

**TEXT**

# MINING PLAN ALONG WITH PROGRSSIVE MINE CLOSURE PLAN

(PREPARED UNDER RULE 13 OF MINERALS (OTHER THAN ATOMIC & HYDRO CARBON ENERGY MINERAL)  
CONCESSION RULES, 2016) AND UNDER RULE 23 OF MINERAL CONSERVATION & DEVELOPMENT RULES, 2017)

**OF**

LASERDA-PACHERI MANGANESE & IRON BLOCK OVER AN AREA OF 131.800 HECTARES IN VILLAGES  
DHANURJAYPUR, KANARDA & LASERDA UNDER BARBIL TEHSIL OF KEONJHAR DISTRICT, ODISHA

Registration No. - IBM/22935/2020

(PROPOSAL PERIOD – 5 YEARS FROM THE DATE SUCCESSIVE YEAR OF LEASE DEED EXECUTION)

## **LEASE DETAILS**

Mine Category	Date of Execution	Period	Date of Expiry	Forest in ha.	Non-Forest in ha.	Total in ha.
A (Fully Mechanised)	Not Applicable	Not Applicable	Not Applicable	94.351	37.449	131.800

## **APPLICANT DETAILS**

M/s Thriveni Earthmovers Pvt. Ltd.  
Ho: 22/110, Greenways Road,  
Fairlands, Salem, Tamil Nadu -636016  
E-mail: [info@thriveni.com](mailto:info@thriveni.com)  
CO: Unchabali, P.O. Bamebari,  
Dist. – Keonjhar, Odisha – 758086  
E-mail: [Orissa@thriveni.com](mailto:Orissa@thriveni.com)

## **PREPARED BY**

(Qualified Person under 15of M(OTAHCEM)CR, 2016

Sri Deepak Kumar Acharya  
MSc, Applied Geology (Economic)  
CO: Unchabali, P.O. Bamebari,  
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Mob. No. – 9777932607  
E-mail:- [dkaa@thriveni.com](mailto:dkaa@thriveni.com)  
Statutory.odisha@thriveni.com



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Approved with left no:-  
M P / A / 14-001 / BTHU/2021-22  
Dated 18.11.2021



**TEXT**

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**MINING PLAN ALONG WITH PROGRESSIVE MINE CLOSURE PLAN  
OF LASERDA-PACHERI MANGANESE & IRON BLOCK OVER AN AREA  
OF 131.800 HECTARES IN VILLAGES DHANURJAYPUR, KANARDA & LASERDA UNDER BARBIL TEHSIL  
OF KEONJHAR DISTRICT, ODISHA**

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8	Pre-feasibility Report	7	146 - 184
9	Chemical Analysis Report of SGS Pvt. Ltd	8(A)	185 - 330
	Chemical Analysis Report of Cotecna Inspection India Pvt Ltd.	8(B)	331 - 1916
	Chemical Analysis Report of IMMT	8( C )	1917 - 1918
	Chemical Analysis Report of Bureau Veritas India Pvt. Ltd	8(D)	1919 - 1948
	CSV File of Survey, Geology, Collar and assay (soft copy)	8(E)	-----
10	Copy of Form I	9	1949 - 1950
11	Form J (Borehole log sheet with Assay value)	10	1951 - 2679
12	Bulk Density	11	2680 - 2688
13	Copy of Mineral Processing Flow Sheet Diagram	12	2689 - 2689
14	Location of year wise proposed Boreholes	13	2690 - 2697
15	Year wise tentative excavation with bench RL	14	2698 - 2700
16	Copy of Performance Security	15	2701 - 2705





**MINING PLAN ALONG WITH PROGRESSIVE MINE CLOSURE PLAN  
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OF 131.800 HECTARES IN VILLAGES DHANURJAYPUR, KANARDA & LASERDA UNDER BARBIL TEHSIL  
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**LIST OF MAPS**

<b>Sl.No</b>	<b>Map Particulars</b>	<b>Scale</b>	<b>Reference</b>
1	Key Plan	1:50000	Plate No. I
2	Lease Plan and Geo referenced Cadastral Plan Authenticated by State Govt.	1:3960	Plate No. I(A)
3	DGPS Map showing 5 Km buffer zone	1:5000	Plate No. I(B)
4	Surface Plan	1:2000	Plate No. II
5	Geological Plan	1:2000	Plate No. III
6	Geological Sections	1:2000	Plate No. III (A, B, C, D, E, F & G)
7	Development Plan & Section 1 <sup>st</sup> Year	1:2000	Plate No. IV(A) & IV(A1, A2 & A3)
8	Development Plan & Sections 2 <sup>nd</sup> Year	1:2000	Plate No. IV(B) & IV(B1, B2 & B3)
9	Development Plan & Section 3 <sup>rd</sup> Year	1:2000	Plate No. IV(C) & IV(C1, C2 & C3)
10	Development Plan & Section 4 <sup>th</sup> Year	1:2000	Plate No. IV(D) & IV(D1, D2 & D3)
11	Development Plan & Section 5 <sup>th</sup> Year	1:2000	Plate No. IV(E) & IV(E1, E2 & E3)
12	Environmental Plan	1:5000	Plate No. V
13	Progressive Mine Closure Plan & Sections	1:2000	Plate No. VI & VI(A, B & C)
14	Financial Assurance Area Plan	1:2000	Plate No. VII
15	Conceptual Plan & Sections	1:2000	Plate No. VIII & VIII(A, B, C, D, E, F, G)

## Format for preparation of Mining Plan/Modified Mining Plan/Review of Mining Plan

☒ Opencast

☐ Underground

☐ Opencast &  
Underground

Start

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	CHAPTER 3	MINERAL PROCESSING
	CHAPTER 4	MINING OPERATIONS
	CHAPTER 5	SUSTAINABLE MINING
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	CHAPTER 7	FINANCIAL ASSURANCE/ PERFORMANCE SURETY
	CHAPTER 8	REVIEW OF PREVIOUS PROPOSALS
	CHAPTER 9	IMPACT ASSESSMENT

PART B: ANNEXURES

PART C: PLANS & SECTIONS

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## Chapter 1: General Information

### 1.1 : Lease Details

IBM Registration Number:	IBM/22935/2020
Lease Code:	Not yet Received
Mine Code:	Not yet Received
Name of Lessee:	M/s Thriveni Earthmovers Pvt. Ltd
Address of Lessee:	Head Office - 22/110, Greenways Road, Fairlands, Salem, Tamilnadu, 636016. Regional Office - Unchabali, Bamebari, Keonjhar, Odisha
Type of Lessee :	Private
Name of Mining Lease:	Laserda-Pacheri Mn & Iron Block
State:	Odisha
District:	Keonjhar
Tehsil/ Taluk/ Mandal:	Barbil
Village:	Dhanurjoyapur-40, Kanrda-38 & Laserda
Lease Area (Ha):	131.800
Forest Area (Ha):	94.351
Name of Minerals:	Manganese
Name of associated minerals:	Iron
Type :	Fresh grant
Five Year Block (Financial Year)	Proposed 5 years plan period will be implemented from the date of lease deed execution.
Type of working:	Opencast
Nature of Use:	Non-captive
Category of Mine:	Category A

TO

Not Applicable

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

Grant	From	To	Lease deed execution date	Lease registration date
Loi Granted for Mining Lease	Not Applicable	Not Applicable	Not Applicable	Not Applicable

#### 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:	7731-IV(B)SM-100/2017/SM
Date:	21.09.2021

### 1.2: Land Ownership Details

S.N.	Village	Taluka	Area (Ha)	Khasra No	Type of Land	Nature of Land
1	DHANURJOYPUR	Barbil	0.037	769	Forest Land	Government Waste Land
2	DHANURJOYPUR	Barbil	0.097	770	Forest Land	Private non-Agriculture Land
3	DHANURJOYPUR	Barbil	0.022	771	Forest Land	Government Waste Land
4	DHANURJOYPUR	Barbil	0.137	772	Private Land	Private Agriculture Land
5	DHANURJOYPUR	Barbil	0.226	773	Private Land	Private Agriculture Land
6	DHANURJOYPUR	Barbil	0.006	776	Government Land	Government Waste Land
7	DHANURJOYPUR	Barbil	0.141	780	Private Land	Private Agriculture Land
8	DHANURJOYPUR	Barbil	0.507	782	Private Land	Private Agriculture Land

DEEPAK KUMAR  
ACHARYA

Regional Controller of Mines  
भारतीय खान ब्यूरो  
Indian Bureau of Mines  
प्रदेशीय/ Regional Office  
22/11/21

APPROVED



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68	DHANURJOYPUR	Barbil	1.138	837/1109	Private Land	Private Agriculture Land
69	DHANURJOYPUR	Barbil	0.410	837/1110	Forest Land	Government Waste Land
70	DHANURJOYPUR	Barbil	0.483	837/1111	Forest Land	Government Waste Land
71	DHANURJOYPUR	Barbil	0.485	839/1112	Private Land	Private Agriculture Land
72	DHANURJOYPUR	Barbil	0.133	839/1113	Private Land	Private Agriculture Land
73	DHANURJOYPUR	Barbil	0.351	841/1114	Forest Land	Government Waste Land
74	DHANURJOYPUR	Barbil	0.244	841/1115	Forest Land	Government Waste Land
75	DHANURJOYPUR	Barbil	0.770	851/1119	Private Land	Private Agriculture Land
76	DHANURJOYPUR	Barbil	0.687	851/1120	Private Land	Private Agriculture Land
77	DHANURJOYPUR	Barbil	0.277	777/1131	Forest Land	Government Waste Land
78	DHANURJOYPUR	Barbil	0.076	820/1159	Private Land	Private Agriculture Land
79	DHANURJOYPUR	Barbil	2.013	820/1184	Forest Land	Government Waste Land
80	DHANURJOYPUR	Barbil	9.052	820/1185	Forest Land	Government Waste Land
81	DHANURJOYPUR	Barbil	0.060	769/1188	Forest Land	Private non-Agriculture Land
82	DHANURJOYPUR	Barbil	0.044	774/1191	Forest Land	Government Waste Land
83	DHANURJOYPUR	Barbil	0.001	773/1192	Private Land	Private non-Agriculture Land
84	DHANURJOYPUR	Barbil	0.001	782/1195	Private Land	Private non-Agriculture Land
85	DHANURJOYPUR	Barbil	0.000	786/1197	Private Land	Private non-Agriculture Land
86	DHANURJOYPUR	Barbil	0.051	792/1199	Private Land	Private non-Agriculture Land
87	DHANURJOYPUR	Barbil	0.084	795/1200	Private Land	Private non-Agriculture Land
88	DHANURJOYPUR	Barbil	0.073	795/1201	Private Land	Private Agriculture Land
89	DHANURJOYPUR	Barbil	0.084	799/1202	Private Land	Private Agriculture Land
90	DHANURJOYPUR	Barbil	0.310	799/1203	Private Land	Private Agriculture Land
91	DHANURJOYPUR	Barbil	0.030	817/1204	Private Land	Private non-Agriculture Land
92	DHANURJOYPUR	Barbil	0.048	817/1205	Private Land	Private Agriculture Land
93	DHANURJOYPUR	Barbil	0.081	818/1206	Forest Land	Private non-Agriculture Land
94	DHANURJOYPUR	Barbil	0.195	818/1207	Government Land	Government Waste Land
95	DHANURJOYPUR	Barbil	0.649	820/1208	Private Land	Private Agriculture Land
96	DHANURJOYPUR	Barbil	0.306	820/1209	Forest Land	Government Waste Land
97	DHANURJOYPUR	Barbil	0.020	800/1265	Private Land	Private Agriculture Land
98	DHANURJOYPUR	Barbil	7.428	820/1270	Forest Land	Government Waste Land
99	DHANURJOYPUR	Barbil	0.098	776/1274	Government Land	Government Waste Land
100	DHANURJOYPUR	Barbil	0.158	820/1316	Private Land	Private Agriculture Land
101	DHANURJOYPUR	Barbil	0.311	820/1330	Private Land	Private Agriculture Land
102	DHANURJOYPUR	Barbil	1.248	837/1341	Private Land	Private Agriculture Land
103	DHANURJOYPUR	Barbil	0.062	789/1342	Private Land	Private non-Agriculture Land
104	KANRDA	Barbil	0.595	1	Forest Land	Government Waste Land
105	KANRDA	Barbil	2.764	2	Forest Land	Government Waste Land
106	KANRDA	Barbil	0.403	3	Forest Land	Government Waste Land
107	KANRDA	Barbil	0.227	4	Forest Land	Government Waste Land
108	KANRDA	Barbil	6.878	5	Forest Land	Government Grazing Land
109	KANRDA	Barbil	0.802	42	Forest Land	Government Waste Land
110	KANRDA	Barbil	0.000	5/470	Private Land	Private Agriculture Land
111	KANRDA	Barbil	3.548	5/471	Private Land	Private Agriculture Land
112	KANRDA	Barbil	1.563	5/472	Private Land	Private Agriculture Land
113	KANRDA	Barbil	0.733	5/473	Private Land	Private Agriculture Land
114	KANRDA	Barbil	0.107	5/474	Forest Land	Private non-Agriculture Land
115	KANRDA	Barbil	5.247	5/476	Forest Land	Government Waste Land
116	LASARDA	Barbil	0.266	3	Forest Land	Government Waste Land
117	LASARDA	Barbil	0.224	5	Forest Land	Government Waste Land
118	LASARDA	Barbil	0.658	6	Forest Land	Private Agriculture Land
119	LASARDA	Barbil	0.188	7	Forest Land	Government Waste Land
120	LASARDA	Barbil	0.378	8	Forest Land	Government Waste Land
121	LASARDA	Barbil	0.206	9	Forest Land	Government Waste Land
122	LASARDA	Barbil	0.176	38	Private Land	Private Agriculture Land
123	LASARDA	Barbil	0.189	39	Forest Land	Government Waste Land
124	LASARDA	Barbil	1.635	40	Forest Land	Government Waste Land
125	LASARDA	Barbil	0.836	41	Forest Land	Government Waste Land
126	LASARDA	Barbil	0.399	42	Forest Land	Government Waste Land

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186	LASARDA	Barbil	1.135	81/918	Forest Land	Government Waste Land
187	LASARDA	Barbil	0.433	939	Private Land	Private Agriculture Land
188	LASARDA	Barbil	0.238	46/940	Private Land	Private Agriculture Land
189	LASARDA	Barbil	0.454	46/945	Private Land	Private Agriculture Land
190	LASARDA	Barbil	0.431	56	Forest Land	Private Agriculture Land

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### 1.3: Existing Lease

Date of Execution	Not Applicable
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#### 1.3.1: Approval of earlier Mining Plan & Its Subsequent Review in Chronological Order

S.N.	Letter Number	Date	Period		Type Of Approved Document
			From	To	
The instant proposal is the 1st Mining Plan	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

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

S.N.	Date	Supplementary Surrender order/ Letter Number	Supplementary Lease Deed Date	Final Retained Area over which current Mining Plan is Prepared ( ha)
Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

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

S.N.	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
There is no transfer of lease	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

#### 1.3.4: Statutory Compliances

##### 1.3.4.1: Environment Clearance

Applicable	Yes
Letter No	After approval of Mining Plan, EC process will start
Date	Not Applicable
Validity	Not Applicable
ROM Mineral in tonnes	Not Applicable

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#### 1.3.4.2: SPCB Approvals

Letter No	During the approval of EC, CTE & CTO will be processed
Approval of	Not Applicable
Date	Not Applicable
Validity	Not Applicable
ROM Mineral in tonnes	Not Applicable

#### 1.3.4.3: Forest Clearance

Applicable	Yes
Letter No	After approval of Mining Plan, FC process will start
Date	Not Applicable
Validity	Not Applicable
Area (Ha)	Not Applicable

#### 1.3.4.4: Land Acquisition Details

Total Area acquired/purchased so far	Nil, It is in application stage
Total Amount Paid (INR)	Not Applicable

#### 1.3.5: Mine Location Details

Toposheet Number:	F45H8(73F/8)
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#### 1.3.5.1: Location of Boundary Pillars

Pillar No.	Pillar Latitude (dd:mm:ss.ss)	Pillar Longitude (dd:mm:ss.ss)
M-1	22°04'11.44231"	85°19'15.99748"
M-2	22°03'41.46540"	85°18'58.42895"
M-3	22°03'44.72543"	85°18'51.75926"
M-4	22°03'52.80955"	85°18'48.42172"
M-5	22°03'52.48892"	85°18'44.49648"
M-6	22°03'52.12774"	85°18'39.63839"
M-7	22°03'50.79430"	85°18'37.36794"
M-8	22°03'50.72136"	85°18'31.20926"
M-9	22°03'48.35128"	85°18'31.21044"
M-10	22°03'41.85747"	85°18'30.67383"
M-11	22°03'34.52683"	85°18'28.95479"
M-12	22°03'28.26537"	85°18'21.12817"
M-13	22°03'16.60991"	85°18'11.18513"
M-14	22°03'25.92856"	85°17'53.81761"
M-15	22°03'55.63711"	85°18'11.23140"
M-16	22°03'56.70078"	85°18'15.83292"
M-17	22°03'52.00934"	85°18'31.19618"
M-18	22°03'52.07779"	85°18'36.93551"
M-19	22°03'53.39000"	85°18'39.42033"
M-20	22°03'53.71123"	85°18'43.27464"
M-21	22°03'54.07213"	85°18'47.91582"
M-22	22°03'59.00540"	85°18'47.98851"
M-23	22°04'03.85204"	85°18'45.59155"
M-24	22°04'08.41959"	85°18'51.55429"
M-25	22°04'08.72237"	85°18'53.42447"
M-26	22°04'15.51014"	85°18'59.18403"
M-27	22°04'18.63916"	85°19'00.30051"
M-28	22°04'19.18502"	85°19'00.80278"

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### 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
B. Prabhakaran	AEFPP5795L	Unchabali, Bamebari, Keonjhar, 758086	9437078399	bpn@thriveni.com	Certificate of Incorporation is attached as Annexure - 2

### 1.3.7: Qualified Person Details as per M(OAHCEM)CR, 2016

S.N.	Prefix	Name	PAN of QP	Address	Mobile no.	Qualification	Exp in years as prescribed under the rule	Email
1	Mr.	Deepak Kumar Acharya	AXDPA0671M	Unchabali, Bamebari, Keonjhar, 758086	9777932607	MSc. Applied Geology	7 years of experience of Supervisor Category as per Rule 15(b) of M(OAHCEM)CR, 2016 Annexure - 5	dkaa@thriveni.com

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Particulars	Distance from lease boundary in kms
Near by village	0.1 Km (Lasarda)
Nearest Railway station	6.5 Km (Barbil)
Nearest Port	300 Km (Paradip)
Distance of SH/NH from lease area	12 Km (NH 520)

## 2.1.3: Regional Geology

### Regional Geology \*

Rocks of the Iron & Manganiferous mixed facies formation occupy a major part of the Bonai - Keonjhar Belt. The manganese deposits of Lasharada-Pacheri Iron & Manganese Mines is located on (the outer slopes of the eastern limbs of the synclinalorium. Hills and domes in the locality are composed of Banded Iron Formation, Banded Iron Formation (BIF) contains iron ore and the shale horizons contain manganese. The weakly metamorphosed lithosequence of Precambrian age is constituting the southerly closing, NNE-SSW extending 60 km long Bonai - Kendujhar belt of North Odisha is the store house of rich iron ore deposits and important low phosphorous manganese ore deposits. This belt has a disposition pattern more or less similar to the symbol Omega ( $\Omega$ ) and is referred classically in geological literature as 'Horse Shoe Synclinalorium'. The general strike is north east to North, dips are moderate to West. The Western limb of the synclinalorium is slightly overturned, at some places.

The stratigraphic succession established by the earlier workers of GSI (Murty & Ghosh, 1975) is summarized below. The Bonai - Keonjhar belt, is disposed in form of a horse shoe shaped synclinalorium with an overturned western limb and low NNE plunge. The general attitude of the litho-units is NNE - SSW dipping Westernly or Low to moderate northwesterly. Antiformal and synformal structures in mesoscopic scale are present in the area investigated.

The Keonjhar manganese belt is a part and parcel of Singhbhum Bonai belt and one of the most important manganese ore producing regions of India. This is confined to shale formation of Pre-Cambrian Iron Ore Super Group as in stratiform, stratabound and lateritoid types. Important deposits in the Keonjhar district are located in the areas of Lasarda, Pacheri, Balani, Baneikala, Kendudihi-Purulpada, Roida-Bhadrasahi, Joda west and Belkundi etc.

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## 2.1.4: Local Geology & Structure

### 2.1.4.1: Local Geological Set-up \*

Lasarda-Pacheri Iron and Manganese Ore Mine is in the southern end of the western limb of the Horse-shoe shaped Iron Ore Range of West Singhbhum-Keonjhar-Sundargarh district of Jharkhand & Odisha. The rock types found within the leasehold belong to Banded Iron Formation (BIF) of Koira Group. The main litho units mapped in this area are laterite, Banded Hematite Jasper, shale of different nature and Brecciated Chert. Alluvium occupies especially the low-lying areas. The boundaries of these lithounits are mostly covered with soil or laterite. The litho contacts are observed to be gradational rather than sharp. The litho units of BIF usually strike in a NE-SW to NNE-SSW direction with westerly dips varying from 20° to 60°. The litho contacts delineated on the Geological Plan. It is observed that the manganese ore deposits occurring as lenses, pockets and veins are confined to variegated shale horizon. The iron ore deposits are float iron ore & occupied mainly on the hill slope of Southern and Northern part of the area. The manganese ore deposits occur as small pockets / patches within the shale zone. Laterite / soil cover observed normally in the area varies in thickness from 2 to 3 m above the shale formations of the area. The mode of manganese mineralisation can be considered to be similar to those countered in lateritoid deposits. The irregularity of shapes and sizes can be attributed to local tectonic activities like secondary folding, faulting and weathering. Based on the field studies, the stratigraphic sequence of different litho assemblages of the area is interpreted as

- Soil & Alluvium,
- Laterite (Ferruginous/Manganeseiferous),
- Manganiferous shale with Mn-ore
- Brecciated Chert with Mn-Ore
- Dolomite.

### 2.1.4.2: Structure \*

The lithounits belong to the Koira Group of the Iron ore Super Group. Manganese mineralisation is confined to the brecciated chert, manganiferous shale and laterite. The area forms part of a NNE plunging synclinalorium having southerly closure. The mapped area has imprints of two pervasive planar fabrics, one conforming to the regional fold axis (NNE - SSW) and the other in NW - SE direction. The explored area constitutes a part of the western inverted limb of the 'horse-shoe synclinalorium', the inverted nature being manifested by the reverse order of superposition of the lithounits. The chief planar structural elements are bedding and axial plane cleavage while minor fold axes and bedding - cleavage intersections are the main linear structures observed in the area. Development of weak foliation in shale is quite conspicuous.

Manganese ore bodies occur as conformable but discontinuous bands and/or lensoidal bodies within shale and brecciated chert horizons, extending along the regional strike of the lithounits. In the top laterite, ore bodies occur in form of discrete isolated pockets. The width of ore bodies vary from 1m to 8m. The ore bands are mostly affected by weathering to a considerable depth along with the enclosing rocks. Localisation of ore lenses / pockets within the chert - shale laterite zone / horizon may be attributed to the geochemical segregation associated with the process of deep chemical weathering and subsequent lateritisation. Further, occurrences of manganese ore zones associated with brecciated chert and along weak foliation planes of shale point to the process of shearing and brecciation undergone in the area.

The ore is lateritoid type at most of the places and is of low to medium grade. The chief manganese minerals are pyrolusite, psilomelane, lithiophorite, and cryptomelane. Botryoidal, box work and coliform structures are commonly observed.

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A discontinuance of Soft and Powderly iron ore with good grade of Fe % been found during drilling. Therefore dip and strike has not been properly measured, however strike and dip of BHJ/BHQ and chert area haven measured. A chert band brecciated at the top, forms a marker in Lasarda segment. It strikes N30°E - S30°W with a shallow westerly dip having maximum width of 200m. It pinches out both in the north as well as in south direction. The manganese laterite horizon, which hosts the manganese ore pockets in the area, shows a N50°E - S50°W trend. The ore pockets seen with in the manganese laterite corroborate with the regional strike. But the ore bands exhibit extreme discontinuous nature both along the strike and in the dip direction.

The detail lithology of the area is as follows:-

(a) Soil and Alluvium  
Traverses along and across the leasehold, however, show that alluvial soil covers a sizeable portion of the area. The alluvium occupies especially the low lying area. These areas are appeared to be barren where village site and low yielding agricultural fields are seen. The lateritised surface is covered by a thin veneer of soil with thickness varying from 0.5 m to 1.50 m at some places. The soil is yellowish brown to reddish brown to grey colour. The thickness is vary from 1 to 6 mtrs.

(b) Laterite

d) Chert

(e) Banded Hematite Jasper (BHJ)

(f) Dolomite

#### 2.1.4.4: Mode of Occurance & Controls of Mineralization \*

**Manganese:** Manganese ore bodies occur as conformable but discontinuous bands and/or lensoidal bodies within shale and brecciated chert horizons, extending along the regional strike of the lithounits. In the top laterite, ore bodies occur in form of discrete isolated pockets. The width of ore bodies vary from 1m to 8m. The ore bands are mostly affected by weathering to a considerable depth along with the enclosing rocks. Localisation of ore lenses / pockets within the chert – shale – laterite sequence is associated with the process of deep chemical weathering and subsequent lateritisation.

**Iron Ore Formation:**

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

**2.1.4.5: Extent of Weathering/ Alteration\***  
The ore deposits of both iron and manganese are of sedimentary origin. The block comprises low-grade metamorphosed volcano - sedimentary sequence of Pre- Cambrian age. Extensively weathering, leaching action with partially alteration effects are there.

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

Lump
Powdery & Friable Iron & Manganese ore

Specify if any other

#### 2.1.4.7: Extent of Mineralization:

**2.1.4.7: Extent of Mineralization:** The ore pockets seen with in the manganiferous laterite corroborate with the regional strike. But the ore bands exhibit extreme discontinuous nature both along the strike and in the dip direction. The manganiferous laterite traced discontinuously in south-westerly part of the area in a length of 1.0 km with an average width of 300m. In the north-easterly part of the area manganiferous laterite also been traced discontinuously, which is concealed under the alluvium and brecciated chert. Top portion of the south-westerly area is covered with laterite with float iron ore and the low grade iron ore occurrence also been found in drilling. The iron ore is found Eastern side of Laserdia area in a length 500 of width 100 mtrs. Both the area has been proved through drilling. Southern side of the north-easterly part of the Mining Lease area is cover with BHJ/BHQ. In the western and southern side, the manganiferous laterite horizon gets concealed under alluvium.

#### 2.1.4.8: Deposit Type (as per MEMC Rule)

**2.1.4.8: Deposit Type (as per MEMC Rule)**

Deposit type of Lasorda-Pacheri is coming under II of Part III of MEMC Rule, 2015 i.e. Lenticular bodies of all dimensions including boding occurring en echelon, sillified linear zones of composite veins. Lenses, pockets, stock-works; irregular shaped modest to small size bodies.

Strike / Trend of the Ore Body: \*

N	50	E
---	----	---

TO

S	50	W
---	----	---

Amount of Dip of the Ore Body (degree) \*

Amount of Dip of the Ore body (deg. cc)

(from)

Amount of Dip of the Ore Body (degree) \*

Amount of Dip of the Ore Body (deg) 60

(to)

Dip Direction of the Ore Body \*

N	85	W
---	----	---

Plunge of Mineral Body (degree) (if any) \*

Plunge of Mineral Body (degree/ft. or m)

Direction of Plunge \*

Direction of Plunge	NE	10 to 45	SW
---------------------	----	----------	----

## 2.2: Exploration

**2.2.1: Summary of The Previous Exploration** (for fresh grant) / **During Last Plan Period** (for existing leases)

Name of The Agency \*

Name of the Agency
Geological Survey of India
Kartikay Exploration & Mining Service
Natural Resources Exploration & Mining Pvt. Ltd
Gemcokati Exploration & (P) Ltd
Thiriveni Earthmovers Pvt. Ltd
APC Drilling & Construction Pvt. Ltd
C13 Tools Manufacturing Pvt. Ltd

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S.N.	Litho units exposed	Name of the radical	Av.grade	Latitude(from)	Longitude (from)	Latitude( to)	Longitude (to)
1	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

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

S.N.	Year	Exploration agency	Core holes		Non-core (RC/DTH)		Grand total		Attach log sheet of each borehole in csv/excel format.
			Number of boreholes drilled	Total metr	Number of boreholes drilled	Total mtrs	Total boreholes	Total mtr	
1	2000 - 2005	Geological Survey of India	81	4581.35	0	0	81	4581.35	Attach in Annexure - 10
2	2018 - 2019	Kartikay Exploration & Mining Service	18	994.3	0	0	18	994.3	Attach in Annexure - 10
3	2018 - 2019	Gemcokati Exploration & (P) Ltd	1	65	0	0	1	65	Attach in Annexure - 10
4	2018 - 2019	Natural Resources Exploration & Mining Pvt. Ltd	2	112.7	0	0	2	112.7	Attach in Annexure - 10
5	2019 - 2020	Kartikay Exploration & Mining Service	10	524.7	0	0	10	524.7	Attach in Annexure - 10
6	2019 - 2020	Gemcokati Exploration & (P) Ltd	70	3807	0	0	70	3807	Attach in Annexure - 10
7	2019 - 2020	Natural Resources Exploration & Mining Pvt. Ltd	13	656.5	0	0	13	656.5	Attach in Annexure - 10
8	2019 - 20	Thriveni Earthmovers Pvt. Ltd	31	1672.9	0	0	31	1672.9	Attach in Annexure - 10
9	2019 - 20	C13 Tools Manufacturing Pvt. Ltd	5	239.45	0	0	5	239.45	Attach in Annexure - 10
10	2019 - 2020	APC Drilling & Construction Pvt. Ltd	0	0	4	291	4	291	Attach in Annexure - 10

### 2.2.1.8: Exploratory Mining

S.N.	Pit/Adit ID	Length in Mtr	Width in Mtr	Depth in mtrs	Volume (m³)
1	Not Done	Not Applicable	Not Applicable	Not Applicable	#VALUE!

### 2.2.1.9: Sampling

S.N.	Type of sample	No of samples collected	Number of samples analyzed	Location		Remark if any
				Latitude	Longitude	
1	Old Pit 1	3	3	2441446.919	326646.989	Old pits were existing prior to CL Grant
2	Old Pit 2	40	40	2441522.629	326450.282	
3	Old Pit 5	10	10	2440495.462	325152.772	
4	Old Pit 6	21	21	2440611.653	325136.908	
5	Old Pit 7	4	4	2440665.372	325019.597	
6	Old Pit 8	12	12	2440025.222	324728.113	
7	Old Pit 9	4	4	2440466.893	325265.731	
8	Old Pit 10	10	10	2440705.359	325092.88	
9	Trial Pit 1	9	9	2440684.626	325083.703	
10	Surface Sample 1	1	1	2441216.09	326251.5	
11	Surface Sample 2	1	1	2441512.31	326537.88	
12	Surface Sample 3	3	3	2441528.09	326465.86	
13	Surface Sample 4	1	1	2441160.3	326486.06	
14	Surface Sample 5	1	1	2440785.98	326276.23	
15	Surface Sample 6	1	1	2440787.45	326185.44	

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Method adopted for calculating bulk density of ore and waste

Manganese 24.56%Mn - 2.49  
26.35%Mn - 2.51  
Iron 54.85%Fe - 2.80  
56.03%Fe - 3.01  
Waste - 2.2  
Attached Annexure - 11.

S.N.	Nature of Ore/OB	Mineral	Number of samples	Bulk Density Established (t/m <sup>3</sup> )
1	SG Ore (-25% Mn)	Manganese	1	2.49
2	Ore (+25% Mn)	Manganese	1	2.51
3	SG Ore (-55%Fe)	Iron	1	2.8
4	Ore (+55%Fe)	Iron	1	3.01
5	Waste	Laterite	1	2.2

#### 2.2.1.14: Area Covered under Exploration

Level of exploration	Area in Ha		Total area in Ha.
	Forest	Non-forest	
G-1	0	0	0
G-2	72.707	19.884	92.591
G-3	0	0	0
G-4	0	0	0
Area proved as Non-mineralized (G-2 level of exploration)	21.701	17.597	39.298
Area to be explored	0	0	0
<b>Total</b>	<b>94.408</b>	<b>37.481</b>	<b>131.889</b>

### 2.2.2: Summary of The Previous Exploration (Before Last Plan Period)

Name of The Agency \*  
Fresh Mining Lease

#### 2.2.2.1: Geological Mapping

S.N.	Year	Scale	Area Covered (ha)
1	Not Applicable	Not Applicable	Not Applicable

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S.N.	Type of Sample	No of Samples
1	Not Applicable	Not Applicable

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S.N.	Average Grade (%)	Running Meters (m)	Latitude	Longitude
1	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Number of children	Not Applicable
--------------------	----------------

Min (m) \*

Mill (in)	Not Applicable
-----------	----------------

Max (m) \*

Max (m)	Not Applicable
---------	----------------

Avg (m) \*

#VALUE!
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### Area Covered Under Trenching

Co-ordinates

Latitude \*

North

Not Applicable

Longitude \*

East

Not Applicable

[illegible]

S.N.	From Latitude	From Longitude	To Latitude	To Longitude
1	Not Applicable	Not Applicable	Not Applicable	Not Applicable

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

#### 2.2.2.8: Exploratory Mining

#### 2.2.2.9: Sampling

#### 2.2.2.10: Chemical Analysis

#### 2.2.2.11: Petrology & Mineralogical Studies

#### 2.2.2.12: Beneficiation Test

#### 2.2.2.13: Bulk Density

#### 2.2.2.14: Area Covered under Exploration

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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
Year 1	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Year 2	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Year 3	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Year 4	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Year 5	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Potentially Mineralised area (Ha)								

### 2.2.3: ORE BODY GEOMETRY & GRADE

S.N.	Name of the ore band	General Strike / Trend	Dip Of Mineral Body	Average Strike Length (m)	Average Width (m)
1	The Manganese occurrence of the lease area basically in laterite type (top) and with an irregular pocket associate with Manganiferous shale and chert. However there is no continuity of ore bands are found.	N-S	20° to 60°	1000	300
2	There is only one place in Laserda Block (Eastern side of the area) found a small band of Iron ore	N-S	E	500	100

Table continued...

S.N.	Average Depth (m)	Name of the radical	Min Grade (%)	Max Grade (%)	Avg Grade (%)
1	45	Mn	10	53.03	19.52
2	41	Fe	45	68.32	52.85

### 2.2.4: Reserve / Resource Estimation Method

#### 2.2.4.1: Methodology

Resource / Reserve Estimation Method \*

Sectional Area Method

#### Methodology

The resource and reserve has been calculated by cross sectional method. The Cross-sectional area of the ore zones (marked through analysis results) has been calculated in a particular section and then multiplied with the influence of the ore body to get the volume of ore. Tonnage is calculated after multiplying the volume with the average bulk density. Cross sectional area was calculated with the help of Auto CAD. The same method has been used during estimation of Reserve also. The cut-off grade parameter for Manganese is considered +25% Mn. and for Iron ore it is considered +55% Fe. Further as per the notification of threshold value published by Indian Bureau of Mines vide letter dated 25.04.2018 for Manganese is 10% Mn and for Iron it is 45% Fe. which will be mineral reject.

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#### 2.2.4.2: Resource Calculation (Manganese 10 to 25% Mn)

S.N.	Cross section/Block	Sectional Area/Block area (sq mtr)	Influence (m)	Depth in mtr	Volume (m <sup>3</sup> )	Bulk Density (t/m <sup>3</sup> )	Resource Quantity (t)	Level of Exploration
		1918.59	71	4 to 60	136219.89	2.5	340549.725	G2
1	A - A'	3115.21	100	5 to 47	311521	2.5	778802.5	G2
2	B - B'	327.88	100	5 to 67	32788	2.5	81970	G2
3	C - C'	424.41	100	12 to 44	42441	2.5	106102.5	G2
4	D - D'	885.26	100	2 to 50	88526	2.5	221315	G2
5	E - E'	845.63	100	7 to 58	84563	2.5	211407.5	G2
6	F - F'	162.81	100	23 to 27	16281	2.5	40702.5	G2
7	G - G'	115.79	100	10 to 28	11579	2.5	28947.5	G2
8	H - H'	312.45	100	4 to 44	31245	2.5	78112.5	G2
9	I - I'	281.82	100	18 to 63	28182	2.5	70455	G2
10	N - N'	1340.86	100	10 to 60	134086	2.5	335215	G2
11	O - O'	1349.95	100	7 to 72	134995	2.5	337487.5	G2
12	P - P'	6984.36	75	4 to 44	523827	2.5	1309567.5	G2
13	Q - Q'	3421.91	50	2 to 35	171095.5	2.5	427738.75	G2
14	R - R'	5246.48	50	1 to 39	262324	2.5	655810	G2
15	S - S'	3324.17	50	1 to 50	166208.5	2.5	415521.25	G2
16	T - T'	1998.27	75	1 to 50	149870.25	2.5	374675.625	G2
17	U - U'	726.17	100	10 to 65	72617	2.5	181542.5	G2
18	V - V'	165.64	100	30 to 56	16564	2.5	41410	G2
19	W - W'	31.49	100	31 to 43	3149	2.5	7872.5	G2
20	X - X'	22.65	100	15 to 23	2265	2.5	5662.5	G2
21	Y - Y'	874.07	90	10 to 40	78666.3	2.5	196665.75	G2
22	Z - Z'							

Table continued...

S.N.	Type of Land	Name of the radical	Grade (%)	Method used for resource estimation
1	Forest	Manganese	10 - 25% Mn	Cross_Sectional
2	Forest	Manganese	10 - 25% Mn	Cross_Sectional
3	Forest & Non-Forest	Manganese	10 - 25% Mn	Cross_Sectional
4	Forest & Non-Forest	Manganese	10 - 25% Mn	Cross_Sectional
5	Forest	Manganese	10 - 25% Mn	Cross_Sectional
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9	Forest	Manganese	10 - 25% Mn	Cross_Sectional
10	Forest	Manganese	10 - 25% Mn	Cross_Sectional
11	Forest	Manganese	10 - 25% Mn	Cross_Sectional
12	Forest	Manganese	10 - 25% Mn	Cross_Sectional
13	Forest	Manganese	10 - 25% Mn	Cross_Sectional
14	Forest	Manganese	10 - 25% Mn	Cross_Sectional
15	Forest	Manganese	10 - 25% Mn	Cross_Sectional
16	Forest & Non-Forest	Manganese	10 - 25% Mn	Cross_Sectional
17	Forest & Non-Forest	Manganese	10 - 25% Mn	Cross_Sectional
18	Forest & Non-Forest	Manganese	10 - 25% Mn	Cross_Sectional
19	Forest & Non-Forest	Manganese	10 - 25% Mn	Cross_Sectional
20	Forest & Non-Forest	Manganese	10 - 25% Mn	Cross_Sectional
21	Forest & Non-Forest	Manganese	10 - 25% Mn	Cross_Sectional
22	Forest & Non-Forest	Manganese	10 - 25% Mn	Cross_Sectional

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8	H - H'	2636.64	100	8 to 57	263664	2.8	738259.2	G2
9	I - I'	713.96	100	10 to 60	71396	2.8	199908.8	G2
10	M - M'	891.24	100	2 to 10	89124	2.8	249547.2	G2
11	O - O'	861.99	100	2 to 41	86199	2.8	241357.2	G2
12	P - P'	940.08	100	26 to 47	94008	2.8	263222.4	G2
13	Q - Q'	1836.14	75	2 to 43	137710.5	2.8	385589.4	G2
14	R - R'	704	50	10 to 35	35200	2.8	98560	G2
15	S - S'	1444.05	50	1 to 28	72202.5	2.8	202167	G2
16	T - T'	1963.19	50	8 to 33	98159.5	2.8	274846.6	G2

Table continued...

S.N.	Type of Land	Name of the radical	Grade (%)	Method used for resource estimation
1	Forest	Iron	45 - 55% Fe	Cross_Sectional
2	Forest	Iron	45 - 55% Fe	Cross_Sectional
3	Forest & Non-Forest	Iron	45 - 55% Fe	Cross_Sectional
4	Forest & Non-Forest	Iron	45 - 55% Fe	Cross_Sectional
5	Forest	Iron	45 - 55% Fe	Cross_Sectional
6	Forest	Iron	45 - 55% Fe	Cross_Sectional
7	Forest	Iron	45 - 55% Fe	Cross_Sectional
8	Forest	Iron	45 - 55% Fe	Cross_Sectional
9	Forest	Iron	45 - 55% Fe	Cross_Sectional
10	Forest	Iron	45 - 55% Fe	Cross_Sectional
11	Forest	Iron	45 - 55% Fe	Cross_Sectional
12	Forest	Iron	45 - 55% Fe	Cross_Sectional
13	Forest	Iron	45 - 55% Fe	Cross_Sectional
14	Forest	Iron	45 - 55% Fe	Cross_Sectional
15	Forest	Iron	45 - 55% Fe	Cross_Sectional
16	Forest & Non-Forest	Iron	45 - 55% Fe	Cross_Sectional

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#### 2.2.4.2: Resource Calculation (Iron >55%Fe)

S.N.	Cross section/Block	Sectional Area/Block area (sq mtr)	Influence (m)	Depth in mtr	Volume (m <sup>3</sup> )	Bulk Density (t/m <sup>3</sup> )	Resource Quantity (t)	Level of Exploration
1	G - G'	2539.37	100	12 to 60	253937	3	761811	G2
2	H - H'	2704.77	100	20 to 50	270477	3	811431	G2
3	I - I'	3158.29	100	10 to 50	315829	3	947487	G2
4	J - J'	217.33	100	0 to 4	21733	3	65199	G2

Table continued...

S.N.	Type of Land	Name of the radical	Grade (%)	Method used for resource estimation
1	Forest	Iron	>55%Fe	Cross_Sectional
2	Forest	Iron	>55%Fe	Cross_Sectional
3	Forest	Iron	>55%Fe	Cross_Sectional
4	Forest	Iron	>55%Fe	Cross_Sectional

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i) Geological mapping (1:2000 scale)

## ii) Geological Sections

iii) The extent and variability of the mineralization expressed

(iv) Description the adequacy of exploration done for estimation of resources under various categories:

#### v) Logging and Sampling method

100% of sample has been carried out in NABL accredited lab.

vi) Describe Quality of assay data and laboratory tests.

The prepared sample sent to M/s SGS India Pvt. Ltd and Cotecna Inspection India Pvt. Ltd., a NABL accredited laboratory for sample preparation and chemical analysis etc. Method of Analysis is being done by SGS under IS 1473-2004 Reaff 2011 – WI XRF-01 ver., method of analysis is being done by

chemical analysis etc. Method of Analysis is being done by SGS under IS 1473-2004 (Part-1):1981. Further 2 nos of Manganese sample and 2 nos of dolomite sample have been carried out at IIMT, Bhubaneswar.

viii) Describe method adopted for Determination of Moisture content in the ore/mineral.

The test sample of a prescribed mass and sample size will be dried by heating in a dry oven at a prescribed temperature. The difference of the initial and dried masses of the sample, the moisture content, as percentage by mass will be determined. The procedure is being followed in Laboratories.

viii) Description of the method adopted for estimation of resources

The resource and reserve has been calculated by cross sectional method. The Cross-sectional area of the ore zones (marked through analysis results) has been calculated in a particular section and then multiplied with the influence of the ore body to get the volume of ore. Tonnage is calculated after multiplying the volume with the average bulk density. Cross sectional area was calculated with the help of Auto CAD.

The cut-off grade parameter for Manganese is considered +25% Mn. and for Iron ore it is considered +55% Fe. Further as per the notification of threshold value published by Indian Bureau of Mines vide letter dated 25.04.2018 for Manganese is 10% Mn and for Iron it is 45% Fe. which will be mineral reject.

Though the mineral occurrence of the said area is up to the depth of 100 mtrs from the surface level, therefore the method of mining will be opencast with benching system of the height of Iron ore will be 10 and in Manganese ore the bench will be 5 mtrs and width will be equal or more than the height. So as per the statute safety zone area must be left out and then open pit work can be carried out. Considering the same there is a chance the

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entire material cannot be extracted. Therefore, Mineral Reserve will be the less than Mineral Resource.

#### 2.2.4.6: Metallurgical Factors or Assumptions

At present there is no proposal of commissioning of any wet processing plant in the M.L area. RoM ore raised from the mine will be sorting & sizing of Manganese ore in different grade and size. For Iron ore RoM ore raised from the mine will be crushed and screened mechanically for separation of ores in to various sizes.

#### 2.2.4.7: Cost & Revenue Factors

The cost of production includes two major costs - cost of diesel and labour. Any drastic change in the cost of these components would also affect the cost of production and the business. However, the effect of these would not be substantial.

#### 2.2.4.8: Market Assessment

The market demand of Manganese and Iron is good enough to consume the materials in open market as per the present scenario. There is an open market for Lump for Manganese ore and also there is a future market in low grade manganese fines, but till date there are only market of 10-75 mm of manganese, for Iron ore there is a huge market for both lump and fines. The steel market and ferromanganese plants are fully dependent upon Iron & Manganese, if there is any shortfall in the current market then there is a possibility of supply of mineral from the said mine.

#### 2.2.4.9: Other Modifying Factors

The cost of production includes two major costs - cost of diesel and labour. Any drastic change in the cost of these components would also affect the cost of production and the business. However, the effect of these would not be substantial.

#### 2.2.4.10: Classification

Mineral reserves has been classified in to varying confidence categories since major part of mineral resources explored under G2 level of exploration is economically mineable considering the marketing, legal, social, environmental factors etc. The micro-economic profitability is encouraging and therefore, making investment in this for Iron and Manganese ore project is worthwhile and economically viable.

Due to constraints of safety zone barrier there is a possibility of reduction in the quantity of material when it is converted from Mineral Resource to Mineral Reserve, the reduced quantity is very marginal, so it won't harshly affect the project.

Mineral Reserve estimation has been taken with considering of all statutory laws/rules etc. such as mineral occurrence are there but could not able to extract due to safety zone barrier.

In few boreholes, where very nominal mineral occurrence is there and is also in depth, which will not be an economical, it is also not being considered in reserve category.

The Mineral resources estimated of Manganese and occurrence of Iron (Major Mineral) is classified under UNFC code 332 (Indicated Mineral Resource).

##### Justification assigning UNFC Code 122

Under Part III (Exploration norm of different types of deposit) of Mineral (Evidence of Mineral Contents) Rule, 2015 the exploration of the said area is being considered as lenticular bodies of all dimensions including bodies occurring Lenses, Pocket, irregular shaped modest to small size bodies of manganese, for that to confirming G2 level exploration the bore hole spacing was taken in 100 x 50 mtrs and a small patch has been taken in close spacing i.e. 50m x 25m grid interval in mineralized area.

Details exploration has not carried out, it will be carried out after execution of lease deed. Further Statutory clearance is also be not yet granted till date, so feasibility is to be under F2 code.

The market rate of Iron & Manganese is good and enough at this stage, therefore the economic is to be under E1 code. Details is elaborated in Pre-feasibility study attached as Annexure -7.

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### 2.2.4.11: Calculation of blocked resources (Manganese 10 - 25%Mn)

S.N.	Reserves blocked due to	Cross section/Block	Sectional area/ block area (in Sq mrt)	Influence (m)	Depth (m)	Volume (m³)	Bulk Density (t/m³)
1	Ultimate Pit limit	A-A'	1918.59	49.7	43 to 62	95353.923	2.5
2	Ultimate Pit limit	B - B'	413.43	100	43 to 55	41343	2.5
3	Ultimate Pit limit	C - C'	11.31	100	63 to 67	1131	2.5
4	Ultimate Pit limit	D - D'	34.58	100	37 to 44	3458	2.5
5	Ultimate Pit limit	E - E'	69.14	100	17 - 50	6914	2.5
6	Ultimate Pit limit	F - F'	299.63	100	22 to 58	29963	2.5
8	Ultimate Pit limit	G - G'	60.09	100	23 to 30	6009	2.5
9	Ultimate Pit limit	H - H'	11.48	100	25 to 28	1148	2.5
10	Ultimate Pit limit	I - I'	56.59	100	16 - 44	5659	2.5
11	Ultimate Pit limit	N - N'	281.82	100	18 - 63	28182	2.5
12	Ultimate Pit limit	T - T'	173.84	50	46 - 55	8692	2.5
13	Ultimate Pit limit	X - X'	31.49	100	30 to 44	3149	2.5
14	Ultimate Pit limit	Y - Y'	22.65	100	16 to 23	2265	2.5
15	Ultimate Pit limit	Z - Z'	874.07	54	10 to 40	47199.78	2.5
Total			4258.71				

Table continued...

S.N.	Resource Quantity (t)	UNFC code	Type of Land	Name of the radical	Grade (%)	Method used for resource estimation
1	238384.8075	222	Forest	Manganese	10-25%Mn	Cross-Sectional
2	103357.5	222	Forest	Manganese	10-25%Mn	Cross-Sectional
3	2827.5	222	Forest & Non Forest	Manganese	10-25%Mn	Cross-Sectional
4	8645	222	Forest	Manganese	10-25%Mn	Cross-Sectional
5	17285	222	Forest	Manganese	10-25%Mn	Cross-Sectional
6	74907.5	222	Forest	Manganese	10-25%Mn	Cross-Sectional
8	15022.5	222	Forest	Manganese	10-25%Mn	Cross-Sectional
9	2870	222	Forest	Manganese	10-25%Mn	Cross-Sectional
10	14147.5	222	Forest	Manganese	10-25%Mn	Cross-Sectional
11	70455	222	Forest	Manganese	10-25%Mn	Cross-Sectional
12	21730	222	Forest	Manganese	10-25%Mn	Cross-Sectional
13	7872.5	222	Forest	Manganese	10-25%Mn	Cross-Sectional
14	5662.5	222	Forest	Manganese	10-25%Mn	Cross-Sectional
15	117999.45	222	Forest	Manganese	10-25%Mn	Cross-Sectional

### 2.2.4.11: Calculation of blocked resources (Manganese >25%Mn)

S.N.	Reserves blocked due to	Cross section/Block	Sectional area/ block area (in Sq mrt)	Influence (m)	Depth (m)	Volume (m³)	Bulk Density (t/m³)
1		A - A'	288.53	49.7	40 - 48	14339.941	2.5
2	Ultimate Pit limit	B - B'	8.82	100	36 to 38	882	2.5
3	Ultimate Pit limit	C - C'	355.51	100	38 to 80	35551	2.5
4	Ultimate Pit limit	D - D'	81.31	100	33 to 37	8131	2.5
5	Ultimate Pit limit	E - E'	87.94	100	43 to 51	8794	2.5
6	Ultimate Pit limit	F - F'	37.08	100	17 to 46	3708	2.5
7	Ultimate Pit limit	G - G'	8.17	100	13 to 15	817	2.5
8	Ultimate Pit limit	H - H'	45.07	100	21 to 24	4507	2.5
9	Ultimate Pit limit	N - N'	22.29	100	23 to 70	2229	2.5

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Total	646.19
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Table continued...

S.N.	Resource Quantity (t)	UNFC code	Type of Land	Name of the radical	Grade (%)	Method used for resource estimation
1	35849.85	222	Forest	Manganese	>25% Mn	Cross-Sectional
2	2205	222	Forest	Manganese	>25% Mn	Cross-Sectional
3	88877.5	222	Forest & Non Forest	Manganese	>25% Mn	Cross-Sectional
4	20327.5	222	Forest	Manganese	>25% Mn	Cross-Sectional
5	21985	222	Forest	Manganese	>25% Mn	Cross-Sectional
6	9270	222	Forest	Manganese	>25% Mn	Cross-Sectional
7	2042.5	222	Forest	Manganese	>25% Mn	Cross-Sectional
8	11267.5	222	Forest	Manganese	>25% Mn	Cross-Sectional
9	5572.5	222	Forest	Manganese	>25% Mn	Cross-Sectional

#### 2.2.4.11: Calculation of blocked resources (Iron 45% to 55%Fe)

S.N.	Reserves blocked due to	Cross section/Block	Sectional area/ block area (in Sq mrt)	Influence (m)	Depth (m)	Volume (m³)	Bulk Density (t/m³)
1	Ultimate Pit limit	A-A'	1146.85	49.7	30 to 41	56998.445	2.8
2	Ultimate Pit limit	D - D'	37.24	100	2 to 6	3724	2.8
3	Ultimate Pit limit	E - E'	134.04	100	2 to 6	13404	2.8
4	Ultimate Pit limit	F - F'	1400.65	100	12 to 62	140065	2.8
5	Ultimate Pit limit	G - G'	230.38	100	26 to 35	23038	2.8
6	Ultimate Pit limit	H - H'	360.86	100	26 to 32	36086	2.8
7	Ultimate Pit limit	M - M,	891.24	100	2 to 10	89124	2.8
Total			4201.26				

Table continued...

S.N.	Resource Quantity (t)	UNFC code	Type of Land	Name of the radical	Grade (%)	Method used for resource estimation
1	159595.646	222	Forest	Iron Ore	45 to 55% Fe	Cross-Sectional
2	10427.2	222	Forest & Non Forest	Iron Ore	45 to 55% Fe	Cross-Sectional
3	37531.2	222	Forest	Iron Ore	45 to 55% Fe	Cross-Sectional
4	392182	222	Forest	Iron Ore	45 to 55% Fe	Cross-Sectional
5	64506.4	223	Forest	Iron Ore	46 to 55% Fe	Cross-Sectional
6	101040.8	222	Forest	Iron Ore	45 to 55% Fe	Cross-Sectional
7	249547.2	222	Non Forest	Iron Ore	46 to 55% Fe	Cross-Sectional

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### 2.2.4.11: Calculation of blocked resources (Iron > 55%Fe)

S.N.	Reserves blocked due to	Cross section/Block	Sectional area/ block area (in Sq mtr)	Influence (m)	Depth (m)	Volume (m <sup>3</sup> )	Bulk Density (t/m <sup>3</sup> )
1	Ultimate Pit limit	G - G'	1178.21	100	26 to 60	117821	3
2	Ultimate Pit limit	H - H'	1598.92	100	6 to 60	159892	3
3	Ultimate Pit limit	I - I'	979.07	100	13 to 49	97907	3
Total			3756.2				

Table continued...

S.N.	Resource Quantity (t)	UNFC code	Type of Land	Name of the radical	Grade (%)	Method used for resource estimation
1	353463	222	Forest	Iron Ore	> 55% Fe	Cross-Sectional
2	479676	222	Forest	Iron Ore	> 55% Fe	Cross-Sectional
3	293721	222	Forest	Iron Ore	> 55% Fe	Cross-Sectional

### 2.2.4.12: Calculation of Reserves (Manganese 10% to 25%Mn)

S.N.	Cross Section/Block	Sectional area/block area in Sq mtr	Influence (m)	Depth (m)	Volume (m <sup>3</sup> )	Bulk Density (t/m <sup>3</sup> )	Reserves Quantity (t)
1	A - A'	1918.59	21.3	4 to 60	40865.967	2.5	102164.92
2	B - B'	2701.78	100	5 to 47	270178	2.5	675445.00
3	C - C'	316.57	100	5 to 67	31657	2.5	79142.50
4	D - D'	389.83	100	12 to 44	38983	2.5	97457.50
5	E - E'	816.12	100	2 to 50	81612	2.5	204030.00
6	F - F'	546	100	7 to 58	54600	2.5	136500.00
7	G - G'	102.72	100	23 to 27	10272	2.5	25680.00
8	H - H'	104.31	100	10 to 28	10431	2.5	26077.50
9	I - I'	255.86	100	4 to 44	25586	2.5	63965.00
10	O - O'	1340.86	100	10 to 60	134086	2.5	335215.00
11	P - P'	1349.95	100	7 to 72	134995	2.5	337487.50
12	Q - Q'	6984.36	75	4 to 44	523827	2.5	1309567.50
13	R - R'	3421.91	50	2 to 35	171095.5	2.5	427738.75
14	S - S'	5246.48	50	1 to 39	262324	2.5	655810.00
15	T - T'	3150.33	50	1 to 50	157516.5	2.5	393791.25
16	U - U'	1998.27	75	1 to 50	149870.25	2.5	374675.63
17	V - V'	726.17	100	10 to 65	72617	2.5	181542.50
18	W - W'	165.64	100	30 to 56	16564	2.5	41410.00
20	Z - Z'	874.07	36	10 to 40	31466.52	2.5	78666.30

Table continued...

S.N.	UNFC code	Type of Land	Name of the radical	Grade (%)	Method used for resource estimation
1	122	Forest	Manganese	10-25%Mn	Cross-Sectional Method
2	122	Forest	Manganese	10-25%Mn	Cross-Sectional Method
3	122	Forest & Non-Forest	Manganese	10-25%Mn	Cross-Sectional Method
4	122	Forest & Non-Forest	Manganese	10-25%Mn	Cross-Sectional Method
5	122	Forest	Manganese	10-25%Mn	Cross-Sectional Method
6	122	Forest	Manganese	10-25%Mn	Cross-Sectional Method
7	122	Forest	Manganese	10-25%Mn	Cross-Sectional Method
8	122	Forest	Manganese	10-25%Mn	Cross-Sectional Method
9	122	Forest	Manganese	10-25%Mn	Cross-Sectional Method
10	122	Forest	Manganese	10-25%Mn	Cross-Sectional Method
11	122	Forest	Manganese	10-25%Mn	Cross-Sectional Method
12	122	Forest	Manganese	10-25%Mn	Cross-Sectional Method

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13	122	Forest	Manganese	10-25%Mn	Cross-Sectional Method
14	122	Forest	Manganese	10-25%Mn	Cross-Sectional Method
15	122	Forest & Non-Forest	Manganese	10-25%Mn	Cross-Sectional Method
16	122	Forest & Non-Forest	Manganese	10-25%Mn	Cross-Sectional Method
17	122	Forest & Non-Forest	Manganese	10-25%Mn	Cross-Sectional Method
18	122	Forest & Non-Forest	Manganese	10-25%Mn	Cross-Sectional Method
20	122	Forest & Non-Forest	Manganese	10-25%Mn	Cross-Sectional Method

#### 2.2.4.12: Calculation of Reserves (Manganese >25%Mn)

S.N.	Cross Section/Block	Sectional area/block area in Sq mtr	Influence (m)	Depth (m)	Volume (m <sup>3</sup> )	Bulk Density (t/m <sup>3</sup> )	Reserves Quantity (t)
1	A - A'	288.53	21.3	4 to 48	6145.689	2.5	15364.2225
2	B - B'	22.12	100	15 to 75	2212	2.5	5530
3	C - C'	262.02	100	15 to 78	26202	2.5	65505
4	D - D'	34.4	100	33 to 47	3440	2.5	8600
5	E - E'	418.32	100	14 to 75	41832	2.5	104580
6	F - F'	198.71	100	17 to 46	19871	2.5	49677.5
7	G - G'	43.02	100	13 to 15	4302	2.5	10755
8	H - H'	119.09	100	10 to 24	11909	2.5	29772.5
9	I - I'	209.8	100	6 to 34	20980	2.5	52450
10	O - O'	810.07	100	23 to 53	81007	2.5	202517.5
11	P - P'	803.61	100	7 to 50	80361	2.5	200902.5
12	R - R'	135.85	50	15 to 23	6792.5	2.5	16981.25
13	S - S'	387.09	50	20 to 37	19354.5	2.5	48386.25
14	T - T'	421	50	25 to 49	21050	2.5	52625
15	U - U'	236.33	75	30 to 40	17724.75	2.5	44311.875
16	V - V'	63.82	100	52 to 58	6382	2.5	15955

Table continued...

S.N.	UNFC code	Type of Land	Name of the of radical	Grade (%)	Method used for resource estimation
1	122	Forest	Manganese	>25% Mn	Cross-Sectional Method
2	122	Forest	Manganese	>25% Mn	Cross-Sectional Method
3	122	Forest & Non-Forest	Manganese	>25% Mn	Cross-Sectional Method
4	122	Forest & Non-Forest	Manganese	>25% Mn	Cross-Sectional Method
5	122	Forest	Manganese	>25% Mn	Cross-Sectional Method
6	122	Forest	Manganese	>25% Mn	Cross-Sectional Method
7	122	Forest	Manganese	>25% Mn	Cross-Sectional Method
8	122	Forest	Manganese	>25% Mn	Cross-Sectional Method
9	122	Forest	Manganese	>25% Mn	Cross-Sectional Method
10	122	Forest	Manganese	>25% Mn	Cross-Sectional Method
11	122	Forest	Manganese	>25% Mn	Cross-Sectional Method
12	122	Forest	Manganese	>25% Mn	Cross-Sectional Method
13	122	Forest	Manganese	>25% Mn	Cross-Sectional Method
14	122	Forest & Non-Forest	Manganese	>25% Mn	Cross-Sectional Method
15	122	Forest & Non-Forest	Manganese	>25% Mn	Cross-Sectional Method
16	122	Forest & Non-Forest	Manganese	>25% Mn	Cross-Sectional Method

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#### 2.2.4.12: Calculation of Reserves (Iron 45% to 55%Fe)

S.N.	Cross Section/Block	Sectional area/block area in Sq mtr	Influence (m)	Depth (m)	Volume (m <sup>3</sup> )	Bulk Density (t/m <sup>3</sup> )	Reserves Quantity (t)
1	A - A'	1146.85	21.3	8 to 47	24427.905	2.8	68398.134
2	B - B'	2394.58	100	2 to 30	239458	2.8	670482.4
3	C - C'	975.61	100	1 to 22	97561	2.8	273170.8
4	D - D'	2227.79	100	2 to 20	222779	2.8	623781.2
5	E - E'	1018.07	100	2 to 20	101807	2.8	285059.6
6	F - F'	1915.53	100	5 to 60	191553	2.8	536348.4



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Mineral	Manganese	
Reserves/ Resources estimated as on	01/04/2021	
UNIT of estimation	Metric Ton	

b. Remaining Resources							
1. Feasibility Mineral Resource (B)	211	0	0	0			
2. Prefeasibility Mineral Resource (B)	221	0	0	0			
3. Prefeasibility Mineral Resource (B)	222	197397.350	0.000	197397.35	Above 25% Mn	Above 25% Mn	
4. Measured Mineral Resource (B)	331	0	0	0			
5. Indicated Mineral Resource (B)	332	0	0	0			
6. Inferred Mineral Resource (B)	333	0	0	0			
7. Reconnaissance Mineral Resource (B)	334	0	0	0			

1121310.95

Mineral	Manganese
Reserves/ Resources estimated as on	01/04/2021
UNIT of estimation	Metric Ton

B. Remaining Resources							
1. Feasibility Mineral Resource (B)	211	0	0	0			
2. Prefeasibility Mineral Resource (B)	221	0	0	0			
3. Prefeasibility Mineral Resource (B)	222	701166.760	0.000	701166.76	Above 10%-25% Mn	bove 10%-25% Mn	
4. Measured Mineral Resource (B)	331	0	0	0			
5. Indicated Mineral Resource (B)	332	0	0	0			
6. Inferred Mineral Resource (B)	333	0	0	0			
7. Reconnaissance Mineral Resource (B)	334	0	0	0			

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## Associated Mineral (A1)

Associated Mineral (A1)						
Mineral	Iron					
Reserves/ Resources estimated as on	01/04/2021					
UNIT of estimation	Metric ton					
Classification	Code	Quantity			Grade	
		Forest	Non-Forest	Total	Forest	Non-Forest
A. Mineral Reserve						
1. Proved Mineral Reserve (A)	111	0	0	0		
2. Probable Mineral Reserve (A)	121	0	0	0		
3. Probable Mineral Reserve (A)	122	1459068	0	1459068	Above 55% Fe	
B. Remaining Resources						
1. Feasibility Mineral Resource (B)	211	0	0	0		
2. Prefeasibility Mineral Resource (B)	221	0	0	0		
3. Prefeasibility Mineral Resource (B)	222	1126860		1126860	Above 55% Fe	
4. Measured Mineral Resource (B)	331	0	0	0		
5. Indicated Mineral Resource (B)	332	0	0	0		
6. Inferred Mineral Resource (B)	333	0	0	0		
7. Reconnaissance Mineral Resource (B)	334	0	0	0		
Total Mineral Resources (A+B)				2585928		

## Associated Mineral (A1)

Associated Mineral (A1)		Iron				
Mineral		01/04/2021				
Reserves/ Resources estimated as on		Metric ton				
UNIT of estimation						
Classification	Code	Quantity			Grade	
		Forest	Non-Forest	Total	Forest	Non-Forest
A. Mineral Reserve						
1. Proved Mineral Reserve (A)	111	0	0	0		
2. Probable Mineral Reserve (A)	121	0	0	0		
3. Probable Mineral Reserve (A)	122	4767258.73	0	4767258.73	Above 45% to 55% Fe	
B. Remaining Resources						
1. Feasibility Mineral Resource (B)	211	0	0	0		
2. Prefeasibility Mineral Resource (B)	221	0	0	0		
3. Prefeasibility Mineral Resource (B)	222	765283.25	249547.2	1014830.45	Above 45% to 55% Fe	
4. Measured Mineral Resource (B)	331	0	0	0		
5. Indicated Mineral Resource (B)	332	0	0	0		
6. Inferred Mineral Resource (B)	333	0	0	0		
7. Reconnaissance Mineral Resource (B)	334	0	0	0		
Total Mineral Resources (A+B)				5782089.18		

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## 2.2.5: Future Exploration Proposal

### 2.2.5.1: Geological Mapping

S.N.	Year	Scale	Area Covered (ha)
1	Year1	Not Applicable	Not Applicable
1	Year2	Not Applicable	Not Applicable
1	Year3	Not Applicable	Not Applicable
1	Year4	Not Applicable	Not Applicable
1	Year5	Not Applicable	Not Applicable

### 2.2.5.2: Ground Geophysical Survey

S.N.	Type of Survey	Spacing (m)	Total line (km)	Area Covered (ha)	Latitude	Longitude
1	Not Proposed	Not Proposed	Not Proposed	Not Proposed	Not Proposed	Not Proposed

### 2.2.5.3: Pitting

Number of pits \*

Not Proposed

S..N.	Year	Land type	Pit ID	Length of Pit (m)	Width of Pit (m)	Depth of Pit (m)	Latitude	Longitude
1	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

### 2.2.5.4: Trenching

Number of Trenches \*

Not Proposed

#### 2.2.5.4.1: SPACING

Min (m) \*

Not Applicable

Max (m) \*

Not Applicable

Avg (m) \*

#VALUE!

#### 2.2.5.4.2: Area Covered Under Trenching

Co-ordinates

S.N.	Year	Land type	Trench ID	Length of Trench (m)	Width of Trench (m)	Depth of Trench (m)
1	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Table continued...

S.N.	From Latitude	From Longitude	To Latitude	To Longitude
1	Not Applicable	Not Applicable	Not Applicable	Not Applicable

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### 2.2.5.5: Exploratory Drilling

#### 2.2.5.5.1: Core Drilling & Non-Core Drilling

S.N.	Year	In forest area			
		No. of boreholes	Total mtr	Type of borehole	Grid interval
1	1st Year	146	7300	Core	50 x 25 m
2	2nd Year	109	5450	Core	50 x 25 m
3	3rd Year	58	2900	Core	50 x 25 m
4	4th year	104	5200	Core	50 x 25 m
5	5th Year	90	4500	Core	50 x 25 m

Table continued...

S.N.	In Non-forest				Total borehole	Total Mtr	Attachment
	No. of boreholes	Total mtr	Type of borehole	Grid interval			
1	36	1800	Core	50 x 25 m	182	9100	Shown in Geological Map
2	0	0	0	0	109	5450	Shown in Geological Map
3	0	0	Core	50 x 25 m	58	2900	Shown in Geological Map
4	20	1000	Core	50 x 25 m	124	6200	Shown in Geological Map
5	38	1900	Core	50 x 25 m	128	6400	Shown in Geological Map

\* The proposed borehole depth will be end of the mineralisation or as per Geological interpretation

### 2.2.5.6: Exploratory Mining

S.N.	Year	Pit ID	Length in mtrs	Width in mtrs	Depth in mtrs	Volume (m <sup>3</sup> )
1	Not Proposed	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

### 2.2.5.7: Sampling

S.N.	Type of Sample	Number of Samples proposed	Area Covered (ha)	Latitude	Longitude
	Drill core	9100	38.71	Bore Hole Sample	Bore Hole Sample
	Drill core	5450	21.36	Bore Hole Sample	Bore Hole Sample
	Drill core	2900	12.69	Bore Hole Sample	Bore Hole Sample
	Drill core	6200	25	Bore Hole Sample	Bore Hole Sample
	Drill core	6400	25.51	Bore Hole Sample	Bore Hole Sample

### 2.2.5.8 Petrology & Mineralogical Studies

S.N.	Type of Sample	Number of Sample proposed
1	Not Proposed	Not Applicable

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## Chapter 3: Mineral Beneficiation / Processing

Name of The Ore/Mineral Manganese and Iron

### 3.1: Mineralogy of the ROM ore/ Mineral:

S.N	Valuable Mineral Name	Approx. Mineral %	Gangue Mineral/s Name	Approx. Gangue Mineral %
.				
	Not Available	Not Available	Not Available	Not Available

### 3.2: Complete Chemical Analysis of the ROM Ore/Mineral:

S.N	Radicals	Wt %
.		
	Not Available	Not Available

### 3.3: Crushing Section:

#### 3.3.1: Primary Crushing

S.N	Type of Crusher	Make	Capacity of Crusher (tph)	Feed Size (mm)	Product Size (mm)
.					
1	Jaw Crusher	METSO/ Equivalent	200 x 2	40 +	0 to 10, 10 to 40 & 40 to 120

#### 3.3.2: Secondary Crushing

S.N	Type of Crusher	Make	Capacity of Crusher (tph)	Feed Size (mm)	Product Size (mm)
.					
1	Cone	METSO/ Equivalent	200 x 2	40 to 120	0 - 5, 5 -18, 10 - 40

#### 3.3.3: Tertiary Crushing

S.N	Type of Crusher	Make	Capacity of Crusher (tph)	Feed Size (mm)	Product Size (mm)
.					
1	Cone	METSO/ Equivalent	200 x 2	Oct-40	0-5 & 5-18

Based on requirement

### 3.4: Grinding Section

#### 3.4.1: Dry Grinding

S.N	Type of Mill	Stages	Make of the mill	Feed Flow Rate (tph)	Feed Size (mm)	Product Size Mill Discharge (mm)	Type of screen
.							
1	Not Required	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Table continued...

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### 3.6.1: Scrubbing / Washing

### 3.6.1: Scrubbing / Washing

Table continued...

### 3.6.2: Screening and Classification

Table continued...

### 3.6.3: Gravity Separation

Table continued...

### 3.6.4: Magnetic Separation

Table continued...[illegible]

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

### 3.6.5: Flotation

S.N	Type of flotation equipment (froth/ column)	Stages (rougher/ cleaner, etc), if applicable	Make	Capacity (tph)	Feed Size (mm)	Product-Float (tph)	Product non-Float (tph)
	Not Proposed	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Table continued...

S.N	Water Requirement (l/h)	Fresh Water Requirement (l/h)	Recirculated water (l/h)
1	Not Applicable	Not Applicable	Not Applicable

### 3.6.6: Other Operations

S.N	Type of equipment / operation	Stages, if applicable	Make	Capacity (tph)	Feed Size (mm)	Product-Conc (tph)	Product-Mid (tph), if available
1	Not Proposed	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Table continued...

S.N	Product-Tail (tph)	Water Requirement (l/h)	Fresh Water Requirement (l/h)	Recirculated water (l/h)
	Not Applicable	Not Applicable	Not Applicable	Not Applicable

### 3.6.7: Product Quality (wet processing)

Products	Wt %	In tonnes	Size (range) mm	Complete chemical analysis
Concentrate	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Sub-grade	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Rejects	Not Applicable	Not Applicable	Not Applicable	Not Applicable

### 3.7: Overall Product Quality (Dry cum Wet Processing)

Products	Wt %	In tonnes	Size (range) mm	Complete chemical analysis
Concentrate	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Sub-grade	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Rejects	Not Applicable	Not Applicable	Not Applicable	Not Applicable

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### 3.8: Disposal Method for tailing/ rejects

a) Explain the disposal method for tailing or reject from processing plant with detail chemical / mineral analysis of tailing	Not Applicable	Not Applicable
b) Size and capacity of tailing pond, toxic effect of such tailings, process adopted to neutralise its effect (if any)	Not Applicable	Not Applicable
c) Any other data (if available)	Not Applicable	Not Applicable

### 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	Attach overall water balance chart	Not Applicable
---	------------------------------------	----------------

### 3.10: Flow sheets and charts

Material balance chart of mineral processing plant(s) (each stage of process)	Attach as annexure - 12	
Attach flow sheet of beneficiation of plant(s)	Not Applicable	Not Applicable
Any other data (if applicable)	Not Applicable	Not Applicable

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## Chapter 4: Mining Operations

☐ Manual ☒ Mechanized

### 4.1: Mining Method (Opencast)

☐ Subsurface ☒ Surface/Opencast

#### 4.1.1: Existing Method of Mining

Choose one or more ☐ Fresh Grant Mining Lease

#### 4.1.2: Proposed Method of Mining

Choose one or more ☐ HEMM with deephole drilling

##### Reasons for Proposed Changes

Overburden and ROM are being removed by using shovel-dumper combination. The benches are being maintained for iron ore is 10 mtrs of height and width will be equal and more than the height at the same time for Manganese ore the height will be 5 Mtrs and width will be equal and more than the height. The haul road having width of 8 - 12m with gradient of 1:16 is designed in the quarries. Blast holes for both overburden and ore are drilled by 100mm diameter crawler drills with 365 cubic feet per minute (cfm) compressors. The blasted run-off mine Manganese ore is being hauled to sorting places located at the designated site. The ROM is then dressed, sorted, sized and graded, the blasted run-off. The pincerated (Mazdoor/Reja) are deployed at different sorting places considering the average output per man shift of 1 ton (Avg.) viewing the finished ore production required from the particular quarry / pit. The different quality of finished ore are then loaded manually / mechanically to the dumpers and transported to stacking ground for stacking the ore in regular geometrical shapes and samples are collected and analyzed at our laboratory. Then removal permission is obtained from Mining Department of State Government after stack verification. The blasted run-off mine iron ore is being hauled to processing plant area as designated for screening and crushing. The different quality of finished ore are then loaded mechanically to the dumpers and transported to stacking ground for stacking the ore in regular geometrical shapes and samples are collected and analyzed at our laboratory. Then removal permission is obtained from the Mining Department of State Government after stack verification. For Iron Saleable - >55% Fe, Mineral Reject - 45 to 55% Fe, Waste - <45% Fe. For Manganese Saleable - >25%Mn, Mineral Reject - 10 to 25%Mn, Waste - <10%Mn. Mineral Reject will be stacked separately at the earmarked location, which will be sale as per the market demand and also blend with the available high grade materials. As the nature of the ore is hard, about 30% of the total production will be required blasting. The proposed mining will have 10m height benches in Iron & 5m height benches in Manganese and will be drilled for blast holes by 115 mm diameter DTH drills fed by compressed air. These holes will be drilled in staggered pattern with burden and spacing of 2.5m and 3.0m respectively. No secondary blasting will be done. Rock breaker will be utilized breaking big boulders if any.

**BLASTING PROCEDURE**

Deep hole blasting has been proposed for loosening of hard materials. In the proposed mining area, 11m & 5m deep Blast holes will be drilled which consists of 10m & 5m bench height and 1m & 0.5m sub-grade drilling. High explosives will be loaded by bottom charging or deck charging. The stemming length is proposed to be one third of the hole depth. The explosive column will be blasted under "V" type blasting pattern initiated by detonator & NONEL and safety fuse. For deep hole blasting, permission has been obtained from Directorate General of Mine Safety, Chhattisgarh region.

**Drilling pattern**

Staggered pattern of drilling and row to row sequence with the help of ordinary delay detonators will be adopted for the blasting purpose. During blasting of multi-rows or more numbers of holes in a single row, provision of delay detonator and NONEL/RAYDET shall be utilized in order to control ground vibration.

**Type of explosive and detonator to be used**

Nitrate mixture such as Power gel explosive will be used for blasting. Electric detonator and Nonel

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- High blasting efficiency
- Minimize ground vibration
- Control fly rocks
- Better fragmentation
- Safe to handle

The explosive for blasting will be out sourced by agreement under Rule 22 from authorized agencies as per the requirement. Hence, there will be no storage facilities for explosive within the mine.

The major hazards associated with blasting are as follows :

4) Fly rock

(a) Dust and fumes

i) Adopting the safe charge per day to restrict the peak particle velocity (ppv) of ground vibration as per blasting test results.

ii) Avoiding water accumulation in the holes, and if there is any water accumulation in the hole, the same has to be dewatered wherever practicable.

- vi) Covering the detonating cords by soil layers.

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

S.N.	Pit ID	Pit Status	Area Covered by Pit (Ha)	Pit Dimension (m x m x m)
1	Quarry-1	Old Quarry	0.113	48 x 23.13 x 5
2	Quarry-1A	Old Quarry	0.085	44 x 13.54 x 3
3	Quarry-1B	Old Quarry	0.016	15.1 x 3.33 x 2
4	Quarry-1C	Old Quarry	0.016	16 x 3.33 x 2
5	Quarry-1D	Old Quarry	0.03	16.9 x 4.17 x 3
6	Quarry-2	Old Quarry	0.166	61 x 34.58 x 5
7	Quarry-2A	Old Quarry	0.043	28.7 x 8.96 x 11
8	Quarry-2B	Old Quarry	0.02	15.6 x 4.17 x 1
9	Quarry-3	Old Quarry	0.141	50.8 x 29.38 x 10
10	Quarry-3A	Old Quarry	0.01	12.88 x 2.08 x 2
11	Quarry-3B	Old Quarry	0.01	16.6 x 2.08 x 2
12	Quarry-3C	Old Quarry	0.045	27.4 x 9.38 x 5
13	Quarry-3D	Old Quarry	0.007	8.9 x 1.46 x 3
14	Quarry-3E	Old Quarry	0.064	30 x 13.33 x 5
15	Quarry-3F	Old Quarry	0.032	23.6 x 6.67 x 6
16	Quarry-3G	Old Quarry	0.101	47 x 21.04 x 5.5
17	Quarry-3H	Old Quarry	0.047	32.5 x 9.79 x 4

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18	Quarry-3I	Old Quarry	0.113	46 x 23.54 x 4
19	Quarry-4	Old Quarry	0.134	100.1 x 27.92 x 2
20	Quarry-4A	Old Quarry	0.084	34.5 x 7.08 x 2
21	Quarry-4B	Old Quarry	0.021	21 x 4.38 x 2
22	Quarry-6C	Old Quarry	0.042	42 x 8.75 x 2
23	Quarry-4D	Old Quarry	0.001	4.3 x 0.21 x 1.5
24	Quarry-4E	Old Quarry	0.005	9.5 x 1.04 x 1.5
25	Quarry-4F	Old Quarry	0.007	9 x 1.46 x 1.5
26	Quarry-4G	Old Quarry	0.017	17 x 3.54 x 1.3
27	Quarry-4H	Old Quarry	0.048	39 x 10 x 2
28	Quarry-5	Old Quarry	0.101	59 x 21.04 x 2
29	Quarry-5A	Old Quarry	0.01	22 x 2.08 x 1
30	Quarry-6	Old Quarry	0.193	77 x 40.21 x 3.5
31	Quarry-6A	Old Quarry	0.024	18.5 x 5 x 4
32	Quarry-7A	Old Quarry	0.178	86 x 37.08 x 2
33	Quarry-7	Old Quarry	0.159	57.5 x 33.13 x 4
34	Quarry-7B	Old Quarry	0.013	15.4 x 2.71 x 2
35	Quarry-7C	Old Quarry	0.058	41 x 12.08 x 4
36	Quarry-7D	Old Quarry	0.021	19 x 4.38 x 2.5
37	Quarry-7E	Old Quarry	0.022	18 x 4.58 x 2
38	Quarry-7F	Old Quarry	0.049	33.9 x 10.21 x 2
39	Quarry-8	Old Quarry	0.124	38 x 25.83 x 10
40	Quarry-9	Old Quarry	0.099	59.5 x 20.63 x 4.5
41	Quarry-9A	Old Quarry	0.006	10.8 x 1.25 x 2
42	Quarry-9B	Old Quarry	0.006	9.5 x 1.25 x 1
43	Quarry-9C	Old Quarry	0.031	27.3 x 6.46 x 2
44	Quarry-9D	Old Quarry	0.016	16.8 x 3.38 x 1.5
45	Quarry-9E	Old Quarry	0.045	34.8 x 9.38 x 2
The above Old quarries were existing prior to grant of Composite Licence (LoI dated 27.01.2017)				

#### 4.2.1.2: Dumps and Stacks

##### 4.2.1.2.1: Dump Details

S.N	Dump ID	Dump Status	Type of Dump	Total Dump Quantity (t)	Area covered by Dump (Ha)	Height (m)	Location
1	There is no existing Dump	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

##### 4.2.1.2.2: Stack Details

S.N	Stack ID	Type of Stack	Total Stack Quantity (t)	Area covered by Stack (Ha)	Height (m)
1	There is no existing Stack	Not Applicable	Not Applicable	Not Applicable	Not Applicable

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#### 4.2.1.3: Details of stabilised dumps

S.N	Dump ID	Number of Terraces	Average Height of Terraces (m)	Length of Toe Wall (m)	Length of Garland Drain (m)	Area Stabilized (ha)	Method of Stabilization
1	There is no existing Dump	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

#### 4.2.2: Opencast Mining

##### 4.2.2.1: Bench Parameters

Pit Id	Year	Max Height of the Benches in Over Burden (m)	Min Width of the Benches in Over Burden (m)	Slope of the Bench 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)
Laserda_Pit_1	Year 1	10	10	85 or more	10	10 or more	85 or more	27 to 60
Laserda_Pit_2	Year 1	5	5	85 or more	5	5 or more	85 or more	45 to 55
Laserda_Pit_1	Year 2	0	0	0	10	10 or more	85 or more	27 to 53
Laserda_Pit_2	Year 2	0	0	0	5	5 or more	85 or more	45 to 55
Laserda_Pit_1	Year 3	10	10	85 or more	10	10 or more	85 or more	17 to 51
Laserda_Pit_2	Year 3	5	5	85 or more	5	5 or more	85 or more	18 to 25
Laserda_Pit_2	Year 4	0	0	0	5	5 or more	85 or more	19
Laserda_Pit_3	Year 4	5	5	85 or more	5	5 or more	85 or more	47 to 60
Laserda_Pit_2	Year 5	0	0	0	5	5 or more	85 or more	13 to 52

Table continued...

Pit Id	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
Laserda_Pit_1	0	0	3	32 metres from OGL	490 RL	18	Plate No - IV (A)	Plate No - IV (A1, A2 & A3)
Laserda_Pit_2	1	1	1	11 metres from OGL	490 RL	18	Plate No - IV (B)	Plate No - IV (B1, B2 & B3)
Laserda_Pit_1	0	4	2	21 metres from OGL	490 RL	18	Plate No - IV (C)	Plate No - IV (C1, C2 & C3)
Laserda_Pit_2	0	0	3	48 metres from OGL	490 RL	18	Plate No - IV (D)	Plate No - IV (D1, D2 & D3)
Laserda_Pit_1	0	0	3	29 metres from OGL	490 RL	18	Plate No - IV (E)	Plate No - IV (E1, E2 & E3)
Laserda_Pit_2	0	0	2	13 metres from OGL	490 RL	18	Plate No - IV (F)	Plate No - IV (F1, F2 & F3)
Laserda_Pit_2	1	0	2	42 metres from OGL	490 RL	18	Plate No - IV (G)	Plate No - IV (G1, G2 & G3)
Laserda_Pit_3	0	2	4	27 metres from OGL	490 RL	18	Plate No - IV (H)	Plate No - IV (H1, H2 & H3)
Laserda_Pit_2	1	0	3	24 metres from OGL	490 RL	18	Plate No - IV (I)	Plate No - IV (I1, I2 & I3)

##### 4.2.2.2: Yearwise Opencast Development (Iron)

S.N	Year	Pit ID	Bench	Direction	Bulk Density of Overburden (BD1) (ton/m <sup>3</sup> )	Bulk Density of Mineral (BD2) (ton/m <sup>3</sup> )	Top Soil Volume (Length x Width x Height) (m <sup>3</sup> )	Over Burden Volume (Length x Width x Height) (m <sup>3</sup> )	Over Burden Quantity (t)	Column1
1	Year 1	Laserda_Pit_1	3	North - South	2.2	3	0	537686	1182809	Only Iron Pit
2	Year 2	Laserda_Pit_1	6	North - South	2.2	3	0	255284	581625	Only Iron Pit
3	Year 2	Laserda_Pit_2	2	East - West	0	2.8	0	0	0	Manganese dominated pit, therefore total waste has been calculated for Manganese.
4	Year 3	Laserda_Pit_1	5	North - South	2.2	2.8	0	420889	925056	Only Iron Pit
5	Year 4	Laserda_Pit_2	2	East - West	2.2	2.8	0	36061	79334	Iron dominated Pit
6	Year 4	Laserda_Pit_3	6	East - West	0	2.8	0	0	0	Manganese dominated pit, therefore total waste has been calculated for Manganese.
7	Year 5	Laserda_Pit_2	4	East - West	2.2	2.8	0	190598	287316	Iron dominated Pit

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S.N	ROM Volume (Length x Width x Height) (m <sup>3</sup> )	ROM Quantity (t)	Recovery	Mineral Reject (t)	Production Main (t)	Production Associated (t)	Location of Advancement	OB to Ore Ratio (ton/m <sup>3</sup> )
1	530712	1545433	100	0	1545433	0	326314.85E, 2440724.01N & 326375.67E, 2441102.46N	01:00.3
2	237132	711396	100	0	711396	0	326335.71E, 2440748.32N & 326395.85E, 2441056.57N	01:00.4
3	19160	53648	100	0	53648	0	326335.90E, 2441451.12N & 326525.35E, 2441448.66N	00:00.0
4	224832	629530	100	472147	157382	0	326375.69E, 2441103.08N & 326568.19E, 2441203.22N	01:00.7
5	96046	268929	100	201897	67232	0	326392.61E, 2441523.20N & 326687.01E, 2441501.07N	01:00.1
6	25910	72548	100	54411	18137	0	326121.25E, 2440987.53N & 326274.70E, 2441044.93N	00:00.0
7	127286	356401	100	267301	89100	0	326362.32E, 2441510.76N & 326622.95E, 2441508.26N	01:00.4

S.N	Pit ID	Total Topsoil Volume (m <sup>3</sup> )	Total Over Burden Volume (m <sup>3</sup> )	Total Over Burden Quantity (t)	Total ROM Volume (m <sup>3</sup> )	Total ROM Quantity (t) (Iron)
1	Laserda_Pit_1	0	1211858	2670490	992676	2886359
2	Laserda_Pit_2	0	166659	366650	242492	678978
3	Laserda_Pit_3	0	0	0	25910	72548

#### 4.2.2.2: Yearwise Opencast Development (Manganese)

S.N	Year	Pit ID	Bench	Direction	Bulk Density of Overburden (BD1) (ton/m <sup>3</sup> )	Bulk Density of Mineral (BD2) (ton/m <sup>3</sup> )	Top Soil Volume (Length x Width x Height) (m <sup>3</sup> )	Over Burden Volume (Length x Width x Height) (m <sup>3</sup> )	Over Burden Quantity (t)	Column1
1	Year 1	Laserda_Pit_2	3	East - West	2.2	2.5	12449	114470	251834	Manganese Dominated Pit
2	Year 2	Laserda_Pit_2	2	East - West	2.2	2.5	0	79839	175646	Manganese Dominated Pit
3	Year 3	Laserda_Pit_2	2	East - West	2.2	2.5	0	30530	67166	Iron dominated pit, therefore total waste has been calculated for Iron.
4	Year 4	Laserda_Pit_2	3	East - West	2.2	2.5	8411	0	0	Manganese Dominated Pit
5	Year 4	Laserda_Pit_3	6	East - West	2.2	2.5	0	161438	355164	Iron dominated pit, therefore total waste has been calculated for Iron.
6	Year 5	Laserda_Pit_2	4	East - West	2.2	2.5	1228	0	0	

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S.N	ROM Volume (Length x Width x Height) (m <sup>3</sup> )	ROM Quantity (t)	Recovery	Mineral Reject (t)	Production Main (t)	Production Associated (t)	Location of Advancement	OB to Ore Ratio (ton/m <sup>3</sup> )
1	7406	18515	100	15788	2777	0	326358.94E, 2441432.57N & 326545.93E, 2441454.37N	01:06.2
2	13780	34450	100	29282	5168	0	326335.80E, 2441451.12N & 326525.55E, 2441448.68N	01:02.3
3	10147	25368	100	11097	14271	0	326376.97E, 2441439.01N & 326487.48E, 2441457.97N	01:01.2
4	7720	19300	100	16405	2895	0	326392.61E, 2441523.20N & 326657.01E, 2441503.07N	00:00.0
5	17205	43013	100	17793	25220	0	326121.25E, 2440987.51N & 326274.70E, 2441044.83N	01:03.8
6	44268	110670	100	94070	16601	0	326362.32E, 2441510.76N & 326622.95E, 2441508.26N	0:00

S.N	Pit ID	Total Topsoil Volume (m <sup>3</sup> )	Total Over Burden Volume (m <sup>3</sup> )	Total Over Burden Quantity (t)	Total ROM Volume (m <sup>3</sup> )	Total ROM Quantity (t) (Mn)	Column1
1	Laserda_Pit_2	22086	224839	494646	83321	208303	
2	Laserda_Pit_3	0	161438	355164	17205	43013	

#### 4.2.2.3: Transportation & Hauling Equipment

S.N	Type	Make	Capacity (m <sup>3</sup> )	No. of Equipments
1	Tipper	VOLVO	18	13
2	Water Tanker	Ashok Leyland	12 K	2
3	Loader	SDLG	3.5	2

### 4.3: Material Handling Summary

#### 4.3.1: Studies Undertaken

Blast Vibration Study Report	No	(If yes attach report as annexure)
Slope Stability Study Report	No	(If yes attach report as annexure)
Recovery Study Report	No	(If yes attach report as annexure)
Hydrological Study Report	No	(If yes attach report as annexure)
Mineral Beneficiation Study Report	No	(If yes attach report as annexure)
Subsidence Study Report	No	(If yes attach report as annexure)
Geotechnical Study Report	No	(If yes attach report as annexure)
Any Other Study Report	No	(If yes attach report as annexure)
Bulk Density Study Report	Yes (Annexure - 11)	(If yes attach report as annexure)

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S.N.	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 (%)	Column1
1	Year 1	2728342	1182409	1545433	1545433	0	01:00.8	58.35 Fe	Not Applicable
2	Year 2	1326669	561625	765044	765044	0	00:00.7	60.03 Fe	Not Applicable
3	Year 3	1555486	925956	629530	157382	472147	01:01.5	53 to 55% Fe	*Mineral Reject will be stacked at the earmarked location shown in the map which will be sale as per the market demand and also blend with the available high grade materials.
4	Year 4	420811	79334	341477	85369	256108	01:00.2	50 to 55% Fe	do
5	Year 5	643717	287316	356401	89100	267301	01:00.8	52 to 55% Fe	do

S.N.	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 (%)	Column1
1	Year 1	270349	251834	18515	2777	15758	01:13.6	10 to 30% Mn	*Mineral Reject will be stacked at the earmarked location shown in the map which will be sale as per the market demand and also blend with the available high grade materials.
2	Year 2	210056	175606	34450	5168	29282	01:05.1	10 to 30% Mn	*Mineral Reject will be stacked at the earmarked location shown in the map which will be sale as per the market demand and also blend with the available high grade materials.
3	Year 3	92534	67166	25368	14271	11097	01:00.4	10 to 30% Mn	do
4	Year 4	417477	355164	62113	28115	84198	01:05.7	10 to 30% Mn	do
5	Year 5	110670	0	110670	16601	94070	00:00.0	10 to 30% Mn	do

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S.N.	Proposed Dump Handling Quantity (t) (A)	Proposed Recovery of Saleable Mineral (t) (B)	Proposed Waste Quantity (t) (A-B)	Grade Range (%)	Justification
1	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

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#### 4.3.4: Calculation Summary (IRON ORE)

Year	Year 1	Year 2	Year 3	Year 4	Year 5	Total
(A) Total ROM quantity (t)	1545433	765044	472148	256108	267401	3306134
(B) Saleable ore from ROM (t)	1545433	765044	157382	85369	89100	2642328
(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	0
(E) Total Saleable Ore (t) (=B+D)	1545433	765044	0	85369	89100	2642328
(F) Total Quantity Handled (t) (=A+C)	1545433	765044	472148	256108	267401	3306134

#### 4.3.4: Calculation Summary (MANGANESE ORE)

Year	Year 1	Year 2	Year 3	Year 4	Year 5	Total
(A) Total ROM quantity (t)	18515	34450	25368	62313	110670	251316
(B) Saleable ore from ROM (t)	2777	5168	14271	28115	16601	66932
(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	0
(E) Total Saleable Ore (t) (=B+D)	2777	5168	14271	28115	16601	66932
(F) Total Quantity Handled (t) (=A+C)	18515	34450	25368	62313	110670	251316

#### 4.4: Machine Calculation

##### 4.4.1: Machine Requirement Summary

Number of Average Working Days in One Year (A)	330
Number of Shifts per Day (B)	2
Material Handling Required per Day (t) ((D)+(E)+(F)+(G))	9087
Material to be Handled per Shift (t) ((E)-(D)/(B))	4543.47
Handling Required per Hour (t) ((F)-(E)/8 hours)	605.80
Effective Shift Time	7 Hours 30 Mins

##### 4.4.2: Shovel / Excavator Requirement

Effective Shift Time:	7 Hours	30 Mins
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S.N.	Type	Bucket Capacity (m³) (A)	Bucket Fill Factor (B)	Swell Factor (C)	Tonnage Factor (m³/t) (D)	Machine Utilization Factor (%) (U)	Efficiency (%) (E)	Cycle time (sec) (F)
1	Hydraulic Excavator	2.5	85%	85%	2.66	90%	85%	35
2	Hydraulic Excavator	1.8	85%	85%	2.35	90%	85%	30

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#### 4.4.5: Machine Deployment Details

##### 4.4.5.1: Excavator & Loading Equipment

S.N.	Type	Make	Capacity (m <sup>3</sup> )	No. of Equipments
1	Hydraulic Crawler Mounted	TATA Hitachi/Equivalent Capacity	2.5	1
2	Hydraulic Crawler Mounted	Komatsu/Equivalent Capacity	1.8	2

##### 4.4.5.2: Dozers Details

S.N.	Type	Make	Capacity (hp)	No. of Equipments
1	Crawler Mounted	Caterpillar	200 HP	1

##### 4.4.5.3: Drilling Details

S.N.	Type	Make	Capacity (t)	Diameter of Hole (mm)
1	Crawler Mounted	Atlas Copco		115

#### 4.5 Blasting Requirement

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

S.N.	Drill Pattern / Spacing of Holes (m)	Burden of Holes (m)	Number of Rows / Rings	Yield per Holes in Waste (m <sup>3</sup> )	Frequency of Blasting in a Week	Maximum Number of Holes Blasted in a Round	Charge per Hole (kg)	Charge per Round (kg)
1	3	2.5	2	82.5	2	18	41.25	742.5
2	3	2.5	2	41.25	2	8	20.6	165

Table continued...

S.N.	Explosive Requirement Per Month in Development (kg)	Powder Factor in Development / Waste (kg/t)	Depth Of Hole
1	5940	0.2	11
2	1160	0.2	5.5

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

Type of Explosive	Type of Explosives used / to be Used
-------------------	--------------------------------------

S.N.	Total ROM proposed to be handled in CUM/annum	Total ROM proposed to be handled in CUM/day	Spacing of Holes (m)	Burden of Holes (m)	Number of Rows	Yield per Holes in ROM Zone (m <sup>3</sup> )	Frequency of Blasting in a Week	Maximum Number of Holes Blasted in a Round	No of Holes Required to be Blasted per Round	Charge per Hole (kg)
1	251838	763	3	2.5	2	82.5	2	20	18	49.5
2	33201	101	3	2.5	2	41.25	2	8	8	24.75

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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	891	7128	0.23	No	No	Yes	50 T	No	11
2	74.25	594	0.24	No	No	Yes	50 T	No	5.5

#### 4.6: Man Power Deployment

##### 4.6.1: Managerial

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	1st Class Manager	0	0	0	1	1
2	2nd Class Manager	1	1	0	0	2
3	Mining Engineer	1	1	0	0	2
4	Geologist	0	0	0	1	1
5	Mechanical Engineer	1	1	0	0	2
6	Electrical Engineer	0	0	0	1	1
7	Others	0	0	0	2	2

##### 4.6.2: Supervisory

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	Foreman	1	1	0	0	2
2	Mine-mate	1	1	0	0	2
3	Blaster	0	0	0	1	1
4	Other	1	1	0	2	4

##### 4.6.3: Skilled Workers / Operators

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
	Operator	2	2	0	0	4
	Dumper Operator	7	7	0	0	14
	Pump Operator	0	0	0	1	1
	Technician	1	1	0	0	2
	Drill Operator	2	2	0	0	4
	Dozer/Grader Operator	1	1	0	0	2
	Other	5	5	0	3	13

##### 4.6.4: Semi-skilled Workers

S.N.	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	Column1
1		0	0	70	70	Persons will be worked for Sorting & Storing of Manganese ore

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#### 4.6.5: Unskilled Workers

S.N.	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	Column1
1	0	0	0	150	150	Persons will be worked for Sorting & Sizing of Mangane ore

#### 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	0	25	25	0	5	55

#### 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
49	49	0	237	335
No of Shifts per Day (I(A) = Machine Requirement Summary (III))				2
Average Daily Employment per Shift (II(B) = (Total Number of Person per Day) / (I(A))				168
Material to be Handled per Shift (I(C) = Machine Requirement Summary (I))				4544

#### 4.6.8: Supervision

S.N.	Particulars	Qualification	Requirement / Proposed	In Position / Existing Strength	(-) Shortage / (+) Excess	Remarks
1	0	0	0	0	0	0

#### 4.7: Waste Management

##### 4.7.1: Existing Dump

S.N.	Year	Dump Id	Type of Dump	Proposed Area (ha)	Height (m)	Total Dump Quantity (m³)	Existing Dump Location
1	No Existing Dump	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

##### 4.7.2: New Dump

S.N.	Year	Dump Id	Type of Dump	Proposed Area (ha)	Height (m)	Total Dump Quantity (m³)	New Dump Location	Remarks
1	Year 1	Dump 1	Waste	2.445	22	430549	Near ML Pillar No. 3	20% of waste materials will be used in road maintenance
2	Year 1	Dump 2	Waste	1.843	15	91576	Near ML Pillar No. 23	20% of waste materials will be used in road maintenance
3	Year 2	Dump 1	Waste	0.751	8	204227	Near ML Pillar No. 3	20% of waste materials will be used in road maintenance
4	Year 2	Dump 2	Waste	0.695	5	63871	Near ML Pillar No. 23	20% of waste materials will be used in road maintenance

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#### 4.7.3: Existing Stack

S.N.	Year	Stack ID	Type of Stack	Proposed Area (ha)	Height (m)	Total Stack Quantity (m³)	Existing Stack Location
1	No Existing Stack	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

#### 4.7.4: New Stack

S.N.	Year	Stack ID	Type of Stack	Proposed Area (ha)	Height (m)	Total Stack Quantity (m³)	New Stack Location
1	Year 1 to Year 5	Temporary MR Stack Yard - 1	Mineral Reject of Manganese	1.218	10	71754	326100.00E, 2441300.00N
2	Year 3	Temporary MR Stack Yard - 2	Mineral Reject of Iron ore	1.637	22	168624	326053.65E, 2440923.56N
3	Year 4	Temporary MR Stack Yard - 3	Mineral Reject of Iron ore	0.751	8	91467	326053.65E, 2440923.56N
4	Year 5	Temporary MR Stack Yard - 3	Mineral Reject of Iron ore	1	15	95465	Top of Back Filled area of Laterite Pit 1

#### 4.8: Mineral Waste Handling To Utilize As Minor Mineral

S.N.	Year	Dump Id	Type of Dump	Proposed Area (ha)	Quantity Handled (t)	Quantity Recovered (t)	Name Of Minor Mineral	Alternative Waste Utilization (m³)
1	No Proposal in the instant Proposal	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

#### 4.9: Use of Minerals

S.N.	Proposed Use Of Mineral*	Name Of Mineral	Relevant Use Of Mineral	Physical Specifications	Chemical Specifications
1	Direct Selling	Iron & Manganese	Steel Making and Ferro Alloys	IRON Colour - Cherry Red to Brown, Lateritised with Jaipurite type of ore. MANGANESE Colour - Steel Gray to Iron Black, Soil Finger (Pyrrhotite), Weathered botryoid type (Pyrrhotite)	Iron - Fe 55% Mn + 25%

\* Choose among these:

- 1) Captive use in Own Industry
- 2) Direct Selling
- 3) Selling Post-Beneficiation / Up-gradation

\*Select more than one, if applicable

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## Chapter 5: Sustainable Mining

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

The Instant Mining Plan is 1st Mining Plan prior to execution of Mining Lease. Therefore it is not applicable at this stage.

(Total 200 characters)

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

Not applicable

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

Area (Ha)	Nil	Area (Ha)	Not Applicable
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##### 5.2.1.2: Area for Water Storage & Recharge Facility

Area (Ha)	Nil	Area (Ha)	Not Applicable
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##### 5.2.1.3: Efforts Made towards Housing for Local Communities

Number of Houses	R & R will be implemented	Number of Houses	25
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##### 5.2.1.4: Efforts Made towards Providing Transport to Local Communities

Number of Beneficiaries	School Van will be provide to school Children	Number of Beneficiaries	40
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##### 5.2.1.5: Efforts Made towards Providing Healthcare to Local Communities

Number of Beneficiaries	Dispensary with free medicine and Ambulance will be provided	Number of Beneficiaries	300
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##### 5.2.1.6: Efforts Made towards Providing Hygiene & Sanitation to Local Communities

Number of Beneficiaries	Toilet will be provided to surrounding villagers under ODF	Number of Beneficiaries	20
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##### 5.2.1.7: Efforts Made towards Skill Development Programs to Local Communities

Number of Beneficiaries	ITI Training will be provided to local villagers	Number of Beneficiaries	40
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##### 5.2.1.8: Efforts Made to Promote Education & Knowledge Based Initiatives

Number of Beneficiaries	Vocational Training, Farming	Number of Beneficiaries	50
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##### 5.2.1.9: Communication Facilities Provided to Local Communities

Number of Beneficiaries	A travel mode will be provided for local villagers as and when required by tl Beneficiaries	Number of Beneficiaries	150
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#### 5.2.1.10: Any Other Steps Taken for Improving the Socio-Economic Standard of Local Communities

Number of Beneficiaries	Will be taken care as per SIA Study	Number of Beneficiaries	150
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#### 5.2.1.11: Adoption of ODF

Number of Toilets Built inside the Lease	4	Number of Toilets Built outside the Lease Area:	20	Number of Beneficiaries	100
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#### 5.2.1.12: Awareness Program among Mine Workers for Swatchata

Number of Swatchata Programmes proposed:	Will be implemented after start of Mining Operation	Number of Swatchata Programmes Held:	3
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#### 5.2.1.13: Efforts for green energy

Total energy consumption (KWh)	Solar Energy will be used in Camp & office areas	Green energy consumption (% of total)	15
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#### 5.2.1.14: Water & recycled use

Total water consumption (KLD)	95	Water recycled (% of total)	30
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#### 5.2.2: YEAR 2

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

Area (Ha)	NIL	Area (Ha)	NIL
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##### 5.2.2.2: Area for Water Storage & Recharge Facility

Area (Ha)	NIL	Area (Ha)	NIL
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##### 5.2.2.3: Efforts Made towards Housing for Local Communities

Number of Houses	R&R Will be implemented and the same will continue	Number of Houses	0
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##### 5.2.2.4: Efforts Made towards Providing Transport to Local Communities

Number of Beneficiaries	A travel mode will be provided for local villagers as and when required by them.	Number of Beneficiaries	150
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##### 5.2.2.5: Efforts Made towards Providing Healthcare to Local Communities

Number of Beneficiaries	Dispensary with free medicine and Ambulance will be provided	Number of Beneficiaries	300
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#### 5.2.2.6: Efforts Made towards Providing Hygiene & Sanitation to Local Communities

Number of Beneficiaries	Basic hygiene materials will be provided to locals like Sanitiser, Soap, Hand Wash etc.	Number of Beneficiaries	300
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#### 5.2.2.7: Efforts Made towards Skill Development Programs to Local Communities

Number of Beneficiaries	ITI Training will be provided to local villagers	Number of Beneficiaries	40
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#### 5.2.2.8: Efforts Made to Promote Education & Knowledge Based Initiatives

Number of Beneficiaries	Vocational Training, Farming, Goatary, Mushroom Cultivation, Fishery training will be imparted	Number of Beneficiaries	150
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#### 5.2.2.9: Communication Facilities Provided to Local Communities

Number of Beneficiaries	A travel mode will be provided for local villagers as and when required by them.	Number of Beneficiaries	150
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#### 5.2.2.10: Any Other Steps Taken for Improving the Socio-Economic Standard of Local Communities

Number of Beneficiaries	NA	Number of Beneficiaries	NIL
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#### 5.2.2.11: Adoption of ODF

Number of Toilets Built inside the Lease Area:	4 no. will be provided in 1st year and same will be continued	Number of Toilets Built outside the Lease Area:	5 nos. will be constructed in 2nd year and maintenance of 20 nos. as implemented in 1st year	Number of Beneficiaries	100
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#### 5.2.2.12: Awareness Program among Mine Workers for Swatchata

Number of Swatchata Programmes proposed:	Training program will be imparted & different awareness program on Swachatta will be carried	Number of Swatchata Programmes Held:	2
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#### 5.2.2.13: Efforts for green energy

Total energy consumption (KWh)	Solar Energy will be used in Camp & office areas. Total reuriment will be 750KWH	Green energy consumption (% of total)	10% of total power
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### 5.2.2.14: Water & recycled use

Total water  
consumption (KLD)

95

Water recycled (% of total)

30

### 5.2.3: YEAR 3

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

Cumulative Work done / Measures Taken

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

Area (Ha)

Nil

Area (Ha)

NIL

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

Area (Ha)

NIL

Area (Ha)

NIL

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

Number of Houses

R&R Will be implemented and the same will continue

Number of Houses

0

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

Number of  
Beneficiaries

A travel mode will be provided for local villagers as and when required by them.

Number of  
Beneficiaries

150

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

Number of  
Beneficiaries

Dispensary with free medicine and Ambulance will be provided

Number of  
Beneficiaries

300

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

Number of  
Beneficiaries

Basic hygiene materials will be provided to locals like Sanitiser, Soap, Hand Wash etc.

Number of  
Beneficiaries

300

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

Number of  
Beneficiaries

ITI Training will be provided to local villagers

Number of  
Beneficiaries

40

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

Number of  
Beneficiaries

Vocational Training, Farming, Goatary, Mushroom Cultivation, Fishery training will be imparted

Number of  
Beneficiaries

150

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### 5.2.3.9: Communication Facilities Provided to Local Communities

Number of Beneficiaries	A travel mode will be provided for local villagers as and when required by them.	Number of Beneficiaries	150
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### 5.2.3.10: Any Other Steps Taken for Improving the Socio-Economic Standard of Local Communities

Number of Beneficiaries	NA	Number of Beneficiaries	NIL
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### 5.2.3.11: Adoption of ODF

Number of Toilets Built inside the Lease Area:	4 no. will be provided in 1st year and same will be continued	Number of Toilets Built outside the Lease Area:	2 nos. will be constructed in 2nd year and maintenance of 20 nos. as implemented in 1st year	Number of Beneficiaries	200
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### 5.2.3.12: Awareness Program among Mine Workers for Swatchata

Number of Swatchata Programmes proposed:	2	Number of Swatchata Programmes Held:	2
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### 5.2.3.13: Efforts for green energy

Total energy consumption (KWh)	750	Green energy consumption (% of total)	10% implemented in 1st year will be continue
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### 5.2.3.14: Water & recycled use

Total water consumption (KLD)	95	Water recycled (% of total)	30
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### 5.2.4: YEAR 4

Details of Work Proposed during the Year / Measures Planned for the Affected Segment	Cumulative Work done / Measures Taken
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#### 5.2.4.1: Area to be Developed for Recreation

Area (Ha)	NIL	Area (Ha)	NIL
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#### 5.2.4.2: Area for Water Storage & Recharge Facility

Area (Ha)	XX	Area (Ha)	XX
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#### 5.2.4.3: Efforts Made towards Housing for Local Communities

Number of Houses	R&R Will be implemented and the same will continue	Number of Houses	0
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#### 5.2.4.4: Efforts Made towards Providing Transport to Local Communities

Number of Beneficiaries	A travel mode will be provided for local villagers as and when required by them.	Number of Beneficiaries	150
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#### 5.2.4.5: Efforts Made towards Providing Healthcare to Local Communities

Number of Beneficiaries	Dispensary with free medicine and Ambulance will be provided	Number of Beneficiaries	300
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#### 5.2.4.6: Efforts Made towards Providing Hygiene & Sanitation to Local Communities

Number of Beneficiaries	Basic hygiene materials will be provided to locals like Sanitiser, Soap, Hand Wash etc.	Number of Beneficiaries	300
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#### 5.2.4.7: Efforts Made towards Skill Development Programs to Local Communities

Number of Beneficiaries	ITI Training will be provided to local villagers	Number of Beneficiaries	40
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#### 5.2.4.8: Efforts Made to Promote Education & Knowledge Based Initiatives

Number of Beneficiaries	Vocational Training, Farming, Goatary, Mushroom Cultivation, Fishery training will be imparted	Number of Beneficiaries	150
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#### 5.2.4.9: Communication Facilities Provided to Local Communities

Number of Beneficiaries	As and when demanded by the local villagers, mobile tower will be provided	Number of Beneficiaries	500
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#### 5.2.4.10: Any Other Steps Taken for Improving the Socio-Economic Standard of Local Communities

Number of Beneficiaries	NIL	Number of Beneficiaries	NIL
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#### 5.2.4.11: Adoption of ODF

Number of Toilets Built Inside the Lease Area:	4 no. will be provided in 1st year and same will be continued & maintained	Number of Toilets Built outside the Lease Area:	2 nos. will be constructed in 4th year and maintenance of already provided will be carried	Number of Beneficiaries	150
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#### 5.2.4.12: Awareness Program among Mine Workers for Swatchata

Number of  
Swatchata  
Programmes  
proposed:

Number of  
Swatchata  
Programmes Held:

#### 5.2.4.13: Efforts for green energy

Total energy  
consumption (KWh)

Green energy  
consumption (% of total)

#### 5.2.4.14: Water & recycled use

Total water  
consumption (KLD)

Water recycled (% of total)

#### 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)

Area (Ha)

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

Area (Ha)

Area (Ha)

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

Number of Houses

Number of Houses

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

Number of  
Beneficiaries

Number of  
Beneficiaries

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

Number of  
Beneficiaries

Number of  
Beneficiaries

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

Number of  
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##### 5.2.5.7: Efforts Made towards Skill Development Programs to Local Communities

Number of  
Beneficiaries

Number of  
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### 5.2.5.8: Efforts Made to Promote Education & Knowledge Based Initiatives

Number of Beneficiaries	Vocational Training, Farming, Goatary, Mushroom Cultivation, Fishery traiir	Number of Beneficiaries	150
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### 5.2.5.9: Communication Facilities Provided to Local Communities

Number of Beneficiaries	As and when demanded by the local villagers, mobile tower will be provide	Number of Beneficiaries	500
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### 5.2.5.10: Any Other Steps Taken for Improving the Socio-Economic Standard of Local Communities

Number of Beneficiaries	NA	Number of Beneficiaries	NA
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### 5.2.5.11: Adoption of ODF

Number of Toilets Built inside the Lease Area:	4 no. will be provided in 1st year and same will be continued & maintained	Number of Toilets Built outside the Lease Area:	2 nos. will be constructed in 4th year and maintenance of already provided will be carried	Number of Beneficiaries	150
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### 5.2.5.12: Awareness Program among Mine Workers for Swatchata

Number of Swatchata Programmes proposed:	2	Number of Swatchata Programmes Held:	2
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### 5.2.5.13: Efforts for green energy

Total energy consumption (KWh)	750	Green energy consumption (% of total)	10%
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### 5.2.5.14: Water & recycled use

Total water consumption (KLD)	95	Water recycled (% of total)	30%
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## 5.3: Rehabilitation & Resettlement of Affected Persons

Particular	Year 1	Year 2	Year 3	Year 4	Year 5
Proposed Number of Project Affected Persons(PAP)					
Proposed Number of Person for Alternate Arrangement for Sustainable Livelihood					
Proposed Number of Person for Skill Training	(It will be decided as per the out come of SIA study in reference LA&RR, 2013)				
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					

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## 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 outArea fully Rehabilitated from Reclaimed area(in hect)	Area under Water Reservoir considered Rehabilitate d (in hect)	Stabilized Waste dump Rehabilitate d (in hect)	Virgin area under Green Belt (in hect)
Area under mining operation	Mined Out area in the lease								
0	0	0	0	0	0	0	0	0	0

### 6.2: Progressive Reclamation and Rehabilitation Plan

#### 6.2.1: Backfilling

Quantity of Waste / Fill Material Available at Site (m <sup>3</sup> )	623613
Availability of Top Soil for Soreading (m <sup>3</sup> )	22088
Spread Area (m <sup>2</sup> )	

##### 6.2.1.1: Year Wise Proposal

S. N.	Year	Pit ID	Area (m <sup>2</sup> )	Top RL	Bottom RL	Estimated Expenditure (INR)
	Year 3	Laserda Pit - 1	2.324	480	450	31779904
	Year 4	Laserda Pit - 1	1.491	480	450	13903936
	Year 5	Laserda Pit - 1	5.283	490	480	9194112

#### 6.2.2: Water Reservoir

Average Rainfall of The Area (mm)	1350
Proposed Area under Water Storage	0

##### 6.2.2.1: Preparations For Ground Water Recharging

6.2.2.1.1: Drilling Holes		6.2.2.1.2: Preparation of Course Gravel Bed	
Year	Proposed no of Holes to be Drilled	Year	Proposed Area of Bed (LxW)
Year 1	1	Year 1	2 x 2 mtrs
Year 2	0	Year 2	0
Year 3	0	Year 3	0
Year 4	0	Year 4	0
Year 5	0	Year 5	0

Please specify, if others

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### 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
Year 1	2644	325972.293, 2440943.09	326670.265, 2441325.149
Year 2	3384	326676.218, 2441347.705	325964.487, 2440985.225
Year 3	Maintenance	Not Applicable	Not Applicable
Year 4	Maintenance	Not Applicable	Not Applicable
Year 5	Maintenance	Not Applicable	Not Applicable

6.2.2.2.3: Garland Drains			
Year	Proposed Bund Length (m)	Co-ordinates from	Co-ordinates to
Year 1	222	325952.407E, 2441320.197N	325981.263E, 2441137.096N
Year 1	292	326065.781E, 2440850.80N	326191.246E, 2440647.533N
Year 2	240	325981.263E, 2441137.096N	326043.27E, 2441267.923N
Year 2	110	326191.246E, 2440647.533N	326247.42E, 2440741.45N
Year 3, 4 & 5	Maintenance		

### 6.2.3: Green Belt Development

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

S. N.	Total Expenditure Incurred up to Last Year (INR)	Area Covered (Ha)	Number of Plants	Survival Rate (%)
1	Not Applicable	Not Applicable	Not Applicable	Not Applicable

6.2.2.2.2: Retaining Wall			
Year	Proposed Wall Length (m)	Co-ordinates from	Co-ordinates to
Year 1	222	325952.407E, 2441320.197N	325981.263E, 2441137.096N
Year 1	292	326065.781E, 2440850.80N	326191.246E, 2440647.533N
Year 1	183	326128.699E, 2441426.133N	326082.411E, 2441347.481N
Year 2	240	325981.263E, 2441137.096N	326043.27E, 2441267.923N
Year 2	110	326191.246E, 2440647.533N	326247.42E, 2440741.45N
Year 3	202	326019.20E, 2440993.44N	326061.98E, 2440855.81N
Year 3, 4 & 5 maintenance	0		

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### 6.2.3.2: Year Wise Proposal

S. N.	Year	Green Belt Location (s)	Area Proposed to be Covered (Ha)	Number of Plants Proposed	Expected Survival Rate (%)	Estimated Expenditure (INR)
1	Year 1	Along the Mine Boundary	0.535	535	75	107000
2	Year 2	Along the Mine Boundary	0.356	356	75	71200
3	Year 3	Along the Mine Boundary and Road Safety Zone	0.702	702	75	140400
4	Year 4	Along the Mine Boundary and Road Safety Zone	0.869	869	75	173800
5	Year 5	Along the Mine Boundary	0.461	461	75	92200

### 6.2.4: Use of shallow pits

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

S. N.	Pit ID	Work Done	Area covered (m <sup>2</sup> )	Total Expenditure Incurred (up to last five year block) (INR)
1	Not Applicable	Not Applicable	Not Applicable	Not Applicable

#### 6.2.4.2: Year Wise Proposal

S. N.	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
1	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

### 6.2.5: PISCICULTURE

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

Not Applicable

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

S. N.	Pit ID	Area (m <sup>2</sup> )	Expenditure (INR)
1	Not Applicable	Not Applicable	Not Applicable

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S. N.	Year	Pit ID	Area (m <sup>2</sup> )	Estimated Expenditure (INR)
1	No Proposal	Not Applicable	Not Applicable	Not Applicable

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

Not Applicable

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

Not Applicable

S. N.	Pit ID	Area (m <sup>2</sup> )	Expenditure (INR)
1	Not Applicable	Not Applicable	Not Applicable

S. N.	Year	Type of Recreational Facility	Area Covered (Ha)	Location	Estimated Expenditure (INR)
1	Year 1	No Proposal	Not Applicable	Not Applicable	Not Applicable
2	Year 2	No Proposal	Not Applicable	Not Applicable	Not Applicable
3	Year 3	No Proposal	Not Applicable	Not Applicable	Not Applicable
4	Year 4	No Proposal	Not Applicable	Not Applicable	Not Applicable
5	Year 5	No Proposal	Not Applicable	Not Applicable	Not Applicable

S. N.	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
	Year 3	Dump - 1	1	15	462	462	2.445	Retreat Method	2934000	0
	Year 4	Dump - 2	1	10	402	402	1.84	Retreat Method	2211600	0

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## 6.2.8: Other Form of Reclaiming the Area

### 6.2.8.1: Cumulative work done as on Date

S. N.	Total Expenditure incurred as on Date (INR)	Work Done
1	Not Applicable	Not Applicable

### 6.2.8.2: Year Wise Proposal

S. N.	Year	Work Proposals	Estimated Expenditure (INR)
1	Year 1	No Proposal	Not Applicable
2	Year 2	No Proposal	Not Applicable
3	Year 3	No Proposal	Not Applicable
4	Year 4	No Proposal	Not Applicable
5	Year 5	No Proposal	Not Applicable

## 6.2.9: TOPSOIL MANAGEMENT

### 6.2.9.1: Cumulative Work Done as on

S. N.	Top Soil Generated (m <sup>3</sup> )	Top Soil Utilized (m <sup>3</sup> )	Topsoil Stored (m <sup>3</sup> )	Total expenditure incurred as on date (₹)
1	Not Applicable	Not Applicable	Not Applicable	Not Applicable

### 6.2.9.2: Year Wise Proposal

Year	Topsoil Generated (m <sup>3</sup> ) (A)	Topsoil Utilized (m <sup>3</sup> ) (B)	Topsoil Stored (m <sup>3</sup> ) (A-B)	Estimated Expenditure (INR)
Year 1	12449	4000	8449	40000
Year 2	0	4000	8449	40000
Year 3	0	4000	4449	40000
Year 4	8411	4000	8860	40000
Year 5	1228	4000	6088	40000

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### 6.2.10: Tailings Dam Management

Year	Yearly generation of Tailing (m³) (A)	Total capacity of Tailing Pond (m³)	Measures Proposed for Periodic Desilting	Yearly Utilization of Tailing (m³) (B)	Disposal of Tailing to Tailing Pond (m³) (A-B)	Tailing Dam Design	Structural Stability Studies
Year 1	No Proposal	Not Applicable	Not Applicable	Not Applicable	#VALUE!	Not Applicable	Not Applicable
Year 2	No Proposal	Not Applicable	Not Applicable	Not Applicable	#VALUE!	Not Applicable	Not Applicable
Year 3	No Proposal	Not Applicable	Not Applicable	Not Applicable	#VALUE!	Not Applicable	Not Applicable
Year 4	No Proposal	Not Applicable	Not Applicable	Not Applicable	#VALUE!	Not Applicable	Not Applicable
Year 5	No Proposal	Not Applicable	Not Applicable	Not Applicable	#VALUE!	Not Applicable	Not Applicable

### 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 outArea fully Rehabilitated from Reclaimed area(in hect)	Area under Water Reservoir considered Rehabilitation d (in hect)	Stabilized Waste dump Rehabilitation d (in hect)	Virgin area under Green Belt (in hect)	Rehabilitated Area under utility services(in hect)	Rehabilitated Area under Tailing dam (in hect)
75.803	18.672	0	31.211	6.114	0.963	74.84	0	18.672	6.114	28.785	0

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# Chapter 7: Financial Assurance/ Performance Surety (AREA PUT TO USE)

YEAR 1

YEAR 1

Consolidated View of Financial Assurance

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	2.491	6.640	9.131
2	Topsoil stacking	0	0.667	0.667
3	Overburden	0	4.287	4.287
4	Mineral Storage	0	3.899	3.899
5	Infrastructure (Workshop, Administrative Building etc.)	0	0.621	0.621
6	Roads	1.175	0.891	2.066
7	Railways	0	0	0
8	Tailing Pond	0	0	0
9	Effluent Treatment Plant	0	0.01	0.01
10	Mineral Separation Plant	0	0.8	0.8
11	Township Area/ Camp Area	0	1.125	1.125
12	Others to Specify (Inhabited Sites, Settling Pond)	0.368	0.187	0.555
<b>Total</b>				
		4.034	19.127	23.161

Old quarries were existing prior to grant of Composite Licence (LoI dated 27.01.2017).

Waste Dump with Environmental Safe guard. Including area for Sorting & Sizing of Mn. ore & Mineral Reject Stack yard.

Internal (Path) Road were existing prior to grant of Composite Licence\* (LoI dated 27.01.2017).

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### Consolidated View of Financial Assurance

YEAR 3

Consolidated View of Financial Assurance

Mineral Reject Stack  
yard including  
Environment Safe guard.

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### Consolidated View of Financial Assurance

Sorting & Sizing area of Mn. ore.

### Consolidated View of Financial Assurance

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## Performance Surety

Lease Category (A/B)	Total Resources in tonnes for calculation of Performance Surety*	Existing Performance surety amount in Rs	Valid till (dd/mm/yyyy)	Upload copy of existing Performance Security as attachment
A (Fully Mechanised)	Manganese - 7.368 Million tons (+10% Mn.) Iron - 8.368 Million Tons (+45%Fe)	67695545	08/01/2026	Copy of the Performance Security is attached as Annexure - 15

\*Submit updated performance security at State based on updated Resources

Under 27(1) of MCDR

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

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### 8.1: General

#### 8.1.1: Lease Area Utilization Not Applicable

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					
15	Undisturbed Area					
	Total					

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### 8.1.2: SDF and CSR Expenditures

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 <u>(Explanation: Expenditure is not over and above the statutory levies imposed by the Government; However, THIS EXCLUDES CONTRIBUTION TO DMF &amp; NMET and is over and above the statutory levies imposed by the Government.)</u>	10% of Royalty (a)	Total Expenditure for SDF implementation (b)		
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/ Underground/ Both/ Dump Mining)

Particulars	Proposed	Actual	Deviation	Reasons for deviation
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### 8.2.2.1: Generation of Ore/Waste While Development

Ore				
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

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

### 8.2.4: Zero Waste Mining

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

### 8.2.5: Backfilling

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				

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### 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				
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 (Select Dump Id)

Blending of mineral reject / sub-grade				
--	--	--	--	--

### 8.2.8: Environment Compliances

Particulars	Proposals	Achievement	Deviation	Reasons for deviation
-------------	-----------	-------------	-----------	-----------------------

#### 8.2.8.1: Top soil

Generation				
Utilization				
Stacking (Dump Id)				

#### Reclamation

Rehabilitation				
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#### 8.2.8.2: Afforestation (Dumps/Benches/Backfilled Area etc.)

Year 1				
Year 2				
Year 3				
Year 4				
Year 5				

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8.2.8.5: Afforestation Green Belt				
Year 1				
Year 2				
Year 3				
Year 4				
Year 5				
Construction of check dams				
Construction of garland drains				
Construction of retaining walls				

8.2.8.4: Tailings				
Generation				
Utilization (Autofill from production)				
Disposal				

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

8.3.2: Grievance Redressal					
Grievances Received	Year 1	Year 2	Year 3	Year 4	Year 5
Grievances Redressed	Year 1	Year 2	Year 3	Year 4	Year 5

Grievances Received	Year 1	Year 2	Year 3	Year 4	Year 5
Grievances Redressed	Year 1	Year 2	Year 3	Year 4	Year 5

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

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### 8.3.3.2: Support to Health & Medical Services

No. of persons identified from Occupational health diseases	Year 1	Year 2	Year 3	Year 4	Year 5
No. of Health Camps/ Medicine Camps Organized	Year 1	Year 2	Year 3	Year 4	Year 5

### 8.3.3.3: Support to Skill development & Education

#### Vocational Training Provided/ Support Provided

No. of employees undergone Vocational training	Year 1	Year 2	Year 3	Year 4	Year 5
No. of other persons undergone Vocational training	Year 1	Year 2	Year 3	Year 4	Year 5
Number of Literacy & Education Camps held/ Supported	Year 1	Year 2	Year 3	Year 4	Year 5

### 8.3.3.4: Support to Transportation Services & Infrastructure

Expenditure on Transportation Services & Infrastructure	Year 1	Year 2	Year 3	Year 4	Year 5
Road development (m) in the peripheral area (not lease area)	Year 1	Year 2	Year 3	Year 4	Year 5
No. of Public transport support provided (Ambulance/Buses/ School Vans etc)	Year 1	Year 2	Year 3	Year 4	Year 5

### 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	Year 1	Year 2	Year 3	Year 4	Year 5
Adoption of ODF in nearby villages					
No. Of Toilets built in the villages	Year 1	Year 2	Year 3	Year 4	Year 5
Provision for greenage recreational facility (Within Lease Area/ Outside)					
Recreational Area Type (Picnic Spot/ tracks/Park Etc)	Year 1	Year 2	Year 3	Year 4	Year 5
Area covered (For within Lease Area only)	Year 1	Year 2	Year 3	Year 4	Year 5
Awareness program among Mine workers for Swatchata					
No. of Swatchchta Programmes held	Year 1	Year 2	Year 3	Year 4	Year 5

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## Chapter 9: Impact Assessment(for fresh gra

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### 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 Defence Land*	No
Any Other Clearance (specify)*	No

Any Significant Objections from any Agency Involved in Stakeholder's Consultation.

There are no objection from any Agency in and around the Mining Lease area. Prior to getting Lol for Mining Lease the said has granted for Composite Licence, we have explored the said area, during the said period peoples are too much interested for opening the mining.

(Total 500 characters)

### 9.2: Environment Parameters

#### 9.2.1: Environment Monitoring

##### Monitoring Activity

##### 9.2.1.1: Ambient Air Quality

Core Zone (Quarterly Monitoring Planned) *	Yes
Buffer Zone (Quarterly Monitoring Planned) *	Yes

##### 9.2.1.2: Water Quality

Core Zone (Quarterly Monitoring Planned) *	Yes
Buffer Zone (Quarterly Monitoring Planned) *	Yes

##### 9.2.1.3: Noise Level

Core Zone (Quarterly Monitoring Planned) *	Yes
Buffer Zone (Quarterly Monitoring Planned) *	Yes

### 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	27.248	It included Sabik forest
Land under Agriculture / Crops	0	
Land covered with Plants		
Land under Grass Cover	1.187	
Land under Public Infrastructure / Utilities (water bodies, roads, railways, electric lines, telephone lines etc.)	0.368	It included Sabik forest
Land under Habitation	0	It included Sabik forest
Land under Monuments & places of Historical Importance	2.491	It included Sabik forest
Degraded by Pits & Excavation		

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#### 9.3.2.3.5: Ground Water Recharging \*

Various measures will be taken care during the Mining Operation for augmentation of Ground Water Recharging. The various measures are as follows:-

- 1) 2 Nos of Settling pond of area 0.187 ha will be provided at the strategic locations of the 2 nos of waste dump area, which will be acted as Settling cum Percolation pond. Further, check weir and check dams will also be implemented at the strategic locations for management of the mines surface run off water.
- 2) Roof top rain water harvesting structure will be constructed at the camp premises for recharge the ground water through recharge well.

#### 9.3.2.3.6: Green Belt Development \*

Total 6.114 ha of land will be abided for green belt plantation along the 7.5 mtrs of Mine boundary, 50 mtrs of road safety zone. During the plan period it is proposed to plant over 2.243 ha. of area along the Mining Lease boundary and 50 mtrs of road safety zone in Laserda side. The waste dumps are marked in the lease area will be covered with plantation & grass patching after proper stabilization followed by compaction. Different types of native plants will be selected for plantation purposes. Further green belt/plantation and other mitigative measures are and will be carried out to abate noise propagation in the area.

(Total 1000 characters)

#### 9.3.2.3.7: Agriculture \*

There is no proposal of any Agriculture within the Mining Lease area.

(Total 1000 characters)

### 9.3.3: Air Environment

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

Temperature (°C) *	
Maximum	46
Minimum	5

Relative Humidity (%) *
75

Average Rainfall (mm) *
1350

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

S.N.	Station Name	Season	PM10 (µg/m3)	PM10 Excess (µg/m3)2	PM2.5 (µg/m3)	PM2.5 Excess (µg/m3)2
1	Core Zone	Pre-Monsoon	57.4	No	29.5	No
2	Core Zone	Pre-Monsoon	57.6	No	29.2	No
3	Laserda Village	Pre-Monsoon	50	No	25.1	No
4	Baladihi Village	Pre-Monsoon	48.3	No	24.4	No
5	Harmutu Village	Pre-Monsoon	48.9	No	24.5	No
6	Nawaedihi Village	Pre-Monsoon	49.9	No	29.4	No
7	Barbil Town	Pre-Monsoon	68.9	No	37.5	No
8	Bolani Village	Pre-Monsoon	58.5	No	29.9	No
9	Kiriburu	Pre-Monsoon	55.6	No	28.9	No
10	Pandulposi	Pre-Monsoon	48.8	No	24.8	No





S.N.	SO <sub>2</sub> Value (µg/m <sup>3</sup> )	SO <sub>2</sub> Excess (µg/m <sup>3</sup> )	NO <sub>x</sub> Value (µg/m <sup>3</sup> )	NO <sub>x</sub> Excess (µg/m <sup>3</sup> )	Date of Observation	Action
1	8.5	No	14.3	No	05.03.21 to 24.05.21	Not Applicable
2	8	No	13.5	No	05.03.21 to 24.05.21	Not Applicable
3	5.7	No	11.3	No	05.03.21 to 24.05.21	Not Applicable
4	5.6	No	11.3	No	05.03.21 to 24.05.21	Not Applicable
5	5.8	No	11	No	05.03.21 to 24.05.21	Not Applicable
6	6.8	No	12.7	No	05.03.21 to 24.05.21	Not Applicable
7	12.6	No	17.6	No	05.03.21 to 24.05.21	Not Applicable
8	9.4	No	15.2	No	05.03.21 to 24.05.21	Not Applicable
9	8.6	No	14.4	No	05.03.21 to 24.05.21	Not Applicable
10	5.5	No	10.9	No	05.03.21 to 24.05.21	Not Applicable

#### 9.3.3.3.1: Anticipated Impact \*

The mining operation along with crusher and screen plant and other allied operations in the area may result in deterioration of air quality due to pollution arising from the project operation if prompt care is not taken. The principal sources of air pollution in the area due to mining and allied activities are:

- a) Drilling and blasting operation
- b) Extraction of ore and overburden by shovels/excavators
- c) Movement of HEMM, such as shovels/excavators, dozer, dumpers etc
- d) Loading and unloading operation,
- e) Overburden / ore transportation,
- f) Crushing and screening operation,
- g) Transportation outside the lease area. Larger suspended particles are generally filtered in the nose and throat and do not cause problems. Particulate matter less than 10 microns, referred to as PM10, can settle in the bronchi and lungs and cause health problems. Particles less than 2.5 micrometers (PM2.5), tend to penetrate into the gas exchange regions of the lungs. Besides, larger particles (higher than 10 microns in diameter) tend to settle to the ground by gravity in a matter of hours whereas the small particles (less than 10 microns) can stay in the atmosphere for weeks and are mostly removed by precipitation.

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#### 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*

Drilling with dust extractors, usage of sharp drill bits and with inbuilt water injecting system. Provision of PPE's including nose mask to the workers engaged in the operation. Well-designed blast by effective stemming and use of milli second delay detonators. Controlled blasting technique as per the recommendation of CIMFR.

Proper maintenance of HEMM to control exhaust emission & noise. Provision of dust filters / mask to workers working at highly dust prone zones. Proper maintenance of haul road and other roads. Water sprinkling to be done regularly with the help of water tanker/ fixed sprinkling system within the lease area at the mineral handling area to reduce the dust emission. Maintaining DG set emissions under control by regular maintenance & follow-up of preventive maintenance. Providing inbuilt nozzles for spraying water in the form of mist (Dry fogging) for efficient dust suppression at dust generating sources at Crushing & Screening plants. Maintain and regular grading of haulage road. Establishment of Quick Dispatch system. Provision of sweeping of road through road sweeping machine. Provision of 300 m cement concrete road from the exit gate to inside the mine and Wheel washing system at the exit gate so that mines dust will not come to the road. Further, the detailed analysis will be done during the time of EIA/EMP study and accordingly management plan will be prescribed.

(Total 1000 characters)

### **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 drainage pattern of the lease area is controlled by Karo River which has passed through the lease area. Apart from that one seasonal nalla passed through the lease area and further connect to Karo. The drainage pattern is dendritic in nature.

(Total 1000 characters)

##### 9.3.4.1.2: Anticipated Impact \*

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

Wash off / runoff of mine workings, waste dumps, ore stock piles, during monsoon may carry the silt / ore residues and pollute the nearby nallah / streams, lands if it is let-out as such. Generation of effluent water from workshop, service building and Domestic effluent may impact on the near by nalla/river.

Water will be required for mining & allied activities like dust suppression, green belt development, domestic use. So ground water will be extracted for this purpose. Due to this there will be impact on ground water regime.

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#### 9.3.4.1.3: Mitigation Measure \*

*(Possibilities of Rain Water Harvesting & Artificial Recharge with in the Mining Lease)*

Various measures will be taken care during the mining operation for augmentation of ground water regime;

1. 2 Nos of Settling pond of area 0.203 ha will be provided at bottom of 2 nos of waste dump area at the strategic locations, which will be acted as Settling cum Percolation pond.
2. Total 1249 mtrs of retaining wall will be constructed on the toe of the Dump and mineral reject stack area and 864 mtrs of garland drain will be constructed during the plan period.
3. Roof-Top rain water harvesting structure will be made in the camp premises towards recharge the ground water through recharge well.
4. The runoff from the other non mining areas will be channelized to series of settling ponds and check dams before discharge to nearby natural water bodies.
5. Settling ponds will be made to prevent flow of fine particles from OB / Waste dumps, check dams, parapet/retaining walls & garlanded drains.

*(Total 1000 characters)*

#### 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)*

River Karo has been crossed through the lease area. It's a perennial river. During the mining activity, quarry will be formed which will help in percolation of rainwater towards augmentation of ground water table. Different run off management practices will be implemented like guard wall, check weir, check dams etc. for protection of the water bodies.

*(Total 1000 characters)*

##### 9.3.4.2.2: Anticipated Impact \*

*(Ingress of Sea Water, Particularly for Mining Projects in Coastal Areas)*

Due to mining & allied activities there may be chance of Wash off / runoff from mine workings, waste dumps, ore stockpiles from the mine effect on the nearby river/nalla. So, the different run off management practices will be implemented like guard wall, check weir, check dams etc. for protection of the water bodies.

*(Total 1000 characters)*

##### 9.3.4.2.3: Mitigation Measure \*

*(Steps to Minimize Impact on Water Table if Mining Intercepts Groundwater Regime)*

There will be intersection of ground water table in the plan period. However NOC from CGWA will be taken for both ground water usage along with working below ground water table. Detail hydro geological study will be done by accredited CGWA consultant. Pumping facility will be provided during the mining operation and water will be used for sprinkling, plantation and ancillary activities. Detail mitigation measures will be implemented. Further Surface run-off management structures like retaining wall along with garland drain, Settling cum de-silting pond will be provided at the strategic location towards run-off management & augmentation of ground water.

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### 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)*

There will be requirement of water for mining & allied activities i.e. for dust suppression, Plantation, Domestic and washing of vehicle. The total water requirement will be 95 KLD which will be sourced from Ground water. Waste water generated from domestic consumption and washing vehicles will be treated through STP & ETP. The treated water will further use for plantation & gardening purpose. Out of 95 KLD, 85 KLD will be sourced from mine seepage/dewater and 10 KLD will be sourced from bore well for domestic purposes. A detailed hydrogeology study will be carried to understand the generation of the total mines seepage water.

(Total 1000 characters)

#### 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, & Leach ate from Solid Waste Dumps etc)*

Due to consumption of ground water there may be impact on local hydrogeology. Detailed hydrogeological study will be done and rain water harvesting structures will be implemented towards water conservation. Waste water generated from domestic consumption and washing vehicles will be treated through STP & ETP. The treated water will further use for plantation & gardening purpose. There will be no such generation of tailings from the mine. Further the run-off which will be generated during rainy day will be channelized through surface run-off management structures like retaining wall, garland drain, settling cum de-silting pit etc.

(Total 1000 characters)

#### 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)*

Waste water generated from domestic consumption and washing vehicles will be treated through STP & ETP. There will be no such generation of tailings from the mine. Further the run-off which will be generated during rainy day will be channelized through surface run-off management structures like retaining wall, garland drain, settling cum de-silting pit, settling pond etc.

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### 9.3.5: NOISE

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

The critical location within the lease area will be crusher & screen plant area, mine pit area, haulage road, blasting zone etc.

(Total 1000 characters)

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

Noise level prediction Modelling will be done during the EIA/EMP study

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

Mitigation measures will be taken towards minimize the noise impact

1. Planting trees at various places within the lease area to act as acoustic barriers.
2. 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.
3. Providing in-built mechanism for reducing sound emissions.
4. Providing Sound proof operator's cabin for equipment's like dumpers, shovel, tippers, etc.
5. Blasting study will conducted by CIMFR and the recommendation towards safe blasting practices will be maintained. Further the vibrations and noise are to be recorded in daily basis by vibro meter.
6. Providing workers with earmuffs & earplugs, as a protection from exposed to higher noise level
7. Noise mapping will be practiced and accordingly measures will be taken.

(Total 1000 characters)

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

Noise Standards *			
Area Code	Category of Area	Limits in dB(A)Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Area	50	40

#### Note:

1. Day time reckoned in between 6.00 am to 9.00p.m
2. Night time reckoned in between 9.00p.m.to 6:00am
3. Silence zone is defined as areas up to 100 meter around such premises as Hospitals, Educational institutes and Courts. The Silence zones are to be declared by the competent Authority
4. Mixed categories of areas should be declared as "one of the four above mentioned categories" by the Competent Authority and the corresponding standards shall be applied.

S.N.	Station Name	Season	Type of Area	Noise At Day Time:	Excess Noise At Day	Noise At Night Time:	Excess Noise at Night	Date of Observa tion
1	Core Zone	Summer	Commercial	52.1	No	40.5	No	12.03.21
2	Core Zone	Summer	Commercial	51.8	No	40.9	No	12.03.21
3	Laserda Village	Summer	Residential	45.6	No	37.2	No	12.03.21
4	Baiadihi Village	Summer	Residential	43.2	No	37.8	No	12.03.21
5	Harmutu Village	Summer	Residential	46.2	No	38.2	No	12.03.21
6	Nawaedihi Village	Summer	Residential	45.6	No	38.5	No	12.03.21
7	Barbil Town	Summer	Commercial	54.2	No	42.6	No	12.03.21
8	Bolani Village	Summer	Commercial	53.8	No	43.2	No	12.03.21
9	Kiriburu	Summer	Commercial	53.6	No	42.8	No	12.03.21
10	Pandulposi	Summer	Residential	44.8	No	40.1	No	12.03.21

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### 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

Noise is one of the inevitable causes of pollution in mining operations, largely due to the extensive mechanization adopted. Besides, other operations such as drilling, blasting, movement of vehicles, crushing, screening etc., also produce noise of considerable magnitude in mining operations. Prolonged exposure to a high noise level is harmful to the human auditory system and can create mental fatigue, rebellious attitude, annoyance and carelessness, which may lead to neglect of work and also result in accidents.

(Total 1000 characters)

#### 9.3.5.5.2: Mitigation Measure \*

Give details on measures for noise abatement including point source & line source

Mitigation measures will be taken towards minimize the noise impact

1. Planting trees at various places within the lease area to act as acoustic barriers.
2. 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.
3. Providing in-built mechanism for reducing sound emissions.
4. Providing Sound proof operator's cabin for equipment's like dumpers, shovel, tippers, etc.
5. The safe blasting practices are done and the vibrations and noise are recorded in daily basis by vibrometer.
6. Providing workers with earmuffs & earplugs, as a protection from exposed to higher noise level
7. For dust suppression of haul road 1 km of fixed sprinkling system and 2 x 16 Kl mobile water tanker will provided for water sprinkling of all other mines road.
8. Dry fog system along with hood over the conveyor belt will pbe provided in Mineral processing plant for dust suppression.
9. Mobile mist canon with water tanker will be provided for mineral stack yard and remote area.

(Total 1000 characters)

### 9.3.6: VIBRATION

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

S.N.	Station Name	Season	Distance from the Blasting Site (m)	Peak Particle Velocity (mm/s)	Air Over Pressure (DB)	Frequency (Hz)	Date of Observation
	Will be carried out after commencing of mining operation	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

#### 9.3.6.2: Impact Assessment & Mitigation Measures

##### 9.3.6.2.1: Anticipated Impact \*

(Give details on impact of vibrations including damage to materials/structures due to blasting)

Vibrations due to blasting may cause damage to nearby structures, if appropriate control measures are not adopted. Fly rock is another possible damage causing outcome of blasting constitutes, one of the main source of material damage and harm to people. There are many factors, which influence these aspects.

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Give details on measures for noise abatement including point source & line source

- 1) Optimally controlled blasting techniques, after necessary field trials.
- 2) Drilling and charging pattern is ideally formulated, with less explosive charge, etc., after field trials.
- 3) Use of suitable initiating sequence and millisecond delay detonators.
- 4) Reduction of amount of explosives charged per day optimally.
- 5) To contain fly rocks, stemming column will not be less than burden of the hole. Blasting area will also be muffled, if necessary, to stop fly rocks propagation.

### 9.3.7: SOCIO-ECONOMIC ENVIRONMENT

S.N.	Type of Area	Name of Village	Total Population	Male to Female Ratio	Literacy Rate (%)	Employment Rate (%)
1	Scheduled	Lasarda	791	98.24	40	27
2	Scheduled	Pachari	943	97.25	39	26
3	Scheduled	Nawadih	343	101.22	47	31
4	Scheduled	Bhaliadihi	465	87.5	38.3	24
5	Scheduled	Kundaroda	397	102.32	37	28
6	Scheduled	Damurda	582	101.29	37	29
7	Scheduled	Panduliposhi	588	96.39	47	29
8	Scheduled	Lotapani	176	85.26	22.5	30
9	Scheduled	Shankarjor	1022	101.92	41	32
10	Scheduled	Barpada	651	101.54	51	33
11	Scheduled	Champuasahi	10393	101.12	39	31
12	Scheduled	Balagorha	907	97.26	52	30
13	Scheduled	Bolani	2194	96.77	44	32
14	Scheduled	Murgaberha	519	95.62	42	28
15	Scheduled	Meghatiburu	5992	106.2	70	35
16	Scheduled	Kiriburu	1769	105.93	69	33

(Give details about impact on the cropping pattern & crop productivity in the core zone)

(Total 1000 characters)

(Give details about compensation for loss of land & crops)

(Total 1000 characters)

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### 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)

Villagers are mainly depending on the mining activities of the nearby mines. Substantially they are doing agriculture like paddy, Bajra, Maize & vegetables.

(Total 1000 characters)

#### 9.3.7.2.2: Anticipated Impact\*

(Give details about positive & negative impacts on present status of livelihood in the area)

There will be no such negative impact on the livelihood of the local peoples. The mining activity will increase their daily income both directly & indirectly. Apart from this there will be socio economic development of local people in terms of infrastructure, education etc.

(Total 1000 characters)

#### 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)

ITI training for mechanical, electrical, fitter and driving training will be given to local people, so that after successful completion they will be engaged in the mining. Apart from this training on Agriculture, pisciculture, bee culture will be provided for self-sustain. Local women will be trained in tailoring, mushroom culture etc. Help will be extended to Self Help Groups (SHG).

(Total 1000 characters)

### 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)

As per the secondary data most of the villagers are mainly depending on mining & allied activities of the nearby mines both directly & indirectly. Very small portion of the population partially depending on the agriculture.

(Total 1000 characters)

#### 9.3.7.3.2: Anticipated Impact\*

(Give details about impact on community resources such as grazing land)

There will be no such impact on community resources like grazing land etc.

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*(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)*

(Total 1000 characters)

**9.3.7.4.1: Base / Present Status\***

(Give details about human settlement in core & buffer zone)

(Total 1000 characters)

(Give details about any displacement of human settlements during the life of the mine)

(Total 1000 characters)

*(Give details about rehabilitation & resettlement of land ousters & displaced people)*

(Total 1000 characters)

## 9.3.7.5.1: Base / Present Status\*

(Give details about health profile of population in core & buffer zone)

(Total 1000 characters)

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#### **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)*

Due to mining & allied activities there will be generation of dust which may impact on the human health. However, detailed precaution measures will be taken towards minimizing the dust pollution. Apart from this there is no such area of impact which may cause the impact on health.

*(Total 1000 characters)*

#### **9.3.7.5.3: Mitigation Measure \***

*(Give details about avenues like dispensaries, hospitals, maternity homes if any to be created)*

Due to mining & allied activities there will be generation of dust which may impact on the human health. However, detailed precaution measures will be taken towards minimizing the dust pollution. Apart from this there is no such area of impact which may cause the impact on health. Dispensary will be established during the start of mining operation. Doctor with free medicine will be provided to locals. Ambulance will be provided for any emergency.

*(Total 1000 characters)*

### **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)*

Historically & culturally there are no such places in the core & buffer zone area. Ecologically in the buffer zone Saranda RF (in the West Singhbhum district of Jharkhand) is situated which is rich in flora & fauna.

*(Total 1000 characters)*

#### **9.3.7.6.2: Anticipated Impact \***

*(Give details about risk profiling)*

Historically & culturally there is no such impact on both core & buffer zone. However, there may be impact on ecological factors which may minimize with proper conservation measures.

*(Total 1000 characters)*

#### **9.3.7.6.3: Mitigation Measure \***

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

Historically & culturally there is no such impact on both core & buffer zone. However, there may be impact on ecological factors which may minimize with proper conservation measures. Under CER drinking water facility having deep bore well with overhead tank will facilitate to locals. Safeguard measures will be provided for any damage to local infrastructures.

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### List of Annexures (in pdf format):

1	Letter of Intent /Letter of lease grant (Annexure - 1)
2	Copy of lease deed executed (Not Applicable)
3	Copy of Environment and Forest Clearance, Consent to Establish, Consent to Operate (Not Applicable)
4	Copy of Declaration of Owner/Nominated Owner in case of Company/partnership firm (Not Applicable)
5	Copy of Registration of Company (GoC)/Partnership firm (Registration) & Deed (Annexure - 2)
6	ID & Address Proof of Owner/ Nominated Owner (Annexure - 3)
7	Consent letter for Qualified Person (Annexure - 4)
8	Experience & Qualification Details of Qualified Person (Annexure - 5)
9	Copy of Study reports conducted as per Para 4.3.1 (Bulk Density - Annexure - 11)
10	Copy of feasibility Report (Pre-feasibility Report - Annexure - 7)
11	Copy of Scale relaxation approval granted(if applicable) (Not Applicable)
12	Exploration details (Authenticated GR, Form I and Borehole log sheet and assay report) Annexure - 10
13	Chemical and Mineralogical analysis report (Annexure - 8(A, B, C, D, E)
14	Any other Report or Certification as required in the submitted Document.
15	Mineral processing flowsheet with stage wise recovery (Annexure - 12)
16	Copy of Bank Guarantee (Not applicable)
17	Copy of Performance Surety (Annexure - 15)
18	Copy of MDPA (as applicable) (Not applicable)

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## List of Plates (Geometry type: Polygon, Datum: WGS 84) :

1	Lease Cadastral Plan (scanned image)	The Scanned copy shall be of the original lease map issued by State Government along with other details
2	Surface Plan(.KML /.KMZ/.SHP format)(Georeferenced)	A statutory plan as per MCDR, 2017. The Plan should be submitted showing different color codes for:(1) Active Pits & Excavation area(2) Excavated area reclaimed & rehabilitated (3)Active dumps (4) Stabilized & rehabilitated dump area , (5) Green belt (6) Mineral Stacks (7) Utilities such as plant, buildings etc (8) Lease boundary along with other details.
3	Surface Geological Plan of the lease (.KML /.KMZ/.SHP format)(Georeferenced)	The Plan should be submitted showing different color codes for : (1) Lithological/Geological Occurance (2) Area under G1,G2,G3 & G4 (3) Active pits & Excavation area (4) Dump Area (5) Mineral Stacks (6) Lease boundary along with other details.
4	Surface Geological sections (in Pdf/.dwg format)	Geological sections with different color coding depicting all the features shown in Surface Geological Plan.
5	Five year Production and Development plan(.KML /.KMZ/.SHP format)(Georeferenced)	The Plan should be submitted showing different color coding for: (1) Active Pit and Excavation area , (2) Year wise excavation proposal for year I to V ( (3) Active dump and yearwise dump proposal for year I to V (4) Year wise Dump working proposal for year I to V (6) Lease boundary (with reference to chapter 4) along with other details.
6	Five year Production and Development sections(in pdf/.dwg format)	Year wise excavation and dumping proposals with different color coding depicting all the features as shown in the Five year Production and development plan.
7	Progressive Mine Clouser Plan (.KML /.KMZ/.SHP format)(Georeferenced)	The Plan should be submitted showing different color coding for : (1) Yearwise excavated area Reclaimed & rehabilitated for year I to V (2) Year wise dump area to be stabilized and dump area to be rehabilitatd for year I to V (3) Year wise Green area proposed from year I to V.(4) Any other reclamation and rehabilitation measures proposed.(5) Lease boundary ( with reference to chapter 6) along with other details.
8	Progressive mine Clouser sections(in pdf/.dwg format)	Year wise Progressive mine clouser sections showing all the yearwise reclamation, rehabilitaion proposals as depicted in the Progressive mine clouser plan.
9	Conceptual Plan and section(.KML /.KMZ/.SHP format)(Georeferenced)	The Plan should depict the staus of lease area as envisaged at the end of life of Mine showing all the details. Status of land use shall be depicted by different color coding.
10	Geo referenced Cadastral Plan	Duly certified by the State Government
11	Environmental Plan(.KML /.KMZ/.SHP format)(Georeferenced)	As per MCDR, 2017 indicating all the details.
12	Any other plan/section as deemed necessary by approving authority	

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