
Iron Ore Super Group
Variegated Shale
BHJ/BHQ/BHC with iron ore
Base not seen

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 synclinoriumll (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 (65^0-75^0) whereas, the eastern limb is a normal one with moderate to low (30^0-45^0) 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 Bamebarisyncline 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° - 55° 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. Penecontemperaneous folds observed in BHJ exhibit plunge at an angle of 45° in S18°W 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=N20°E – S20°W/70°SE (Strike joint)

J2=N70°W – S70°E/80°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 (laminations 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 variesfrom NE-SW to NW-SE with dip of 25° to 30° 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 withdifferent hues varying frompurple 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.Limonitisation of shale at places has given rise topatchy occurrence of limonite at dept. Theinfluence 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 byHard Laminated Ore (HLO), Soft Laminated Ore (SLO), Blue Dust, Lateritic Ore of varied thickness and the associated litho types like variegated shalehave 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 mostlymasked 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 20^0 - 40^0 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 Dholtapahar and comprises laterite, SLO and BHJ. The thickness of float varies from 0.5 to 2m .Size of the floats varies from boulder to gravelwhich 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 13.2mhas 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 insitu 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 or 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 19 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/E 200 and 10m north of N100/W200 respectively due to vegetation (tall & thick trees) on the grid points. Due to escarpment and steepslope at grid location S200, the bore hole could not be accomplished. So a pit of 2mx 2m x 2.5m had been excavated to ascertain existence of ore body which revealed existence of insitu 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 soilattains maximum thickness of 51.4 m (DIOP 2), though it contains 18.6 m high gradepowdery ore. Basing on the observations of the litholog of bore holes and assay log of the BH 5, 8, 12& 13 non mineralised zone area has been demarcated in which mineable ore zone has not been intercepted. 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 + 55% Fe cut off is 20.75 m in (BH-3) and minimum thickness is 0.6m 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 shaleoccurs 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 anticlinal synclinorium 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 derth of supply of sediments accompanied by the accumulated stress given rise to pinching of the ore bodies on either side following the fold geometry.

2.1.4.8: Deposit Type (as per MEMC Rule) -

Iron ore occurs as Bedded deposit of homogenousnature 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° to 55°

Dip Direction of the Ore Body: NW

Plunge of Mineral Body (degree) (if any): BHJ exhibit plunge at an angle of 45°

Direction of plunge: S18°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 andthe 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°W- S45°E direction across the general strike with the help of theodolite taking 0/0 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^2)
1	2006-07	1:2000	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/km²)	Latitude		Longitude	
					To	From	To	From
NIL								

2.2.1.4: Geochemical Survey –Not Carried out

Sl. No.	Type of Sample	No of Samples	Analysisreport	Area Covered (Ha/km²)
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 (from)	Depth (to)	Running meters	Litho units exposed	Name of the radical	Av. Grade (in %)	Latitude	Longitude
1	2006-07	Pit-1	2	2	2.5	774.12	771.62	2.5m	SLO	Fe	----	312504	2415970

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(from)	Depth(to)	Running meters	Litho units exposed	Name of the radical	Av.grade	Latitude(from)	Longitude (from)	Latitude(to)	Longitude (to)

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 mtrs	Total boreholes	Attach log sheet of each borehole in csv/excel format.
1	2007 -08	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	700.25	--	--	14	
Total			**19**	**982.50**			**19**	

2.2.1.8: Exploratory Mining –

Sl. No.	Pit/Adit ID	Length in Mtr	Width in Mtr	Depth in mtrs	Volume (m³)
1	Pit-1	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	2416172.563	BH 1
2	Drill core	19	19	312132.3824	2416306.671	BH 2
3	Drill core	28	28	312072.3095	2416091.46	BH 3
4	Drill core	12	12	312340.7176	2416388.137	BH 4
5	Drill core	0	0	312540.6795	2416460.4	BH 5
6	Drill core	26	26	311998.5048	2416158.287	BH 6
7	Drill core	14	14	312058.4703	2416373.595	BH 7
8	Drill core	3	3	311924.3757	2416225.407	BH 8
9	Drill core	15	15	312260.4704	2416447.607	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	311850.3199	2416292.461	BH 12
13	Drill core	0	0	311969.8798	2416424.726	BH 13
14	Drill core	36	36	312392.1278	2416072.013	BH 14
15	Drill core	57	57	312356.6265	2416103.629	DIOP 1
16	Drill core	15	15	312206.5142	2416237.054	DIOP 2
17	Drill core	28	28	312222.5765	2415955.401	DIOP 3

18	Drill core	26	26	312425.1934	2416311.648	DIOP 4
19	Drill core	24	24	312139.8364	2416030.318	DIOP 5
20	Chips	1	1	312504.3901	2415970.1691	PIT-1

2.2.1.10: Chemical Analysis –

Sample ID	Minerals	Radical with grade in %								Name of Agency	Type of agency	Attach ment
		LOI %	SiO_2 %	Al_2%	TiO%	Mn%	Fe%	P%	S%			
BH 1 (1-32)	Iron	1.28-13.65	0.22-42.52	0.3 25.24	0.4-1.76	Nil	45.93-66.26	0.002-0.008	0.008-0.01	Director of Mines	NABL accredited	Chemical analysis certificate is attached as Annexure - IV
BH 2 (1-19)	Iron	5.6-12.34	0.6 6.88	1.44-24.45	0.32-3.2	Nil	47.04-60.09	0.002 0.008	0.002-0.006		NABL accredited	
BH 3 (1-28)	Iron	0.88-5.51	0.8-3.86	0.23-4.34	Nil	Nil	46.49-66.52	0.002-0.008	0.002-0.006		NABL accredited	
BH 4 (1-12)	Iron	5.2-20.32	0.22-13.7	8.23-38.8	0.4-2.8	Nil	45.37-57.34	0.003-0.008	0.003-0.006		NABL accredited	
BH 5	Iron	--	--	--	--		--	--	--	--	--	
BH 6 (1-26)	Iron	1.35-15.21	1.3-24.76	0.12-31.1	0.16-1.44	Nil	48.44-66.54	0.004-0.01	0.003-0.01	Director of Mines	NABL accredited	
BH 7 (1-14)	Iron	4 11.89	2.1-26.22	5.06 25.66	0.4-2.78	Nil	48.65-60.67	0.003-0.008	0.003-0.007		NABL accredited	
BH 8 (1-3)	Iron	7.66-12.67	9.68-27.54	13.42-19.39	0.56-0.96	Nil	46.97	0.004-0.005	0.003-0.004		NABL accredited	
BH 9 (1-15)	Iron	4.42-9.58	1.52-10.64	5.3-15.92	0.16-0.96	Nil	45.85-59.83	0.002-0.008	0.002-0.008		NABL accredited	
BH 10 (1-26)	Iron	2.32-9.38	3.02 24.64	0.35-15.11	0.08-0.72	Nil	46.56-63.75	0.002-0.008	0.002-0.008		NABL accredited	
BH 11 (1-6)	Iron	6.32-9.43	11.1-18.6	8.66-14.77	0.56-0.8	Nil	45.57-50.05	0.003-0.005	0.002-0.004		NABL accredited	
BH 12	Iron	--	--	--	--	--	--	--	--	--	--	
BH 13	Iron		--	--	--	--	--	--	--	--		
BH 14 (1-36)	Iron	3.7-9.72	0.54-6.54	0.46-11.99	0.2-0.56	Nil	52-64.02	0.004-0.008	0.002-0.008	Director of Mines	NABL accredited	
DIOP 1 (1-57)	Iron	3.82-18.4	0.16-22.1	0.12-20.45		Nil	45.92-67.1	0.004-0.27	0.005-0.15		NABL accredited	
DIOP 2 (1-15)	Iron	3.01 18.02	0.49-11.03	0.01 20.05	---	0.16	62.6-65.78	0.01-0.014	0.005-0.15		NABL accredited	
DIOP 3(1-28)	Iron	1.64-8.09	0.68-12.81	0.6-11.35	---	0.12-0.2	49.03-65.88	0.004-0.018	0.008 0.1		NABL accredited	
DIOP 4(1-26)	Iron	2.19-13.72	0.7 15.2	0.3-22.7		0.14-0.83	49.28-66.69	0.012-0.12	0.01-0.06		NABL accredited	
DIOP 5 (1-24)	Iron	2.19-11.48	2.25-36.45	0.2 13.32	---	0.12-0.82	47.23-64.48	0.01-0.15	0.012-0.02		NABL accredited	
PIT-1	Iron	---	--	--	--	--	--	--	--	---	---	

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

2.2.1.12: Beneficiation Studies – Not carried out

Sl. No.	Type of Beneficiation	Number of Samples	Attach

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 —ISll 5842 (1986) Viz: The weight of the empty container wasdetermined. 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 shaked for tight 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—

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/m³)
1	Iron ore	*Blue dust*	1	3.32
		HLO	1	3.02
		SLO(+55%Fe)	1	2.95
		SLO(45-55%Fe)	1	2.56
		Lateritic 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)

2.2.2.2: Airborne Geophysical Survey –Not Applicable

Sl. No.	Type of Survey	Spacing (m)	Total line (km)	Area Covered (ha)	Latitude	Longitude

2.2.2.3: Ground Geophysical Survey - Not Applicable

Sl. No.	Type of Survey	Spacing (m)	Total line (km)	Area Covered (ha)	Latitude	Longitude

2.2.2.4: Geochemical Survey - Not Applicable

Sl. No.	Type of Sample	No of Samples

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

2.2.2.6: TRENCHING – Not Applicable

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

Area Covered Under Trenching –Not Applicable

Co-ordinates -

Latitude	Longitude

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

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^3)

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

2.2.2.12: Beneficiation Test -Not Carried out

Sl. No.	Type of Beneficiation	Number of Samples

2.2.2.13: Bulk Density – Not Applicable

Sl. No.	Rock Types	Number of Samples	Minerals	Bulk Density Established (t/m^3)

2.2.2.14: Area Covered under Exploration – Not Applicable (Since it is a Fresh Grant)

G1 (Ha)	
G 2 (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 –

Sl. No.	Name of the ore band	General Strike / Trend	Dip Of Mineral Body	Average Strike Length (m)	Average Width (m)	Chemical parameters				
						Average Depth (m)	Name of the radical	Min Grade (%)	Max Grade (%)	Avg. Grade (%)
1	Iron Ore	NE-SW	20°- 40°NW	800	750	50	Fe	45.57	67.1	58
							SiO_2	0.22	42.52	3.48
							Al_2O_3	0.01	38.8	3.133
							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

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, 3.02for 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^3)	Bulk Density (t/m^3)	Resource Quantity (t)	Level of Exploration	Type of Land	Name of the radical	Grade (%)	Method used for resource estimation
1	AA'(SLO)	4132	200	90	743760	2.56	1904026	G2	FOREST	Fe	45 to 55% Fe	Sectional Area Method
		2574	200	90	463320	2.95	1366794	G2	FOREST	Fe	+55% fe	Sectional Area Method
	AA'(HLO)	0	200	--	0	3.02	0	G2	FOREST	Fe	+55% fe	Sectional Area Method
	AA'(BD)	0	200	--	0	3.32	0	G2	FOREST	Fe	+55% fe	Sectional Area Method
	AA'(LATERITIC ORE)	0	200	--	0	2.45	0	G2	FOREST	Fe	45 to 55% Fe	Sectional Area Method
	AA'(FLOAT ORE)	0	200	-	0	2.95	0	G2	FOREST	Fe		Sectional Area Method
2	BB'(SLO)	1667	200	90	300060	2.56	768154	G2	FOREST	Fe	45 to 55% Fe	Sectional Area Method
		7396	200	90	1331280	2.95	3927276	G2	FOREST	Fe	+55% fe	Sectional Area Method
	BB'(HLO)	821	200	90	147780	3.02	446296	G2	FOREST	Fe	+55% fe	Sectional Area Method
	BB'(BD)	3308	200	80	529280	3.32	1757210	G2	FOREST	Fe	+55% fe	Sectional Area Method
	BB'(LATERITIC ORE)	0	200	--	0	2.45	0	G2	FOREST	Fe	45 to 55% Fe	Sectional Area Method
	BB'(FLOAT ORE)	90	200	40	7200	2.95	21240	G2	FOREST	Fe		Sectional Area Method
3	CC'(SLO)	4667	200	90	840060	2.56	2150554	G2	FOREST	Fe	45 to 55% Fe	Sectional Area Method
		10987	200	90	1977660	2.95	5834097	G2	FOREST	Fe	+55% fe	Sectional Area Method
	CC'(HLO)	47	200	90	8460	3.02	25549	G2	FOREST	Fe	+55% fe	Sectional Area Method
	CC'(BD)	1519	200	80	243040	3.32	806893	G2	FOREST	Fe	+55% fe	Sectional Area Method
	CC'(LATERITIC ORE)	114	200	90	20520	2.45	50274	G2	FOREST	Fe	45 to 55% Fe	Sectional Area Method
	CC'(FLOAT ORE)	912	200	40	72960	2.95	215232	G2	FOREST	Fe		Sectional Area Method
4	DD'(SLO)	4868	200	90	876240	2.56	2243174	G2	FOREST	Fe	45 to 55% Fe	Sectional Area Method
		1380	200	90	248400	2.95	732780	G2	FOREST	Fe	+55% fe	Sectional Area Method
	DD'(HLO)	0	200	90	0	3.02	0	G2	FOREST	Fe	+55% fe	Sectional Area Method
	DD'(BD)	2921	200	80	467360	3.32	1551635	G2	FOREST	Fe	+55% fe	Sectional Area Method
	DD'(LATERITIC ORE)	150	200	90	27000	2.45	66150	G2	FOREST	Fe	45 to 55% Fe	Sectional Area Method
	DD'(FLOAT ORE)	230	200	40	18400	2.95	54280	G2	FOREST	Fe		Sectional Area Method
	TOTAL						23921613					

Note:- As per geological report the recovery percentage considered for
- SLO, HLO and Lateritic ore is 90%
- BD is 80%
- Float ore is 40%

DEBABRAT A BEHERA Date: 2021.12.30 14:40:24 +05'30'

PRADEEPT MOHAPATRA Date: 2021.12.30 10:19:24 +05'30'

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 –

1	Threshold	45% Fe
2	Cut-off grade	55%Fe

2.2.4.5: Mining Factors or Assumptions –

SINo	Salient features	Description
1)	Method of Mining	Fully Mechanized (FM)
2)	Proposed production	2.0 Million Tones
3)	Type of ore	Lateritic Iron 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 (t/m3) (Ore: OB)	1:0.28
7)	Over all slope	28^{0} - 37.5^{0}
8)	Transportation ore to the stacking yard	Through dumper
9)	Nature of overburden/ interburden	Generally consists of BHJ, shale, and Laterites.
10	Drilling	110mm dia drill hole
11)	Blasting	Deep hole blasting using slurry/Emulsion, 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.

DEBABRAT A BEHERA Date: 2021.12.30

PRADEEPT MOHAPATR Date: 2021.12.30

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 obtaing 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)

E3 (Economic)	F3 (Pre-feasibility study)	G2 (General exploration)	code
Detailed geological study and general exploration 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 detail 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 ore 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 (G2 stage) of UNFC as per Minerals (Evidence and Mineral Content) Rules, 2015 which follows UNFC and CRISCO norms.	332

DEBABRAT A BEHERA Date: 2021.12.30

PRADEEPT MOHAPATR Date: 2021.12.30

JUSTIFICATION OF MINEABLE RESERVE (122)

E1 (Economic)	F2 (Pre-feasibility study)	G2 (General exploration)	CODE
1. Exploration Total 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. **2. Mining report/mining plan.** 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. **3. Specific end – use grades of reserves (above economic cut – off grade).** 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. 5-18 mm, 10-30mm and fines (screening and crushing materials) containing +55% Fe will be utilized in the own plant of lessee. **4. Specific knowledge of forest/non-forest and other land use data.** Reserve Forest: - 60.508 Ha. **5. Cost Benefit Analysis** Cost analysis has been carried out in the pre-feasibility study report. Therefore, the reserve of iron ore has been kept under E1 category.	Geological information has been detailed. Part of the block area has been explored in detail through bore hole and by exposures in the existing quarry. The level of exploration in this part is high and hence falls under G2 category. Pre-Feasibility study has been undertaken based on the following factors: **1. Mining:** The details of proposed mining method and bench parameter, deployment of equipment, manpower, and infrastructure have been envisaged in this mining plan. **2. Processing:** Mineral processing will be done by deplying crushing and screen plant to obtain the product i.e. 5-18 mm, 10-30mm and fines. **3. Costing:** Cost analysis has been carried out in the Pre-feasibility study report. **4.0Statutory Clearances** 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. 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.	The present work is under General Exploration which involves initial delineation of the ore 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 (G2 stage) of UNFC as per Minerals (Evidence and Mineral Content) Rules, 2015 which follows UNFC and CRISCO norms.	122

Refer **Annexure No – XV** for Pre- Feasibility report

DEBABRATA REHERA Date: 2021.12.30

PRADEEPT MOHAPATR Date: 2021.12.30

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^3)	Bulk Density (t/m^3)	Resource Quantity (t)	UNFC	Type of Land	Name of the radical	Grade (%)	Method used for resource estimation
1	AA'(SLO)	4132	200	90	743760	2.56	1904026	122	FOREST	Fe	45 to 55% Fe	Sectional Area Method
		2574	200	90	463320	2.95	1366794	122	FOREST	Fe	+55% fe	Sectional Area Method
	AA'(HLO)	0	200	--	0	3.02	0	122	FOREST	Fe	+55% fe	Sectional Area Method
	AA'(BD)	0	200	--	0	3.32	0	122	FOREST	Fe	+55% fe	Sectional Area Method
	AA'(LATERITIC ORE)	0	200	-	0	2.45	0	122	FOREST	Fe	45 to 55% Fe	Sectional Area Method
	AA' (FLOAT ORE)	0	200	--	0	2.95	0	122	FOREST	Fe		Sectional Area Method
2	BB'(SLO)	1667	200	90	300060	2.56	768154	122	FOREST	Fe	45 to 55% Fe	Sectional Area Method
		7396	200	90	1331280	2.95	3927276	122	FOREST	Fe	+55% fe	Sectional Area Method
	BB'(HLO)	821	200	90	147780	3.02	446296	122	FOREST	Fe	+55% fe	Sectional Area Method
	BB'(BD)	3308	200	80	529280	3.32	1757210	122	FOREST	Fe	+55% fe	Sectional Area Method
	BB'(LATERITIC ORE)	0	200	--	0	2.45	0	122	FOREST	Fe	45 to 55% Fe	Sectional Area Method
	BB'(FLOAT ORE)	90	200	40	7200	2.95	21240	122	FOREST	Fe		Sectional Area Method
3	CC'(SLO)	4667	200	90	840060	2.56	2150554	122	FOREST	Fe	45 to 55% Fe	Sectional Area Method
		10987	200	90	1977660	2.95	5834097	122	FOREST	Fe	+55% fe	Sectional Area Method
	CC'(HLO)	47	200	90	8460	3.02	25549	122	FOREST	Fe	+55% fe	Sectional Area Method
	CC'(BD)	1519	200	80	243040	3.32	806893	122	FOREST	Fe	+55% fe	Sectional Area Method
	CC'(LATERITIC ORE)	114	200	90	20520	2.45	50274	122	FOREST	Fe	45 to 55% Fe	Sectional Area Method
	CC'(FLOAT ORE)	912	200	40	72960	2.95	215232	122	FOREST	Fe		Sectional Area Method
4	DD'(SLO)	4868	200	90	876240	2.56	2243174	122	FOREST	Fe	45 to 55% Fe	Sectional Area Method
		1380	200	90	248400	2.95	732780	122	FOREST	Fe	+55% fe	Sectional Area Method
	DD'(HLO)	0	200	90	0	3.02	0	122	FOREST	Fe	+55% fe	Sectional Area Method
	DD'(BD)	2921	200	80	467360	3.32	1551635	122	FOREST	Fe	+55% fe	Sectional Area Method
	DD'(LATERITIC ORE)	150	200	90	27000	2.45	66150	122	FOREST	Fe	45 to 55% Fe	Sectional Area Method
	DD'(FLOAT ORE)	230	200	40	18400	2.95	54280	122	FOREST	Fe	+55% fe	Sectional Area Method
	TOTAL						23921613					

Note:- As per geological report the recovery percentage considered for
- SLO, HLO and Lateritic ore is 90%
- BD is 80%
- Float ore is 40%

DEBABRAT A BEHERA Date: 2021.12.30 14:40:24 +05'30'

PRADEEPT MOHAPATRA Date: 2021.12.30 10:19:24 +05'30'

2.2.4.13

Mineral	Iron Ore
Reserves/ Resources estimated as on	1.11.2021
UNIT of estimation	Tonnes

Classification	Code	Quantity			Grade	
		Forest	Non-Forest	Total	Forest	Non-Forest
A. Mineral Reserve		23921614	Nil	23921614	+45%Fe	Nil
1. Proved Mineral Reserve (A)	111 (In situ)	Nil	Nil	Nil	Nil	Nil
		Nil	Nil	Nil	Nil	Nil
	111(float)	Nil	Nil	Nil	Nil	Nil
		Nil	Nil	Nil	Nil	Nil
2. Probable Mineral Reserve (A)	121	Nil	Nil	Nil	Nil	Nil
3. Probable Mineral Reserve (A)		16448530	Nil	Nil	+55%Fe	Nil
	122 (In situ)	7182332	Nil	Nil	45-55%Fe	Nil
		290752	Nil	Nil	+55%Fe	Nil
	122 (Float)	--	Nil	Nil	Nil	Nil
B. Remaining Resources		Nil	Nil	Nil	Nil	Nil
1. Feasibility Mineral Resource (B)	211(In situ)	Nil	Nil	Nil	Nil	Nil
		Nil	Nil	Nil	Nil	Nil
	211(float)	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
Total Mineral Resources (A+B)		23921614		23921614	+45%Fe	--

*** 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	1st year	1:2000	60.508
2	2nd 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

2.2.5.3: Pitting – Not proposed

Number of pits

Sl. No.	Year	Land type	Pit ID	Length of Pit (m)	Width of Pit (m)	Depth of Pit (m)	Latitude	Longitude

2.2.5.3: TRENCHING – Not Proposed

Number of Trenches -

2.2.5.4.1 -SPACING

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

DEBABRAT A REHERA Date: 2021.12.30

PRADEEPT MOHAPATR Date: 2021.12.30

2.2.5.4.2 Area Covered Under Trenching - Not Applicable

Co-ordinates -

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

2.2.5.5: EXPLORATORY Drilling –

2.2.5.5.1:Core/Non-core Drilling –

SN	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	1ST YEAR	PBH NO-1	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	Ref plate No-V
2		PBH NO-2	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
3		PBH NO-3	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
4		PBH NO-4	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
5		PBH NO-5	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
6		PBH NO-6	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
7		PBH NO-7	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
8		PBH NO-8	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
9		PBH NO-9	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
10		PBH NO-10	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
11		PBH NO-11	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
12		PBH NO 12	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
13		PBH NO-13	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
14		PBH NO-14	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
15		PBH NO-15	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
16		PBH NO-16	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
17		PBH NO-17	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
18		PBH NO-18	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
19		PBH NO-19	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
20		PBH NO-20	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
21		PBH NO-21	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
22	2ND YEAR	PBH NO-22	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
23		PBH NO-23	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
24		PBH NO-24	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
25		PBH NO 25	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
26		PBH NO-26	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
27		PBH NO-27	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
28		PBH NO-28	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	

DEBABRATA REHERA Date: 2021.12.30

PRADEEPT MOHAPATR Date: 2021.12.30

29		PBH NO-29	300 or upto end of the Mineralisation	Core	100m	--	--		--	1	300 or upto end of the Mineralisation	
30		PBH NO-30	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
31		PBH NO-31	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
32		PBH NO-32	300 or upto end of the Mineralisation	Core	100m	--	--		--	1	300 or upto end of the Mineralisation	
33		PBH NO-33	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
34		PBH NO-34	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
35		PBH NO-35	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
36		PBH NO-36	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
37		PBH NO-37	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
38		PBH NO-38	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
39		PBH NO-39	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
40		PBH NO 40	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
41		PBH NO-41	300 or upto end of the Mineralisation	Core	100m	--	--	--	--	1	300 or upto end of the Mineralisation	
42		PBH NO-42	300 or upto end of the Mineralisation	Core	100m	--	--		--	1	300 or upto end of the Mineralisation	
			12600m							42	12600m	

2.2.5.6: Exploratory Mining – Not Proposed

Sl. No.	year	Pit ID	Length in mtrs	Width in mtrs	Depth in mtrs	Volume (m^3)

2.2.5.7: SAMPLING –

Sl. No.	Type of Sample	Number of Samples proposed	Area Covered (ha)	Latitude	Longitude
1	Core/RC drill sample	Meter-wise sample to be carried out in ore zone. Tentatively 12600nos of samples will be analysed if ore zone persists. In the non-mineralised zone composite samples will be of 1-10m will be considered for analysis of samples.	1.00	312549.7441	2416469.0093
2			1.00	312623.8722	2416401.8898ID
3			1.00	312334.3684	2416529.1200
4			1.00	312408.4965	2416462.0006
5			1.00	312482.5826	2416394.9193
6			1.00	312556.7528	2416327.7617
7			1.00	312630.8809	2416260.6422
8			1.00	312193.1208	2416522.1114
9			1.00	312489.6333	2416253.6336
10			1.00	312563.7615	2416186.5141
11			1.00	312637.8896	2416119.3947
12			1.00	312051.7241	2416514.9379
13			1.00	312125.8522	2416447.8185
14			1.00	312199.9803	2416380.6990
15			1.00	312274.1085	2416313.5796
16			1.00	312348.2366	2416246.4601
17			1.00	312422.3647	2416179.3407
18			1.00	312496.4928	2416112.2212
19			1.00	312570.6938	2416045.0359
20			1.00	311910.4765	2416507.9293
21			1.00	312429.3734	2416038.0931
22			1.00	312504.3901	2415970.1691
23			1.00	312577.6297	2415903.8542
24			1.00	311843.3570	2416433.8011
25			1.00	311917.4852	2416366.6817
26			1.00	311991.6385	2416299.5394
27			1.00	312065.7414	2416232.4428

28			1.00	312139.8696	2416165.3238
29			1.00	312213.9972	2416098.2039
30			1.00	312288.1258	2416031.0844
31			1.00	312362.2539	2415963.9650
32			1.00	312436.3821	2415896.8455
33			1.00	312295.2335	2415889.9461
34			1.00	311818.6623	2416183.0432
35			1.00	311930.6692	2416083.2662
36			1.00	312080.0134	2415950.2289
37			1.00	312154.6855	2415883.7102
38			1.00	311863.5476	2416009.1357
39			1.00	311938.2197	2415942.6170
40			1.00	312012.8918	2415876.0983
41			1.00	311796.4259	2415935.0051
42			1.00	311871.0980	2415868.4864

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	Lateritic iron ore	2
2	Hard Laminated ore	2
3	Soft Laminated 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 +55 Cutoff	61.863%
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	5-18, 0-5mm
2	Cone Cr.	Metso/Sandvik	250	0-80	5-18, 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	TypeofMill	Stages	Makeofthe 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/Screenoversize (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.	ApertureSizeofScreen/ Classifier (mm), if applicable	Classifier/ Screen Undersize(tph)	Classifier/ Screen oversize(tph)	Water Requirement(l/h)	Fresh Water Requirement(l/h)	Recirculated Water(l/h)

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	Sanvik /Metso /Horizon	250	30,10	0-300	0-10, 5-18, 10-30, 30+	+55 to +65 % Fe.
2	Dry screen			200	30,10	0-300	0-10, 5-18, 10-30, 30+	+55 to +65 % Fe.
	Dry screen			150	30,10	0-300	0-10, 5-18, 10-30, 30+	+55 to +65 % 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)

3.5.3: Product Quality:

Products	Wt%	In tonnes	Size(range)mm	CompleteChemical Analysis
Reject	25	500000	(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)

table continued…

S.N	Water Requirement(l/h)	Fresh Water Requirement (l/h)	Recirculated water(l/h)

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)

Table continued……

S.N	Product quality (if applicable)	Water Requirement (l/h)	Fresh Water Requirement (l/h)	Recirculated Water (l/h)

3.6.3: Gravity Separation: Not Applicable

S.N	Type of separators (jig,table, spiral,	Stages, if applicable	Make	Capacity(tph)	FeedSize(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)

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

table continued….

DEBABRATA REHERA Date: 2021.12.30

PRADEEPT MOHAPATR Date: 2021.12.30

Sl. No.	Product non-Mag(tph)	Water Requirement (l/h)	Fresh Water Requirement (l/h)	Recirculated water(l/h)

3.6.5: Flotation: Not Applicable

S. N	Type off lotation equipment	Stages(roughe r/ cleaner,etc), if applicable	Make	Capacity (tph)	Feed Size (mm)	Product-Float (tph)	Product non-Float (tph)

table continued….

S.N	Water Requirement(l/h)	FreshWaterRequirement(l/h)	Recirculatedwater(l/h)

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)	WaterRequirement (l/h)	FreshWaterRequirement (l/h)	Recirculatedwater(l/h)

3.6.7: Product Quality (wet processing):

Products	Wt%	Intonnes	Size(range)mm	Completechemical
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 (Proposed) Water Balance Chart Attached as Annexure - X

3.10: Flow sheets and charts

Material balance chart of mineral processing plant(s) (each stage of process)	Attach as Annexure--Xi
Attach flow sheet of beneficiation of plant(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:

Deployement of HEMM with deep hole drilling & blasting.

During the plan period, it has been Proposed to produce 2.0 MTPA iron oe 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 producton @ 2.0 MTPA during plan period. Further considering the topography and accessibility the proposed area is suitable for immediate develpment 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 Metalliferrous 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^3 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 & un-loading 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 Benches in Over Burden (m)	Min Width of the Benches in Over Burden (m)	Slope of the Benc in Over Burden (degree)	Max Height of the Benches in Mineral (m)	Minimum Width of the Benches in Mineral (m)	Slope of the Bench in Mineral (degree)	Overall Slope of Pit (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 Haul Roads (1 in)	Year-Wise Development & Production Plan	Year-Wise Development & Production Section
Proposed Quarry	1st	5m	More than 10m	28-37°	10	15m	28-37°	37°	Nil	1	2	25	70m	1:16	1999999 (Plate no-V(A))	(Plate no-V(B))
	2nd	--	--	--	10	15m	28-37°	37°	Nil	--	2	35		1:16	1999999 (Plate no-V(D))	(Plate no-V(E))
	3rd	--	--	--	10	15m	28-37°	37°	Nil	--	2	40		1:16	2000000 (Plate no-V(F))	(Plate no-V(G))
	4th	--	--	--	10	15m	28-37°	37°	Nil	--	2	40		1:16	1999999 (Plate no-V(H))	(Plate no- V(I))
	5th	--	--	--	10	15m	28-37°	37°	Nil	--	2	50		1:16	2000000 (Plate no-V(J))	(Plate no-V(K))

DEBABRAT A BEHERA Date: 2021.12.30

PRADEEPT MOHAPATR Date: 2021.12.30

4.2.2.2: Year wise Opencast Development

Sr. No	Year	Pit ID	Bench	Direction	Bulk Density of Overburden (BD1) (ton/m^3)	Bulk Density of Mineral (BD2) (ton/m^3)	Top Soil Volume (Length x Width x Height) (m^3)	Waste Volume (Length x Width x Height) (m^3)	Waste Quantity (t)	ROM Volume (Length x Width x Height) (m^3)	ROM Quantity (t)	Recovery	Mineral Reject (t)	Production Main (t)	Production Associated (t)	Location of Advancement	DB to Ore Ratio (ton/m3)
1	1st	Proposed Quarry (Insitu)	800-810	Due NW & Depth Ward	2	HLO (+55%Fe - 3.02 SLO: (+55%Fe) - 2.95 BD:+55%Fe - 3.32 LIO: 45-55%Fe - 2.45 SLO45-55%Fe - 2.56	Nil	26000	52000	677972	1962121	MAIN-76% MR-24%	474535	1487586	Nil	E-312136-312185 N-2415888-2416200	1:0.754
		Proposed Quarry (Float)	810		2	Float (+55%Fe) 2.95	Nil	47250	94500	12840	37878	100%	Nil	37878	Nil		1:0.008
								73250	**146500**	**690812**	**1999999**		**474535**	**1525464**			1:0.273
2	2nd	Proposed Quarry (Insitu)	790-810	Due NW, NE and Depth Ward	2	HLO (+55%Fe - 3.02 SLO: (+55%Fe) - 2.95 BD:+55%Fe - 3.32 LIO: 45-55%Fe - 2.45 SLO 45-55%Fe - 2.56	Nil	250550	501100	691180	1977579	MAIN-72% MR-27%	551860	1425719	Nil	E-312105-312488 N-2415904-2416250	1: 0.078
		Proposed Quarry (Float)	800		2	Float (+55%Fe) - 2.95	Nil	32000	64000	7600	22420	100%	Nil	22420	Nil		1: 0.007
								282550	**565100**	**698780**	**1999999**		**551860**	**1448139**			1: 0.070
3	3rd	Proposed Quarry (Insitu)	780-800	Due NW, NE and Depth Ward	2	HLO (+55%Fe - 3.02 SLO: (+55%Fe) - 2.95 BD:+55%Fe - 3.32 LIO: 45-55%Fe - 2.45 SLO 45-55%Fe - 2.56	Nil	323600	647200	692953	1974040	MAIN-77% MR-23%	460684	1513355	Nil	E-312189-312562 N-2415980-2416410	1:0.061
		Proposed Quarry (Float)	800		2	Float (+55%Fe) - 2.95	Nil	15000	30000	8800	25960	100%	Nil	25960	Nil		1:0.017
								338600	**677200**	**701753**	**2000000**		**460684**	**1539315**			1:0.059
4	4th	Proposed Quarry (Insitu)	770-800	Depth ward	2	HLO (+55%Fe - 3.02 SLO: (+55%Fe) - 2.95 BD:+55%Fe - 3.32 LIO: 45-55%Fe - 2.45 SLO 45-55%Fe - 2.56	Nil	234550	469100	689066	1999999	MAIN-74% MR 26%	520447	1479551	Nil	E-312070-312515 N-2415925-2416400	1: 0.085
		Proposed Quarry (Float)	--		2	Float (+55%Fe) - 2.95	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil		
								234550	**469100**	**689066**	**1999999**		**520447**	**1479551**			1:0.085
5	5th	Proposed Quarry (Insitu)	760-800	due NW & Depth ward	2	HLO (+55%Fe - 3.02 SLO: (+55%Fe) - 2.95 BD:+55%Fe - 3.32 LIO: 45-55%Fe - 2.45 SLO 45-55%Fe - 2.56	Nil	470700	941400	684084	2000000	MAIN-81% MR-18%	370944	1629056	Nil	E-312050-312480 N-2415976-2416488	1:0.042
		Proposed Quarry (Float)	--		2	Float (+55%Fe) - 2.95	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil		
								470700	**941400**	**684084**	**2000000**		**370944**	**1629056**			1:0.042
TOTAL								**1399650**	**2799300**	**3464495**	**9999997**		**2357096**	**7621236**			1:0.071

DEBABRAT A BEHERA Date: 2021.12.30

PRADEEPT MOHAPATR Date: 2021.12.30

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	551860	1999999	565100
3RD	1539315	460685	2000000	677200
4TH	1479551	520447	1999998	469100
5TH	1629056	370944	2000000	941400
GRAND TOTAL	**7621525**	**2378471**	**9999996**	**2799300**

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

S.No.	Pit ID	Total Topsoil Volume (m^3)	Total Waste Volume (m^3)	Total Waste Quantity (t)	Total ROM Volume (m^3)	Total ROM Quantity (t)
1	Quarry-1	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. Necessery permission will be obtained from competent authority for taking the waste outside the lease.

क्षेत्रीय खान नियंत्रक
Regional Controller of Mines
भारतीय खान ब्यूरो
Indian Bureau of Mines
भुवनेश्वर/Bhubaneswar
1/1/2022

अनुमोदित
APPROVED

भारतीय खान ब्यूरो * INDIAN BUREAU OF MINES * GOVT. OF INDIA * BHUBANESWAR

DEBABRAT A BEHERA Date: 2021.12.30

PRADEEPT MOHAPATR Date: 2021.12.30

4.2.2.3: Transportation & Hauling Equipment

S. No.	Type	Make	Capacity (m^3)	No. of Equipments
1	Tipper/dumper	Volvo/BEML	12.5	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- IV) however for G1 level Resource assessment recover 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; - Rain water Harvesting - Biodiversity Study - Socioeconomic study
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	1st	2146499	146500	1999999	1525175	453161	1:0.073	45% Fe to +65 % Fe
2	2nd	2565099	565100	1999999	1448139	551860	1:0.283	45% Fe to +65 % Fe
3	3rd	2677200	677200	2000000	1539315	460684	1:0.339	45% Fe to +65 % Fe
4	4th	2469099	469100	1999999	1479551	520447	1:0.235	45% Fe to +65 % Fe
5	5th	2941400	941400	2000000	1629056	370944	1:0.471	45% Fe to +65 % Fe
Total		**12799297**	**2799300**	**9999997**	**7621236**	**2357096**	**1:0.280**	45% Fe to +65 % Fe

4.3.3: Dump workings: Not Applicable

Sl. No.	Year	Dump Id	Location Latitude	Location Longitude	Area (m^2)	Avg Height of Dump (m)	Volume (m^3)	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	1st	2nd	3rd	4th	5th	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

DEBABRAT A BEHERA Date: 2021.12.30

PRADEEPT MOHAPATR Date: 2021.12.30

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))		9666mt
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^3)(A)	Bucket Fill Factor (B)	Swell Factor (C)	Tonnage Factor (t /m^3) (D)	Machine Utilization Factor (%) (U)	Efficiency (%) (E)	Cycle time (sec) (F)	(G) TPH =TPH (G) =((3600 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 block period (t) (J)	Number of excavator machines required (K) = (J / I)	Standby excavator (L)
1	Excavator	2	0.8	0.7	2.4	80	80	50	123.863	3780	468202.1	2941400	6.282 (say 6)	2

4.4.3: Dumper Requirement

Effective Shift Time:	Hrs	mins

Sl No	Total Hours=Number of working days (W)x Number of shifts/day x Effective shift hours (Machine Requirement Summary) (A)	Capacity of Dumpers (t) (B)	Speed of the dumper (KMPH) (i)	Lead Distance (KM) (ii)	Time taken to cover distance in minutes(iii) =(ii/i) x 60	Queuing, Loading Time at Shovel (min) (iv)	Queuing, Unloading Time during unloading (min) (v)	Total Time to complete one trip(vi) = (iii + iv + v)	No. of Trips / hr = (60 / vi)	Total transportation per hour =(B X vii)	Yearly handling by one dumper (ix) = A x TPH	Maximum handling of the material by this machine during the block period (t) (x)	Number of dumpers will be (xi) =(x / ix)	Plus Stand by dumper (xii)
1	3780	25	10	3.2	19.2	10	6	35.2	1.7	42.5	164475	2941400	17.88 (say 18)	6

4.4.4: Drill Machine Requirement

Effective Shift Time:	6 hrs	30 mins

Sl. No.	Type of Drill	Depth of Hole (including Sub-grade Drilling (m)	Spacing (m)	Burden (m)	Bulk Density of Waste (t/m^3)	Bulk Density of Mineral (t/m^3)	Yield per Hole (t)	Yield per Meter (t/m)	Annual Target Known (t)	Drilling Requirement per Day (m)	Drilling Requirement per Shift(m)	Rate of Drilling per Hours (m/hr)	Required Number of Drills (m/c)	Stand by Drill
1	Pneumatic DTH	11	3.25	2.5	2.2	3.1	241.312	21.93	1740000	264	132	0	2	1

DEBABRATA BEHERA Date: 2021.12.30

PRADEEPT MOHAPATR Date: 2021.12.30

4.4.5: Machine Deployment Details

4.4.5.1: Excavator & Loading Equipment

Sl.No.	Type	Make	Capacity	No. of Equipments
1	Excavtor	Hitachi	2.0	3+1
		Volvo	2.0	3+1
2	Excavtor for plant feeding	komastu	0.9	5+1
3	loader	SDLG	3.0	2
		Liugung	2.5	3
		Cat	4.5	2+1
4	DTH	Sandvik (D1550)	110mm Dia	2+1
5	Dumper	volvo	25MT	18+6
6	Water tanker	Volvo	20000 Litre	2
7	Mobile Crushing unit	SANDVIK/METSO	250 TPH 150TPH	1 1 (Stand by)
	Fix Crushing unit	SANDVIK /METSO	350TPH	1
8	Mobile Screen plant	SANDVIK/METSO/ Horizon SANDVIK/METSO/ Horizon	250TPH 200TPH 150TPH	1 1 1
9	Dozer	Cat	264 HP	2
10	Grader	Komatsu 705	260 HP	1
11	Rock Breaker	Hitachi	25Mt	1
12	Ambulance	---	---	1
13	Staff bus	Force	---	1
14	Camper	Mahindra	---	2
15	Bolero	Mahindra	---	4

4.4.5.2: Dozers Details

S.No.	Type	Make	Capacity (m^3)	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^3)	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	0.5	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 DiaCatridge 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^3)	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

DEBABRATA REHERA Date: 2021.12.30

PRADEEPT MOHAPATR Date: 2021.12.30

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 Requirements	Depth Of Hole
1	3500	28000	4.8	--	--	1	25Mt	--	--

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	---	1	3
4	Geologist	---	---	---	2	2
5	Surveyor	---	---	---	2	2
6	Mechanical Engineer	1	1	---	1	3
7	Electrical Engineer/Electrical supervisor	1	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 Mate	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
	5	5	0	6	16

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	21	21	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	14	28	250

DEBABRATA REHERA Date: 2021.12.30

PRADEEPT MOHAPATR Date: 2021.12.30

No of Shifts per Day ((A) = Machine Requirement Summary (B))	2
Average Daily Employment per Shift ((B) = (Total Number of Person per Day) / (A))	104
Material to be Handled per Shift ((C) = Machine Requirement Summary (E))	4833mt

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^3)	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 (m^3)	New Dump Location
1	1st	Waste Dump-1	Waste	0.512	3.5	43950	2416412N-2416492N 311933E-312009E
2	2nd			1.23	4	169530	2416349N-2416533N 311872E-312049E
3	3rd			1.25	4	203160	2416342N-2416534N 311866E-312075E
4	4th			1.20	9	140730	2416342N-2416534N 311866E-312075E
5	5th			0.912	10	282420	2416342N-2416534N 311866E-312075E
TOTAL						**839790**	

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	1st	Stack-1	Ore stack	5.5	3	165000	2416059N-2416269N 312041E-312371E
1	2ND	Stack-1	Ore stack	3.94	3	118200	2416070N-2416349N 312041E-312347E
2		Stack-2	Ore stack	1.60	3	48000	2415926N-2416063N 311916E-312120E
3		Stack-3	Ore stack	1.39	3	41700	2415920N-2416082N 312127E-312302E
4		Stack-4	Ore stack	2.32	3	69600	2416000N-2416217N 312215E-312440 E
1	3rd	Stack-1	Ore stack	3.06	3	91800	241600N-2416349N 312.41E-312317E
2		Stack-2	Ore stack	1.60	3	48000	2415926N-2416063N 311916E-312120E
3		Stack-3	Ore stack	1.28	3	38400	2415920N-2416068N 312138E-312299E
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

DEBABRATA REHERA Date: 2021.12.30

PRADEEPT MOHAPATR Date: 2021.12.30

1	4th	Stack-1	Ore stack	2.19	3	65700	2416081N-2416331N 312041.E-312314E
		Stack-2	Ore stack	1.60	3	48000	2415926N-2416063N 311916E-312120E
2		Stack-3	Ore stack	4.17	3	125100	2415938N-2416223N 312110E-312400E
3		Stack-4	Ore stack	0.664	3	19920	2416162N- 2416316N 312480E- 312583E
1	5th	Stack-1	Ore stack	1.92	3	57600	2416089N-2416325N 312014E-312292E
		Stack-2	Ore stack	1.60	3	48000	2415926N-2416063N 311916E-312120E
2		Stack-3	Ore stack	4.12	3	123600	2415960N-2416400N 312104E-312500E
3		Stack-4	Ore stack	0.664	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^3)

4.9: Use of Minerals

S.N.	Proposed Use Of Mineral	Name Of Mineral	Relevant Use Of Mineral	Physical Specifications			Chemical Specifications		
				Constituer	DRI Grade	Sinter gra	Constituents	DRI Grade	Sinter grade
1	Captive use in own industry & Direct Selling	Iron Ore	DRI and SINTER	Size	(5 – 20) mm	(0-10)mm	Fe	60% Fe to 63.5% Fe	60.0 to 63.50%
				+ 10mm	-	5.0% Max.	$SiO_2 + Al_2O_3$	5% Max.	5% Max.
				- 100 Mesh	-	25% Max.	CaO + MgO	2% Max.	-
							P	0.07% Max.	0.07% Max.
							S	0.03% Max.	0.03% Max.

DEBABRATA REHERA Date: 2021.12.30

PRADEEPT MOHAPATR Date: 2021.12.30

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)	0	Area (Ha)	0

5.2.1.2: Area for Water Storage & Recharge Facility

Area (Ha)	0	Area (Ha)	0

5.2.1.3: Efforts Made towards Housing for Local Communities

Number of Houses	0	Number of Houses	0

5.2.1.4: Efforts Made towards Providing Transport to Local Communities

Number of Beneficiaries		Number of Beneficiaries	0

5.2.1.5: Efforts Made towards Providing Healthcare to Local Communities

Number of Beneficiaries	0	Number of Beneficiaries	0

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

Number of Beneficiaries	0	Number of Beneficiaries	0

5.2.1.7: Efforts Made towards Skill Development Programs to Local Communities

Number of Beneficiaries	0	Number of Beneficiaries	0

5.2.1.8: Efforts Made to Promote Education & Knowledge Based Initiatives

Number of Beneficiaries	0	Number of Beneficiaries	0

5.2.1.9: Communication Facilities Provided to Local Communities

Number of Beneficiaries	0	Number of Beneficiaries	0

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

Number of Beneficiaries	0	Number of Beneficiaries	0

5.2.1.11: Adoption of ODF

Number of Toilets Built inside the Lease Area:	4	Number of Toilets Built outside the Lease Area:	0	Number of Beneficiaries	50

5.2.1.12: Awareness Program among Mine Workers for Swatchata

Number of Swatchata Programmes proposed:	0	Number of Swatchata Programmes Held:	0

5.2.1.13: Efforts for green energy

Total energy consumption (KWh)	20	Green energy consumption (% of total)	0
Total water consumption (KLD)	200	Water recycled (% of total)	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)	0	Area (Ha)	Nil

5.2.2.2: Area for Water Storage & Recharge Facility

Area (Ha)	0	Area (Ha)	Nil

5.2.2.3: Efforts Made towards Housing for Local Communities

Number of Houses	0	Number of Houses	Nil

5.2.2.4: Efforts Made towards Providing Transport to Local Communities

Number of Beneficiaries	0	Number of Beneficiaries	Nil

5.2.2.5: Efforts Made towards Providing Healthcare to Local Communities

Number of Beneficiaries	0	Number of Beneficiaries	Nil

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

Number of Beneficiaries	0	Number of Beneficiaries	Nil

5.2.2.7: Efforts Made towards Skill Development Programs to Local Communities

Number of Beneficiaries	0	Number of Beneficiaries	Nil

5.2.2.8: Efforts Made to Promote Education & Knowledge Based Initiatives

Number of Beneficiaries	0	Number of Beneficiaries	Nil

5.2.2.9: Communication Facilities Provided to Local Communities

Number of Beneficiaries	0	Number of Beneficiaries	Nil

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

Number of Beneficiaries	0	Number of Beneficiaries	Nil

5.2.2.11: Adoption of ODF

Number of Toilets Built inside the Lease Area:	2	Number of Toilets Built outside the Lease Area:	0	Number of Beneficiaries	50

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)	0.20

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 (KLD)	200	Water recycled (% of total)	10

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

Particular	
Proposed Number of Project Affected Persons(PAP)	Not Applicable
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	

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 Stack 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 area 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^3)	
Availability of Top Soil for Spreading (m^3)	
Spread Area (m^2)	

Year Wise Proposal						
Sr No	Year	Pit ID	Area (m^2)	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
1st	
2nd	
3rd	
4th	
5th	

6.2.2.1.2:Preparation of Course Gravel Bed :- Not Proposed

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

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
1st	439 (Around the Safetyzone of Magazine)	E= 311907 N= 2416533	E= 311905 N= 2416533
2nd	573	E= 311905 N = 2416533	N = 312478 N = 2416536
3rd	880	E=311785 N = 2415842	E= 312658 N = 2415886
4th	565	E= 311905 N = 2416533	E = 311787 N = 2416417
5th	651	E= 312658 N = 2415886	E = 312655 N = 2416537

DEBABRATA BEHERA Date: 2021.12.30 14:40:24 +05'30'

PRADEEPT MOHAPATRA Date: 2021.12.30 19:19:24 +05'30'

6.2.2.2.2: Retaining Wall

Year	Proposed Wall Length (m)	Co-ordinates from	Co-ordinates to
1ST	65	E = 311972 N = 2416410	E = 311929 N = 2416447
	346	E=312026 N=2416096	E= 312249 N= 2416309
	254	E=2416309 N=2416061	E= 312007 N= 2416274
2ND	100	E=311938 N= 2416340	E= 311858 N= 2416403
3RD	Maintenance	Maintenance	Maintenance
4TH	Maintenance	Maintenance	Maintenance
5TH	Maintenance	Maintenance	Maintenance

6.2.2.2.3: Garland Drains

Year	Proposed Bund Length (m)	Co-ordinates from	Co-ordinates to
1ST	70	E = 311973 N = 2416411	E = 311930 N = 2416450
	250	E=2416310 N=2416065	E= 312010 N= 2416277
2ND	105	E = 311937 N = 2416338	E = 311856 N = 2416398
3RD	Maintenance	Maintenance	Maintenance
4TH	Maintenance	Maintenance	Maintenance
5TH	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 (%)

6.2.3.2: Year Wise Proposal (Gap Filling Plantation)

Sr. No	Year	Green Belt Location (s)	Area Proposed to be Covered (Ha)	Number of Plants Proposed	Expected Survival Rate (%)	Estimated Expenditure (INR)
1	1st	Safety zone(MLB)	0.25	230	85%	30000
2	2nd	Safety zone (MLB)	0.25	230	85%	30000
53	3rd	Safety zone (MLB and Magazine)	1.52	1126	85%	80000
4	4th	Safety zone(MLB)	0.25	230	85%	30000
5	5th	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^2)	Total Expenditure Incurred (up to last five year block) (INR)
1				

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 (s)	Remarks

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^2)	Expenditure (INR)

6.2.5.3: Year Wise Proposal: Not Applicable

Sr. No	Year	Pit ID	Area (m^2)	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^2)	Expenditure (INR)
1	---	---	---

6.2.6.3: Year Wise Proposal: Not Applicable

Sr No	Year	Type of Recreational Facility	Area Covered (Ha)	Location	Estimated Expenditure (INR)
---	---	---	---	---	---

6.2.7: Dump Area Stabilization & Development

Sr. No	Year	Dump ID	No of Terraces	Average Height of Terraces (m)	Length of Toe Wall (m)	Length of Garland Drain (m)	Area Stabilized (Ha)	Method of Stabilization	Estimated Expenditure (INR)	No of Check Dams
1	1ST YEAR	WASTE DUMP-1	1	3	65	70	Nil	NA	NA	NA
2	2ND YEAR		1	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

6.2.8.2: Year Wise Proposal : Not Applicable			
Sr. No	**Year**	**Work Proposals**	**Estimated Expenditure (INR)**
1	1ST YEAR		
2	2ND YEAR		
3	3RD YEAR		
4	4TH YEAR		
5	5TH YEAR		

6.2.9: TOPSOIL MANAGEMENT:- Not Applicable

6.2.9.1: Cumulative Work Done as on Date				
Sl. No.	**Top Soil Generated** (m^3)	**Top Soil Utilized** (m^3)	**Topsoil Stored** (m^3)	**Total expenditure incurred as on date (₹)**

6.2.9.2: Year Wise Proposal:-Not Applicable				
Year	**Topsoil Generated** (m^3) **(A)**	**Topsoil Utilized** (m^3) **(B)**	**Topsoil Stored** (m^3) **(A-B)**	**Estimated Expenditure** (INR)
1st				
2nd				
3rd				
4th				
5th				

6.2.10: TAILINGS DAM MANAGEMENT:-Not Applicable

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

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 undisturbed/virgin	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)
40.201	13.286 (Waste dump & ore stackyard)	0.00	3.459 Road infrastructure Magazine	3.562 Safety Zone Area & Green Belt	40.201 Back filling area 16.029 bench plantation 24.172	0.00	0.00	13.286 Plantation	3.562 Safety Zone Area &Green Belt	3.459	0.00

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

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

1st 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	0.394	0.394
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
	Total	**0.00**	**21.685**	**21.685**

2nd 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	0.394	1.160	1.554
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
	Total	**21.685**	**3.801**	**25.486**

3rd 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	7.339	3.787	11.126
2	Topsoil stacking	0	0	0
3	Overburden/Waste Dumping	1.554	0.590	2.144
4	Mineral Storage	6.41	(-)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		**25.486**	**0.662**	**26.148**

4th 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	11.126	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**

5th 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	(-)0.205	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
	Total	**28.131**	**1.121**	**29.252**

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 INR)	Valid till (dd/mm/yyyy)	Upload copy of Bank Guarantee
Mineral block granted through auction therefore B/G 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	349947933 (To be paid)	For five years	-----

अनुमोदित
APPROVED

11/1/2022

क्षेत्रीय खान नियंत्रक
Regional Controller of Mines
भारतीय खान ब्यूरो
Indian Bureau of Mines
भुवनेश्वर/Bhubaneswar

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

8.1: General:

8.1.1: LEASE AREA UTILISATION

Sl. 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
Total expenditure incurred for implementation of SDF at mine level including - Environment Protection - CSR & other welfare activities in peripheral area *(Explanation: Expenditure is not over and above the statutory levies imposed by the Govemment; However, THIS EXCLUDES CONTRIBUTION TO DMF & NMET and is over and above the statutory levies imposed by the Govemment.)*					
CSR (Corporate Social Responsibility) spending at the mine level in Proposal Period (as per Companies Act, 2013 or otherwise)					

8.2: Technical Details

8.2.1: Exploration

Particulars	Proposals	Achievement	Deviation	Reasons for deviation
Number of Boreholes/ Pits/ Trenches				
Boreholes Meterage (If Boreholes selected in first row) (m)				
Grid				
G Axis 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
8.2.2.1: Generation of Ore/Waste While Development				
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	Deviaion	Reasons for deviation
Alternative use / Disposal of Waste Generated (excluding top soil)	Nil			

8.2.5: Backfilling:-Not Appliclable

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
8.2.6.1: ROM				
Opencast				
8.2.6.2: Cleaned Ore				
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
Generation of mineral rejects				
Opencast				
Dump mining				
Other recovery				
Stacking of mineral rejects/ sub-grade mineral				
Blending of mineral reject / sub-grade				

8.2.8: Environment Compliances

Particulars	Proposals	Achievement	Deviation	Reasons for deviation
8.2.8.1: Top soil:- Not Applicable				
Generation				
Utilization				
Stacking (Dump Id)				
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 fill 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 (A/NA)				
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 only)				
Awareness program among Mine workers for Swatchata				
No. of SwatchchtaProgrammes 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= 319261,N= 2412315 E= 319094,N= 2411911
Buffer Zone (Quarterly Monitoring Planned)	Yes, 5NOS. in predominant down ward wind direction
LOCATION	(TENSA) E = 316432,N= 2416006 (RAIKELA) E= 317651,N= 2415763 (DENGULA) E= 320945,N= 2415770 (TENTULIDIHI) E= 322137,N= 2415692 (KENSARA)E= 320641, N = 2409706

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 (TENSA) 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	(TENSA) E = 316432,N= 2416006 (RAIKELA) E= 317651,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 / Utilities (water bodies, roads, railways, electric lines, telephone lines etc.)	
Land under Habitation	
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	26.635

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

Sr. No.	Station Name	Season	PM10 (µg/m3)	PM10 Excess (µg/m3) 2	PM2.5 (µg/m3)	PM2.5 Excess (µg/m3) 2	SO_2 Value (µg/m3)	SO_2 Excess (µg/m3)	NO_x Value (µg/m3)	NO_x Excess (µg/m3)	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)	NOx (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	❖ Drilling with dust extractors, usage of sharp drill bits and use of water jet for dousing the cuttings. ❖ Usage of Drill bits in good condition ❖ Proper maintenance of drills. ❖ Provision of PPE's including nose mask to the workers engaged in the operation ❖ Proposed new drills will also be fitted with dust extraction system along with wetting provision.
Blasting Operation	❖ Controlled blasting method will be practiced by controlled and delay explosion ❖ To control ground vibrations and arrest fly rocks, advanced initiation system of NONEL is being used for blasting, etc. ❖ Ground vibrations are also being monitored and the results are well within the norms. ❖ Blasting with safe and optimum blast design patterns for future enhanced working will be followed.
Extraction of ore and waste by Excavator, Loading operation.	❖ Use of sharp teeth for shovels and other soil excavation equipment, and their periodical replacements. . ❖ Provision of dust filters / mask to workers working at highly dust prone and affected areas, etc.
Iron ore/waste transportation, movement of vehicles	❖ 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. ❖ Fixed - auto water sprinkling arrangement system on the main haul road for effective dust suppression. ❖ Provision for wheel wash system will be implemented ❖ Ensuring that all mineral trucks are covered by tarpaulin. ❖ 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. ❖ Provision of additional fixed - auto water sprinkling arrangement system for effective dust suppression
Crushing &screening operation	❖ Dry fogging system for crusher & screen plants and hoods over the belt conveyors are provided. ❖ All the conveyor belts of hooded with GI sheets. ❖ Loading & unloading points are equipped with water sprinkling arrangement system. ❖ Fixed Sprinkling system has been provided along processing area. ❖ 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.

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 1st 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 StudyGive 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	ETP & 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(3nos)		
	L(m	W(m)	H(m)	L(m)	W(m)	D(m)	L(m)	W(m)	D(m)	L(m)	W(m)	D(m)
1st year	665	1	2	320	1	1.5	430	1	1.5	10	8	2
										2nos		
2nd year	100	1	2	105	1	1.5	Maintenance			10	8	2
3rd year	Maintenance											
4th year	Maintenance											
5th 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 / TΣ (10Ln/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 x 10(Ld/10) + 8 x 10(Ln/10))}
Where Ld = A weighed equivalent for day time period (6am-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
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, tippers, etc.
- The safe blasting practices are done and the vibrations and noise are recorded in 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 (Kuchcha, 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	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
Tentuldihi	115	475	4	151	32	134	17	149	85	0	0	324	68
Tantigram	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 land)

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	Agri Main Person	Main HH Per	Non Work Per	Non-Working Pop%
Tensa	376	1617	4	442	27	379	63	297	29	1	8	1175	73
Tentuldihi	115	475	4	151	32	134	17	149	85	0	0	324	68
Tantigram	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

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 ousters & 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)

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 authorites of Indian Bureau of Mines.

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

PRADEEPT MOHAPATRA
Date: 2021.12.30 10:19:24 +05'30'

Place: Cuttack
Date: 30.12.2021

Pradeept Mohapatra
(Qualified Person)

At- Telengapentha, Dist.:Cuttack, Odisha: 754001,
MOB: 7978724154, Email: pmohapatra_07@yahoo.com

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 : 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:-

Sri Pradeept Mohapatra
World Consultancy Cervices 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 : U40100OR2009PTC011341

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- Koira, 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- Koira 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.

Kashvi Power And Steel Pvt. Ltd.

Managing Director

Place: Bhubaneswar

Managing Director

Date: 07.12.2021

M/s Kashvi Power & Steel Pvt Ltd.