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MINING PLAN

INCLUDING PROGRESSIVE MINE CLOSURE PLAN

(Submitted forApproval under Rule 16(1) of MCR, 2016, 23B of MCDR 2017)

For

"BBH IRON ORE MINE"

(Auctioned Block – BBH Iron ore & Manganese Mine, ML No: 2346)

Villages: Bedarabommenahalli, Hirekandavadi and other villages.

Taluka: Chitradurga, District: Chitradurga, State: Karnataka

(Category A-Fully Mechanized-Opencast-Private-Captive Mine)

Type of Land: Forest

Lease Area: 93.60 Ha

Of

M/s. JSW STEEL LTD.

Preferred Bidder

IBM Registration No.: IBM/432/2011

Prepared by
B.P. Pandey
B.Tech. (Mining)
Qualified Person
Oct-2019

VOLUME – I
(Text & Annexure)

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MINE DESCRIPTION

INTRODUCTORY NOTE

BBH Iron Ore Mine (ML No. 2346) of M/S Mineral Enterprises Ltd., located in Bedara bommenahaill, Hirekandavadi and other villages, Chitradurga Taluka and District, over an extent of 93.60 Ha of Forest Land, is an iron ore mining lease area, granted to JSW Steel Limited as per the Letter of Intent of Govt. of Karnataka after e-auction **(Annexure-I).**

The mining lease is located in 'Chitradurga schist belt' of iron ore deposits in Bedara Bommenahalli, Hirekandavadi and other villages, Chitradurga Taluk and District, Karnataka between Latitude 14^0 12' 51.1'' to 14^0 12' 22.4'' N and Longitude 76^0 13' 41.6'' to 76^0 13' 33.2" E. The lease area elevation varies from 811 to 960 m above MSL and it lies in Survey of India Toposheet No. 43K/4(57B/4 old). The nearest rail head for iron ore transportation is the MEL constructed railway spur line at a distance of 3 km from the mine head.

All the Bio - Engineering measures, Engineering Constructions are duly followed by M/s. MEL, as per the approved R & R plan, except the engineering measures, which are to be constructed during the progress of Mine/ Dump workings.

The information pertaining to all attributes of mining was mainly obtained from the records of the Directorate of Mines and Geology, Govt. of Karnataka up to the extent possible. Information from secondary sources such as EIA report, Mining Scheme, IBM Annual returns etc., was largely utilized for assessing the existing environmental status of the mine.

To ensure raw material self- sufficiency, JSW Steel Limited, having its integrated steel plant with an installed capacity of 18 Million Tons (i,e 12 Million Tons at Vijayanagar works, Karnataka, 5 Million Tons at Dolvi, Maharashtra & 1 Million Ton at Salem, Tamilnadu), also decided to take part in aforesaid auction. JSW Steel Limited had been awarded this mining block vide **LOI** no. DMG-2020: MLS: AUC: 2018 – 19 ML No: 2346 : dated 13.08.2019. **(Annexure-I).**

The Department of Mines & Geology, in its LOI dated 13.08.2019, had directed M/s JSW Steel Limited to obtain all consents, approvals, permits, no objections and the like as may be required under applicable law before signing the MDPA. The Hon'ble Supreme court vide its judgement dated 30.07.2015 ordered to transfer the existing statutory clearances of previous lessees in favor of new lessees, who have obtained the blocks in the auction. Accordingly, the Environment

This Mining Plan is approved subject to the conditions / stipulations Indicated in the Mining Plan approval letter No. ..279/11.04.12019/BMG
Date..31/10/19

31/10/19
क्षेत्रीय खान नियंत्रक
Regional Controller of Mines
भारतीय खान ब्यूरो
Indian Bureau of Mines,
बेंगलूरु / Bangalore - 560 022

clearance **(Annexure-VI)** and Forest clearance **(Annexure-VII)** will be transferred in the favour of M/s JSW Steel Limited. Till getting all the statutory clearances, the mining operations will be carried out on the basis of temporary working permission.

Monitoring Committee issued a letter vide letter No.F.No.2-75/CEC/SC/2018-Pt.VII dated 14.06.2018 **(Annexure- II),** prescribing 1.0 MT as permissible annual production limit of iron ore which is the EC capacity of previous lessee. On the basis of the existing production criteria the current plan has prepared for the production capacity of 1.0 MTPA. (based on the criteria of Road capacity) as recommended in R & R Plan prepared by ICFRE and also duly concurred by Central Empowered Committee.

Sl. No.	Criteria	Feasible Production Limit (Million Tonnes Per Annum)
1	Reserves	2.82
2	Dump Capacity	1.25
3	**Road Capacity**	**1.00**
4	EC Capacity	1.00

The Mining plan is prepared with the reference to the latest approved Mining plan by IBM vide letter No. 279/346/92/BNG/1217 dated 02/07/2018. Which is enclosed as **Annexure no-XV**. The Mining lease is under operational by the M/s. MEL, the preferred bidder will take the possession of said mining lease at the end of financial year 2019-20, The Environment and Forest clearance which are co terminus with the validity of present approved mining plan.

However, once the lease is granted to JSW Steel Ltd, the lessee will conduct survey and collect latest data regarding topography, geology and latest reserves/ resources will be estimated and this Mining Plan will be modified accordingly.

The Mining lease area of the existing lessee is 102.53 Ha contains 5 blocks. Out of five blocks, DMG has auctioned only the Block – 1, having the area of 93.60 Ha. So, the Preferred bidders lease area can be considered as 93.60 Ha.

The existing lease area as shown below:

Block	Survey No	Village	Area as per CEC in Ha.	Forest /Non - Forest
Block -1	5	Bedara Bomminahalli	69.46	Forest
	107	Hirekandavadi	12.6	Forest
	9	Marijogihalli	1.47	Forest
	21	Meghalahalli	1.75	Forest
	18	Dindadahalli	8.32	Forest
Total			93.60	

The Mining Plan is prepared for the area of 93.60 Ha as per the Letter of Intent (LOI) as per Rule 16(1) of MCR, 2016, in compliance of clause no 3.4 (a)(iv) of Letter of Intent (LOI) issued by Government of Karnataka and also prescribed under Sec.5 (2)(b) of MMDR amendment act, 2016 for grant of Mining Lease.

The lease is operating at the annual capacity of 1.0 MTPA as per the CEC letter No.75/CEC/SC/2018-Pt-VII dated 14.06.2018, Environmental Clearance accorded by vide letter No. 11015/210/2005.IA.II (M) dated 31.03.2006 , the FC was granted vide letter no F.N8-83/93-FC dated 04.04.1997 for year's 20 with effect from 07.10.1992, according the proceedings of Govt. of Karnataka incorporating the Govt. Order no FEE 23 FM 2013 dated 21.11.2016. the period for both the Environmental and Forest clearances are Co- terminus with Mining lease, After Finalization of Mining Plan, preferred bidder will initiate for Transfer of Statutory clearance, Viz EC & FC in the name of preferred Bidder including CTO etc & Obtaining all the other requisite approvals and NOC's. Ministry of mines held a meeting with official of MOEFCC (Fc Division and Department of legal affairs on 05.12.2008. proposal for transfer / extension of FC & EC is being examined by in MOEFCC in consultation with DOLA and changes have been suggested in the rules /guideline of MOEFCC to allow for extension of EC & FC for 3 (2+1) years to the new lessees for allowing seamless transition of mining leases.

Minerals present in the Mining lease deed of M/s. MEL are Iron ore and Manganese. As per the Letter of Intent, the preferred bidder intends to Mine the Iron ore only. (refer Lease deed of M/s MEL **Annexure – XVI**)

List of Mining leases held by M/s. JSW STEEL Ltd

Sl. No.	Lease reference no.& date	Area in Ha	Postal address / Location	Type of Minerals	Status of Mining plan/ scheme	Working/ Non-working	Date of execution / expiry
1.	MINE CODE – 30KAR03181 ML NO -0004	32.68	JSW Steel Limited (Mines Division), Near Talur Cross, Vidyanagar, 583275 Taluk: Sandur, Dist: Ballari.	IRON ORE	Approved For Period 2017-18 to 2021-22	Working	Executed on 12.01.2018
2.	MINE CODE – 30KAR03182 ML NO -0005	21.03		IRON ORE	Approved For Period 2018-19 to 2022-23	Working	Executed on 17.03.2018
3.	MINE CODE – 30KAR03183 ML NO -0006	100.54		IRON ORE	Approved For Period 2018-19 to 2022-23	Working	Executed on 22.12.2018
4.	MINE CODE – 30KAR03184 ML NO -0007	130.53		IRON ORE	Approved For Period 2019-20 to 2023-24	Working	Executed on 27.05.2019
5.	ML – 2621(old) Lease execution is pending	32.56		IRON ORE	Approved (execution is pending)	Not Working	Lease execution is pending
6.	ML-995 (Old) Lease execution is pending	32.89		IRON ORE	Approved (execution is pending)	Not Working	Lease execution is pending
7.	ML-2239 (Old) Lease execution is pending	43.58		IRON ORE	Yet to be Submitted	Not Working under M/S JSWSL	Lease execution is pending
8.	ML-1602 (Old) Lease execution is pending	107.51		IRON ORE	Yet to be Submitted	Not Working under M/S JSWSL	Lease execution is pending

1.0 General			
	a)	Name of the Preferred Bidder	M/s JSW Steel Limited Nominated Owner: Dr. Vinod Nowal. Copy of photo ID of nominated owner is enclosed as **Annexure V**
		Mine code and Rule 45 registration number	Mine code not yet allotted, REG No : IBM/432/2011 The copy of Certificate is Enclosed as **Annexure IV**
		Address	JSW STEEL LIMITED, Mining Division, Near Talur Cross, Po: Vidyanagar, 583275, Taluk: Sandur
		District	Ballari
		State	Karnataka
		Pin code	583275
		Phone	022- 42868128
		Fax	022-42863000,
		Mobile	+91-9449899998,
		E-mail id	vinod.nowal@jsw.in
	b)	Status of lessee	Listed Public Limited Company, Copy of Registration of Company & Memorandum of Association is attached as **Annexure VIII & IX.** List of board of directors, Resolution to appoint nominated owner, Letter of authorization to represent the company is enclosed as **Annexure X.**
	c)	Mineral which is included in the prospecting License	Not Applicable
	d)	Mineral which is included in the Letter of Intent	Iron Ore
	e)	Mineral which the lessee intends to mine	Iron Ore
	f)	Name of the Person responsible for preparation of Mining Plan	**Mr. B.P. Pandey** (Qualification and Experience certificate attached as **Annexure III)**
		Address	JSW Mining office, Near Talur Cross, Vidya Nagar -583275., Sandur (Taluk), Ballari (District)
		Phone No.	08395-245956
		Email	pandey.binay@jsw.in
		Mobile No.	+91-9448286155

2.0 LOCATION AND ACCESSIBILITY

a)	**Lease Details (Existing Mines)**	
	Name of the mine	BBH Iron Ore Mine
	Latitude & longitude of any boundary point	LBS-1 Latitude: N14^0 12' 51.1" Longitude: E76^0 13' 41.6" There are 15 corner pillars and lat/long values of these pillars are given in the sketch enclosed as key plan and surface plan **Plate-01** and **Plate-03** respectively and also listed in **Table-2.1**
	Date of grant of lease	LOI grant date 13/08/2019, lease Yet to be granted.
	Period/Expiry Date	50 years as per MMDR (Amendment) Act-2015
	Name of the Lease Holder	M/s JSW Steel Limited.
	Postal Address	JSW STEEL LIMITED., Mining Division, Near Talur Cross, Po: Vidyanagar, 583275 Taluk: Sandur.
	District	Ballari
	State	Karnataka
	Pin code	583275
	Phone	08395-245956
	Fax	08395-250132
	Mobile	+91-9448286155
	E-mail id	pandey.binay@jsw.in
b)	**Details of Lease with Location Map**	
	Forest	
	Forest:	Nirthadi Range, Chitradurga schist belt

Forest		**Non-Forest**	
Forest	**Area (Ha)**	**Non-forest**	**Area**
Nirthadi Forest Range	93.60 Ha	i) Waste land ii) Grazing Land iii) Agriculture Land iv) Others	N A
CEC sketch as enclosed in **Plate-02** Mahazar copy enclosed as **Annexure XI**			

Total lease area	93.60 Ha
District & State	Chitradurga Dist, Karnataka State
Taluka	Chitradurga
Village	Bedara bommenahalli, Hirekandavadi and other villages
Whether the area falls under Coastal Regulation Zone (CRZ)?	The lease area does not fall under Coastal Reg Zone.
Existence of public road/railway line, if any nearby and approximate distance	Road – State Highway 48 – 2 kms. Railway line – Chitradurga – Chikkajajur Railway line – 10 kms.
Topo-sheet No. with latitude & Longitude of all corner boundary point/pillar	43K/4 (57B/4 old), Latitude and Longitude values are given in the below table.
Latitude and longitudes of the corner pillars of the lease area (Datum WGS-1984)	

Table no – 2.1

CORNER PILLARS CO-ORDINATES			
Sl No.	**BP No.**	**Latitude**	**Longitude**
1	LBS.1	N14^0 12' 51.1"	E76^0 13' 41.6"
2	LBS.2	N14^0 12' 52.8"	E76^0 13' 36.5"
3	LBS.3	N14^0 12' 49.8"	E76^0 13' 34.5"
4	LBS.4	N14^0 12' 52.7"	E76^0 13' 25.7"
5	LBS.5	N14^0 12' 57.9"	E76^0 13' 23.9"
6	LBS.6	N14^0 13' 01.5"	E76^0 13' 11.8"
7	LBS-7	N14^0 12' 42.1"	E76^0 13' 03.9"
8	LBS.8	N14^0 12' 34.4"	E76^0 13' 06.4"
9	LBS.9	N14^0 12' 26.7"	E76^0 13' 10.3"
10	LBS.10	N14^0 12' 21.5"	E76^0 13' 16.5"
11	LBS.11	N14^0 12' 20.6"	E76^0 13' 18.9"
12	LBS.12	N14^0 12' 21.4 "	E76^0 13' 20.5"
13	LBS-13	N14^0 12' 20.2"	E76^0 13' 24.1"
14	LBS.14	N14^0 12' 21.8"	E76^0 13' 24.8"
15	LBS.15	N14^0 12' 22.4"	E76^0 13' 33.2"

The following are the details of Ground Control Points (Datum WGS-1984):

Table no – 2.2

Sl No.	Ground Control Points	Locations	Distance from the Boundary Pillar " LBS-15 "	GPS READING (WGS 84 DATUM)		Whole Circle Bearing
				LATITUDE	LONGITUDE	
1	GCP - 1	Retaining wall	1281.20 m	N14^0 12' 59.3"	E76^0 13' 53.1"	27°26'50"
2	GCP - 2	Temple (Kukadamma)	265.40 m	N14^0 12'18.7"	E76^0 13' 41.2"	115^{0}03'49''
3	GCP - 3	Temple (Anjaneya)	1181.10 m	N14^0 12'22.6"	E76^0 14' 12.6"	89^{0}24'0"

c) General Location & Vicinity Map

The Key Plan showing the lease area is marked on a Survey of India topo-sheet with the scale of 1:50,000 as **Plate-01A** and General location Plan & administrative map as **Plate-01B** showing lease area and access routes. CEC sketch of the lease has been shown as **Plate-2A,** accorded lease area in auction has been shown as **Plate-2B**

3.0 DETAILS OF APPROVED MINING PLAN

3.1) Date and reference of earlier approved Mining Plan

Sl. No.	Type of document and rule under which prepared	Approval Letter no. & Date	Lease Area (Ha.)	Proposal From-To (Period of Years)
1.	Not Applicable, as it's the first Mining plan after getting the letter of intent (LOI)			

3.2) Details of last modifications if any (for the previous approved period) of approved

MP/SOM, indicating date of approval, reason for modification

Not applicable, as this is the first Mining Plan after M/s JSW Steel Ltd declared as a Preferred Bidder.

3.3) Review of earlier approved proposal in respect of excavation exploration, reclamation etc.

Not applicable, as this is the first Mining Plan after M/s JSW Steel Ltd declared as a Preferred Bidder

3.4) Status of compliance of violations pointed out by IBM

Not applicable, as this is the first Mining Plan after M/s JSW Steel Ltd declared as a Preferred Bidder

3.5) Indicate and give details of any suspension/closure/prohibitory order issued by any Government agency under any rule or Court of law:

Not applicable, as this is the first Mining Plan after M/s JSW Steel Ltd declared as a Preferred Bidder

3.6) In case the MP/SOM is submitted under rules 9 and 10 of the MCDR 88 or under rule 17(3) of the MCR' 2016 for approval of modification, specify reason and justification for modification under these rules.

Not applicable, as this is the first Mining Plan after M/s JSW Steel Ltd declared as a Preferred Bidder

PART – A

1.0 GEOLOGY AND EXPLORATION

a) Description of the topography, drainage pattern, vegetation, climate, and rainfall data of the mining lease area.

(i) Topography

The Lease area of BBH **Iron ore mine (M/s Mineral Enterprises Ltd., ML No. 2346)** falls under Survey of India topo-sheet no.43K/4 (57 B/4 old toposheet) bounded by Longitudes 76^0 13' 33.20" E to 76^0 13' 41.60" E and Latitudes 14^0 12' 24.40" and 14^0 12' 51.10" N. The area falls in the hill range running North- South. The highest elevation is 962 meters is in the Northern part of the lease. A parallel ridge starts from the Northern peak is formed in the North South direction with an altitude of 900 MSL on the North and 825 MSL on the South. The valley is formed in between two hill ranges and is locally called as 'KAGIHALLA', which drains towards South. A third valley exists on the North East of the lease area which is draining towards North East. All the drainages merge in Bheemasamudra Kere (Tank). Further the Bheemasamudra water joins to the Krishna Basin.

(ii) Drainage Pattern

No rain water accumulates in the lease area, naturally. The rain water flows from hill slopes and it does not accumulate till it reaches the lower valleys. The drainage pattern of the area is sub-dendritic in nature. Half of the run-off with-in the buffer zone drains towards east and the other half flows towards South. Mining activity will be carried out on a hilly terrain, wherein there is no possibility of encountering ground water as the mining operations will be carried out on plateau and sloping hill with highest and lowest elevation of 962 m and 813 m above MSL, respectively. The ground water table is about 50 m to 60 m below the general ground level and the mining operations are conducted along the hill. Mining may reach up to 700 m above MSL. Therefore, no groundwater shall be encountered in the mine workings. There are two nalas originating from the lease area, out of which, one is from western side and another is from the eastern side. Both the nalas are emptying into the tank Bhemasumudra.

(iii) Vegetation

Even though the mining lease is in the forest, there is no growth of trees worth the name. Only small bushes, shrubs and trees are seen in the area here and there. The impact on forest due to proposed mining is very minimal. The exposure of hard laterites are partially seen in the mine lease area and the vegetation around the area is mixed open jungle of neither commercial nor medicinal value.

PART – A

1.0 GEOLOGY AND EXPLORATION

a) Description of the topography, drainage pattern, vegetation, climate, and rainfall data of the mining lease area.

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(iv) Climate

The climate of this district, which is in the south-west part of the Deccan plateau, is marked by hot summer months, low rainfall and a pleasant monsoon season. The temperature is around 14 ° to 15° Centigrade during November and December months and goes up to 40^0 C to 41^0 C during April and May months of the year. The monsoon season extends over a period of six months from June to November. The district receives almost an equal amount of rainfall during the South-west monsoon (June to September) and during the November month.

(vi) Rainfall Data

The average annual rainfall in the district is 800mm with an average of 40 rainy days. October happens to be the month with the heaviest rainfall. The relative humidity is high during the monsoon, ranging from 70 percent to 75 percent and remains low in the rest of the year, particularly in the summer months. Winds are generally moderate during summer and strong during rainy season.

North-east monsoon period (October to November).

b) Brief description of Regional Geology with Reference to Location of lease

The Lease area of BBH **Iron ore mine (M/s Mineral Enterprises Ltd., ML No. 2346)** is covered under Survey of India topo-sheet no.43K/4 (57 B/4 old toposheet) and bound by Longitudes 76^0 13' 33.20" E to 76^0 13' 41.60" E and Latitudes 14^0 12' 24.40" and 14^0 12' 51.10" N. The area falls in the hill range running North- South.

The important geological rock formations in the district are crystalline schists, granitic gneisses and the newer granites with few intrusive dykes, all belonging to the oldest rock formations. The schists and their associated rocks constitute a portion of the Dharwar system and are designated as the Chitradurga and the Chikanayakanahalli schist belt. The schistose rocks consist of a complex series of crystalline schists, quartzite's, limestone, manganiferous clay schists and banded iron ore formation. The granitic gneisses occupying a large part of the district are grouped under a separate formation under the title "Peninsular gneiss" that include a heterogeneous mixture of several types of granitic rocks with enclosed lenses and patches of hornblendic schists. Peninsular gneisses are usually banded in appearance and are of light to dark grey in color and form excellent building stones. On weathering they yield red lateritic soils. Peninsular gneisses are found in Challakere, eastern parts of Hiriyur and Hosadurga taluks and in some patches of Chitradurga and Holalkere taluks.

"The Chitradurga Green Schist Belt" extends between Megalahalli village of Holalkere taluk in Chitradurga in the North and near Yalladabagi village of Gubbi Taluk in Tumkur District, in the South.

The major rock types are Laterite, Banded Hematite Quartzite, Talc, Sericite Schist, Shale, basic Volcanic rocks, Gneisses and Phyllite and at many places the formation is intruded by Dolerite Dykes and Quartz veins. There are many parallel hill ranges. The general strike of the belt is North 20° West & South 20° East and dipping both in East & West directions varying from 55^0 to 85° but the same formation has taken deviation on the way in between villages Basavanagudi and Doddabayaladkere forming almost East – West for a distance of 10 to 20 Km.

Geology of the Area

The area is considerably disturbed geologically. The main deposit in this block is bedded with ore body outcropping at many places. The Strike of the ore body is NW-SE and folded across strike, thereby forming a chain of synclines and anticlines. All the limbs of folds are parallel and dipping in the same direction (i.e. towards west) leading to "ISOCLINAL FOLD". The deposit has been mined extensively in the last two decades exposing ore body laterally and depth wise. The strike length of this main ore body is 1.2 km. The ore body is widest and deepest at the Centre (section OO'), i.e. 580 meters wide and 150 meters deep, and pinches at both ends. Float ore is observed on the northern slope, with a thickness of about 15 meters. The deposit comprises mostly Goethite, Limonite and haematite and hence, brown in color. The ore is friable and almost uniform throughout the deposit. A few narrow quartz veins intersect the ore body at few places. Dolerites dykes are also observed at few places. Intercalated manganiferrous clays are also seen throughout the deposit.

A second parallel band of ore body is also occurring to the east of the main ore body. The characteristics of this deposit is different in comparison to main ore body. Here the ore body is in the fractured form due to the Irruption of Magmatic activity below the Iron Ore reef (the weathered igneous mass is visible in the foot Wall). This ore body is well exposed in the old workings showing no definite strike & Dip directions. The extension of this ore body in the north has been mined out in the past.

The footwall as BHQ rock is outcropping in South of the block, in between the two ore bodies. BHQ is also exposed northern slopes, outside the lease area. The quartzites are highly weathered. Phyllitic Clay is exposed in the North east portion of worked out areas, area vacated by subgrade stock and few patches in the West.

The topmost surface of the area is covered with lateralized soil and iron ore floats followed by iron ore reef, banded haematite quartzite, with phyllite in lower levels. Iron ore is in the form of thin beds of laminations with few intervening clay and silicate bands, which suggests the break in sedimentation or deposition from time to time. The banded iron formations are dark blue in colour, fine-grained and strongly bonded. The bonding is due to silicate and iron rich oxide. The ore is

bedded with lot of structural disturbances resulting in series of folds. The iron ore deposit comprises mostly limonite, goethite and hematite in that order. The character of the ore is given below:

I. **Physical:** The +10mm portion of the ore is very hard, having a tumbler index of +80. This +10 mm portion comprises 29 percent of ROM. The balance 71 percent comprises fines of poor quality iron ore in the form of friable ore.

II. **Chemical**: The chemical analysis of ROM is as follows:

ROM

Fe	Above 45%
Mn	2 to 7 %
SiO_2	3 to 5 %
Al_2O_3	2 to 4%

The general sequence of the rock formation is given below

1) Soil mixed with iron Ore Float
2) Iron ore reef
3) Banded Hematite quartzite
4) Shale/Phyllites

The general strike of the deposit is NS and the dip is due west. The geological plan as shown as **Plate - 04**

c) Detailed description of geology of the lease area such as shape and size of the mineral/ore deposit, disposition various litho-units indicating structural features if any etc.

The rock formations belong to the iron ore stage of Dharwar system. The general sequence of rock formations found in the area is as given below,

- Soil Cover/ Float Ore
- Iron Ore Formation
- Banded Hematite Quartzite (BHQ)
- Shale/ Phyllites

Soil Cover/ Float Ore

Since the mine has been in operation for several decades before Auctioning, hence area is already considered as broken up. There is no likelihood of generation of topsoil. However, if, some quantity is generated during the mining operations from lease area, at the same time it will be used for afforestation purpose.

Iron Ore Formation

The general trend of the iron ore formation is NW-SE with steep westerly dip of 45^0-60^0 (Plate-III). Few intervening clay bands were noticed. Few BHQ bands occurs which run almost parallel to main

iron ore band in the western as well as eastern part of the lease area. Occasionally, the BHQ band gets enriched into ore as could be visualized in boreholes.

The iron ore formation occurs in the form of reef having reddish brown in color and hard metallic luster. Ore in the form of lumps and fines having average ratio of 30:70 is observed at many places. The quality of iron ore is good with the grade varies ranging from 45% to + 58% Fe content.

Banded Hematite Quartzite's (BHQ)

The Banded Hematite Quartzite's is exposed in the area of ML block in the form of discontinuous bands at places along the hill slopes. The BHQ exposed in patches over the iron ore formation, is banded in nature and following the trend of the iron ore formation with dip of 45° to 60° towards west. The BHQ in the area is considered as waste due to low Fe content and exhibit, fine grained, cherry red in color and has metallic luster.

Shale/ Ferruginous Clay

Shale / Ferruginous Clay are exposed as wall rocks at places and exposed within the iron ore formation, as intercalated waste. It is light yellow to light pinkish red in color.

d) Details of Exploration Agency

Name of Exploration agency	**M/s M/s Mineral Enterprises ltd**
Address	**M/s. Mineral Enterprises Limited** Khanija Bhavan, NO.49, 3rd Floor, West Wing, Race Course Road, Bengaluru – 560001
Phone No.	Phone No. : 080 42459797/725/731

e) Details of Prospecting/Exploration Already Carried Out:

i) Number of pits and trenches indicating dimensions, spacing etc. along and across the strike/ Foliation with reference to geological plan.

Exploration of the lease area was carried out by M/s **Mineral Enterprises ltd**. As it is a working mine, most of the orebody has been exposed wherein pit is already available. The Exploration Agency is categorised only G1, G2, & G3 and Surface Area of the Same is shown in below table. And same is marked in the Geological plan and Geological Cross sections.

Category	Area in Ha
G1	56.69
G2	6.69
G3	-
Unexplored area	30.22
Total area	93.60*

* The area belongs to Block- I only.

ii) Number of boreholes indicating type (Core/RC/DTH), diameter, spacing, Inclination, Collar level, depth etc. with standard borehole logs duly marking on geological plan/sections.

M/s MEL has drilled 79 nos. of Core drill holes (5770 m) and 31 nos. of RC drill holes (2423 m), DTH drill holes of 140 no.s (5844 m).These Boreholes are marked in Geological Plan and the respective borehole logs are enclosed as **Annexure-XII**.

TABLE-1.1
Quantum of Work Executed by MEL in
BBH Iron Ore Mine (ML No. 2346)

Sl. No	Activity	Quantity
1	Topographical Survey - on 1:1000 scale.	93.60 Ha
2	Geological Mapping	0.9360 sq. km
3	**Survey**	
	i) Triangulation/Traversing	93.60 Hectares
	ii) BH Fixation	110 nos.
	iii) Determination of RL and Co-ordinates	110 nos.
4	**Exploratory Drilling**	
	i) Core Drilling	5770.0 m (79 Bhs)
	ii) RC Drilling	2423.0 m (31 Bhs)
	iii)DTH Drilling	5844.0 m (140 Bhs)
5	**Geological Activities**	
	i) Core Logging	8193.00m (110 BHs)
	ii) Primary Samples	8193 Nos
	iii) Lump and Fine (Pits)	3 Nos
	iv) Bulk Density determinations	3 Nos
6	**Chemical Analysis:**	
	i) Primary (Fe,)	8193 Nos.

Surface features & Topography of the mine lease area are shown in Surface plan **(Plate 3).**
Geological features of the lease area, Location of Boreholes, Extent of Mineralization are shown in Geological Plan & Geological cross sections **(Plate 4&5)**.

Surface Survey and Geological plan.

The survey work has been carried by using Total station & DGPS of Tremble make having an accuracy of 0.10 m with WGS 1984 datum. They surveyed map and Geological plan of the mining lease area has been provided by DMG, Karnataka. The boreholes have been fixed and RL determined by triangulation method. The borehole location details have been provided as **Table – 1.1a.**
The base map has been provided by DMG, Karnataka as surveyed by M/s MEL, Karnataka. The co-ordinates, both National and UTM, of triangulation stations and boundary pillars of the base map were provided by DMG, Karnataka. Surface features & Topography and Geological plan of the mine lease area are shown in Surface plan **(Plate 3) &** Geological plan **(Plate 4).**

Exploratory Drilling

Particulars	Type of Drill				Total
	Phase -1			Phase -2	
	DTH	RC	CORE	CORE	
Detailed Exploration	-	31	18	61	110
Confirmation	140	-	-	-	140
Meterage(m)	5,844	2,423	1,619	4,151	14,037
Max Depth(m)	92	165	191	235	-
Min. depth(m)	9	23	32	24	-

The boreholes have been drilled by MEL. In order to assess total potential of iron ore in the mine area, a total of 79 no.s of boreholes for core drilling and 31 no.s of boreholes for RC drilling have been drilled involving of 5770 m and 2423 m respectively. Thus, a total of 8193 m exploratory drilling has been completed in Mine Lease Area (ML No. 2436). During the period of execution, due to the finer nature of ore, utmost care has been taken while drilling, so as to achieve maximum core recovery. In the mineralized zone, the overall recovery has been 85% and above.

Details of Borehole's are given below Table no 1.1a

BBH MINES LIST OF BORE HOLES DRILLED (CORE DRILLING)								
	(From Date: 09.09.2012 to 16.08.2013)						ML No. : 2346	
Sl. No.	Date		Bore Hole No.	Northing	Easting	Top RL	Bottom RL	Depth
	FROM	TO				(m)	(m)	(m)
1	09.09.2012	20.09.2012	BCD-19	1571626	631716	864	658.0	206.0
2	18.09.2012	26.09.2012	BCD-20	1571244	631827	830	769.0	61.0
3	23.09.2012	25.09.2012	BCD-21	1571480	631964	859	813.0	46.0
4	27.09.2012	03.10.2012	BCD-22	1571395	632003	849.5	775.5	74.0
5	04.10.2012	11.10.2012	BCD-23	1571362	631901	819	633.0	186.0
6	05.10.2012	16.10.2012	BCD-24	1571391	631670	883.7	733.7	150.0
7	13.10.2012	19.10.2012	BCD-25	1571110	631935	852	745.5	106.5
8	19.10.2012	21.10.2012	BCD-26	1571291	632015	852	802.5	49.5
9	25.10.2012	27.10.2012	BCD-27	1571021	631984	856	802.0	54.0
10	09.01.2013	09.01.2013	BCD-28	1571481	632308	862	831	31
11	10.01.2013	10.01.2013	BCD-29	1571554	632373	851.5	821.5	30
12	11.01.2013	11.012013	BCD-30	1571690	632428	829.3	799.3	30
13	12.01.2013	15.01.2013	BCD-31	1571276	632293	857	795.5	61.5
14	16.01.2013	16.01.2013	BCD-32	1571193	632305	858	817	41
15	18.01.2013	23.01.2013	BCD-33	1570902	632219	830	775	55
16	18.01.2013.	30.01.2013	BCD-34	1570993	631880	862.6	839.1	23.5
17	24.01.2013	28.01.2013	BCD-35	1571078	632232	847.2	807.2	40
18	28.01.2013	29.01.2013	BCD-36	1571009	632115	836.7	806.7	30
19	30.01.2013	30.01.2013	BCD-37	1571179	632160	863.3	833.3	30
20	31.01.2013	07.03.2013	BCD-38	1571200	631879	837.5	602.5	235
21	31.01.2013	05.02.2013	BCD-39	1571121	631841	874	789	85
22	06.02.2013	14.02.2013	BCD-40	1571190	631736	871.3	714.3	157
23	15.02.2013	21.02.2013	BCD-41	1571295	631706	871.5	760.5	111

24	22.02.2013	28.02.2013	BCD-42	1571695	631574	898	802	96
25	02.03.2013	09.03.2013	BCD-43	1571582	631608	897	793	104
26	11.03.2013	22.03.2013	BCD-44	1571194	631666	872	752	120
27	25.03.2013	29.03.2013	BCD-45	1571082	631685	880	827	53
28	01.04.2013	05.04.2013	BCD-45A	1571083	631720	879.5	822	57.5
29	05.04.2013	08.04.2013	BCD-46	1571482	632058	853.5	823.5	30
30	08.04.2013	09.04.2013	BCD-47	1571357	632177	861	831	30
31	10.04.2013	13.04.2013	BCD-48	1570989	631758	884	849	35
32	15.04.2013	24.04.2013	BCD-49	1570995	631684	886	791	95
33	25.04.2013	02.05.2013	BCD-50	1570936	631755	858	786	72
34	03.05.2013	06.05.2013	BCD-51	1571235	631525	840	775	65
35	07.05.2013	11.05.2013	BCD-52	1571320	631487	841.6	769.6	72
36	13.05.2013	20.05.2013	BCD-53	1571406	631480	846.8	786.8	60
37	21.05.2013	30.05.2013	BCD-54	1571445	631550	859	769	90
38	25.06.2013	02.07.2013	BCD-54A	1571443	631550	859	762	97
39	31.05.2013	03.06.2013	BCD-55	1571150	632046	841	811	30
40	03.06.2013	04.06.2013	BCD-56	1571278	632116	861	831	30
41	04.06.2013	05.06.2013	BCD-57	1571062	632097	842	812	30
42	05.06.2013	06.06.2013	BCD-58	1571402	632300	857	827	30
43	05.06.2013	07.06.2013	BCD-59	1571307	632377	840	810	30
44	07.06.2013	12.06.2013	BCD-60	1570950	631810	843	797	46
45	08.06.2013	13.06.2013	BCD-61	1570873	631791	831	775	56
46	14.06.2013	18.06.2013	BCD-62	1570876	631923	820	790	30
47	14.06.2013	20.06.2013	BCD-63	1571116	631613	845	780	65
48	19.06.2013	24.06.2013	BCD-64	1571180	631523	841	776.5	64.5
49	20.06.2013	24.06.2013	BCD-65	1571109	631557	837.7	797.7	40
50	26.06.2013	13.07.2013	BCD-66	1571337	631587	855.4	710.4	145
51	09.07.2013	13.07.2013	BCD-67	1571621	631497	881	815	66
52	15.07.2013	19.07.2013	BCD-68	1571542	631520	865	780	85
53	15.07.2013	16.07.2013	BCD-69	1571519	631435	860	830	30
54	17.07.2013	19.07.2013	BCD-70	1571703	631502	893	833	60
55	20.07.2013	24.07.2013	BCD-71	1571792	631599	910	845	65
56	20.07.2013	26.07.2013	BCD-72	1571753	631808	914	831	83
57	26.07.2013	27.07.2013	BCD-73	1571565	631838	875	840	35
58	26.07.2013	01.08.2013	BCD-74	1571827	631809	928	892	36
59	31.07.2013	03.08.2013	BCD-75	1571792	631599	910	845	65
60	02.08.2013	03.08.2013	BCD-76	1571191	631999	843	813	30
61	05.08.2013	06.08.2013	BCD-77	1570847	631953	812	782	30
							TOTAL	**4151.0**

iii) Details of samples analysis indicating type of sample (surface/sub-surface from pits/trenches/borehole etc.)

The Samples of ore and waste from the boreholes were analyzed by M/s MEL, the data has been extracted from the approved Mining plan. Analytical Results of litho-logs and chemical analysis of Borehole samples are enclosed in **Annexure XII**.

(iv) Expenditure Incurred in various Prospecting Operations

Entire prospecting was done by M/s. MEL, so expenditure as per the approved Mining plan was INR Rs. 4,96,00,000 (Rupees Four Crores Ninety-Six Lacs only) (Source: as per the approved Modification & Review of Mining plan vide letter no . 279/346/92/BNG/1217 dated 02/07/2018.

f) Surface Plan

The Surface Plan has been prepared on a scale of 1:2000 R.F with contour interval of 5mtr and is enclosed as **Plate No.3.**

g) Geological Plan

The Geological Plan has been prepared on a scale of 1:2000 R.F, incorporating already carried out and proposed exploration data, mineralized zone, lithologs, and structural features and is enclosed as **Plate No.4.**

h) Geological Cross Sections

Based on the Geological Plan, geological Cross Sections has been drawn at an interval of average 50m on a scale of 1:2000 R.F. and enclosed as **Plate No. 5**.

i) Future Exploration Programme

An additional 19 Boreholes have been proposed to be drilled during plan period for further access the extent of ore body. The year-wise proposed bore holes to be drilled during plan period is given in **Table 1.2 ,** the same as been demarcated on the **Plate no. 4&5.**

Table 1.2 Proposed BH with Location

Sl. no	Year of Drilling	BH-No	Latitude	Longitude	Reduced Level from MSL	Depth in Mts	Angle
1	2nd year	PBH-1	1571822	631713	925	75	90
2		PBH-2	1571685	631785	898	75	90
3		PBH-3	1571759	631974	920	75	90
4		PBH-4	1571463	631744	849	75	90
5		PBH-5	1571322	631794	834	75	90
6		PBH-6	1571197	631593	855	75	90
7		PBH-7	1571253	631752	845	75	90
8		PBH-8	1571334	631978	835	75	90
9		PBH-9	1571169	631814	855	75	90
10		PBH-10	1571044	631608	859	75	90
					Total Depth(A)	**750**	
11	3rd Year	PBH-11	1571038	631889	865	75	90
12		PBH-12	1570924	631871	854	75	90
13		PBH-13	1570961	631976	838	75	90
14		PBH-14	1570929	632030	817	75	90
15		PBH-15	1570915	632142	838	75	90
16		PBH-16	1571000	632231	829	75	90
17		PBH-17	1571123	632285	842	75	90
18		PBH-18	1571214	632238	871	75	90
19		PBH-19	1571261	632216	874	75	90
					Total Depth(B)	**675**	
					Total Depth (A+B)	**1425**	

j) Reserves and Resources as per UNFC with respect to the threshold value notified by IBM:

(i) Mineralization

All the materials analyzing more than 45% and above have been considered as ore. The ore exhibits vide variations of physical properties ranging from compact, hard and massive ore to soft, flaky, laminated, granular, unconsolidated sandy blue dust or reddish-brown powdery ore.

However, categorization/classification of ore based on quantitative data such as hard, soft, laminated, powdery etc., have been possible based on mine data (size range or granulometry). It is based on physical properties like colour, presence or absence of weakness, cohesiveness of the grains etc. This lithological classification helped in revealing a stratigraphical picture of the relative preponderance of different ore types.

The iron ore in nature is not homogeneous, but consists of a mixture of many ore types. Hence, practical approach of demarcating the ore zones based on predominant nature of the lithology/ore substantiated with analytical data have been applied.

(ii) Types of Ore

Various types of iron ores are derived from hematite viz. massive ore, laminated ore, and blue dust.

Table 1.3 Ore Characteristics

Type of Ore	Characteristic Features
Lateritic	Porous and cavernous in nature
Laminated	Closely spaced laminae, which give rise to biscuity ores.
Blue dust (-)10 mesh	Ore constituting of haematite and martite
Massive (Haematitic)	No planar structure

Besides the float ore gets accumulated along the slope and foot hills which are rich in iron content. The gangue materials are of shale pieces, banded hematite quartzite, dolerite and clay. If lateralization is extensive, the alumina to silica ratio will be high.

(iii) Grade Classification

In order to distribution of the ore and non-ore, the grade of the ore is considered Fe % i.e. threshold value of 45% Fe has been adopted and below this will be waste.

(iv) Mineralization Factor

Mineralization factor is the ratio of net ore bearing area to gross area. It is referred as the co-efficient of impurities. Out of the mining lease area i.e. 93.60 Ha., the mineralized area is 67.71 Ha.

(v) Physical Characteristics of the Iron Ore

The ore are massive, laminated, soft laminated and blue dust. Principal ore minerals are haematite, magnetite, goethite and limonite. The iron content ranges from 45 % to 58 % in ore.

(vi) Chemical Characteristics of the Iron Ore

In the entire deposit, the ore is almost free from lateritisation and the laterite area is very less (2-3.6%). The haematitic ore persists even beyond the level of exploration as could be visualize from the geological cross sections **(Plate-V).** Silica to Alumina ratio ranges between 0.03 and 4.2 with the average of 0.383 indicating low level of lateritisation. The iron ore, in general is, rich in iron (>45%Fe), but they also contain 3-7% Al_2O_3 and the ore deposits normally have Al_2O_3: Fe ratio varies between 0.02 and 0.74.

(vii) Method of Reserve Estimation

Ore reserves have been estimated by geological cross section method. In order to delineate the ore and non-ore, the grade or threshold value of 45% Fe has been adopted, thus non ore above

and below ore zones has been demarcated. The rule of gradual change or law of linear function has been applied [Constantine C. Popoff, 1965] along with the rule of nearest points for application of influence of half way between successive boreholes.

At threshold cutoff of 45% Fe as stipulated by IBM, the mineralized zone within the lease hold area and the ore reserves are estimated.

A total of cross sections serially numbered A-A' to Y-Y' from east to west along N70°E-S70°W have been prepared (Plate-V), based on the interpretation of sub surface borehole qualitative data along with surface geological data, which is perpendicular to general strike of the ore body. Following parameters have been considered for estimation of the mineral reserves:

a) Bulk density of 2.25 T/M^3
b) Cut-off grade of 45% Fe.
c) Configuration of the ore body has been done based on the exploration data and the cross sections were prepared accordingly.
d) 100 m on either side of the iron ore intersection of the bore holes has been placed under (G1) and the next 100 m under (G2) of UNFC.

(viii) Estimation of Reserves and Grade

- After delineating the limit of non-ore (<45% of Fe) and boundaries of different litho units, the geometry of the ore body has been demarcated. Thus, the sectional area or volume has been computed by the software using AutoCAD.
- Ore resource tonnage has been estimated by multiplying the volume with the tonnage factor of bulk Density of 2.25. The sum has been considered as geological in-situ reserves.
- The UNFC code pertains to geological axis of (G1 & G2) have been assigned. The Geological reserves estimated by cross section method at 45% Fe cut off are given in **Table -1.4.**
- A total of 62.673 MT. of net Geological resources with average grade of 50 % Fe, 14 % SiO_2 and 7 % Al_2O_3 has been estimated.

A summary of the category wise Geological reserve estimated for this mine is given in **table 1.4:**
(The reserves/Resources as on 01.04.2018 as per Approved modification & Review of Mining Plan)

Table-1.4: Geological Reserves

Category	UNFC	Geological Reserves (tonnes)
Proved	111	**55,903,278**
Blocked Reserves	121	**6,769,752**
Total Geological Reserves		***62,673,030***
Grade of Fe		**>45%**

M/s MEL considered Fe +45% for reserve calculation, however After the lease execution by preferred bidder further exploration will be carried out to calculate geological reserve of Fe +35% and tabulated accordingly.

Area explored under different level of exploration has been marked on the geological plan and area given below table **(Plate No. 4)**

Category	Area in Ha
G1	56.69
G2	6.69
G3	-
Unexplored area	30.22
Total area	93.60

k) Detailed calculation of reserves /resources section wise

As detailed exploration has been carried out by M/s MEL, following data is assessed based Approved Mining Plan. Section Wise, as well as UNFC Category wise reserves i.e Geological and Mineable reserves are furnished in **table 1.6A and Table 1.6B** of Fe 45% Cutoff.

GEOLOGICAL AND MINEABLE RESERVES ARE ESTIMATION Based on Cross sectional method.

The Mineable reserve is estimated based on the exploration carried out, the UNFC guidelines are strictly followed during the estimation. 25 cross sections have been prepared considering the following parameters estimation of reserves has been done:

- Cut-off grade of 45% Fe
- Bulk density of 2.25 T/M^3 based on field tests conducted from 3 pits in thin laminated ore, hard compact massive ore and laminated ore. And waste/overburden BD considered as 1.7 T/M^3.
- 50 m on either side of the ore intersection of the bore holes under G1 level and the next 50 m under G2 level of exploration as per UNFC.
- Safety zone or green belt of 7.5 m from the lease boundary.
- Considering the intercalated litho units such as ferruginous shale, siliceous iron ore, etc. which cannot be mined separately and have to be mined along with ore.

Thus, Mineable reserves estimated by cross sectional method are as given below,

TABLE-1.6a: GEOLOGICAL ORE RESERVES ESTIMATED BY CROSS SECTIONAL METHOD.

GEOLOGICAL RESERVES OF BBH IRON ORE MINE										
		Proved (G - 1)			Intercalated	Probable (G - 2)			Intercalated	
Section Number	Sectional influence	Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	waste @ 1.7 b.d with 15% rec	Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	waste @ 1.7 b.d with 15% rec	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	Tonnes
A-A'	50	-	-	-	-	3,750	1,87,500	3,58,594	47,813	47,813
B-B'	50	-	-	-	-	4,458	2,22,900	4,26,296	56,840	56,840
C-C'	50	-	-	-	-	7,250	3,62,500	6,93,281	92,438	92,438
D-D'	50	1,834	91,700	1,75,376	23,384	6,750	3,37,500	6,45,469	86,063	1,09,446
E-E'	50	15,478	7,73,900	14,80,084	1,97,345	-	-	-	-	1,97,345
F-F'	50	28,579	14,28,950	27,32,867	3,64,382	-	-	-	-	3,64,382
G-G'	50	34,568	17,28,400	33,05,565	4,40,742	-	-	-	-	4,40,742
H-H'	50	41,158	20,57,900	39,35,734	5,24,765	-	-	-	-	5,24,765
I-I'	50	48,114	24,05,700	46,00,901	6,13,454	-	-	-	-	6,13,454
J-J'	50	31,250	15,62,500	29,88,281	3,98,438	-	-	-	-	3,98,438
K-K'	50	38,698	19,34,900	37,00,496	4,93,400	-	-	-	-	4,93,400
L-L'	50	35,720	17,86,012	34,15,748	4,55,433	-	-	-	-	4,55,433
M-M'	50	42,907	21,45,350	41,02,982	5,47,064	-	-	-	-	5,47,064
N-N'	50	42,194	21,09,700	40,34,801	5,37,974	-	-	-	-	5,37,974
O-O'	50	48,332	24,16,600	46,21,748	6,16,233	-	-	-	-	6,16,233
P-P'	50	43,348	21,67,400	41,45,153	5,52,687	-	-	-	-	5,52,687
Q-Q'	50	38,147	19,07,350	36,47,807	4,86,374	-	-	-	-	4,86,374
R-R'	50	32,356	16,17,800	30,94,043	4,12,539	-	-	-	-	4,12,539
S-S'	50	30,214	15,10,700	28,89,214	3,85,229	-	-	-	-	3,85,229
T-T'	50	24,350	12,17,500	23,28,469	3,10,463	-	-	-	-	3,10,463
U-U'	50	15,555	7,77,750	14,87,447	1,98,326	-	-	-	-	1,98,326
V-V'	50	12,394	6,19,700	11,85,176	1,58,024	-	-	-	-	1,58,024
W-W'	50	10,248	5,12,400	9,79,965	1,30,662	-	-	-	-	1,30,662
X-X'	50	10,928	5,46,400	10,44,990	1,39,332	-	-	-	-	1,39,332
Y-Y'	50	6,824	3,41,200	6,52,545	87,006	-	-	-	-	87,006
Total				**6,05,49,390**	**80,73,252**			**21,23,640**	**2,83,152**	**83,56,404**
							Total Ore	***6,26,73,030***	***Waste***	***83,56,404***

TABLE-1.6b: MINEABLE ORE RESERVES ESTIMATED BY CROSS SECTIONAL METHOD

MINEABLE RESERVES OF BBH IRON ORE MINE													
		Proved (G - 1)			Intercalated	Probable (G - 2)			Intercalated	WASTE (BHQ/Shale/Phyllite)			
Section Number	Sectional influence	Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	waste @ 1.7 b.d with 15% rec	Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	waste @ 1.7 b.d with 15% rec	Sectional area	Volume	Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
A-A'	50	-	-	-	-	-	-	-	-	-	-	-	-
B-B'	50	-	-	-	-	-	-	-	-	-	-	-	-
C-C'	50	-	-	-	-	-	-	-	-	-	-	-	-
D-D'	50	1,561	78,050	1,49,271	19,903	-	-	-	-	-	-	-	19,903
E-E'	50	8,380	4,19,000	8,01,338	1,06,845	-	-	-	-	183	9,150	15,555	1,22,400
F-F'	50	21,029	10,51,450	20,10,898	2,68,120	-	-	-	-	4,771	2,38,550	4,05,535	6,73,655
G-G'	50	31,252	15,62,600	29,88,473	3,98,463	-	-	-	-	1,848	92,400	1,57,080	5,55,543
H-H'	50	39,501	19,75,050	37,77,283	5,03,638	-	-	-	-	5,470	2,73,500	4,64,950	9,68,588
I-I'	50	47,901	23,95,050	45,80,533	6,10,738	-	-	-	-	3,504	1,75,200	2,97,840	9,08,578
J-J'	50	31,250	15,62,500	29,88,281	3,98,438	-	-	-	-	13,863	6,93,150	11,78,355	15,76,793
K-K'	50	38,036	19,01,800	36,37,193	4,84,959	-	-	-	-	12,767	6,38,350	10,85,195	15,70,154
L-L'	50	34,721	17,36,062	33,20,219	4,42,696	-	-	-	-	12,715	6,35,750	10,80,775	15,23,471
M-M'	50	41,285	20,64,250	39,47,878	5,26,384	-	-	-	-	10,907	5,45,350	9,27,095	14,53,479
N-N'	50	38,716	19,35,800	37,02,218	4,93,629	-	-	-	-	11,501	5,75,050	9,77,585	14,71,214
O-O'	50	46,258	23,12,900	44,23,421	5,89,790	-	-	-	-	5,647	2,82,350	4,79,995	10,69,785
P-P'	50	40,958	20,47,900	39,16,609	5,22,215	-	-	-	-	8,094	4,04,700	6,87,990	12,10,205
Q-Q'	50	37,590	18,79,500	35,94,544	4,79,273	-	-	-	-	8,330	4,16,500	7,08,050	11,87,323
R-R'	50	31,992	15,99,600	30,59,235	4,07,898	-	-	-	-	8,251	4,12,550	7,01,335	11,09,233
S-S'	50	29,346	14,67,300	28,06,211	3,74,162	-	-	-	-	9,361	4,68,050	7,95,685	11,69,847
T-T'	50	24,051	12,02,550	22,99,877	3,06,650	-	-	-	-	7,540	3,77,000	6,40,900	9,47,550
U-U'	50	14,259	7,12,950	13,63,517	1,81,802	-	-	-	-	6,209	3,10,450	5,27,765	7,09,567
V-V'	50	9,746	4,87,310	9,31,980	1,24,264	-	-	-	-	3,778	1,88,900	3,21,130	4,45,394
W-W'	50	5,843	2,92,150	5,58,737	74,498	-	-	-	-	2,724	1,36,200	2,31,540	3,06,038
X-X'	50	5,145	2,57,250	4,91,991	65,599	-	-	-	-	931	46,550	79,135	1,44,734
Y-Y'	50	5,789	2,89,450	5,53,573	73,810	-	-	-	-	1,478	73,900	1,25,630	1,99,440
Total				**5,59,03,278**	**74,53,770**			-	-			**1,18,89,120**	1,93,42,890
							Total Ore	*5,59,03,278*				*Total waste*	1,93,42,890

Total Ore	*55903278*
Total waste	*19342890*
Ore to waste Ratio	*1 : 0.35*

Reliability of Estimation:

i) Cut-off Grade

As per the usage of Iron ore for Captive consumption, with the available beneficiation methods the cut –off grade is considered as +45 % Fe.

Threshold value as declared by IBM is +35 % Fe siliceous Heamatitic ore.

ii) Percentage of Recovery

The percentage of recovery is considered based on the past mining data in the mine, its average is given below:

CATEGORY	GRADE (Fe%)	PERCENTAGE
Saleable	+45%	85%

iii) Analysis report

M/s MEL has carried out core logging and sample analysis. Sample collected have been analyzed for Fe, Content. Analytical details of the samples Assay data are maintained as per Form-K of MCDR 1988 and Form-J of Rule 48 (1) of MCDR 2017, which includes the data such as type and make of the drill and size of core, bore hole/pit number and its location, duration of drilling, total length of the bore hole, details of intersection (run details, size of core, percentage recovery of core, lithology and chemical analysis details). All these details are recorded and maintained for each and every bore-hole which are drilled. During exploration by core drilling 100% of the core sample were analyzed by Mitra S.K. NABL accredited laboratory for Fe, Mn and intermittently for SiO_2, Al_2O_3 and LOI. The certificates showing the credentials of the laboratory.

iv) Bulk Density

To calculate the Mineral reserves in any area it is very essential to know the exact bulk density of the mineral. Hence a bulk density test was carried out for the iron ore, sub grade and the waste material. The Bulk Density of ROM and overburden have been determined by field trials, which is given below:

Bulk Density of ROM : 2.25

Bulk Density of OB/waste : 1.70

For carrying out bulk density test, ground surface is levelled at selected site and all loose materials around demarcated pit is removed. Pit is excavated of size, approximately, 0.125 m3 and the excavated material is carefully collect in strong bags. Excavated material is weighed and the weight in kilograms is noted down. The total weight, less the weight of bags is recorded. Excavated pit is filled with sand or water till it is completely full. Precautions taken that the sand or water filled, it

should stick to the true profile of excavated pit. Volume of water or sand is noted down required to fill the pit as volume in litres. The bulk density is calculated using formula MASS/VOLUME.

Table 1.8: Details of Geological Reserves as per 01.04.2018

Quantity in Million Tonnes

Category	UNFC	In situ Geological Reserves
Proved	111 (G1)	**60.549**
Probable	122 (G2)	**2.124**
Total		***62.673***
Avg Fe – 50 %		

It was noticed that the mining has almost reached its lowest level with little cushion for developing the benches further down for scientific and systematic mining. So, some quantities of geological reserves estimated get blocked in UPL. mineable reserves which works out as below (**Table 1.9**).

Table 1.9: Details of Mineable Reserves as on 01.04.2018

Quantity in Million Tonnes

Category	UNFC	Net Minable Reserves
Proved	111 (G1)	**55.903**
Probable	122 (G2)	-
TOTAL MINEABLE RESERVES		**55.903**
Blocked	211/221	**6.770**
Total		***62.673***
Avg Fe – 50 %		

The Available reserves as on 31.03.2018 is 55,903,278 tonns

I) Mineral Reserves/Resources:

Based on level of exploration, mineral reserves with reference to threshold value of Iron ore declared by IBM are as follows the reserves as on 31.03.2018.

Level of Exploration	Geological Resources in million tons	Mineable Reserves in million tons	Grade
G1- Detailed Exploration	**60.549**	**55.903**	+45% Fe
G2- General Exploration	**2.124**	-	+45% Fe
G3-Prospecting	-	-	-
G4- Reconnaissance	-	-	-
Total Reserve	***62.673***	**55.903**	+45% Fe

v) UNFC Classification

All the materials analyzing more than 45% and above have been considered as ore. The ore exhibits vide variations of physical properties ranging from compact, hard and massive ore to soft, flaky, laminated, granular, unconsolidated sandy blue dust or reddish-brown powdery ore. However, categorization/classification of ore based on quantitative data such as hard, soft, laminated, powdery etc., have been possible based on mine data (size range or granulometry). It is based on physical properties like color, presence or absence of weakness, cohesiveness of the grains etc. This lithological classification helped in revealing a stratigraphically picture of the relative preponderance of different ore types.

The iron ore is not homogeneous in nature, but consists of a mixture of many ore types. Hence, practical approach of demarcating the ore zones based on predominant nature of the lithology/ore substantiated with analytical data have been applied.

As per the UNFC classification, economic viability axis, feasibility axis and geological axis are considered for reserves and resources estimation. In this effect separate feasibility study report has been prepared and enclosed as **ANNEXURE-XIII.**

Classification	UNFC Code	Quantity in million tonnes	Grade (%Fe)
1	2	3	4
A) Total Mineral Reserve		**55.903**	**+45%**
1.Proved Mineral reserves	111	55.903	+45%
2.Probable Mineral Reserve	121 & 122	-	+45%
B. Total Remaining Resources	-	**6.770**	+45%
1. Feasibility Mineral Resource	211 & 212	6.770	+45%
2.Prefessilibility Mineral resource	221	-	-
3.Measured Mineral resource	331	-	-
4.Indicated Mineral resource	332	-	-
5.Inferred Mineral resource	333	-	-
6.Reconnaissance Mineral resource	334	-	-
Total Reserves & Resources (A+B)		**62.673**	**+45%**

Exploration work has been carried out by M/s MEL up to G1, G2 stage. As such the reserves under different remaining categories are nil.

2.0 MINING

A. Open Cast Mining

a) Brief description of the existing as well as proposed method for excavation with all design parameters indicating on plans /sections

i) Existing Method of Excavation:

The mine is already developed in respect of open pit, access roads, network of internal roads, site facilities, waste dump, sub grade stock, process plant, etc. as it is an operating mine for nearly four decades.

The existing method of mining, namely "opencast mining" method is proposed to be continued. Entire operations will be fully mechanized through use of Heavy earth moving Machinery. **There will be no blasting, as most of the strata are amenable to direct excavation by hydraulic excavators. Wherever medium hard strata occur, it is loosened by Ripper Dozer.**

Broadly, the mining operations include excavation, loading and haulage of overburden to waste dumps. The normal ROM will be similarly excavated, loaded and hauled to process plant. Excavation, loading and haulage will be through deployment of HEMM (Heavy Earth Moving Machines). The normal ROM will be processed in a Process Plant to obtain finished products.

Table 2.1: Dimensions of Existing Mine Pit

Pit No.	*Location*	*Dimension(in m)*			*Area (in Ha)*
		Length	**Width**	**Depth**	
1	N1571888 – N1571100, E631871–E631275	980	500	148	40.82
3	N1571399 – N1570900, E632300 – E632200	400	150	27	

ii) Proposed Method of Excavation:

The Mine is going to operate by opencast Mining method, deploying HEMM – Heavy earth Moving Machinery for loading and hauling operations.

The pit workings will be carried out by Benching with average height of the bench will be 6m and the width of the bench shall not be less than 6m.

The haul roads will be designed as per the norms of DGMS, with the gradient of not more than 1 in 16, the ramps shall be designed at 1 in 10.

The ultimate pit slope will not be more than 45 degrees; the bench slope shall not be more than 70 degrees from horizontal.

The excavators will be used to load and the conventional dumpers, ROM will be processed through the crushing and screening plants.

In the current Mining Plan period, it is proposed to operate the working in the Pit 1 extending benches towards North western side from cross section F-F' to Q-Q' between 898 and 802 m RL.

The Mine shall be operated by fully mechanized opencast mining method category 'A'. The height of the benches will be 6m while the width, more than 6 m. A 10 meter wide road with a gradient of 1 in 16 connects all the benches for haulage. A mud bund will be constructed all along the edge of the road as an embankment wall. The height of the bund shall be 1 m. The slope of the individual bench shall not exceed 70^0 and the overall pit slope will not exceed 45^0.

The sequence of mining involves excavation, loading of ore and waste to tippers by excavators. As the strata are mostly friable and soft, it is excavated directly by Excavator. Medium hard formations are excavated by Ripper Dozer.

The ROM will be loaded into the trucks and directly transported to ROM Stack, where it is fed into mobile screening plant for sizing. The oversize product of screening plant is fed to Mobile Crushing Plant. It is proposed to produce a maximum of 1.0 MTPA of recoverable ROM from this mine, starting from Financial year 2020 - 21 of the plan period. As this mine will be used for captive purpose only, entire quantity of finished product from stockyards will be dispatched to JSW Steel Plant by railway wagons (Rakes), trucks.

Dimensions of the proposed pit workings:

Pit No.	*Location*	*Dimension(in m)*			*Area (in Ha)*
		Length	**Width**	**Depth**	
1	N1571200 – N1571850, E631550–E632000	650	450	96	17.5

b) Year-wise tentative Excavation in Cubic Meters indicating development, ROM, pit wise

(i) Insitu Tentative Excavation:

As per the Plans and Production and Development Sections **(Plate no. 6A to 6E & 07** drawn for the designed parameters, the year wise tentative excavation both in Cum. and tonnage is given below:

Sl.No	Particulars	Bulk Density (T/M^3)	% of Recovery
1	Iron ore	2.25	85%
2	OB / Waste	1.70	-

Table 2.2(a) Proposed year wise tentative Excavation in Cum

Year	Pit No.	Total tentative Excavation	Top soil	OB/SB/IB	ROM (m^3)		Total Mineral Reject	ROM/ waste Ratio
					Ore	Intercalated Waste		
		(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	
I	I	5,69,475.64		46600	444444.4	78431.2	0	0.28
II	I	5,45,625.64	-	22,750	444444.4	78431.2	0	0.23
III	I	5,32,475.64		9600	444444.4	78431.2	0	0.20
IV	I	5,32,475.64		9600	444444.4	78431.2	0	0.20
V	I	5,27,675.64		4800	444444.4	78431.2	0	0.19
Total		**27,07,728.22**		**93350**	**2222222.2**	**392156**	**0**	**0.22**

Table 2.2 (b) Proposed year wise tentative Excavation in Tonnes

Year	Pit No.	Total tentative Excavation	Top Soil	OB/SB/IB	ROM (tonnes)		Total Mineral Reject	Waste/ ROM Ratio
					Ore	Intercalated Waste		
		(tonnes)	(tonnes)	(tonnes)	(tonnes)	(Tonnes)	(tonnes)	
I	I	12,12,553.04	0	79,220	1000000	133333.04	0	0.21
II	I	11,72,008.04	0	38,675	1000000	133333.04	0	0.17
III	I	11,49,653.04	0	16,320	1000000	133333.04	0	0.15
IV	I	11,49,653.04	0	16,320	1000000	133333.04	0	0.15
V	I	11,41,493.04	0	8,160	1000000	133333.04	0	0.14
Total		**58,25,360**	**0**	**1,58,695**	**50,00,000**	**6,66,665**	**0**	**0.17**

As the entire ROM (up to threshold value of +45% Fe) is consumed by the JSW steel plant, no mineral rejects will be generated.

II) DUMP RE- HANDLING:

There is no dump re-handling during the plan period.

c) Individual year wise Production & Development Plans and sections

i) First year development & production

From the maps prepared for development and production **Plate No-6A & its Section Plate No-7**, working has proposed in 8 benches which are ore bearing to be formed between RL 910 and RL 844 m Above MSL of width and height of 6 m each. For 1st year the total area Proposed for pit working is 6.92 Ha. and for dumping is 3.37 Ha, where the existing dump will be extended towards South Eastern direction. The average ore to waste ratio works out to be 1:0.21 (in tonnes). The total saleable ore amounts to 1000000 tonnes, while, the total waste of 2,12,553 tonnes likely to be generated will be dumped in the existing dump, designated for the purpose.

Ore will be stacked in the Dynamic stacking area of 1.25 Ha, earmarked for the purpose.

PRODUCTION AND DEVELOPMENT PLAN FOR I YEAR

SECTION F-F'

Bench Level	Sectional Influence	Proved (G - 1)			Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2)			Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite)			TOTAL WASTE
		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 1.7 b.d	
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+910	50	183	9,150	17,499	2,333	-	-	-	-	-	-	-	2,333
+904	50	347	17,350	33,182	4,424	-	-	-	-	-	-	-	4,424
+898	50	986	49,300	94,286	12,572	-	-	-	-	-	-	-	12,572
+892	50	914	45,700	87,401	11,654	-	-	-	-	-	-	-	11,654
Total				2,32,369	30,983			-	-			-	30,983
							Total Ore	2,32,369				Total waste	30,983

SECTION G-G'

Bench Level	Sectional Influence	Proved (G - 1)			Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2)			Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite)			TOTAL WASTE
		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 1.7 b.d	
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+898	50	111	5,550	10,614	1,415	-	-	-	-	-	-	-	1,415
+892	50	436	21,800	41,693	5,559	-	-	-	-	-	-	-	5,559
Total				52,307	6,974			-	-			-	6,974
							Total Ore	52,307				Total waste	6,974

SECTION H-H'

Bench Level	Sectional Influence	Proved (G - 1)			Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2)			Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite)			TOTAL WASTE
		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 1.7 b.d	
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+880	50	219	10,950	20,942	2,792	-	-	-	-	-	-	-	2,792
+874	50	360	18,000	34,425	4,590	-	-	-	-	-	-	-	4,590
+868	50	484	24,200	46,283	6,171	-	-	-	-	-	-	-	6,171
+862	50	533	26,650	50,968	6,796	-	-	-	-	-	-	-	6,796
+856	50	431	21,550	41,214	5,495	-	-	-	-	-	-	-	5,495
+850	50	281	14,050	26,871	3,583	-	-	-	-	-	-	-	3,583
Total				2,20,703	29,427			-	-			-	29,427
							Total Ore	2,20,703				Total waste	29,427

SECTION I-I'

Bench Level	Sectional influence	Proved (G - 1)			Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2)			Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite)			TOTAL WASTE
		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 1.7 b.d	
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+886	50	21	1,050	2,008	268	-	-	-	-	-	-	-	268
+880	50	247	12,350	23,619	3,149	-	-	-	-	-	-	-	3,149
+874	50	329	16,450	31,461	4,195	-	-	-	-	-	-	-	4,195
+868	50	353	17,650	33,756	4,501	-	-	-	-	-	-	-	4,501
+862	50	328	16,400	31,365	4,182	-	-	-	-	-	-	-	4,182
+856	50	399	19,950	38,154	5,087	-	-	-	-	-	-	-	5,087
+850	50	281	14,050	26,871	3,583	-	-	-	-	-	-	-	3,583
+844	50	131	6,550	12,527	1,670	-	-	-	-	-	-	-	1,670
Total				1,99,761	26,635			-	-			-	26,635
								Total Ore	*1,99,761*			*Total waste*	*26,635*

SECTION J-J'

Bench Level	Sectional influence	Proved (G - 1)			Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2)			Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite)			TOTAL WASTE
		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 1.7 b.d	
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+874	50	31	1,550	2,964	395	-	-	-	-	-	-	-	395
+868	50	36	1,800	3,443	459	-	-	-	-	-	-	-	459
+862	50	73	3,650	6,981	931	-	-	-	-	-	-	-	931
+856	50	287	14,350	27,444	3,659	-	-	-	-	-	-	-	3,659
+850	50	293	14,650	28,018	3,736	-	-	-	-	-	-	-	3,736
+844	50	270	13,500	25,819	3,443	-	-	-	-	-	-	-	3,443
Total				94,669	12,623			-	-			-	12,623
								Total Ore	*94,669*			*Total waste*	*12,623*

SECTION K-K'

Bench Level	Sectional influence	Proved (G - 1)			Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2)			Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite)			TOTAL WASTE
		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 1.7 b.d	
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+874	50	42	2,100	4,016	536	-	-	-	-	-	-	-	536
+868	50	103	5,127	9,805	1,307	-	-	-	-	221	11,050	18,785	20,092
+862	50	133	6,650	12,718	1,696	-	-	-	-	213	10,650	18,105	19,801
+856	50	169	8,450	16,161	2,155	-	-	-	-	-	-	-	2,155
+850	50	242	12,100	23,141	3,086	-	-	-	-	-	-	-	3,086
+844	50	380	19,000	36,338	4,845	-	-	-	-	-	-	-	4,845
Total				1,02,179	13,624			-	-			36,890	50,514
								Total Ore	*1,02,179*			*Total waste*	*50,514*

SECTION L-L'

Bench Level	Sectional influence	Proved (G - 1)			Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2)			Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite)			TOTAL WASTE
		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 1.7 b.d	
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+862	50	66	3,300	6,311	842	-	-	-	-	123	6,150	10,455	11,297
+856	50	124	6,200	11,858	1,581	-	-	-	-	184	9,200	15,640	17,221
+850	50	322	16,100	30,791	4,106	-	-	-	-	191	9,550	16,235	20,341
+844	50	513	25,650	49,056	6,541	-	-	-	-	-	-	-	6,541
Total				98,016	13,069			-	-			42,330	55,399
								Total Ore	*98,016*			*Total waste*	*55,399*
												Total Ore	*1000002*
												Total waste	*212554*
												Ore to waste Ratio	*1:0.21*

ii) Second year development & production

From the maps prepared for development and production **Plate No-6B & its Section Plate No-7**, working has proposed in 7 benches which are ore bearing to be formed between RL 874 and RL 814 m Above MSL with width and height of 6 m for 2nd year the total area Proposed for pit working is 7.577 Ha. and for dumping is 1.732 Ha. The average ore to waste ratio works out to be 1:0.17 (in tonnes). The total saleable ore amounts to 1000000 tonnes, while, the total waste of 172008 tonnes likely to be generated will be stocked in the dump yard designated for the purpose. Ore will be stacked in the Dynamic stacking area of 1.25 Ha, earmarked for the purpose.

PRODUCTION AND DEVELOPMENT PLAN FOR II YEAR

SECTION J-J'

Bench Level	Sectional influence	Proved (G - 1)			Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2)			Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite)			TOTAL WASTE
		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 1.7 b.d	
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+874	50	60	3,000	5,738	765	-	-	-	-	-	-	-	765
+868	50	72	3,600	6,885	918	-	-	-	-	-	-	-	918
+862	50	93	4,650	8,893	1,186	-	-	-	-	-	-	-	1,186
+856	50	113	5,650	10,806	1,441	-	-	-	-	-	-	-	1,441
+850	50	118	5,900	11,284	1,505	-	-	-	-	-	-	-	1,505
+844	50	118	5,900	11,284	1,505	-	-	-	-	-	-	-	1,505
+838	50	240	12,000	22,950	3,060	-	-	-	-	-	-	-	3,060
Total				77,839	10,379			-	-			-	10,379
							Total Ore	77,839				Total waste	10,379

SECTION K-K'

Bench Level	Sectional influence	Proved (G - 1)			Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2)			Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite)			TOTAL WASTE
		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 1.7 b.d	
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+874	50	9	450	861	115	-	-	-	-	-	-	-	115
+868	50	59	2,950	5,642	752	-	-	-	-	-	-	-	752
+862	50	59	2,950	5,642	752	-	-	-	-	-	-	-	752
+856	50	115	5,750	10,997	1,466	-	-	-	-	-	-	-	1,466
+850	50	134	6,700	12,814	1,709	-	-	-	-	-	-	-	1,709
+844	50	134	6,700	12,814	1,709	-	-	-	-	-	-	-	1,709
+838	50	367	18,350	35,094	4,679	-	-	-	-	-	-	-	4,679
Total				83,863	11,182			-	-			-	11,182
							Total Ore	83,863				Total waste	11,182

SECTION L-L'

Bench Level	Sectional influence	Proved (G - 1)			Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2)			Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite)			TOTAL WASTE
		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 1.7 b.d	
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+862	50	79	3,950	7,554	1,007	-	-	-	-	-	-	-	1,007
+856	50	131	6,550	12,527	1,670	-	-	-	-	-	-	-	1,670
+850	50	157	7,850	15,013	2,002	-	-	-	-	-	-	-	2,002
+844	50	157	7,850	15,013	2,002	-	-	-	-	-	-	-	2,002
+838	50	641	32,050	61,296	8,173	-	-	-	-	-	-	-	8,173
Total				1,11,403	14,854			-	-			-	14,854
							Total Ore	1,11,403				Total waste	14,854

SECTION M-M'

Bench Level	Sectional influence	Proved (G - 1)			Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2)			Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite)			TOTAL WASTE
		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 1.7 b.d	
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+856	50	257	12,850	24,576	3,277	-	-	-	-	49	2,450	4,165	7,442
+850	50	381	19,050	36,433	4,858	-	-	-	-	80	4,000	6,800	11,658
+844	50	615	30,750	58,809	7,841	-	-	-	-	80	4,000	6,800	14,641
+838	50	843	42,150	80,612	10,748	-	-	-	-	45	2,250	3,825	14,573
+832	50	941	47,050	89,983	11,998	-	-	-	-	34	1,700	2,890	14,888
+826	50	895	44,750	85,584	11,411	-	-	-	-	-	-	-	11,411
+820	50	745	37,250	71,241	9,499	-	-	-	-	-	-	-	9,499
Total				4,47,238	59,632			-	-			24,480	84,112
							Total Ore	4,47,238				Total waste	84,112

SECTION N-N'

Bench Level	Sectional influence	Proved (G - 1)			Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2)			Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite)			TOTAL WASTE
		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.		Sectional area	Volume	Quantity @ 1.7 b.d	
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+844	50	163	8,150	15,587	2,078	-	-	-	-	22	1,100	1,870	3,948
+838	50	239	11,927	22,810	3,041	-	-	-	-	82	4,100	6,970	10,011
+832	50	308	15,400	29,453	3,927	-	-	-	-	63	3,150	5,355	9,282
+826	50	418	20,900	39,971	5,330	-	-	-	-	-	-	-	5,330
+820	50	653	32,650	62,443	8,326	-	-	-	-	-	-	-	8,326
		-	-	-	-	-	-	-	-	-	-	-	-
Total				1,70,264	22,702			-	-			14,195	36,897
							Total Ore	1,70,264				Total waste	36,897

SECTION G-G'														
		Proved (G - 1)			Intercalated	Probable (G - 2)			Intercalated	WASTE (BHQ/Shale/Phyllite)			
Bench Level	Sectional influence	Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	waste @ 1.7 b.d with 15% rec	Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	waste @ 1.7 b.d with 15% rec	Sectional area	Volume	Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+844	50	13	650	1,243	166	-	-	-	-	-	-	-	166
+838	50	79	3,950	7,554	1,007	-	-	-	-	-	-	-	1,007
+832	50	168	8,400	16,065	2,142	-	-	-	-	-	-	-	2,142
+826	50	191	9,550	18,264	2,435	-	-	-	-	-	-	-	2,435
+820	50	239	11,950	22,854	3,047	-	-	-	-	-	-	-	3,047
+814	50	454	22,700	43,414	5,789	-	-	-	-	-	-	-	5,789
Total				1,09,395	14,586				-			-	14,586
							Total Ore	1,09,395				Total waste	14,586
												Total Ore	1000002
												Total waste	172009
												Ore to waste Ratio	1 ; 0.17

iii) Third year development & production

From the maps prepared for development and production **Plate No-6C & its Section Plate No-7**, working has proposed in 8 benches which are ore bearing to be formed between RL 886 and RL 814 m Above MSL with the width and height of 6m. For 3rd year the total area Proposed for pit working is 7.634 Ha. and for dumping is 3.076 Ha. The average ore to waste ratio works out to be 1: 0.15 in tonnes. The total saleable ore amounts to 1000000 tonnes, while, the total waste of 149653 tonnes likely to be generated will be stocked in the dump yard designated for the purpose. Ore will be stacked in the Dynamic stacking area of 1.25 Ha, earmarked for the purpose.

PRODUCTION AND DEVELOPMENT PLAN FOR III YEAR													
SECTION H-H'													
		Proved (G - 1)			Intercalated	Probable (G - 2)			Intercalated	WASTE (BHQ/Shale/Phyllite)			
Bench Level	Sectional influence	Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	waste @ 1.7 b.d with 15% rec	Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	waste @ 1.7 b.d with 15% rec	Sectional area	Volume	Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+886	50	77	3,850	7,363	982	-	-	-	-	-	-	-	982
+880	50	168	8,400	16,065	2,142	-	-	-	-	-	-	-	2,142
+874	50	168	8,400	16,065	2,142	-	-	-	-	-	-	-	2,142
+868	50	168	8,400	16,065	2,142	-	-	-	-	-	-	-	2,142
+862	50	168	8,400	16,065	2,142	-	-	-	-	-	-	-	2,142
+856	50	168	8,400	16,065	2,142	-	-	-	-	-	-	-	2,142
+850	50	168	8,400	16,065	2,142	-	-	-	-	-	-	-	2,142
Total				1,03,753	13,834			-	-			-	13,834
							Total Ore	1,03,753				Total waste	13,834
SECTION I-I'													
		Proved (G - 1)			Intercalated	Probable (G - 2)			Intercalated	WASTE (BHQ/Shale/Phyllite)			
Bench Level	Sectional influence	Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	waste @ 1.7 b.d with 15% rec	Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	waste @ 1.7 b.d with 15% rec	Sectional area	Volume	Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+886	50	110	5,500	10,519	1,403	-	-	-	-	-	-	-	1,403
+880	50	201	10,050	19,221	2,563	-	-	-	-	-	-	-	2,563
+874	50	210	10,500	20,081	2,678	-	-	-	-	-	-	-	2,678
+868	50	210	10,500	20,081	2,678	-	-	-	-	-	-	-	2,678
+862	50	210	10,500	20,081	2,678	-	-	-	-	-	-	-	2,678
+856	50	210	10,500	20,081	2,678	-	-	-	-	-	-	-	2,678
+850	50	210	10,500	20,081	2,678	-	-	-	-	-	-	-	2,678
+844	50	210	10,500	20,081	2,678	-	-	-	-	-	-	-	2,678
Total				1,50,227	20,030			-	-			-	20,030
							Total Ore	1,50,227				Total waste	20,030

SECTION J-J'

Bench Level	Sectional influence	Proved (G - 1) Sectional area	Proved (G - 1) Volume	Proved (G - 1) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Probable (G - 2) Volume	Probable (G - 2) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	WASTE (BHQ/Shale/Phyllite) Volume	WASTE (BHQ/Shale/Phyllite) Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+874	50	25	1,250	2,391	319	-	-	-	-	-	-	-	319
+868	50	81	4,050	7,746	1,033	-	-	-	-	-	-	-	1,033
+862	50	137	6,850	13,101	1,747	-	-	-	-	-	-	-	1,747
+856	50	137	6,850	13,101	1,747	-	-	-	-	-	-	-	1,747
+850	50	137	6,850	13,101	1,747	-	-	-	-	-	-	-	1,747
+844	50	137	6,850	13,101	1,747	-	-	-	-	-	-	-	1,747
+838	50	137	6,850	13,101	1,747	-	-	-	-	-	-	-	1,747
Total				75,639	10,085			-				-	10,085
								Total Ore	75,639			Total waste	10,085

SECTION K-K'

Bench Level	Sectional influence	Proved (G - 1) Sectional area	Proved (G - 1) Volume	Proved (G - 1) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Probable (G - 2) Volume	Probable (G - 2) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	WASTE (BHQ/Shale/Phyllite) Volume	WASTE (BHQ/Shale/Phyllite) Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+868	50	102	5,100	9,754	1,301	-	-	-	-	-	-	-	1,301
+862	50	146	7,300	13,961	1,862	-	-	-	-	-	-	-	1,862
+856	50	150	7,500	14,344	1,913	-	-	-	-	-	-	-	1,913
+850	50	150	7,500	14,344	1,913	-	-	-	-	-	-	-	1,913
+844	50	150	7,500	14,344	1,913	-	-	-	-	-	-	-	1,913
+838	50	150	7,500	14,344	1,913	-	-	-	-	-	-	-	1,913
Total				81,090	10,812			-				-	1,913
								Total Ore	81,090			Total waste	10,812

SECTION L-L'

Bench Level	Sectional influence	Proved (G - 1) Sectional area	Proved (G - 1) Volume	Proved (G - 1) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Probable (G - 2) Volume	Probable (G - 2) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	WASTE (BHQ/Shale/Phyllite) Volume	WASTE (BHQ/Shale/Phyllite) Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+862	50	123	6,150	11,762	1,568	-	-	-	-	-	-	-	1,568
+856	50	154	7,700	14,726	1,964	-	-	-	-	-	-	-	1,964
+850	50	154	7,700	14,726	1,964	-	-	-	-	-	-	-	1,964
+844	50	154	7,700	14,726	1,964	-	-	-	-	-	-	-	1,964
+838	50	154	7,700	14,726	1,964	-	-	-	-	-	-	-	1,964
Total				70,667	9,422			-				-	9,422
								Total Ore	70,667			Total waste	9,422

SECTION M-M'

Bench Level	Sectional influence	Proved (G - 1) Sectional area	Proved (G - 1) Volume	Proved (G - 1) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Probable (G - 2) Volume	Probable (G - 2) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	WASTE (BHQ/Shale/Phyllite) Volume	WASTE (BHQ/Shale/Phyllite) Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+856	50	61	3,050	5,833	778	-	-	-	-	-	-	-	778
+850	50	164	8,200	15,683	2,091	-	-	-	-	-	-	-	2,091
+844	50	164	8,200	15,683	2,091	-	-	-	-	-	-	-	2,091
+838	50	164	8,200	15,683	2,091	-	-	-	-	-	-	-	2,091
+832	50	164	8,200	15,683	2,091	-	-	-	-	-	-	-	2,091
+826	50	164	8,200	15,683	2,091	-	-	-	-	-	-	-	2,091
+820	50	164	8,200	15,683	2,091	-	-	-	-	-	-	-	2,091
Total				99,928	13,324			-				-	13,324
								Total Ore	99,928			Total waste	13,324

SECTION N-N'

Bench Level	Sectional influence	Proved (G - 1) Sectional area	Proved (G - 1) Volume	Proved (G - 1) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Probable (G - 2) Volume	Probable (G - 2) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	WASTE (BHQ/Shale/Phyllite) Volume	WASTE (BHQ/Shale/Phyllite) Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+850	50	57	2,850	5,451	727	-	-	-	-	-	-	-	727
+844	50	141	7,050	13,483	1,798	-	-	-	-	-	-	-	1,798
+838	50	232	11,600	22,185	2,958	-	-	-	-	-	-	-	2,958
+832	50	232	11,600	22,185	2,958	-	-	-	-	-	-	-	2,958
+826	50	232	11,600	22,185	2,958	-	-	-	-	-	-	-	2,958
+820	50	232	11,600	22,185	2,958	-	-	-	-	-	-	-	2,958
Total				1,07,674	14,357			-				-	14,357
								Total Ore	1,07,674			Total waste	14,357

SECTION O-O'

Bench Level	Sectional influence	Proved (G - 1) Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional	Volume	Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+844	50	27	1,350	2,582	344	-	-	-	-	-	-	-	344
+838	50	181	9,050	17,308	2,308	-	-	-	-	-	-	-	2,308
+832	50	182	9,100	17,404	2,321	-	-	-	-	-	-	-	2,321
+826	50	182	9,100	17,404	2,321	-	-	-	-	-	-	-	2,321
+820	50	182	9,100	17,404	2,321	-	-	-	-	-	-	-	2,321
+814	50	182	9,100	17,404	2,321	-	-	-	-	-	-	-	2,321
Total				89,505	11,934			-	-			-	11,934
								Total Ore	89,505			Total waste	11,934

SECTION P-P'

Bench Level	Sectional influence	Proved (G - 1) Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	Volume	Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+844	50	51	2,550	4,877	650	-	-	-	-	-	-	-	650
+838	50	135	6,750	12,909	1,721	-	-	-	-	-	-	-	1,721
+832	50	186	9,278	17,744	2,366	-	-	-	-	-	-	-	2,366
+826	50	260	13,000	24,863	3,315	-	-	-	-	-	-	-	3,315
+820	50	286	14,300	27,349	3,647	-	-	-	-	-	-	-	3,647
+814	50	304	15,200	29,070	3,876	-	-	-	-	96	4,800	8,160	12,036
Total				1,16,812	15,575			-	-			8,160	23,735
								Total Ore	1,16,812			Total waste	23,735

SECTION Q-Q'

Bench Level	Sectional influence	Proved (G - 1) Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	Volume	Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+850	50	46	2,300	4,399	587	-	-	-	-	-	-	-	587
+844	50	58	2,900	5,546	740	-	-	-	-	-	-	-	740
+838	50	88	4,400	8,415	1,122	-	-	-	-	-	-	-	1,122
+832	50	209	10,450	19,986	2,665	-	-	-	-	-	-	-	2,665
+826	50	357	17,850	34,138	4,552	-	-	-	-	-	-	-	4,552
+820	50	337	16,850	32,226	4,297	-	-	-	-	-	-	-	4,297
+814	50	-	-	-	-	-	-	-	-	96	4,800	8,160	8,160
Total				1,04,709	13,961			-	-			8,160	22,121
								Total Ore	1,04,709			Total waste	22,121
												Total Ore	10,00,004
												Total waste	1,49,654
												Ore to waste Ratio	1 ; 0.15

iv) Fourth year development & production

From the maps prepared for development and production Plate **No-6D & its Section Plate No-7**, working has proposed in 8 benches which are ore bearing to be formed between 880 and 814 m Above MSL with the width and height of 6 m, for 4th year the proposed for pit working is 8.057 Ha. and for dumping area 2.759 Ha. The average ore to waste ratio works out to be 1: 0.15 in tonnes. The total saleable ore amounts to 1000000 tonnes, while, the total waste of 149653 tonnes likely to be generated will be stocked in the dump yard designated for the purpose. Ore will be stacked in the Dynamic stacking area of 1.25 Ha, earmarked for the purpose.

PRODUCTION AND DEVELOPMENT PLAN FOR IV YEAR

SECTION J-J'

Bench Level	Sectional Influence	Proved (G - 1) Sectional area	Proved (G - 1) Volume	Proved (G - 1) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Probable (G - 2) Volume	Probable (G - 2) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	WASTE (BHQ/Shale/Phyllite) Volume	WASTE (BHQ/Shale/Phyllite) Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+880	50	54	2,700	5,164	689	-	-	-	-	-	-	-	689
+874	50	118	5,900	11,284	1,505	1	50	96	13	2	100	170	1,687
+868	50	129	6,450	12,336	1,645	2	100	191	26	4	200	340	2,010
+862	50	129	6,450	12,336	1,645	-	-	-	-	-	-	-	1,645
+856	50	129	6,450	12,336	1,645	-	-	-	-	-	-	-	1,645
+850	50	129	6,450	12,336	1,645	-	-	-	-	-	-	-	1,645
+844	50	129	6,450	12,336	1,645	-	-	-	-	-	-	-	1,645
+838	50	129	6,450	12,336	1,645	-	-	-	-	-	-	-	1,645
Total				90,461	12,062			287	38			510	12,610
							Total Ore	90,748				Total waste	12,610

SECTION K-K'

Bench Level	Sectional Influence	Proved (G - 1) Sectional area	Proved (G - 1) Volume	Proved (G - 1) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Probable (G - 2) Volume	Probable (G - 2) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	WASTE (BHQ/Shale/Phyllite) Volume	WASTE (BHQ/Shale/Phyllite) Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+874	50	131	6,550	12,527	1,670	-	-	-	-	-	-	-	1,670
+868	50	190	9,500	18,169	2,423	-	-	-	-	-	-	-	2,423
+862	50	210	10,500	20,081	2,678	-	-	-	-	-	-	-	2,678
+856	50	210	10,500	20,081	2,678	-	-	-	-	-	-	-	2,678
+850	50	210	10,500	20,081	2,678	-	-	-	-	-	-	-	2,678
+844	50	210	10,500	20,081	2,678	-	-	-	-	-	-	-	2,678
+838	50	210	10,500	20,081	2,678	-	-	-	-	-	-	-	2,678
Total				1,31,102	17,480			-	-			-	17,480
							Total Ore	1,31,102				Total waste	17,480

SECTION L-L'

Bench Level	Sectional Influence	Proved (G - 1) Sectional area	Proved (G - 1) Volume	Proved (G - 1) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Probable (G - 2) Volume	Probable (G - 2) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	WASTE (BHQ/Shale/Phyllite) Volume	WASTE (BHQ/Shale/Phyllite) Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+874	50	12	600	1,148	153	-	-	-	-	-	-	-	153
+868	50	194	9,700	18,551	2,474	-	-	-	-	-	-	-	2,474
+862	50	210	10,500	20,081	2,678	-	-	-	-	-	-	-	2,678
+856	50	210	10,500	20,081	2,678	-	-	-	-	-	-	-	2,678
+850	50	210	10,500	20,081	2,678	-	-	-	-	-	-	-	2,678
+844	50	210	10,500	20,081	2,678	-	-	-	-	-	-	-	2,678
+838	50	210	10,500	20,081	2,678	-	-	-	-	-	-	-	2,678
Total				1,20,105	16,014			-	-			-	16,014
							Total Ore	1,20,105				Total waste	16,014

SECTION M-M'

Bench Level	Sectional Influence	Proved (G - 1) Sectional area	Proved (G - 1) Volume	Proved (G - 1) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Probable (G - 2) Volume	Probable (G - 2) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	WASTE (BHQ/Shale/Phyllite) Volume	WASTE (BHQ/Shale/Phyllite) Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+862	50	102	5,100	9,754	1,301	-	-	-	-	-	-	-	1,301
+856	50	170	8,500	16,256	2,168	-	-	-	-	-	-	-	2,168
+850	50	180	9,000	17,213	2,295	-	-	-	-	-	-	-	2,295
+844	50	180	9,000	17,213	2,295	-	-	-	-	-	-	-	2,295
+838	50	180	9,000	17,213	2,295	-	-	-	-	-	-	-	2,295
+832	50	180	9,000	17,213	2,295	-	-	-	-	-	-	-	2,295
+826	50	180	9,000	17,213	2,295	-	-	-	-	-	-	-	2,295
+820	50	180	9,000	17,213	2,295	-	-	-	-	-	-	-	2,295
Total				1,29,285	17,238			-	-			-	17,238
							Total Ore	1,29,285				Total waste	17,238

SECTION N-N'

Bench Level	Sectional Influence	Proved (G - 1) Sectional area	Proved (G - 1) Volume	Proved (G - 1) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Probable (G - 2) Volume	Probable (G - 2) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	WASTE (BHQ/Shale/Phyllite) Volume	WASTE (BHQ/Shale/Phyllite) Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+856	50	121	6,050	11,571	1,543	-	-	-	-	-	-	-	1,543
+850	50	206	10,300	19,699	2,627	-	-	-	-	-	-	-	2,627
+844	50	211	10,550	20,177	2,690	-	-	-	-	-	-	-	2,690
+838	50	211	10,550	20,177	2,690	-	-	-	-	-	-	-	2,690
+832	50	211	10,550	20,177	2,690	-	-	-	-	-	-	-	2,690
+826	50	211	10,550	20,177	2,690	-	-	-	-	-	-	-	2,690
+820	50	211	10,550	20,177	2,690	-	-	-	-	-	-	-	2,690
Total				1,32,154	17,621			-	-			-	17,621
							Total Ore	1,32,154				Total waste	17,621

SECTION O-O'

Bench Level	Sectional influence	Proved (G - 1) Sectional area	Proved (G - 1) Volume	Proved (G - 1) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Probable (G - 2) Volume	Probable (G - 2) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	WASTE (BHQ/Shale/Phyllite) Volume	WASTE (BHQ/Shale/Phyllite) Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+856	50	125	6,250	11,953	1,594	-	-	-	-	-	-	-	1,594
+850	50	159	7,950	15,204	2,027	-	-	-	-	-	-	-	2,027
+844	50	183	9,150	17,499	2,333	-	-	-	-	-	-	-	2,333
+838	50	230	11,500	21,994	2,933	-	-	-	-	-	-	-	2,933
+832	50	230	11,500	21,994	2,933	-	-	-	-	-	-	-	2,933
+826	50	230	11,500	21,994	2,933	-	-	-	-	-	-	-	2,933
+820	50	230	11,500	21,994	2,933	-	-	-	-	-	-	-	2,933
+814	50	230	11,500	21,994	2,933	-	-	-	-	-	-	-	2,933
Total				1,54,626	20,617			-	-			-	20,617
								Total Ore	1,54,626			Total waste	20,617

SECTION P-P'

Bench Level	Sectional influence	Proved (G - 1) Sectional area	Proved (G - 1) Volume	Proved (G - 1) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Probable (G - 2) Volume	Probable (G - 2) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	WASTE (BHQ/Shale/Phyllite) Volume	WASTE (BHQ/Shale/Phyllite) Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+856	50	56	2,800	5,355	714	-	-	-	-	-	-	-	714
+850	50	128	6,400	12,240	1,632	-	-	-	-	-	-	-	1,632
+844	50	161	8,028	15,354	2,047	-	-	-	-	-	-	-	2,047
+838	50	161	8,050	15,396	2,053	-	-	-	-	-	-	-	2,053
+832	50	161	8,050	15,396	2,053	-	-	-	-	-	-	-	2,053
+826	50	161	8,050	15,396	2,053	-	-	-	-	-	-	-	2,053
+820	50	161	8,050	15,396	2,053	-	-	-	-	-	-	-	2,053
+814	50	161	8,050	15,396	2,053	-	-	-	-	-	-	-	2,053
Total				1,09,927	14,657			-	-	96	4,800	8,160	10,213
												8,160	22,817
								Total Ore	1,09,927			Total waste	22,817

SECTION Q-Q'

Bench Level	Sectional influence	Proved (G - 1) Sectional area	Proved (G - 1) Volume	Proved (G - 1) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Probable (G - 2) Volume	Probable (G - 2) Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	WASTE (BHQ/Shale/Phyllite) Volume	WASTE (BHQ/Shale/Phyllite) Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+856	50	106	5,300	10,136	1,352	-	-	-	-	-	-	-	1,352
+850	50	143	7,150	13,674	1,823	-	-	-	-	-	-	-	1,823
+844	50	143	7,150	13,674	1,823	-	-	-	-	-	-	-	1,823
+838	50	143	7,150	13,674	1,823	-	-	-	-	-	-	-	1,823
+832	50	216	10,800	20,655	2,754	-	-	-	-	-	-	-	2,754
+826	50	315	15,750	30,122	4,016	-	-	-	-	-	-	-	4,016
+820	50	315	15,750	30,122	4,016	-	-	-	-	-	-	-	4,016
+814	50	-	-	-	-	-	-	-	-	96	4,800	8,160	8,160
Total				1,32,058	17,608			-	-			8,160	25,768
								Total Ore	1,32,058			Total waste	25,768
												Total Ore	10,00,004
												Total waste	1,50,164
												Ore to waste Ratio	1 ; 0.15

v) Fifth year development & production

From the maps prepared for development and production Plate **No-6E & its Section Plate No-7**, working has proposed in 3 benches which are ore bearing to be formed between RL 832 and RL 802 m Above MSL with the width and height of 6 m each, for 5th year the proposed for pit working is 5.227 Ha. and for dumping area 2.215 Ha. The average ore to waste ratio works out to be 1:0.14 (in tonnes). The total saleable ore amounts to 1000000 tonnes, while, the total waste of 141493 tonnes likely to be generated will be stocked in the dump yard designated for the purpose. Ore will be stacked in the Dynamic stacking area of 1.25 Ha, earmarked for the purpose.

PRODUCTION AND DEVELOPMENT PLAN FOR V YEAR ...

SECTION K-K'

Section Level	Sectional influence	Proved (G - 1) Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	Volume	Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+832	50	521	26,050	49,821	6,643	-	-	-	-	-	-	-	6,643
Total				49,821	6,643			-	-	-	-	-	6,643
								Total Ore	49,821			Total waste	6,643

SECTION L-L'

Section Level	Sectional influence	Proved (G - 1) Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	Volume	Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+832	50	856	42,800	81,855	10,914	-	-	-	-	-	-	-	10,914
+826	50	707	35,350	67,607	9,014	-	-	-	-	-	-	-	9,014
Total				1,49,462	19,928			-	-	-	-	-	19,928
								Total Ore	1,49,462			Total waste	19,928

SECTION M-M'

Section Level	Sectional influence	Proved (G - 1) Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	Volume	Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+814	50	941	47,050	89,983	11,998	-	-	-	-	-	-	-	11,998
+808	50	791	39,550	75,639	10,085	-	-	-	-	-	-	-	10,085
+802	50	641	32,050	61,296	8,173	-	-	-	-	-	-	-	8,173
Total				2,26,918	30,256			-	-			-	30,256
								Total Ore	2,26,918			Total waste	30,256

SECTION N-N'

Section Level	Sectional influence	Proved (G - 1) Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	Volume	Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+814	50	1,054	52,700	1,00,789	13,439	-	-	-	-	-	-	-	13,439
+808	50	917	45,850	87,688	11,692	-	-	-	-	-	-	-	11,692
+802	50	769	38,450	73,536	9,805	-	-	-	-	-	-	-	9,805
Total				2,62,013	34,935			-	-			-	34,935
								Total Ore	2,62,013			Total waste	34,935

SECTION O-O'

Section Level	Sectional influence	Proved (G - 1) Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	Volume	Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+808	50	1,007	50,350	96,294	12,839	-	-	-	-	-	-	-	12,839
+802	50	905	45,228	86,499	11,533	-	-	-	-	-	-	-	11,533
Total				1,82,793	24,372			-	-			-	24,372
								Total Ore	1,82,793			Total waste	24,372

SECTION P-P'

Section Level	Sectional influence	Proved (G - 1) Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	Probable (G - 2) Sectional area	Volume	Quantity @ 2.25 b.d with 85% Rec.	Intercalated waste @ 1.7 b.d with 15% rec	WASTE (BHQ/Shale/Phyllite) Sectional area	Volume	Quantity @ 1.7 b.d	TOTAL WASTE
m	m	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes	m2	m3	Tonnes	Tonnes
+814	50	-	-	-	-	-	-	-	-	96	4,800	8,160	8,160
+808	50	696	34,800	66,555	8,874	-	-	-	-	-	-	-	8,874
+802	50	653	32,650	62,443	8,326	-	-	-	-	-	-	-	8,326
Total				1,28,998	17,200			-	-			8,160	25,360
								Total Ore	1,28,998			Total waste	25,360

Total Ore	10,00,004
Total waste	1,41,494
Ore to waste Ratio	1 : 0.14

Year-wise production and development details are shown in **Table 2,3.**

Table 2.3: Summary of production program

Year	Ore in tonnes	Waste in tonnes	Ore to waste ratio	Pit working area in Ha	Dump area in Ha
First	1,000,000	2,12,553	0.21	6.92	3.37
Second	1,000,000	1,72,008	0.17	7.557	1.732
Third	1,000,000	1,49,653	0.15	7.634	3.076
Fourth	1,000,000	1,49,653	0.15	8.057	2.759
Fifth	1,000,000	1,41,493	0.14	5.227	2.215
Total	**5,000,000**	**8,25,360**	**0.17**		

The production and Development details in section wise are shown in **Annexure - XIV**

Year wise Production and Development plans and sections are enclosed in 1:2000 scale. **(Plate No.6, Plate No.6B, Plate No.6C, Plate No.6D , Plate No.6E)**

Also combined production and development sections are enclosed in 1:2000 scale **(Plate No.7)**

d) Salient features of the proposed method of working:

Open cast fully mechanized (category 'A') method of mining will be adopted to mine the iron ore deposit keeping in mind the quality, cost, safety and conservation of mineral.

Bench height will be 6m and width will be more than 6 m. The overall pit slope angle will be 45^0 max from the horizontal and individual bench slope will be maintained at 75^0. No deep hole drilling and blasting techniques will be adopted, Ripper and Dozer will be used for fragment the ore/waste formation. ROM will be fed to mobile crushing and screening plants to produce usable ore fractions. All waste material will be dumped systematically in the area earmarked.

Ore dispatch will be done by railway / Road to siding and JSW steel plant through trucks of 10/16/20 tons capacity.

Loading will be carried out systematically and care will be taken to prevent spillage and dust generation. All loaded trucks will be covered by tarpaulins and water sprinkling will be ensured all along the haul roads and benches to avoid generation of dust during haulage. Other activities like water supply for domestic use, water sprinkling and afforestation will be done by water tankers.

(i) Drilling & Blasting:

There will be no blasting, as most of the strata are soft in nature for direct excavation by hydraulic excavators. Wherever medium hard strata occur, it is loosened by Ripper Dozer.

(ii) Handling of Ore/Waste

In-situ Ore/Waste will be excavated by 1.6 m^3 Bucket excavators and shifted by 20 T dumpers to the mobile Crushing and Screening plant for processing. The waste is mainly consisting of shale and BHQ. The waste generated will be dumped in designated area as the extension of active dump towards South East direction progressing from M - M' to S – S' of the lease as per R&R Plan and the Ore will be fed either directly to the screen or to the crushers depending on the type of ore. In the mobile Crushing & Screening unit two fraction of products will be segregated, undersize below 10mm which is treated as fines and 10 to 40 mm, is treated as calibrated lumpy ore.

The ore will be excavated by excavator/loader and loaded into 20 tonnes tippers and transported to screening plant. The oversize product will be transported to the mobile crushing unit for crushing. The fines and C-ore are stocked separately and based on the plant demand the Iron Ore products will be dispatched. Finished products will be dispatched to the JSW Steel Plant, as the entire production is being consumed by the plant itself, where further beneficiation and upgradation of ore will be carried out inside the plant.

As per the requirement of the steel plant it is proposed to transport the ROM directly to the plant for further blending. Alternatively, ROM could also be sent to the stockyard located outside the lease area for processing and further transportation to the steel plant by prevailing system of transportation.

(iii) Production & Development Plan

Based on the availability of Mineral reserves, dump capacity and volume of traffic, annual production of 1.0 million tonnes per annum is considered as the feasible production level based on the road capacity which is approved by CEC.

In the entire mine production and development benches in the waste and ore zone are oriented and worked along the strike of the ore body. The present position of working /pit layout, dumps are shown in surface plan **(Plate NO.03)** and Geological Plan **(Plate No.04)** and It is proposed to work in the sections from F- F' to Q - Q' during the plan period. The benches will be properly developed for a height of 6m & width of more than 6m.

The year wise benches proposed to be worked both in ore and overburden are shown in P&D plans and Cross Sections **(Plate No.6A to 6E)** for the plan period.

e) **The layout of mine workings, pit road layout, the layout of faces and sites for disposal of overburden/waste along with ground preparation prior to disposal of waste, reject etc.**

The overburden/ Waste will be accommodated as an extension to the existing dump towards Eastern side of the Mining lease, the proposed dumping area for I-Year, III-year, IV-year & V-year are falls in the proved barren land, beyond the Ultimate Pit limit. In the II-year, proposed dumping area (only in section R-R') utilized for temporary dumping, based on the existing bore hole analysis result, as shown in the year wise production and Development plans and sections.

Bench height will be 6m and width will be more than 6m. The overall pit slope angle will be 45^0 max from the horizontal. Approach road to workings will be from Southern portion of lease area. The excavation of ore and waste will be done by excavators and hauled by 20 ton dumpers. Slope of the faces will be maintained at not exceeding 75^0 degrees. Benches will be advancing towards southwest and North East, including the benches would be laid along with the strike of the deposit.

ROM will be fed to mobile crushing and screening plant to produce useable fractions. Haulage roads will be maintained with a gentle gradient of not more than 1:16 (except short ramps). The haul road will be maintained with prescribed width and gradient (except short ramp) and care will be taken to ensure all the safety measures in place. The approach road from active mining area to dump yard will be maintained with more than 8 mts width and ramp with the gradient of 1:16.

During the first five years, it is proposed to produce 1.0 million tonnes of iron ore per annum at a stripping ratio of 1: 0.21 (Maximum) about 8,25360 tonnes of waste is required to be handled during the first five-year plan period.

The waste mainly consists of shale/Phylites and BHQ. The waste generated will be dumped in Northeastern side of the lease as per R & R plan. The area demarcated for the dumping in this plan period is 8.8 Ha Which is sufficient to accommodate the quantity of 8,25,360 tonnes during the plan period. Ore will be stacked in the Dynamic stacking area of 1.25 Ha, earmarked for the purpose.

Year wise working details

Year	Area in Ha.	No of Benches	Levels range	Production in Tonnes	Waste/OB in Tonnes	location	
						Northing	Easting
First	6.920	08*	898 - 844 910	1000000	2,12,553	631570 E to 631869 E	1571401 N to 1571839 N
Second	7.577	07*	880 - 814 874	1000000	1,72,008	631657 E to 632000 E	1571276 N to 1571651 N
Third	7.634	08*	886 - 814	1000000	1,49,653	631568 E to 631975 E	1571184 N to 1571665 N
Fourth	8.057	08*	880 - 814	1000000	1,49,653	631586 E to 631976 E	1571173 N to 1571538 N
Fifth	5.227	03*	832 - 802	1000000	1,41,493	631660 E to 631938 E	1571227 N to 1571557 N
Total				5000000	8,25,360		

*All benches are ore benches.

Year wise Dumping details:

Year	Top Soil		Dump	Mineral Rejects		
	Reuse/ Spreading	Storage		Blending	Storage	Beneficiation
First	-	-	2,12,553	-	-	-
Second	-	-	1,72,008	-	-	-
Third	-	-	1,49,653	-	-	-
Fourth	-	-	1,49,653	-	-	-
Fifth	-	-	1,41,493	--	-	-
Total	-	-	**8,25,360**	-	-	

f) Conceptual Mining plan:

The mineable reserves estimated are 55.903 million tons as on 31.03.2018 after the depletion 53.903 (01.04.2020) million tons and with the proposed production of 1.00 MTPA, the life of mine will be 54 years. Conceptual mine planning has been made considering the life of the mine. The life of mine will be enhanced depending upon the result of the exploration carried out during conceptual plan period. The various R & R measures which are approved by ICFRE like Dump and management, Surface water management, Green belt Development, afforestation and Environmental monitoring (which are detailed in **Table 2.4** are duly completed , additional measures while progressing of the dumps and mine workings ,provided with a specific timeline which already detailed in **Table 2.5**, and we are committed to implement the recommendation on ground with prescribed timelines.

Nearly 10.44 Ha of area will be used for backfilling in the Pit No.1 , from the level 724 to 772 can accommodate the waste of 8.02 Million Tonnes (5014848 M^3), the same matter has been shown in the Plates i.e Conceptual Plan -plate no- 10 & Conceptual sections plate-10A. Conceptual Plan is enclosed in **Plate No. 10.**

Land use pattern:

Sl. No.	Particulars	Land use pattern at the beginning of the plan period (Area in Ha)	Land use pattern at the end of the conceptual plan period (Area in Ha)
1	Area for Mining	43.95	52.18
2	Area for Waste dump	10.03	16.80
3	Roads	4.92	2.00
4	Green belt	2.95	2.95
5	Infrastructure & Engg. measures	1.19	3.42
6	Backfilled area	-	10.44
7	Rom Stock	5.55	0
8	Virgin/ Unbroken area	20.17	0.97
9	Bio- Diversity area	4.84	4.84
10	**Total**	**93.6**	**93.6**

ii) Future exploration programme:

An additional 19 Boreholes have been proposed to be drilled during plan period for further access the extent of ore body. The year-wise proposed bore holes to be drilled during plan period is given in **Table no 1.2(a)**.

iii) Ultimate Pit Limit

In this lease about 62.86 ha area is mineralized. Considering the current exploration data and geology, pit layout is designed. The mining will be carried out in the already opened pits in this plan period and in the conceptual stage. The final pit limit is designed based on the ultimate pit slope and ultimate pit limit.

UPL Parameters

Area (ha)	Pit Dimension			
	Length (m)	Width (m)	Depth (m)	Pit Slope
62.86	1070	790	236	45^O

The ultimate pit limit is demarcated on the Geological Plan and Cross Sections are enclosed as **Plate No.04** and **Plate No.05** respectively. Location of proposed workings are shown in the year wise layout plans, **Plate No.6A to Plate No.6E.**

v) Adequacy of Land for Disposal of Waste:

Production & Development during Mining Plan Period

Proposed production for next five-year period is as follows:

Year	Production (Tonnes)	Waste generated (Tonnes)	Ore to waste Ratio	Location of production Sections	Location of dumping Site
I	1000000	2,12,553	0.21	Section no. F-F' to L –L', Bench Level 910m to 844m	Section no. N-N' to P - P', Stage Level 860m to 885m
II	1000000	1,72,008	0.17	Section no. J -J' to O – O', Bench Level 874m to 814m	Section no. Q –Q' TO R –R'', Stage Level 846m to 865m
III	1000000	1,49,653	0.15	Section no. H - H' to Q – Q', Bench Level 886m to 814m	Section no Q –Q', Stage Level 865 m to 885m
IV	1000000	1,49,653	0.15	Section no. J - J ' to Q – Q 'Bench Level 880m to 814m	Section no. N – N' T0 O – O', Stage Level 884m to 894m
V	1000000	1,41,493	0.14	Section no. K – K' TO P – P' Bench Level 832m to 802 m	Section no. N – N' to P – P ', Stage Level 884m to 905 m
Total	5000000	8,25,360	0.17		

a) It is proposed to extract entire mineable reserves during the life of the mine. Mineable reserves which are being considered for annual production limit, are based on ICFRE report. Extent of mineral reserves in the lease area will be further calculated after detailed exploration to establish the mineable reserves more accurately.

Disposal of Waste: The waste mainly consists of shale/Phylite and BHQ. The waste generated will be Dumped in Active dump and proposed dump in North-Eastern side of the Lease and progressing towards South Eastern side as per the Dump Management approved in R & R plan. The area demarcated for the dumping in this plan period is 8.80 Ha. There is no mineral rejects generation during plan period as all the +45% Fe material produced will be sent to JSW Steel plant.

vi) Reclamation & Rehabilitation

For protection of the mining area and to prevent further degradation of land and stabilization of dumps, the measures that are proposed in the approved R&R plan will be carried out. The details of the same are given below:

The successful Reclamation and Rehabilitation plan for the mine will primarily depend on following considerations:

1. Rehabilitation and Reclamation of Encroached Areas.
2. Loose OB dumps and their stabilization
3. Mining pits, their back filling and stabilization
4. Nala/Stream courses and their stabilization
5. Development of vegetation on non-mineralized areas
6. Safety zone and Greenbelt Development
7. Avenue plantation all along mine haul roads

Reclamation and Rehabilitation Measures

The measures contemplated under the R and R plan are broadly categorized under the following heads:

1. R and R measures for areas considered under encroachment.
2. Stabilization of Dumps
3. Surface Water Management
4. Afforestation/ Plantation
5. Green Belt Development

R&R Measures for Area under encroachment

An area of 3.13 ha has been identified by the CEC as encroachment (ML No. 2346, of previous lessee) under others category. The encroached area should be reclaimed and rehabilitated by afforesting with suitable vegetation as well as engineering measures.

Particulars of area under encroachment are given below:

Particulars of Plantation	Area (ha)
Others	3.13
Total	**3.13**

Measures for the management of OB dumps (Dump Management Plan)

In order to stabilize waste dumps, toe wall at its toe and catch water drains (garland drains) and Silt Settling tanks (SST), Log wood and Brush wood check dams should be constructed as per the design. The height of the dumps and its terraces should be strictly maintained as per the design suggested for the purpose in the statutory clearances. Dumping should be carried out by adopting retreating method starting from bottom and reaching to the top by creating terraces of 10 m height and 6-8 m width. Berms should be provided at the toe of each terrace to avoid water flow over the dump slopes. Wherever necessary, garland drains should be provided and connected to the vertical drains and finally to the check dams followed by Silt Settling Tanks (SSTs). Inactive dumps should be vegetated with suitable plantation immediately after the terraces are made and the active dumps should be protected from erosion by planting with suitable grass/legumes. All the plantation activities should preferably be taken up during monsoon seasons to enjoy the benefit of rainwater for the same. Rills and gullies should be treated with different types of gully plugs as suggested in the engineering measures.

Additional Engineering measures for the proposed additional waste dump as per approved R & R plan are to be carried out.

Table 2.4: Proposed engineering measures for management of Additional waste dumps

Location	Items	Particulars of works	No	Dimension in m				Qty.	Unit	Rate/ Unit (Rs.)	Amount (Rs. In Lakhs)	Year of Proposal
				Length	Width		Height					
					Top	Bottom						
Proposed Dump	TW-2: Toe Wall at the toe of the dump	Foundation in hard soil mixed with boulders including hard rock	1.0	1100.00	2.00		0.60	1320.00	Cum	111	1.47	1 and 2nd year, shown in Plate.No:6A & 6B
		Plain cement concrete (1:4:8) in foundation	1.0	1100.00	1.70		0.15	280.5	Cum	1860	5.220	
		RR Stone masonry Dry	1.0	1100.00	1.00	3.00	3.00	6600.00	cum	400	26.40	
	GD-2	Garland drain below the toe wall	1.0	1120.00	2.00	1.00	1.00	1680.00	cum	111	1.86	
Proposed Dump	SST - 4	Silt Settling Tank Below the Dump	1.0	30.00	15.00		3.00	1.00	No	900000	9.00	
Below SST 3 &4	Catch Drain	Catch drain below the SST to direct overflowing water into pit	1.0	300.00	2.00	1.00	1.00	450.00	cum	111	0.50	
	Total										44.45	

iii) Surface Water Management

There are no rivers or perennial water coursed in the Mining Lease area. However, the area is traversed by few seasonal water courses which are usually active during monsoon season and draining into the nearby water bodies. Naturally, no rain water accumulates in the lease area. The rain water flows from hill slopes and it does not accumulate till it reaches the lower valleys. Hence, the drainage pattern is sub-dendritic in nature and is typical of the hilly area.

Control of erosion is important for both during Mining and non-Mining as the waste material from the fragmented areas like Mine pits, dumps can cause severe damage to the local environment including Soil, water, Land, air and Agriculture operations. The main objective for the surface water management is to suggest suitable Bio – engineering measures for the protection of Nallahas, Mine pits and Waste dumps etc from erosion / run-off due to rain. Erosion / Run-off of the waste material during monsoon can be controlled / arrested by constructing the silt retaining structures like Gabion Check dam, Stone Masonary check dam, Earthen check dams, Silt Settling tanks etc.

The proposed additional engineering measures are for surface water management of the area are given in the **Table No: 2.4**

1. Silt settling tank:

This is particularly important for the water channels where high discharge loaded with heavy sediments. The water in the natural courses should be allowed to flow freely after treatment through Silt Settling Tanks. One Silt Settling Tank (SST – No:4) of dimensions 30x15x3 is proposed at the toe of the additional waste dump in the lease area.

2. Catch Drain:

It's nothing but the drain channel to direct the overflowing water from the SST to its destination.

A catch drain of length 300m suggested at the toe of the SST 3 and 4 for the management of water flow from the proposed additional waste dump in the mine lease area.

Afforestation:

The afforestation covering 1000 trees and 2500 shrubs per ha, inclusive of maintenance for five years has been worked out as per the norms of State Forest Department, Karnataka.

Work of afforestation will be carried out in close coordination with the State Forest Department, Karnataka, utilizing local people and the periodical monitoring shall be assigned to a national specialized scientific institution.

Afforestation will be made through:

- Propagules (seeds, tubers, corms, bulbs, rhizomes and roots) stored in the topsoil and sowing seed.
- Planting nursery-raised seedlings
- By seed dibbling.
- Silt accumulated in silt settling tanks/check dams etc. can be removed and could be used after mixing with FYM and sand in the ratio 2:1:1. This mixture could be used for plantation

Table 2.5: Implementation Schedule of Mitigation / Engineering Measures for BBH MINES (ML NO-2346)

IMPLEMENTATION SCHEDULE OF MITIGATION / ENGINEERNG MEASURES OF BBH IRON ORE MINES ,ML -2346 OF M/s. MEL																				
Description	**Years**																			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Retaining wall at the toe of waste dump (TW)	√	√																		
Garland drain(GD)	√	√																		
Silt Settling Tank (SST)	√	√																		
Rectification of Mine benches as DGMS Ruels and as per Mining Scheme/plan	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Reclaimation / Back filling of exhausted pits								√	√	√	√	√	√	√	√	√	√	√		
Green Belt development on Safety zoe area	√	Maintenance and Gap Plantation																		
Afforestation																				
Plantation on Dumps	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Plantation on Backfilled pits	√	√								√	√	√	√	√	√	√	√	√	√	√
Strengthening & Gap Plantaton	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Environmental monitoring & watch –ward	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

Greenbelt development plan

In order to minimize the impact of mining on environmental components outside the mine lease area, greenbelt zone of 7.5 m width should be established in safety zone inside mine lease area. The establishment of greenbelt will help wildlife movement, and also reduce the impact of mining on human health. The greenbelt will act as a barrier to trap the suspended dust particles, noise and also suppresses air pollutants. It is also important to create a greenbelt with tall seedlings (>1 m height) of fast growing species to hasten the process of greening the area. Greenbelt has been raised by the lessee within the lease area, strengthened by Gap plantation, which will be nearly 0.4 Ha.

Indicative cost of developing Green belt is given in the table below:

Sl. No.	Mine Lease	Area of	Rate/Ha	Total Amount(INR in Lac)
1	ML 2346	0.4	2	1.028

The proposed cost is only indicative and the work pertaining to various engineering and biological measures may vary subject to Scheduled rates of Karnataka State. The final dimensions of the engineering structures may be modified depending on the suitability of the local field conditions.

Plans & Sections

All the Reclamation & rehabilitation measures, listed above are shown on Reclamation Plan as **(Plate No.08)** & Environment plan **(Plate No.09).**

g) Extent of Mechanization

(1) **Drilling:** No drilling and Blasting is carried out in the Mines.

(2) **Loading Equipment:** Hydraulic Excavators and wheel loaders are generally used for loading. Besides loading they are also used for many other jobs in the mine because they are versatile.

(3) **Excavators are required for the following purposes.**

Loading of ROM & OB at Pit head:

Loading of Plant products from stock piles

Loading of ROM from stock pile

Loading of subgrade fines from stock pile (reclamation of Old dump)

Toping up of dispatch trucks at weighbridge to maintain exact dispatch quantity.

Supporting works like Cutting drains, trenches, desilting of settling ponds, creation of bunds, lifting and shifting of small machine equipment.

(4) **Wheel Loaders are required for the following purposes.**

Loading of Rom from stock pile

Loading of finished product from stock pile

To maintain OB Dumps and Stock piles (Dozing & leveling)

Road maintenance

Miscellaneous jobs like lifting and shifting of small machines, etc.,

The proposed maximum Handling is 2,12,556 Tonnes of waste and 1,000,000 Tonnes of Rom during the 1st year of the plan period, making a total of 12,12,556 Tonnes.

For primary Handling at pit head excavators of size 1.6 cu.m capacity Hydraulic excavators will be deployed, which will have loading capacity of 250 TPH. Calculations for estimating the number of Excavators required for loading is given below:

Total quantity to be Handled maximum = 12,12,556 Tonnes
No. of working days per year = 300
No. of operating hours/day = 7 (effective hrs in one shift)
Loading capacity of each excavator = 250 Tonnes/hour

$$\text{No, of excavators required} = \frac{1212556}{300 \times 7 \times 250} = 2.31$$

Considering 80 % availability 2.88, i.e. 3 excavators are required to load the iron ore and waste – 3 nos.

(b) Excavators are also required for topping up - 1 no.

(c) For miscellaneous jobs like desilting, trenching – 1 no

Wheel loaders of bucket capacity 1.7 to 4 cum are proposed to be deployed which will have loading capacity of 200 TPH

The quantity to be loaded by wheel loaders from stock pile for dispatch is 1.0 MTPA.

(d) No. of wheel loaders required = 1000000/ (200 x 7 x 300) = 2.38

Considering 80 % availability, 2.975, i.e., 3 Wheel loader is required to handle the dispatch quantity – 3 no.

(e) Additionally 2 wheel loaders are required, one for Dump and stack maintenance and another for Road and other miscellaneous work – 2 nos

List of Loading Equipment Required for Excavation and Dispatch

Type	Nos	Bucket Capacity M3	Make	Motive Power	HP	Remarks
Excavator	3	1.6	Volvo & similar	Diesel	175	For Ore and Waste handling
Excavator	2	0.5	Tata Hitachi	Diesel	76	For dispatch and Miscellaneous works
Wheel Loader	5	1.7 to 4	TATA & Similar	Diesel	135	3 Nos for Dispatch, 2 Nos for Dump and stack Maintenance

(5) Haulage and Transport Equipment:

(a) Haulage within the mining lease-hold

i. Transport equipment is required for hauling a maximum. Quantity of 1.0 Million Tonnes iron ore to crushing and screening plant and 2,12,556 Tonnes of waste to the dumping yard. The estimate of the number of tippers required is given below:

Tippers of capacity 31, 25 & 10 Tonnes are proposed to be deployed. Hence an average of 20 Tonnes/tipper is considered

Total quantity of iron ore and waste to be handled max = 12,12,556Tonnes

No. of working days per year = 300

No. of operating hours/day = 7

Average Capacity of each Tipper = 20 Tonnes

$$\text{No, of trips required per hour} = \frac{12,12,556}{300 \times 7 \times 20} = 28.87 \text{ trips}$$

Each Tipper can make 2.5 trips per hour

$$\text{No. of Tippers required shall be} = \frac{28.87 \text{ trips}}{2.5} = 11.54 \text{ Nos}$$

Considering 80% , 14.4 tippers , i.e 15 tippers will be required for primary hauling at pit head. 15 nos.

(ii) Additional tippers are required for Hauling processing plant products to respective stockpiles.

Total quantity of Plant products to respective stocks = 1000000 Tonnes
No. of working days per year = 300 days
No. of operating hours/day = 7 hours
Average Capacity of each Tipper = 20 Tonness

$$\text{No, of trips required per hour} = \frac{1000000}{300 \times 7 \times 20} = 23.80 \text{ trips}$$

Each tipper can make 3 trips per hour

$$\text{No. of Tippers required shall be} = \frac{23.80 \text{ trips}}{3} = 7.93 \text{ Nos}$$

Considering 80% availability 9.92 tippers, 10 tippers will be required for hauling plant products to respective stock piles. – 10 nos.

Additional 2 tippers are required for any other miscellaneous work for Desilting, afforestation & Drainage purposes. – 2 nos.

Total number of Tippers required within the Mine - 22.

List of Trucks required for haulage within the Mine.

Type	Nos	Size/ Capacity	Make	Motive Power	HP
Tippers	27	20 Tonnes	Tata, Leyland, Volvo and similar	Diesel	125 to 176

Whether the dumpers are fitted with exhaust conditioner should be indicated: Not applicable.

(b) Transport from mine-head to the destination.

(i) The M/s MEL has developed a private Railway siding close to the mine at a distance of about 4 kms from the mine. About 70% of the total dispatch is expected to be done through Railway. Hired trucks of 30 Tonnes capacity are used for this transport.

Total quantity of iron ore to Railway siding = 700000 Tonnes
No. of working days per year = 300
No. of operating hours/day = 7
Average Capacity of each Tipper = 30 Tonnes

$$\text{No, of trips required per hour} = \frac{700000}{300 \times 7 \times 30} = 11.11 \text{ trips}$$

Each dumper can make 0.5 trip per hour

No. of Dumpers required shall be = 11.11 trips / 0.5 = 22.22 Nos

Considering 80% of availability, 27.77, i.e 28 no of Tippers will be required for transporting Ore from stockyard to BBH Railway Siding. – **28 nos**

The balance 30 % of ore will be dispatched through Road which joins state highway no. SH 48 at a distance of about 2 kms. The trucks are normally hired by the client/buyer of ore.

(ii) Total quantity of iron ore proposed to be transported to client by road is 300000 Tonnes of which 90% (270000 Tonnes) will be transported by 16 Tonnes capacity trucks and the balance 10 % (30000 Tonnes) will be done 10 Tonnes capacity trucks.

By 16 Tonnes capacity trucks (90%) = 270000 Tonnes

No. of working days per year = 300

Average Capacity of each Tipper = 16 Tonnes

No, of trips required per day = $\frac{270000}{300 \times 16}$ = 56.25 trips

Each dumper can make 1 trip per day.

No. of Dumpers required shall be = $\frac{56.25 \text{ trips}}{1}$ = 56.25 Nos

Considering 75% of availability Trucks/Lorries of 16 Tonnes capacity will be required for transporting products to client's destination – **75 nos.**

(iii) By 10 Tonnes capacity trucks (5%) = 30000 Tonness

No. of working days per year = 300

Average Capacity of each Tipper = 10 Tonness

No.of trips required per day = $\frac{30000}{300 \times 10}$ = 10 trips

Each dumper can make 1 trip per day

No. of Dumpers required shall be = $\frac{10 \text{ trips}}{1}$ = 10 Nos

Considering 75% of availability of Tippers, 13.3 tippers of 10 Tonnes capacity will be required for transporting ore to Buyer's destination – **14 nos.**

Total number of Trucks Required for Despatch of Ore outside the Mine

Type	Nos	Size/ Capacity	Make	Motive Power	HP
Tippers	28	30 Tonnes	Tata, Leyland, Volvo and similar	Diesel	183
Truck	75	16 Tonnes	Tata, Leyland, Volvo and similar	Diesel	176
Truck	14	10 Tonnes	Tata, Leyland, Eicher and similar	Diesel	125

(6) **Miscellaneous:**

Describe briefly any allied operations and machineries related to the mining of the deposit not covered earlier.

(A) Operations

a) A Ripper Dozer will be deployed for excavation of any hard formations, if encountered. The Ripper Dozer will also help in making and maintaining roads and dumps.

b) Motor grader and a Soil Impactor (Vibratory Roller) will be deployed for maintenance of Roads.

c) Water Tankers will be used to sprinkle water for dust suppression on roads, loading places and supply of water for drinking purposes.

d) A tyre mounted backhoe (JCB) machine will be deployed for miscellaneous works, like clearing of spillage, desilting of drains, settling tanks etc.

(B) Machinery deployed:

The details of the miscellaneous equipment

Type	Nos	Capacity	Make	Motive Power	HP
Ripper Dozer	1	13.5 m3	L & T	Diesel	443
Motor Grader	1		L & T	Diesel	200
Soil Impactor/ Vibrating Roller	1		L & T	Diesel	112
Water Tanker	3	10 KL	L & T	Diesel	125
Tyre mounted backhoe (JCB)	1		L & T	Diesel	58

7) BLASTING

a) Broad blasting parameters like charge per hole, blasting pattern, charge per delay, maximum number of holes blasted in a round, manner and sequence of firing etc.

No Blasting will be done at the mines. Ripper dozer and hydraulic Rock Breaker are used to loosen Medium Hard rock.

3.0 MINE DRAINAGE

a) Minimum and maximum depth of water table based on observations from nearby wells and water bodies:

The ground water level is not encountered in any of the bore holes within the ore body and hence no mine workings will be met at or near ground water level. However, the nearest Bore well to the Lease area has encountered ground water at 600 m RL.

b) Maximum and minimum depth of workings:

In this plan period the workings are carried out in the Pit No:1, The workings will be carried out between 910m RL to 802m RL.

c) Quantity and quality of water likely to be encountered, the pumping arrangements and places where the mine water is finally proposed to be discharged:

The ground water is not going to be encountered in this mining plan period.

The rain water will be channelized and controlled through various structures like retaining walls, gulley plugs, check dams, garland drains and settling tanks to prevent further land degradation and rolling down the soil/waste material to the down slope and ultimately into seasonal streams as recommended in the approved R & R Plan.

An Environmental Management Plan indicating the pattern of drainage, check dams, culverts etc., is attached as **Plate No. 9**

The rainfall in the area is very small and it is found that such rainwater seeps through the strata with in few days. However, if large quantity of rainwater collected within the pit, it will be pumped to the nearest drain, which will course the water to settling tank.

d) Regional and local drainage pattern, indicating annual rainfall, catchments area, and likely quantity of rainwater to flow through the lease area, arrangement for arresting solid wash off etc.

The drainage pattern of the lease area is sub dendritic in nature. 70% of the runoff within the buffer zone drains towards in north & south directions. The study area experiences an average annual rainfall of about 580 mm and considering the hilly terrain with fragmented vegetation due to mining operations. Hence the runoff water is stored in the settling ponds.

The engineering measures carried out to control/arrest the solid wash off are as below: -

The following engineering measures carried out as per approved R & R plan

1. Retaining wall at the foot of the dump of length 1210 RM.
2. Garland drains are proposed around dumps and pits of length 1381 RM
3. Six settling tanks.
4. Stone Masonry check dam of 2 numbers.
5. Gully plugs of 6 Nos.
6. Four Hume pipe culverts.
7. Rock Fill Check dam of 2 numbers

Note: The R & R works proposed by ICFRE as per Revised R & R plan will be carried out as per time schedule.

4.0 STACKING OF MINERAL REJECT /SUB GRADE MATERIAL AND DISPOSAL OF WASTE

a) Nature and quantity of topsoil, overburden / waste and Mineral Reject to be disposed off:

There is no topsoil in the area and if encountered it will be used in our regular afforestation work. The waste generated will be Shale/Phyllite, BHQ, Manganiferrous clays intercalated clays, poor grade from contact zones, etc.

The colour of the waste varies from Brown, Yellow, white & Black. The Bulk density is 1.7 t/m3 insitu.

The waste with Fe content below 35% (Siliceous Ore) is dumped in the earmarked waste dump. The estimated quantity of Waste generation in the mining plan period is tabulated below. This quantity (8,25,360 T) will be dumped in extension of existing dump in the area of 8.80 Ha.

Table -4.1: Year wise quantity of Waste to be generated

Year	Topsoil		Waste / OB in Tonnes				
	Reuse / Spreading	Storage	Back filling	Storage	Blending	Storage	Beneficiation
First	-	-	-	2,12,553	-	-	-
Second	-	-	-	1,72,008	-	-	-
Third	-	-	-	1,49,653	-	-	-
Fourth	-	-	-	1,49,653	-	-	-
Fifth	-	-	-	1,41,493	-	-	-

b) Dumping area:

The BHQ/shale waste material will be disposed in the area earmarked existing active dump and proposed to extend towards South eastern side.

Table 4.2: Existing Waste Dumps
Details of Dumps in Block-I

Name of the dump	Name of the dump	Location	Top RL	Bottom RL	Height (m)	Area (ha)
Active Dump	Dump	Maximum elevatioin	902	862	40	8.80

There is only one active dump where the total waste will be dumped as an extension of the existing dump. The dumping will be done terrace wise from the bottom level to top level.

Each stage of the dump will be maintained at equal height of 10 m and 3 stages are proposed as per the existing dump and the topography of the area.

The dumping will be carried out at an angle not exceeding the angle of repose of the material, varies from 31 to 40 degrees.

R & R engineering measures will be carried out as per the approved Revised R & R plan with the time schedule.

c) **Manner of disposal of waste, configuration and sequence of year wise build-up of dumps along with the proposals for protective measures.**

There is only one active dump where the total waste will be dumped as an extension of the existing dump. The dumping will be done terrace wise from the bottom level to top level.

Year wise Dumping proposals

Year	Area (Ha)	No. of stages	Level in mRL	Location Co-ordinates	
				Northing	Easting
First	3.37	3	860 - 885	1571358-1571643	632130-632437
Second	1.732	3	845 - 865	1571284-1571419	632235-632402
Third	3.076	2	865 - 885	1571288-1571460	632124-632384
Fourth	2.759	1	885 - 895	1571411-1571609	632184-632357
Fifth	2.215	2	885 - 905	1571373-1571572	632184-632333

No sub-grade generation is proposed in this plan period. Proposals for respective measures/ Waste Dump Management are already given in **Table No. 2.4**

5.0 USE OF MINERAL AND MINERAL REJECTS

a) Requirement of end-use industry:

Lessee have own steel plant, total production will be consumed for captive purpose.

Name of the Firm Company	Chemical Specification	Physical Specification
M/s JSW Steel Limited.	+45% Fe	Lumps 10-40 mm
	+45% Fe	Fines 0-10 mm

b) Requirement of intermediate industries involved in up gradation of mineral before its end-use: Since this mine is captive, entire production will be utilized in the JSW Steel Plant. Hence no intermediate industries are involved in up gradation of mineral.

c) Detail requirements for other industries, captive consumption, export, associated industrial use etc.

i) Entire quantity of Iron ore mined (as captive) from this mine will be utilized in JSW steel plant.

Name of the Firm Company	Chemical Specification	Physical Specification
M/s JSW Steel Limited.	+45% Fe	Lumps 10-40 mm
	+45% Fe	Fines 0-10 mm

ii) As per the requirement of the steel plant there is also a proposal to transport the ROM directly to the steel plant as ore beneficiation Unit is already existing and is operational in the plant. Alternately ROM could also be sent through stockyard by appropriate prevailing system of transportation.

d) Precise physical and chemical specification stipulated by buyers

Presently the material produced will be transported to M/s JSW Steel Plant for its own captive use, so there is no stipulated buyer.

e) Details of processes adopted to upgrade the ROM to suit the user requirements:

ROM produced will be sent for dry processing (Crushing / screening) to generate +10-40mm calibrated lumpy Iron ore and -10mm fines Iron ore by Crushing / screening plant. Since all +45% Fe grade Iron ore will be useful in the steel plant, and hence there will be no specific blending of different grade of ore.

6.0 PROCESSING OF ROM AND MINERAL REJECT

a) Nature of processing / beneficiation of ROM or Mineral Reject, indicating size and grade of feed material and concentrate (finished marketable product), recovery etc. Processing of Mineral Reject

No beneficiation of ROM will be carried out in the lease area during the plan period. However, sorting and sizing will be carried out by mobile crushing and screening of the ore to the required physical specification. The crusher will process the mineral to different sizes of 0-10 (fines) and 10-40mm (c-ore).

As the ore is low grade and for better usage in the steel making, C.ore will be crushed upto -10 mm for better liberation of Fe, making 100% Fines for beneficiation at mine head, if the requirement demands.

Processed ore stacked separately will be transported to JSW Steel Plant, as entire production of Iron ore mined from this mine will be consumed by the plant for its captive use.

Proposed Plants and D.G. Sets

SL No	Plants/ Equipments	Quantity	Capacity
1	Mobile Crushing & Screening Plant/ static screening plant	1	200 TPH
2	Mobile screening Plant	3	200 TPH
	Diesel Generator		
1	DG for Crushing & Screening Plant	1	250 KVA
2	Office	1	25 KVA

b) Material balance chart with a flow sheet or schematic diagram of the processing procedure

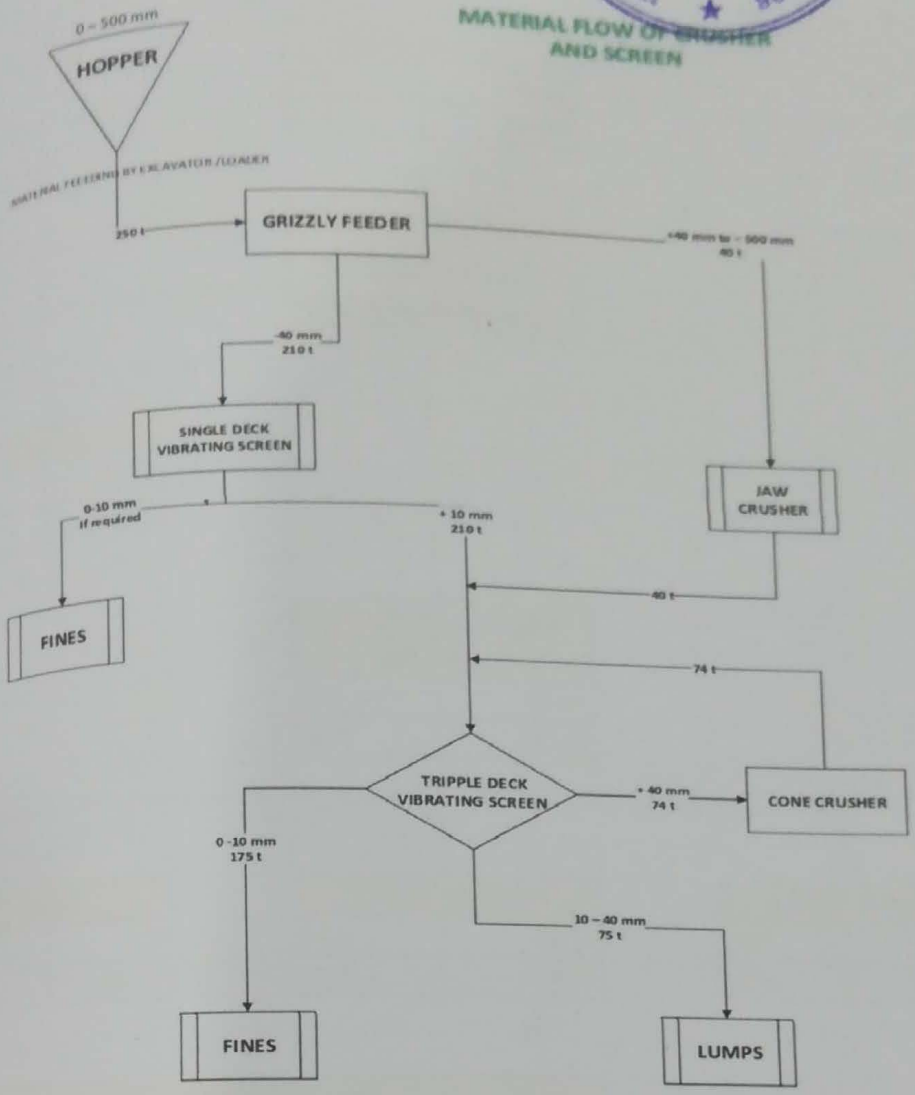
i) A mobile crushing plant of 200/250 tonnes/hour and screening unit of 250-300 tonnes/hour capacity will be established in the mine, to process the ROM upto 200 mm sizes. The crusher will process the mineral to different sizes of 0- (fines) and 5-20mm (Lumps), 20-40 mm (C.Ore) which will be stacked separately at the designated stock yard .

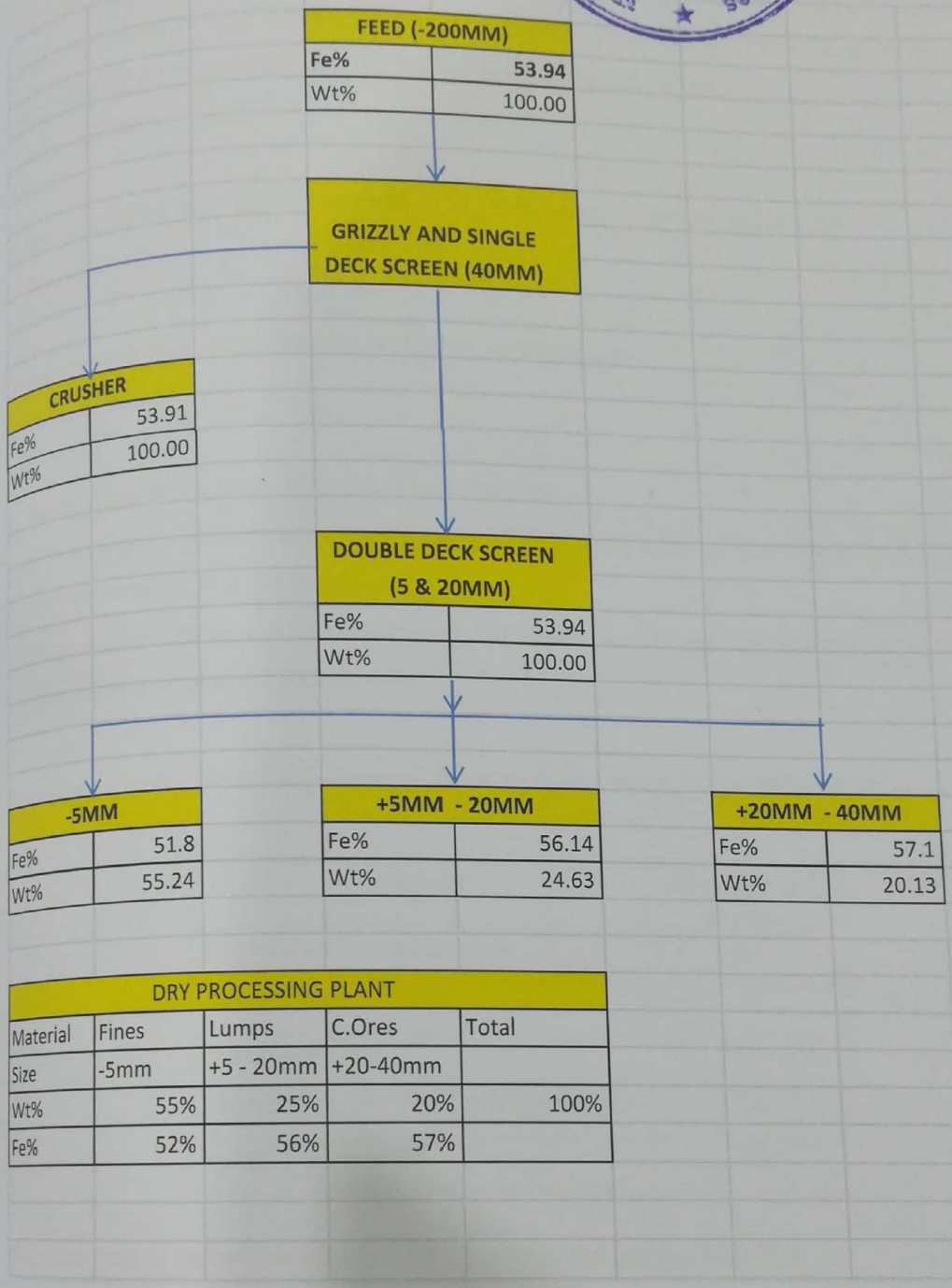
ii) Further possibility will be explored after carrying out techno economic study to install a stationary Crushing and Screening Plant for processing ROM.

iii) As per the requirement of the steel plant, we also propose to transport the ROM directly to the steel plant as Ore Crushing and Screening with Beneficiation Unit is already established in

the plant. Alternatively, ROM may also be sent through intermediate stockyard by appropriate prevailing system of transportation.

MATERIAL FLOW OF CRUSHER AND SCREEN





DRY PROCESSING PLANT				
Material	Fines	Lumps	C.Ores	Total
Size	-5mm	+5 - 20mm	+20-40mm	
Wt%	55%	25%	20%	100%
Fe%	52%	56%	57%	

c) The disposal method for tailings or reject from the process Plant.

Not applicable.

d) Quantity and quality of tailings/reject proposed to be disposed, size and capacity of tailing pond, toxic effect of such tailings, if any, with process adopted to neutralize any such effect before their disposal and dealing of excess water from the tailings dam.

Not applicable.

e) Specify quantity and type of chemicals if any to be used in the processing plant.

Not applicable.

f) Quantity and type of chemicals to be stored on site/plant.

Not applicable.

g) Water usage of the mine, disposal of waste water

In this mine the requirement of the water shall be only for purpose of drinking, dust suppression and afforestation as given below.

If the wet processing will be commenced, the water requirement for processing will be 70 KLD after the due recovery of 90% of water .

Requirement of the water for purpose of drinking, dust suppression and afforestation:

Purpose	Qty Required m^3/day
Drinking water for Domestic	30
Afforestation	10
Dust suppression	60
Processing plant (If puts in operation)	70
Total	**170**

The water shall be drawn from the private bore wells outside the lease area.

7.0 OTHERS

a) Site services:

The following statutory and administrative facilities are to be developed at the mine site or to be acquired from the previous lessee (M/s. MEL) , which are readily available.

(a) Mine-cum-Time Office
(b) Rest Shelter
(c) First Aid Station
(d) Latrines/Urinals
(e) Canteen
(f) Stores
(g) Water supply for drinking purposes

b) Employment potential:

Vice president, Mines (JSW Steel Limited) heads the central mine organization followed by senior mining professionals (GM, DGM) and Mines Manager holding 1st class Certificate of competency. This mine will provide employment to 110 people and also generates indirect employment to around 300 people. Most of the work force employed by the lessee are for mine supervision.

The employment includes Ist Class Mines Manager, IInd Class Mines Manager, Mines Foreman, Surveyor, Geologist and Mining Engineer, Environment Manager, Mechanical Engineers; Electrical Engineer etc., are employed. Skill wise employement potential is listed below.

Skill wise employment potential

Sl. No	Particulars	No's
1	Highly Skilled	11
2	Skilled	43
3	Semi-skilled	12
4	Unskilled	44
Total		**110**

8.0 PROGRESSIVE MINE CLOSURE PLAN UNDER RULE 23B OF MCDR, 2017

8.1 Environment Base line information:

This mine is recently reallocated to JSW Steel Limited., through an E-Auction process, conducted in accordance with the Mineral (Auction) Rules, 2015. The transfer of statutory clearances is under process. This has restricted our access to the core as well as buffer zones of mining lease. After the commencement of mining operations, a detailed EIA/EMP will be carried out.

The schedule for monitoring base line data is proposed for core zone and buffer zone season wise i.e. for Monsoon, Post Monsoon, winter and summer seasons. The monitoring will be carried out as per IBM and MOEF guidelines for meteorological data, ambient air quality, water quality, noise quality.

Existing land use pattern indicating the area already degraded due to quarrying/pitting, dumping, roads, processing plant, workshop, township etc., in a tabular form. The existing land use pattern of core zone is given below.

8.1.1 Existing land use pattern:

Table 8.1: Existing and conceptual land use pattern within mine lease area

Sl. No.	Land use particulars	Existing Area (Ha)	Conceptual Area (Ha)
1	Area for Mining	43.95	52.18
2	Area for Dumping	10.03	16.80
3	Mineral Storage	5.55	0
4	Area for roads	4.92	2.00
5	Safety zone/green belt	2.95	2.95
6	Infra structures	-	-
7	C&S Plant	-	-
	Engineering Measures for Waste Dump Mgmt.	1.19	3.42
	Bio- Diversity area	4.84	4.84
	Back filled area	-	10.44
8	Virgin/Untouched area	20.17	0.97
Total		93.60	93.60

8.1.2 Water regime:

Mining activities causes adverse impacts on water bodies due to changes in mine drainage and Siltation due to storm water. The impact on water environment has been considered on the basis of

water consumption and impact on water bodies. As the mining activity is confined to the top of the hill range, there are no perennial streams or nallas. Water courses are seasonal and becomeactive during the monsoon season only. Bheemasamudra water reservoir, which remains dry for 3 to 4 months, is located at a distance of 4 km from the mine lease.

Basin characteristics

The mining activity is confined to the top of the hill range and there are no perennial streams or nallas in the mine lease area. However, seasonal streams are present in the mine area, which become active during the monsoon season.

Drainage Pattern

The drainage pattern of the lease area is sub – dendritic in nature. Seventy percent of the run off with in the buffer zone drains towards in north and south direction.

8.1.3 Quality of air and Ambient noise level

Ambient Air Quality:

Once the mining becomes operational, regular monitoring of air quality for the core and buffer zone will be undertaken. Air quality will be closely monitored, data collected will be analyzed to understand the quality of air. In case, the air quality does not meet the norms for certain parameters, adequate measures will be taken to contain the air quality parameters well within the prescribed limits.

Noise Levels:

Once the mining becomes operational, regular monitoring of noise levels for the core and buffer zone will be undertaken. Data collected will be analyzed to understand the sources for excessive noise levels. In case, the noise levels do not meet the norms for certain parameters, adequate measures will be taken to contain the noise level parameters well within the prescribed limits.

8.1.4 Flora & Fauna

All the Flora & Fauna data has been extracted form the previous approved mining plan and approved R & R plan.

a) Flora:

Natural Vegetation:

The vegetation occurring in the area belongs to Southern tropical dry deciduous (Champion and Seth, 1968). The area falls under the mixed deciduous sub classification. According to the classification made by Legris and Pascal (1982) the area falls under deciduous climax forests. According to this classification this type of forests does not have the potentiality of secondary moist deciduous forests. The canopy is open and the majority of the trees are leafless during the dry months. The flowering and fruiting are generally far advanced before the first flush of new leaves appears with the showers in April – May. The dominant tree species found in the area are Anogeissus latifolia, Buchanania lanzan, Cassia fistula, Radermachera xylocarpa, Bridelia retusa, Holarrhena pubescens, Wrightia tomentosa, Grewia orbiculata. Terminalia chebula, Chloroxylon sweitenia, Santalum album are seen occasionally. And few climbers and twiners like Celastrus paniculata, Cocculus hirsutua, Aristolochia indica, Asparagus racemosus, and Cardiospermum halicacabum are also observed. Cassia auriculata, Tecoma stans, Dodonaea viscosa, Gardenia gummifera, Clerodendrum serratum etc. The ground flora is chiefly seasonal. The dominant herbs include Acalypha indica, Achyranthes aspera, Aerva lanata, Crotalaria albida, Bidens biternata,

Blepharis maderaspatana, Justicia simplex, Leucas aspera, Cassia occidentalis and Leucas cephalotes. The dominant grasses include species like Apluda mutica, Chloris inflata, Chrysopogon fulvus, Cynodon dactylon, Heteropogon contortus etc. Striga asiatica occur as root parasite associated with grasses (Tables 29 and 30).

Plant Species occurring inside mine lease area in the BBH Mines

S. No	Botanical name	Habit	Family	Local/kannada name
1.	*Acacia ferruginea*	Tree	Mimosaceae	Banniz
2.	*Acacia mangium*	Tree	Mimosaceae	
3.	*Albizia lebbeck*	Tree	Caesalpiniaceae	Baage
4.	*Alternathera pungens*	Herb	Amaranthaceae	
5.	*Argemone mexicana*	Herb	Papavaraceae	Haladi dattoori
6.	*Atylosia scarabaeoides*	Climber	Fabaceae	
7.	*Azadirachta indica*	Tree	Meliaceae	Bevu
8.	*Butea monospermal*	Tree	Fabaceae	Muttuga
9.	*Calotropis procera*	Shrub	Asclepiadaceae	Kempu ekka
10.	*Capparis divaricata*	Shrub	Capparaceae	
11.	*Cipadessa baccifera*	Shrub	Meliaceae	Nela bevu
12.	*Croton bonplandianus*	Herb	Cuphorbiaceae	Seemeenne gida
13.	*Eucalyptus sp*	Tree	Myrtaceae	
14.	*Eupatorium odoratum*	Herb	Asteraceae	Communist weed
15.	*Euphorbia hirta*	Herb	Euphorbiaceae	
16.	*Evolvulus alsinoides*	Herb	Convolvulaceae	Vishnukranthi

17.	*Ficus religiosa*	Tree	Moraceae	Arali
18.	*Hardwickia binata*	Tree		
19.	*Hemidesmus indicus*	Climber	Asclepiadaceae	Sogdeberina balli
20.	*Indigofera linifolia*	Herb	Fabaceae	
21.	*Leucas aspera*	Herb	Lamiaceae	Tumbe
22.	*Mimosa pudica*	Herb	Mimosaceae	Muttidare muni
23.	*Oxalis corniculata*	Herb	Oxalidaceae	Huli soppu
24.	*Parthenium hysterophorus*	Herb	Asteraceae	Congress kale
25.	*Passiflora foetida*	Climber	Passifloraceae	Kukke balli
26.	*Polygonum plebeium*	Herb	Polygonacaeae	
27.	*Solanum torvum*	Shrub	Solanaceae	
28.	*Spermacoce hispida*	Herb	Rubiaceae	
29.	*Stachytarpheta jamaicensis*	Herb	Amaranthaceae	
30.	*Tecoma stans*	Shrub	Bignoniaceae	Haladigante hoo
31.	*Tridax procumbens*	Herb	Asteraceae	

a) **Fauna:**

The list is based on the Macro level EIA studies undertaken by ICFRE and secondary data (**Tables 45 to 49**). In the buffer zone area, a total of 36 vertebrates and 20 invertebrates were recorded. Out of this, 26 were mammals, 7 were reptiles, 2 were amphibians and 20 were arthropods.

Antelope, Spotted deer, Sambhar, Red and black mouth monkey, Pig, Rabbit, Cow, Buffalo, Mouse, Porcupine and Horse observed belong to mammals.

House Lizard, Garden lizard, Krait, Cobra, Viper, Python and chameleon were among the reptiles observed. Frog and Todd were the amphibians found in the region.

Millipede, Centipede, Cockroach, Ant, Honey Bee, House fly, Red ant, Silver Fish, Earthworm, Cricket and grasshopper observed fall under the category, arthropods.

Major avifauna observed in the region include Nilkanth, Crow, Pigeon, Batair, Koel, Teetar, Owl, Kite, peacock, Parrot, Bulbul, Whistling teal, Vultures, Maina, Egred, Brahmany Kite, Shikra, Buzzard, Blue jay and Shrike.

8.1.5 Climatic conditions

The climate of this district, which is in the south-west part of the Deccan plateau, is marked by hot summer months, low rainfall and a pleasant monsoon season. The temperature is around 14° C to 15° C during November and December months and goes up to 40° C to 41°C during April and May months of the year. The monsoon season extends over a period of six months from June to November. The district receives almost an equal amount of rainfall during the South-west monsoon (June to September) and during the North-east monsoon period (October to November). The average annual rainfall in the district is 580 mm with an average of 40 rainy days. October happens to be the month with the heaviest rainfall. The relative humidity is high during the monsoon, ranging

from 70 to 75 % and remains low in the rest of the year, particularly in the summer months. Winds are generally moderate during summer and strong during rainy season. In the south-west monsoon period, the winds blow mainly from a South-Westerly or Westerly direction. In the rest of the year the winds are predominantly from directions between North-East and South-East.

The study area forms a part of the region dominated by tropical climate with hot summer days moderately cool winters and moderate monsoon. The maximum & minimum temperatures with in core zone area were observed to be 41^0 C and 20^0 C, respectively and the relative humidity varied between 30% & 80%.

8.1.6 Human Settlements

No human settlements within the lease area. However, within 10 km radius from mine lease area there are 22 villages and the demographic profile of the villages are given below:

Village		Total Population								Scheduled Castes		Scheduled Tribes	
		Person	Male	Female	Sex Ratio		Person	Male	Female	Male	Female	Male	Female
Nallikatte	222	1,073	547	526	962	959	56.6	66.2	46.5	150	153	104	83
Hunasekatte	224	1,252	677	575	849	936	49.1	61.4	34.3	169	123	9	7
Kadleguddu	281	1,496	757	739	976	1,027	63.3	73.5	52.7	148	141	290	290
MarijogiHalli	160	992	499	493	988	1,114	69.5	82.3	56.4	12	14	481	467
MegalaHalli													
BoraBommenahalli	507	2,718	1,379	1,339	971	1,021	55.8	66.2	45.1	227	209	456	416
Bommenahalli	496	2,656	1,368	1,288	942	851	68.6	77	59.9	201	167	180	206
Hireguntanur	293	1,429	727	702	966	1,188	63.4	75.5	50.5	286	285	189	190
Haliyur	316	1,459	744	715	961	748	60.1	72	48.2	617	586	44	48
Palya	104	568	283	285	1,007	1,029	61.8	75.4	48.2	19	23	106	103
Nallikatte	52	274	146	128	877	938	58	76.2	37.2	130	111	14	13
Malali	259	1,273	644	629	977	1,188	84.6	89.2	79.7	61	58	62	67
Bheemasamudr	160	812	423	389	920	698	79.3	87.1	71	66	50	12	12
MegalaHalli	458	2,193	1,085	1,108	1,021	992	76.2	86	66.7	124	118	209	216
B.Durga	1,243	5,986	2,971	3,015	1,015	1,039	80.6	89.5	71.9	704	740	228	239
Chikkajajur	164	784	386	398	1,031	981	81.2	89.2	73.5	108	102	16	26
Basapura	180	1,096	558	538	964	925	48	55.7	40	0	0	0	0
AmrutHapura	115	644	338	306	905	1,682	68	81.6	52	275	272	1	0
Kashipura	511	2,595	1,343	1,252	932	696	66.5	76.2	56.5	241	245	53	52
ChitraHalli	290	1,446	754	692	918	909	72.2	83.2	60.3	257	218	20	13
T.Nulenur	456	2,284	1,199	1,085	905	993	66.5	75.3	56.6	175	164	107	103
Hirekandavadi													

8.1.7 Public buildings, places of worship and monuments

There are no public buildings, natural parks, places of worship & monument within the core zone or within the vicinity of the mine area.

8.1.8 Any sanctuary located near leasehold

There is no sanctuary located near the lease area. Environmental Plan is enclosed in 1:5000 **(Plate No.09)**

8.2 Impact Assessment:

i) Land area indicating the area likely to be degraded due to quarrying, dumping, roads, workshop, processing plant, tailing pond/dam, township etc.

The mining pits are present in the lease area serving as production benches. The major impacts observed include soil erosion, loss of topsoil, creation of pits and deforestation and possibility of adding silt load in the natural nallah nearby the lease area.

ii) Air quality

The semi-arid climatic condition of the area coupled with mining activities on the top of the hills through open-cast, contributes to air pollution. The dust is observed to be the predominant air pollutant when the mining is in operation.

iii) Water quality

The major impact on water pollution is due to erosion of waste dump and sub-grade dump, oil and grease, contamination of water bodies due to discharge of mine water/effluent and sedimentation of the seasonal nallahs flowing nearby.

iv) Noise levels

Noise pollution by mining activities is mainly because of excavation, handling and transportation of ore and overburden and operation of processing equipment.

v) Vibration levels (due to blasting):

No blasting has been proposed during plan period , as the strata is medium hard, can be diggable by the excavators, any hard strata exists , can be loosened by deploying the Ripper and Dozer and Rock breakers.

vi) Water regime

The existing seasonal nallahs in the buffer zone remain dry and become active during rainy season. Since the watercourse are shallow and the workings are situated at higher elevations, water will not pose any problem. Since rainfall is comparatively low, there will not be much siltation or run-off problem. However, suitable engineering measures are proposed, as mentioned in the Environment management plan **(Plate No.09)** to avoid any impact on water regime.

The mining operations are conducted at hill top which is at much higher level than ground water level. Mining activities will not intersect the groundwater as the groundwater table is 226 m below the pit bottom.

vii) Acid mine drainage

Not applicable as no acidic material is present in the mining area.

viii) Surface subsidence

Not applicable as it is opencast mining in a stable area.

ix) Socio-economics

The mining will bring positive effect by way of generation of employment and business opportunities to local people. Apart from this, lessee will undertake CSR activities focusing on measures to improve education, health, literacy of people of surrounding villages.

x) Historical monuments etc.

There are no public buildings, places of worship or monuments are located near the lease area.

Mitigative measures:

Air: It is proposed to deploy Water tankers with automated sprinkling system to suppress dust by regular water spraying on all the roads used for haulage and around mobile Crushing &Screening Plant. Plantation will be carried out as green belt all along the lease boundary which will act as windbreaks.

Water: For protection of the mining area and for arresting solid wash-off the surface water management measures will be implemented as proposed in the R&R report.

Noise: The management plan for controlling noise pollution are by providing noise insulation/padding in plants and machinery wherever practicable, limiting of speed of haulage vehicles/tippers, proper maintenance of noise generating parts of the machine, provision of earmuffs to workers.

Regular monitoring of all the environmental parameters will be undertaken as per CCOM circular, Location of monitoring stations has been marked on Environment plan **(Plate No.09).**

Proposed Environment Monitoring stations in Core and Buffer zones are as below:

Village	Air Monitoring station	Water Monitoring station	Noise Monitoring station	Remarks
Loading & Unloading point, C & S plant, Excavation area	CA1, CA2, CA3	SW	CN1 CN2 CN3	Core Zone
Palya	BA2	GW1	BN2	Buffer Zone
Beemasamudra	BA5	GW2	BN5	
Hirekandavadi	BA3	GW3	BN3	
Megalahalli	BA4	GW4	BN4	
Kadleguddu	-	GW5	-	

8.3 Progressive reclamation Plan

8.3.1. Mined-Out Land:

The existing land use pattern is as follows

Table. 8.3 Existing Land Use Pattern

Type of Land Use	Existing Area (Ha.)
Area for Mining	43.95
Area for Dumping	10.03
Mineral Storage	5.55
C & S	-
Area for roads	4.92
Safety zone/green belt	2.95
Infra structures	-
Engineering Measures	1.19
Bio – diversity area	4.84
Virgin/Untouched area	20.17
Total	**93.60**

The proposed conceptual land use pattern is as follows:

Table 8.4 Proposed Land Use Pattern

Type of Land Use	Proposed Area at conceptual period(Ha.)
Area for Mining	52.18
Area for Dumping	16.80
Area for roads	2.00
Safety zone/green belt	2.95
Mineral Storage area	0
Engineering Measures	3.42
C & S area	0
Back filled area	10.44
Bio diversity area	4.84
Virgin/Untouched area	0.97
Total	**93.60**

The proposed area to be worked during the plan period is shown in the year-wise production and development plans. Mining in this plan period is proposed in the existing benches of earlier mined out area.

Hence reclamation by afforestation on the old dump slopes, Active dumps and green belt development along the lease boundary will be carried out.

The environmental protective works such as afforestation, avenue plantation, settling tank, geo-textile matting, green belt development, dump management, check dam, retaining wall will be taken up in the mine effectively as per the ICFRE - R & R Plan.

Year-wise afforestation programme is furnished below and same has been marked on year-wise Production and Development plans **(Plate No.6A) to Plate No.6E).**

Year	Species	Quantity (nos)	Survival rate	Location	Area can be covered	Expenses Incurred (Rs in lac)
1st Year	*Acacia ferruginea* *Acacia mangium* *Albizia lebbeck* *Alternathera pungens* *Argemone mexicana*	1000	80%	Green belt/ Gap Plantation	1 Ha	1.50
2nd Year		1000	80%	Green belt/ Gap plantation	1 Ha	1.50
3rd Year		1000	80%	Dump slopes	1 Ha	1.50
4th Year		1000	80%	Dump slopes	1Ha	1.50
5th Year		1000	80%	Dump slopes	1 Ha	1.50
Total		5000	80%		5 Ha	7.50

8.3.2 Topsoil Management:

Since the mine has been operation for several years before coming into auction, maximum area is already broken up. As per proposed mining programme over next five years, there is no likelihood of generation of topsoil. However, if any small quantity is encountered during coarse of operation the same shall be stack separately sand used for afforestation purpose.

8.3.3 Tailings Dam Management:

Not required as no tailing dam is present or proposed.

8.3.4 Acid mine drainage, if any and its mitigative measures:

Not applicable as no acidic material is present in the mining area.

8.3.5 Surface subsidence mitigation measures:

Not applicable as the proposal is for opencast mining in a stable area.

Table-8.5: Summary of year wise proposal for item Table No. 8.3

Items	Details	Year-wise Proposed measures					Remarks
		Ist	IInd	IIIrd	IVth	Vth	
Dump Management	Area afforested in (Ha)			1 Ha	1 Ha	1Ha	N.A.
	No. of saplings planted	-	-	1000 -	1000 -	1000 -	N.A.
	Cumulative no. of plants planted	-	-	1000 -	2000 -	3000 -	N.A.
	Cost including watch and ward care during the year (Rs in Lacs)	-	-	1.5	1.5	1.5	N.A.
	Toe wall in Mts	550	550	-	-	-	
	Garland drain in Mts	560	560	-	-	-	
	Silt setteling tank	-	10x20x3 m	-	-	-	
Management of worked out benches	Area available for rehabilitation (Ha)	-	-	-	-	-	Mining operations are yet to resume. No worked out abandoned benches.
	Afforestation done	-	-	-	-	-	N.A.
	No. of saplings planted in the year	-	-	-	-	-	N.A.
	Cumulative no. of plants	-	-	-	-	-	N.A.
	Cost including watch & care	-	-	-	-	-	N.A.
R&R by backfilling	Void available for backfilling	-	-	-	-	-	-
	Void Filled by waste/ tailing (Area in Ha.)	-	-	-	-	-	N.A.
	Afforestation on the backfilled area	-	-	-	-	-	N.A.
	Rehabilitation by making water reservoir	-	-	-	-	-	N.A.

Rehabilitation of waste land within lease	Area available (Ha)	-				-	-
	Area rehabilitated	-	-			-	Afforestation work will be taken up simultaneously with mining operation.
	Method of rehabilitation	-	-	-	-	-	Local species, as suggested by ICFRE will be planted to restore the natural flora.
	Area for Greenbelt Development (Ha)	1.0	1.0	0	0	0	Gap Plantation will be carried out green belt development.
Others	Afforestation for area under encroachment (Ha)	Area of encroachment 3.13 Ha has been duly afforested by Old Lessee.					

To prevent further degradation of land and stabilization of dumps, engineering measures i.e. toe walls, garland drains etc. are proposed inside the lease area. The details are given below:

8.4 Disaster Management and Risk Assessment:

The aim of disaster management is to identify potential dangers associated with the mining operations. An important element of mitigation is emergency planning i.e., recognizing that accidents are possible, assessing the consequences of such possible accidents and deciding on the emergency procedures, in advance, both on-site and off-site, that would need to be implemented in the event of an emergency, systematically and without delays and confusion.

The risk and disasters that could be foreseen in opencast mines may arise from:

i. Failure of external overburden dumps
ii. Failure of mine bench slopes
iii. Chemical spills
iv. Fire in the bulk fuel storage ore forest fire
v. Plying of trucks and other vehicles on public roads

Maintenance of proper bench geometry, observing safety precautions for transport, proper storage, safe handling and use of explosives and fuel etc., good maintenance of roads and transport units, fire prevention measures, good dump management, shall go a long way in preventing accidents/disasters. No chemicals are used in mining operations or beneficiation process. Hence, there is no risk involved due to chemical spills.

Mining will be carried-out strictly as per MMR 1961 and all other rules and regulations. Project proponent is having mobile communication system for quick passing of information if need arises. Proper training will also be given to the work persons periodically, as per DGMS rules.

The management is committed to identify possible causes for the potential disasters and draw a code of emergency measures and procedures to deal with such disasters, which is otherwise also advised by DGMS through their periodic circulars.

Safety and Security

Around the ultimate pit limit, a fencing will be constructed as per the norms prescribed by the DGMS, to fence off the entry of stray animals and persons to the mine area. Where such effective blocking is not possible, watch & ward Posts will be established. Periodical inspection of all such arrangements will be carried out. The visitors will be allowed to enter the mine area only with permission.

Risk Management

In case of any emergency, evacuation of affected people will be undertaken immediately. Injured person(s) will be shifted to the hospital by departmental ambulance to Government Hospital located at 25 km. & 5 Km. from mine head respectively. Using cellphone service, monitoring of relief services will be carried out.

No high-risk accidents are anticipated, as the project is an open cast mining operation in a stable area free from land subsidence, earthquake etc. However, in case of any eventuality, the designated Mines Manager will be managing of the situation. He will be having communication facility and a Jeep at his disposal which will help in evacuating persons involved in any accidents.

Details of the Person to be contacted in case of emergency situation:

Name: Sri BP Pandey

Cell: 9448286155

Location of Help in case of emergency:

Stations	Location of the station	Distance of station from mines
Govt. Hospital	Chitradurga	18.0 Km
Police station	Chitradurga	18.0 Km
Fire Brigade	Chitradurga	18.0 Km

Nearest Hospital (102), Fire station (101) and Police Station (08395-260249) are in Sandur which is about 9 km away.

8.5 Care and maintenance during temporary discontinuance:

An emergency plan to deal with the situation of temporary discontinuance or incomplete programme due to Court order/due to statutory requirements or any other unforeseen circumstances will be drawn by the technical & managerial personnel to suit the specific situation of this mine.

This will be reviewed & modified to suit the varying conditions. This would involve preventing access to dangerous places, pits and preventing accidental fall into the pit of animals & men. Safety measures, such as firefighting equipment, switchgear etc., will be placed at readily accessible locations.

The following measures will be implemented:

(i) Proper and adequate security at the entrance/exit to the mine to prevent entry of unauthorized person.

(ii) Top edges of the quarry will be fenced off.

(iii) Entrance to the toe of dumps will be blocked.

(iv) Special security and fire preventing measures will be taken at dangerous places/explosive magazine etc.

(v) All the above will be examined by mines manager once in a week to ensure that they are in order.

Financial Assurance:

As per the provisions of Rule 27(1) of MCDR 2017, Financial assurance is not required to provide by the lessee, as the Mining Lease – BBH Mines allotted to M/S. JSW Steel Ltd through Auction process., wherein Mine development and Production Agreement will be signed between the lessee and the State Govt. Any how the area considered for FA is 77.30 Ha proposed to be broken up during the Plan period. The partially/completely reclaimed areas are also included in the calculations for FA, as matter of abundant caution. The detailed breakup of the land required for mining and allied activities are given below and shown in the Financial Assurance Plan enclosed vide **Plate No.12**

Table indicating the break-up of areas in the Mining lease for calculation of Financial assurance.

8.6 Financial Assurance:

Sl. No	Particulars	Area put on use at start of MP (Ha)	Additional requirement during plan period (Ha)	Total Area (Ha) A+B = C	Area considered as fully reclaimed and rehabilitated (Ha)	Net area considered for calculation (Ha) C-D=E
		A	B	C	D	E
1	Area under mining	43.95	3.49	47.44	0.00	47.44
2	Storage for topsoil	-	-	-	-	-
3	Waste dump site	10.03	2.99	13.02	-	13.02
4	Mineral storage (Existing)	5.55	0	5.55	0	5.55
5	Infrastructure Workshop, Admin. Building etc.	0.00	0.50	0.50	0	0.50
6	Roads	4.92	-	4.92	0	4.92
7	Railways	-	-	-	-	-
8	Tailing pond	-	-	-	-	-
9	Effluent treatment plant	-	-	-	-	-
10	Mineral separation plant	-	-	-	-	-
11	Township area	-	-	-	-	-
12	Greenbelt/Afforestation	2.95	0	2.95	0	2.95
12A	Engineering measures (retention wall, Garland drain, Settling tank etc.)	1.19	1.73	2.92	0	2.92
12B	Bio – Diversity conservation area	4.84	0	4.84	4.84	-
13	Others -Un used	20.17	(-8.71)	11.46	0	0
	Grand Total	93.60	(-8.71)	93.60	4.84	77.30

Financial area assurance plan is enclosed in 1:2000 **(Plate No.11)**

31/10/19

क्षेत्रीय खान नियंत्रक
Regional Controller of Mines
भारतीय खान ब्यूरो
Indian Bureau of Mines,
बेंगलूर / Bangalore - 560 022

B P Pandey

Qualified Person

This Mining Plan is approved subject to the conditions / stipulations Indicated in the Mining Plan approval letter No. 279/11.04/2019/BNG
Date..31/10/19

JSW Steel Limited

Vijayanagar Works :
P.O. Vidyanagar - 583 275,
Dist. Ballari, Karnataka, India.
CIN. : L27102MH1994PLC152925
Phone : +91 8395 250 120-30
Fax : +91 8395 250 132/142
Website : www.jsw.in

PART - B

certificate/ undertaking/ consent letter AS BELOW

A. consent letter/undertaking/certificate from the Lessee

1. **Consent:** The Submission of Mining plan in respect of **BBH Iron ore Mine** (ML no- 2346) of M/s JSW STEEL LTD. over an area of 93.60 Ha in Bedara Bommenahalli, Hirekandavadi and other village, Chitradurga Taluk and District, Karnataka State Under Rule 16 of MCR 2016 has been prepared by Sri. B.P.Pandey, Qualified Person. This is to request the Regional Controller of Mines, Indian Bureau of Mines, Bangalore to make any further correspondence regarding any correction of the Mining plan with the said qualified person at his address below:

Mr. B P Pandey
Sr. VP-Mines
JSW Mining Office,
Near Talur Cross,
Vidyanagar -583 275

We hereby undertake that all updating as made in the said Mining plan by the said qualified person be deemed to have been made with our knowledge and consent and shall be acceptable on us and binding in all respects.

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

3. **Certificate:** It is certified that the Progressive Mine Closure Plan of **BBH IRON ORE MINE** (ML no- 2346) of M/s JSW Steel Ltd over an area of 93.60 Ha complies with all statutory Rules, Regulations, Orders Made by the Central or State Government, Statutory Organization, Court etc., which have been taken into consideration and wherever any specific permission is required the lessee will approach the concerned authorities.
The information furnished in the Progressive Mine Closure Plan is true and correct to the best or our knowledge and records.

4. **Certificate:** "The provisions of Mines Act, Rules and Regulations made there under have been observed in the Mining plan over an area of 93.60 Ha in Chitradurga District in Karnataka State belonging to **BBH IRON ORE MINE**, (ML no- 2346) of M/s JSW STEEL LTD and where specific permissions are required, the applicant will approach the D.G.M.S. Further, standards prescribed by DGMS in respect of Miner's health will be strictly implemented".

For M/s. JSW Steel Ltd.,

Dr. Vinod Nowal
Nominated Owner

Place: Vidyanagar

Date: 25th Oct, 19

Regd. Office : JSW Centre
Bandra Kurla Complex,
Branch (East), Mumbai - 400 051
Phone : +91 22 4286 1000
Fax : +91 22 4286 3000

JSW Steel Limited

Vijayanagar Works :
P.O. Vidyanagar - 583 275,
Dist. Ballari, Karnataka, India.
CIN. : L27102MH1994PLC152925
Phone : +91 8395 250 120-30
Fax : +91 8395 250 132/142
Website : www.jsw.in

CERTIFICATE FROM QUALIFIED PERSON

The provisions of the Mineral Conservation and Development Rules, 2017 have been observed in the preparation of the Mining Plan along with Progressive Mine Closure plan of **BBH IRON ORE MINE** (M/s Mineral Enterprises Ltd, ML no- 2346), in BedaraBommenahalli, Hirekandavadi and other village, Chitradurga Taluk and District, Karnataka over an extent of 93.60 Ha and whenever specific permissions are required, the Preferred bidder will approach the concerned authorities of Indian Bureau of Mines.

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

Place: Vidyanagar
Date: 25th oct, 2019

B.P. Pandey
Qualified person

Regd. Office : JSW Centre
Bandra Kurla Complex,
Branch (East), Mumbai - 400 051
Phone : +91 22 4286 1000
Fax : +91 22 4286 3000