The Sandur Manganese & Iron Ores Limited

Iron and Manganese Mine

(Post: Deogiri, Taluka: Sandur, District: Bellary, State: Karnataka-583119)

Name of the Mine: The Sandur Manganese & Iron Ores Limited., ML NO-2678
Mine Code: 30KAR03180
IBM Registration Number: IBM/35/2011

Status of the Lessee: Private Company
Non-Captive

MODIFICATION TO THE APPROVED REVIEW AND UPDATION OF MINING PLAN

Submitted under Rule 17(3) MCR-2016

MINING LEASE NO-2678

MODIFICATION PERIOD: 2018-19 to 2022-23

Period of ML as per MMDR Amendment Act 2015: 20 Years (01.01.2014 to 31.12.2033)

"A" (Fully Mechanized)/ Open cast/ Private/ Non captive

ML Area as per Lease Deed: 1612.72 ha. (Reserved Forest Land)
247.38 ha. (Revenue Land)
Total: 1860.10 ha.

ML Area as per CEC Sketch: 1617.32 ha. (Reserved Forest Land)
247.38 ha. (Revenue Land)
Total: 1864.70 ha.

VOLUME - 1
TEXT

Shridhar P. Hegde
QUALIFIED PERSON

Rajesh M. Katral
QUALIFIED PERSON

OCTOBER-2018

MODIFICATION TO THE APPROVED REVIEW AND UPDATION OF MINING PLAN FOR ML 2678 (OLD ML-2580)

The present document is prepared for seeking Modifications as per Rule 17(3) of MCR 2016, to the Approved Review and Updation of Mining plan for the period from 2018-19 to 2022-23 of ML 2678 vide letter No. 279/281/91/BNG/2284 dated 07-12-2017; by modifying the relevant chapters including the linked chapters, plans and sections.

1. 0. GENERAL:

INTRODUCTION:

The Sandur Manganese & Iron Ores Limited (The SMIORE Ltd, The Company) is a private company established on 29th July 1964. This company was previously designated as M/s. The Sandur Manganese & Iron Ores Private Limited and was founded by Shri Y.R. Ghorpade on 18th January 1954, Erstwhile ruler of Sandur state. M/s. General Sandur Mining Company (a Belgium company), over an area of 29 Square (Sq) miles was taken over by Shri Y.R. Ghorpade in order to scientifically develop the Manganese mines, which had been earlier mined between 1907 to 1953. Thus, M/s. Sandur Manganese & Iron Ores Private Limited had mining lease over an area of 29 Square (Sq) miles for a period of 20 years (1954 – 1973). The Sandur Manganese & Iron Ores Private Limited Company was converted in to Public Limited Company on the 29th July 1964 to establish Electro Metallurgical Industry (Ferro Alloy plant). Accordingly, in the year 1968, a Metal and Ferroalloy plant for manufacture of Pig iron and Ferroalloy was established at Vyasanakeri near Hospet. SMIORE is the largest Manganese ore supplier in the country only next to Manganese Ore India Limited.

Later on, in the year 1974, when the mining lease was renewed for the first time the renewal was done for reduced area of 18.20 Sq miles, and this area was distributed for two mining leases namely ML-1179 with 16.74 Sq miles and ML-1952 with 1.46 Sq miles. During the second renewal for the period from 1994 to 2013 the ML No-1179 was changed to ML No-2580 and lease deed was executed for an area of 1863.02 Ha on the basis of section 2 (ii) Forest clearances under FC Act 1980. Similarly ML No-1952 was changed to ML No-2581 and lease deed was executed for an area of 142.58 Ha on the basis of section 2 (ii) Forest clearances under FC Act 1980. Presently, the third renewal was executed on 20th March 2015 with effect from 01.01.2014 wherein the mining lease number 2580 has been changed to ML No-2678 and mining lease is executed for an area of 1860.10 Ha. Similarly, ML No-2581 has been changed to ML No-2679 and mining lease is executed for an area of 139.20 Ha.

This Mining Plan is approved subject to the conditions / stipulations indicated in the Mining Plan approval letter No. 279/281/91/BNG Date. 05/10/2018

5.10.18

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

A copy of the executed Mining Lease deed of ML No 2678 is enclosed as **Annexure-01** and the relevant plan is enclosed as **Plate No-SM03-Md1.**

Review and Updation of Mining Plan including Progressive Mine Closure Plan for the Financial years 2018-19 to 2022-23 in respect of Manganese and Iron Ore for Mining Lease 2678 was approved vide letter No. 279/281/91/BNG/2284 dated 07-12-2017, in which review is for the period from 2013-14 to 2017-18 and updation of Mining Plan is for the period from 2018-19 to 2022-23, with the permissible production limit of 254000 tons of Manganese Ore as approved by CEC vide Letter No: 2-75/CEC/SC/2015-Pt.III dated: 27th June 2016 & 1600000 tons of Iron Ore as approved by CEC vide Letter No: 2-75/CEC/SC/2015-Pt.II dated: 18th March 2016.The copies of CEC approval for enhancement in production for Iron Ore and Manganese Ore are enclosed as **Annexure 02 and 02 A** respectively.

The present document is prepared as per Rule 17(3) of MCR 2016 and modifications are made in the following chapters.

1. Part A-Chapter1, Geology and Exploration: The of Iron Ore reserves increased substantially with additional exploration.
2. Part A-Chapter 2, Mining: With significant increase in Iron ore reserves, the year wise tentative excavation for Iron Ore is modified from 1.60MTPA to 3.85MTPA along with relevant chapters, plans & sections to facilitate in getting Environmental Clearance of higher production capacity for Iron Ore. However, the year wise tentative excavation for Manganese Ore is not modified as the production of manganese ore will remain same at the earlier approved level of 2,54,000 tons and the production planning locations are also kept as it is as per last approved Review and Updation of Mining Plan dated 7th Dec.2017. Common boundary working between ML-2678 & ML-2679 of SMIORE is included at one place between KMK(E) pit of ML-2678 and Myadarbanda pit of ML 2679. A Downhill Conveyor System (DCS) is contemplated between Kammathuru Iron Ore Mine (KTIO) and PMBR (BMM) siding for eco-friendly transportation of Iron Ore.
3. Part A-Chapter 6, Processing of ROM and Mineral Reject. Proposal is made for Beneficiation Plants (wet processing) of Iron Ore of 300TPH (2 No's) and a Manganese Ore of 100TPH.

The permissible production limit of 254000 tons of Manganese Ore & 1600000 tons of Iron Ore will only continue to be produced as approved in Review and Updation of Mining Plan including Progressive Mine Closure Plan vide letter No. 279/281/91/BNG/2284 dated 07-12-2017, for the Financial years 2018-19 to 2022-23, till approval of Environment Clearance from MoEFCC for higher production capacity of Iron Ore (3.85MTPA) & approval from CEC for enhanced production of Iron Ore from 1.6 MTPA to 3.85MTPA comes in hand.

Details of other mining leases held by the lessee

Sl. No.	ML Name & No.	Mineral	Area Ha	Execution Date	Expiry Date	Status working
1	Manganese & Iron Ores Lease, ML 2679 (Old ML No.2581 & 1952)	Mn and Iron Ores	139.20	20-03-2015 (20 years w.e.f 01.01.2014)	31-12-2033	Working
2	Haravanahalli Quartz Mine ML: 896	Quartz	72.84	20-06-1969 (20 years).	19-06-1989	Not working
3	Yerraiahna Halli Quartz Mine ML: 2140	Quartz	19.22	17-01-1992 (10 years w.e.f 06-05-1991).	05-05-2001	Not working

ML No. 896 and ML no.2140 for Quartz mineral is not working because application for lease renewal is pending.

GENERAL

a) Name of the lessee:

The Sandur Manganese & Iron Ores Ltd.
Rule 45 registration no. IBM/35/2011

Address:

Registered Office:
The Sandur Manganese & Iron Ores Limited, Satyalaya, Door No.266(Old no 80), Behind Taluka office, Palace road, Ward no.1,Sandur 583119, Ballari District, Phone: 08395- 260301, Fax:08395-260473, e-mail: eps@sandurgroup.com
Resolution of board for authorized signatory is enclosed as **Annexure-03.**

Contact person & address:

Md. Abdul Saleem
Agent and Vice President(Mines)
The Sandur Manganese & Iron Ores Ltd.,
Deogiri (Po) - 583 112, Sandur Taluk, Bellary (Dist), Karnataka
Ph. No: 08395-271025/28/29/40 Extn: 21 Fax: 271066

b) Status of lessee:

The lessee is a Private Company.

The certificate of incorporation of the Company is enclosed as **Annexure-04.**

Latest list of Directors is enclosed as **Annexure-05.**

c) Mineral(s) which is / are included in the prospecting license (For Fresh grant):

Not applicable.

d) Mineral(s) which are included in the lease deed: **Iron & Manganese Ore.**

e) Mineral(s) which the lessee intends to mine: **Iron & Manganese Ore.**

f) Name of Qualified Persons who have prepared the document.

Names of Qualified Persons:

Sl. No.	Name	Contact No.	Email ID
1	Shridhar P.Hegde	9448497925	shridharhegde@sandurgroup.com
2	Rajesh M. Katral	9448497858	katral@sandurgroup.com

Copies of relevant educational qualification, professional experience certificates and photo identity proofs are enclosed as **Annexures-06**

Address of Qualified Persons:

The Sandur Manganese & Iron Ores Ltd.,
Deogiri (Post) – 583 112
Sandur (Taluk), Bellary (District), Karnataka.
Ph. No: 08395-271025/28/29/40 Extn: 31, 48 and 49
Fax: 271066.

2.0 LOCATION AND ACCESSIBILITY

a) **Lease Details:**

Name of mine: The Sandur Manganese & Iron Ore Ltd.,

Lat/long of any boundary point: Pillar No-A138
(N 15° 00' 24.97426" : E 76° 37' 26.30908")
Date of grant of lease: 20th March 2015 with effect from 01.01.2014
Period for 20 years and Expiry Date: 31st December 2033

Name of leaseholder : The Sandur Manganese & Iron Ore Ltd.

Postal Address of Registered Office:

The Sandur Manganese & Iron Ores Limited, Satyalaya, Door No.266(Old no 80),
Behind Taluka office, Palace road, Ward no.1,Sandur 583119, Ballari District, State: Karnataka, Pin Code: 583 119.Phone: 08395- 260301, Fax:08395-260473,
e-mail: eps@sandurgroup.com

b) **Details of lease area with location map :**

Total lease area: 1860.10 ha.
Forest Area: 1612.72 ha, Non Forest Area (Waste land): 247.38 ha

District & State: Bellary & Karnataka

Taluka: Sandur, Village: Kammathur, Deogiri, Subbarayana Halli and Ramgad.

Whether the area falls under Coastal Regulation Zone (CRZ)? : NO

Existence of public road/railway line, if any nearby and approximate distance:

The nearest State High way is Kudligi-Bellary which is 1.1 Kms from the lease. The nearest railway station is Swamihalli which is at a distance of 1.3 Kms. From the mine lease Block A.

Toposheet No. with latitude & longitude of all corner boundary point/pillar:

Topo sheet No.57 A/8, 57 A/12, and 57 B/9

Latitude & Longitude for Toposheet No 57A/8

Latitude	15° 00' 00" N – 15° 15' 00" N
Longitude	76° 15' 00" E – 76° 30' 00" E

Latitude & Longitude for Topo sheet No 57A/12

Latitude	15° 00' 00" N – 15° 15' 00" N
Longitude	76° 30' 00" E – 76° 45' 00" E

Latitude & Longitude for Topo sheet No 57B/9

Latitude	14° 45' 00" N – 15° 00' 00" N
Longitude	76° 30' 00" E – 76° 45' 00" E

The contents of items 6 and 7 of IBM Circular 2/2010 have been complied with and the geo-referenced lease boundaries are superimposed on latest high resolution satellite data and are already submitted along with MMP previously.

c) **General location map showing area and access routes.**

A general location plan marked on a Survey of India topo sheet is enclosed as **Plate No SM-01-Md1.**

3.0 DETAILS OF APPROVED MINING PLAN:

3.1 Date and reference of earlier Approved Mining Plan:

Table No. 1

Sl. No.	Type of Document	Rule	Letter No. and Date	Lease Area in (ha)	ML No.	Proposal period
1	Review and Updation of Mining Plan	17(1) MCR 2016	279/281/91/BNG/2284 dated 07-12-2017	1860.10	2678	2018-19 to 2022-23
2	Modification to the approved mining plan	17(3) MCR 2016	279/281/BNG/1049 dated 19/08/2016	1860.10	2678	2016-17 to 2017-18
3	Modification to the approved mining plan	10 (1) MCDR 1988	279/281/BNG/1858 dated 01/09/2015	1860.10	2678	01/01/2014 - 31/03/2014 to 2017-18
4	Mining plan	24(A) of MCDR 1988	KNT/BLR/MP/FeMn-273-SZ/2103 dated 11/12/2013	1863.02	2580	01/01/2014 - 31/03/2014 to 2017-18
5	Scheme of mining	12(3) of MCDR 1988	KNT/BLR/MS/FeMn-195-SZ dated 15/01/2013	1863.02	2580	2011-12 to 31.12.2013
6	Modification to the approved Scheme of mining	10(2) of MCDR 1988	MS/BLR/FeMn-77-SZ dated 09/12/2010	2005.60	2580	2010-11
7	Modification to the approved Scheme of mining	10(2) of MCDR 1988	MS/BLR/FeMn-77-SZ dated 23/06/2009	2005.60	2580	2009-10 to 2010-11
8	Scheme of mining	10(2) of MCDR 1988	MP/BLR/FeMn-77-SZ dated 28/09/2006	1863.02 & 142.58	1179 & 1952	2006-07 to 2010-11
9	Modified scheme of mining	10(2) of MCDR 1988	MS/BLR/Fe-27-SZ dated 09/09/2005	2005.60	1179 & 1952	2005-06
10	Mining scheme	12(4) of MCDR 1988	MS/BLR/Mn-27-SZ dated 29/10/2002	1863.02 & 142.58	1179 & 1952	2001-02 to 2005-06
11	Scheme of mining	12(4) of MCDR 1988	KNT/BLR/MP-MS-9-SZ dated 18/05/1999	1863.02 & 142.58	1179 & 1952	1996-97 to 2000-01
12	Mining plan	11(4) of MCDR 1988	279/281/91/BNG dated 28/04/1992	1863.02 & 142.58	1179 & 1952	1991-92 to 1995-96

Review and Updation of Mining Plan including Progressive Mine Closure Plan for the financial years 2018-19 to 2022-23 in respect of Manganese and Iron Ore for Mining Lease 2678 was approved vide letter No. 279/281/91/BNG/2284 dated 07-12-2017. **ANNEXURE-07**

3.2 Details of last Modifications (for the previous approved period) to the Approved Mining Plan:

No modification done to the previous approved period, this is the first modification for the same period i.e. financial period 2018-19 to 2022-23 with substantial addition in Iron Ore reserve and proposed production quantity of Iron Ore from 1.6 Million Tonnnes to 3.85 Million Tonnes per annum. There is no major change in Manganese Ore reserve and proposed production quantity of Manganese Ore remains at the same level of 2.54 Lakh Tonnes per annum as approved in the previous approval.

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

The details are given in Tables 2, 3 and 4 as below:

Table No. 2

Review of Exploration

Year	Number of Holes			Drilling Meterage		
	Proposed for the year	Actual	Deviation in %	Proposed for the year	Actual	Deviation in %
2018-19 (Up to 31st July 2018)	15	129	+760	405	6137	+1415
Total						

The excess drilling as compared to proposed drilling was carried to bring G2 level of exploration to G1 level, particularly in Iron Ore bearing areas for confirmation of extent of ore body, as the company intends to go for higher production of Iron Ore. The copy of form I (notice of sinking of Bore hole) submitted to IBM is enclosed as **Annexure No.20** and Bore hole logs enclosed in Plate No. **SM18-Md1.**

Table No. 3

Review of Excavation

Year	Development (t)						Production (t)					
	Manganese			Iron			Manganese			Iron		
	Proposed For the Year	Actual	Dev. In %	Proposed for the year	Actual	Dev. In %	Proposed for the year	Actual	Dev. In %	Proposed for the year	Actual	Dev. In %
2018-19(Up to 31st august 2018)	1553088	1848293	19	703538	842927	19	105837.5	117676	11	666662.5	821838	23

In the above table, as against the proposal of development and production the actual development and production are more because it is given for only 5 months of the financial year 2018-19. However the balance planned quantity will be achieved in the remaining 7 months of the planned period.

Table No. 4

Review of Reclamation

Year	Area in hectare			Quantity in cubic meters		
	Proposed For the Year	Actual	Deviation in %	Proposed For the Year	Actual	Deviation in %
2018-19	0.5	0.4	-20%	57000	56800	-0.35

There is no major deviation. The planned area and the quantities will be achieved by the end of the planned period.

3.4 Status of compliance of violations pointed out by IBM:

The violations pointed out by IBM have been complied with. The copies of compliance reports are enclosed as **Annexure-08.**

3.5 Details of any suspension /closure/ prohibitory order issued by any Government agency under any rule or Court of law:

Pursuant to Hon'ble Supreme Court Order dated 29th July 2011 in writ petition (Civil) No. 562/2009, the mining operations were suspended. On satisfactory compliance of conditions imposed by CEC, The Director, Department of Mines & Geology, Government of Karnataka, as convener of the Monitoring Committee granted permission for commencement of mining activities vide letter no DMG/R&R/2012-13/19 dated 28th January 2013 and accordingly mining operations were resumed in February 2013.

3.6 In case the MP is submitted under rules 9 and 10 of the MCDR, 2017 or under rule 17(3) of the MCR, 2016 for approval of modification, specify reason and justification for modification under these rules.

The present document is prepared for seeking Modifications to the Approved Review and Updation of Mining plan for ML 2678 (old ML-2580), as per Rule 17(3) of MCR 2016.

Reason and justification for Modification:

1. **To facilitate obtaining Environmental Clearance of higher production capacity for Iron Ore:** As per the Environmental Clearance (EC) granted vide letter No.110015/96/2006-IA.II(M) dated 24 January 2007 by the Ministry of Environment, Forests and Climate Change (MoEFCC), production capacity of Iron Ore is 1.60 Million Tonnes Per Annum (MTPA). In accordance with the parameters prescribed by the Hon'ble Supreme Court in Writ Petition (Civil) No.562 of 2009, based on the estimation of reserves as per United Nations Framework Classification (UNFC), Company would be entitled for higher production limits. Accordingly, it is proposed to seek enhancement of EC to enable increase in production of Iron Ore from 1.60 to 3.85 MTPA. Therefore, this modification is made in the approved document for increase in production of Iron Ore from 1.60 to 3.85 MTPA for the period of 2018-19 to 2022-23. However, Manganese Ore production will remain same as approved i.e., 2,54,000 tonnes per annum.
2. **To bring on record the enhanced Iron Ore Reserves & Resources:** Recent exploration has proved additional Hematitic Ore. Further, as per the recent Notification No.C-284/3/CMG/2017 dated 25 May 2018 Hematitic Silicious Ore has been introduced. Hematatic Silicious Ore has been estimated based on the previous exploration data for Iron Ore. The core samples wherever silica is predominantly from quartz are now analysed for Silica %, and they have met the requirement as per the said notification.

3. **To work along the common boundary between Mining Leases No.2678 & No.2679, both belonging to the same lessee namely, The Sandur Manganese & Iron Ores Limited (SMIORE):** The area of ML-2678 is 1860.10Ha and of ML-2679 is 139.20 Ha. For DGMS purpose both the leases together have four mines namely, Deogiri Manganese & Iron Ore mine, Subbarayanahalli Manganese & Iron Ore mine, Ramgad Manganese & Iron Ore mine and Kammathuru Iron Ore mine. Out of four mines there is a common boundary between two leases and the two mines namely Subbrayanahalli Manganese & Iron Ore mine, and Ramgad Manganese & Iron Ore mine. At one of the common boundary point the mine boundary as per DGMS is extending up to 'L' Block (Myadarbanda Pit) of ML-2679 from 'A' Block (KMK-E Pit) of ML-2678. Therefore, 'L' block of ML-2679 is a part of Subrayanahalli Manganese & Iron Ore Mine of ML-2678.Therefore, the proposal is made for the operation along the common boundary at this location. However, excavated material including Ore, Subgrade ore and the waste will be accounted and stacked in respective mining lease only. This operation along the boundary will help in systematic and scientific mining by developing benches in a compact and optimal way and it is possible to extract the entire ore in KMK(E) pit and mineral conservation also is also ensured.

   In this regard, DGMS permission under Regulation 111(1) of MMR-1961 is enclosed for the reference in **Annexure-09** and the surface plan of Subrayanahalli Manganese & Iron Ore Mine in **Plate No.SM20-Md1**.
4. A Downhill Conveyor System (DCS) is contemplated in compliance with the directions of the Hon'ble Supreme Court by Order dated 7 December 2017. It is proposed to set up a DCS between Kammathuru Iron Ore Mine (KTIO) and PMBR (BMM) Siding for environment friendly transportation of Iron Ore.
5. Proposal for installation of Beneficiation plant for production of 3.85 MTPA of Iron Ore of +55% Fe.

The existing permissible annual production limit i.e., 2,54,000 tons of Manganese Ore & 16,00,000 tons of Iron Ore, as approved by Central Empowered Committee (CEC) constituted by the Hon'ble Supreme Court, will be continued to be produced until we get enhancement in EC of higher production capacity for Iron Ore i.e., 3.85MTPA from MoEFCC and subsequent approval from CEC for enhancement in permissible limit of Iron Ore from 1.6MTPA to 3.85MTPA.

Table No. 66

Summary of UNFC Reserves and Resources of Iron ore as on 31.08.2018

	UNFC Code	Quantity (Million tons)	Average Grade (Fe%)
A. Total Mineral Reserves		**101.92**	
Proved Mineral Reserves	111	100.61	50.29
Probable mineral Reserves	122	1.31	49.39
B. Total Remaining resources		**12.94**	
Feasibility mineral Resources	211	12.94	50.29
Prefeasibility mineral resources	221 & 222		
Measured mineral resources	331		
Indicated mineral resources	332		
Inferred mineral resources	333		
Reconnaissance mineral resources	334		
Total Reserves + Resources		**114.86**	

MANGANESE ORE:

Table below gives the summary of UNFC classification of Reserves and Resources for Manganese ore as on 31.08.2018.

Table No. 67

Summary of UNFC Reserves and Resources of Manganese ore as on 31.08.2018

	UNFC Code	Quantity (million tons)	Average Grade (Mn %)
A. Total Mineral Reserves		**13.354**	
Proved Mineral Reserves	111	13.309	22-28
Probable mineral Reserves	122	0.045	22-28
B. Total Remaining resources		**0.415**	
Feasibility mineral Resources	211	0.415	22-28
Prefeasibility mineral resources	221		
Measured mineral resources	331		
Indicated mineral resources	332		
Inferred mineral resource	333		
Reconnaissance mineral resources	334		
Total Reserves + Resources		**13.769**	

2.0 MINING:

A. OPEN CAST MINING:

a) Briefly describe the existing as well as proposed method for excavation with all design parameters indicating on plans /sections.

The Mining Operations in the Mining Lease area is being carried out for more than a century. Opencast method of Mining is being practiced, since from inception. The mining operations for Manganese Ore was manual to semi-mechanized for a long time and presently the operations are mechanized, but manganese ore sorting is still continued manually. Mining operations for Iron Ore is highly mechanized. Ore body's are sedimentary formation in nature continuing from the top as out crop & dipping to a consistent depth. The foot wall is shales , phylite & BHQ & the hanging wall is generally laterite and lateritic Iron & Manganese ore. The proposed modification is for enhancement of the production capacity of Iron Ore from 1.6 to 3.85 MTPA.

Existing Method of Mining for Manganese Ore:

Mining is carried out by open cast method. Mechanized mining with deep-hole drilling & blasting of the overburden and short hole drilling with jack hammer & blasting for the manganese ore bodies is carried out. Down the hole (Deep hole) drilling & scientific blasting is carried out for loosening OB/SB/IB of hard strata and the self-dig gable cum blasted muck is excavated by using Heavy Earth Moving Machineries like Hydraulic Excavators (back hoe) with a bucket capacity of 0.9 to 1.6 m^3 and the material is loaded on to the dumpers which in turn are transported to designated dumps. Short holes are drilled with jack hammer to a depth of 2 ½ to 5 feet on the Manganese Ore pockets which are charged & blasted to a desired size and the blasted ore is loaded on to the tippers by wheel loaders which in turn is transported to the designated sorting yard.
From August 2017, mechanized method of operation of Manganese Ore pockets has been introduced by engaging Xcentric Ripper which is a patented external attachment for the Back hoe of suitable capacity by replacing the bucket. This machine reduces Jack hammer drilling & blasting and enhances the productivity where the ore bodies of sufficient width is available.

Generally the benches are formed parallel to the slope of the hill as external box-cuts with a few pits as internal box-cut depending on the nature of the ore bodies. The formation of the mine pits are as per the permissions given by Director General of Mines Safety & other statutory agencies. Mining is carried out by forming open pits which are expanded horizontally as well as vertically as the mining progresses. The existing benches are of 4 to 7.5 m height and width range from 7.5 to 25 m. Benches are maintained safe and stable with safety bunds at the edge of the bench with a minimum of 0.5 meter. The overall pit slopes are maintained at about 20^0 to 30^0, which is less than the angle of repose of loose material. As the benches advance, the access roads to the each bench are also modified with in the stipulated gradient permitted by the DGMS. Over Burden (OB) handling is more due to higher stripping ratio of 1:20 to1:25.

Year wise tentative excavation calculation details of development and production of Iron ore pits are given in **Table Nos 82 to 90** at the end of the text. During the first year planned quantity is 3180801t and already produced is 669199t, total of this is 3850000t.

Year wise tentative excavation plans are enclosed as **Plate No. MP-02c-Md1 to MP-02g-Md1, MP-03c-Md1 to MP-03g-Md1, MP-06c-Md1 to MP-06g-Md1, MP-15c-Md1 to MP-15g-Md1, MP-18e-Md1 to MP-18g-Md1, MP-26c-Md1 to MP-26g-Md1, MP-28c-Md1 to MP-28g-Md1, MP-30c-Md1 & MP-30d-Md1, and MP-29c-Md1 to MP-29g-Md1.**

Year wise tentative excavation sections are enclosed as **Plate No. MP-02h1-Md1 & MP-02h2-Md1, MP-03h1-Md1, MP-02h1-Md1 & MP-02h2-Md1, MP-06h-Md1, MP-15h-Md1, MP-18h-Md1, MP-26h-Md1, MP-28h-Md1, MP-30h1-Md1 & MP-30h2-Md1.**

Production Summary: Annual planned production and development quantities are as follows,

Table No 91
Summary of Production and Development

Year	For Iron Ore		For Manganese Ore	
	Production(t)	Development(t)	Production(t)	Development(t)
2018-19	38,50,000	1008085	2,54,000	3376244
2019-20	38,50,000	1258249	2,54,000	3998427
2020-21	38,50,000	1597414	2,54,000	4395717
2021-22	38,50,000	2829314	2,54,000	6375948
2022-23	38,50,000	3597582	2,54,000	6600853

II) Dump re-handling (for the purpose of recovery of mineral):

Manganese Ore:

Sub grade dumps which were identified & quantities estimated while preparing R&R report by ICFRE and subsequently approval by CEC is given in the below Table No 92. If there exist demand in the market the ROM from these dumps will be sold as is varies basis, but any sale/ dispatch from these dumps is not a part of CEC/EC production limit as per Supreme Court Judgment Dated: 18-04-2013. The copy of Judgment enclosed as **Annexure-12**. If the existing sub-grade stacks are found to be in the areas planned for development and production, they will be re-handled. There is no proposal made for dump re handling for the purpose of recovery of the mineral during this plan period of 2018-19 to 2022-23.

24	KG & TNP	KG3-IO	950	937	22425	44850
25	KG & TNP	KG4-IO	940	938	3500	7000
Total					**549356**	**2352552**
					Say	**2.35 MT**

c) Individual year wise development plans and sections showing pit layouts, dumps, stacks of mineral reject, etc.

Year wise development and production are planned for the quantities as per the table given below

Table No.94

Year wise handling quantity in Tonnes

Year	Waste	ROM		Hematatic silicious ore	Top soil	Total
		Mn ore	Fe ore			
2018-19	5198981	616855	3708540	395989	112875	10033240
2019-20	6023636	616855	4362517	542060	85650	11630718
2020-21	6339120	616855	4362540	564340	108900	11991755
2021-22	10214261	616855	4362535	699330	98325	15991306
2022-23	11481416	616855	4362610	499110	93375	17053366
Total	**39257414**	**3084275**	**21158742**	**2700829**	**499125**	**66700385**

d) Describe briefly giving salient features of the proposed method of working indicating Category of mine.

The mine is in 'A' Category Fully mechanized mine with open cast method of mining.

Lease area consists of Manganese Ore as well as Iron Ore. It is proposed to operate 11 pit in Manganese Ore sections and 6 pits in Iron Ore sections. Out of 11 Manganese ore pits in 8 pits low grade Iron Ore is associated with Manganese ore and this low grade Iron Ore excavation is incidental during the development for Manganese Ore and are considered as Iron ore ROM and proposed for wet processing. Out of 6 Iron ore pits, in 3 pits incidental low grade Manganese ore will be excavated and will be stacked separately as Manganese ore Mineral reject.

Operations in manganese pits are Mechanized as well as manual. Deep hole drilling & blasting will be carried out for loosening OB/SB/IB/Iron ore and excavation will be carried out by using Heavy Earth Moving Machineries like Hydraulic excavators, wheel loaders etc. and loaded on dumpers and transported to designated dumps/stock yard. Due to pockety nature of the Manganese Ore body, which is contaminated with interstitial waste (gang-matti), after jack hammer drilling & blasting in Manganese Ore pockets and these material is loaded by wheel loaders on tippers and transported to sorting yard where the ore pockets are manually sized, hand sorted at sorting ground by gang workers where gang-matti is separated and quality wise ore is segregated. Each gang consists of 9 members and output per man shift is in the range of 1 to 1.5 tons. Operations in Manganese ore pockets are now partially mechanized by using X-centric Ripper instead of Jack hammer drilling & blasting.

The mine workings in case of Iron Ore deposit are fully mechanized, where Ore and OB are handled mechanically. The mechanized operation includes deep-hole drilling and blasting, heavy earth moving machinery like Excavators, Wheel loaders, Rock breaker, Dumpers, and Tippers, water tanker etc.

Systematic mine benches are formed by Heavy Earth Moving Machinery (HEMM) based on the designed year wise production plans and within the permissions given by statutory agencies where the height is maintained at 7.5 meters maximum & the width of the benches are more than the height. When the strata are hard drill holes are marked on the bench floor with proper burden & spacing by the statutory team. Down the hole drilling with 10% sub grade drilling is carried out. The holes are then charged under the supervision of statutory team with explosives. Generally Ammonium nitrate based slurry (30 % booster) & Prilled Ammonium nitrate mixed with 5 to 7 % HSD (70 % primer) is used. The connection circuit with delays is connected to achieve better fragmentation & also in reducing Ground Vibrations & Air over pressure, after ground clearance shots are fires by the competent person authorized for blasting operations by the respective Mine Manage under his jurisdiction. The strata like Overburden /Side burden / Inter-burden/Iron ore gets loosened and excavation of the material will be carried out by using Heavy Earth

Moving Machineries like Hydraulic excavators (backhoe), wheel loaders(Front end loaders) etc and the material is loaded onto the dumpers & transported to the designated dumps/stock yard. Very hard oversize boulders which is about 5% of the blast remains have to be reduced in size either by drilled with jack hammer charged with 25 mm cartridges & blasted or they are disintegrated into smaller fragments by rock breaker to be handled by Excavators.

Proposals under consideration

1. Increase in Iron Ore production from 1.60MTPA to 3.85MTPA after approval of Environmental Clearance from MoEFCC & CEC approval for enhanced quantity, until then the existing limit of production of Iron Ore 1.60MTPA and Manganese Ore 2.54LTPA will be continued.
2. Proposal for Commissioning 3.0 MTPA beneficiation plant at mine site.
3. Downhill conveyor system (DCS) for transportation of Iron ore from Kammathuru Iron Ore Mine to the nearest Railway Siding PMBR (BBM) siding, in place of conventional mode of transport using trucks.
4. The approach roads from the active pits to the designated waste/sub-grade & mineral reject dumps in the mining lease area are proposed to be tarred (bituminous) to improve efficiency of the Heavy Earth Moving Machinery & to minimize the effect on environment at an additional cost to the company.
5. The external roads for a length of 35 kilometers connecting the mining lease which is used to transport the minerals form the ML are planned to be tarred (bituminous) & cement concerted for improving the surrounding environment & good accesses to the surrounding villages.
6. The internal development trucks are fitted with GPS to monitor & improve their efficiency.
7. Use of in-pit crushing & screening plant for Iron ore process.

e) Describe briefly 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. A reference to the plans and sections may be given. UPL or ultimate size of the pit is to be shown for identification of the suitable dumping site.

Pit wise and year wise mine workings are designed for the planned period i.e. from 2018-19 to 2022-23. The mine benches are designed with bench height of 7.5 meters with 70 degree angle and bench width as 7.5 meters, with provision for having roads, bunds and drainages. Pit layout of mine workings for Manganese & Iron Ore pits are presented in various plates as shown in **table no. 95.**

Table No. 101

Mineral Reject Stacking Locations Iron Ore Pits

Pit No	Name of the pit	HSO Stacking Locations
1	Kammathuru-A(KTIO-A) Kammathtu-B(KTIO-B)	N 1659494 TO 1659897 E 675432 TO 675835
2	Kanavihalli(KVHIO)	N 1661046 TO 1661165 E 664926 TO 665080

Table No. 102

Mineral Reject Stacking Locations Manganese Ore Pits

Pit No	Name of the Pit	Mineral Reject Stackinglocation
1	Jadikolla (JLK)	N 1659200 TO 1659400 E 676000 TO 676200
2	Yerandari (YRD)	N 1658740 TO 1659000 E 674400 TO 674800
3	Ramakolla (RMK)	1. N 1658317 TO 1658600 E 673730 TO 674000 2. N1658150 TO 1658378 E 673517 TO 673730
4	Chinnabudanagundu(CBG)	N 1657750 TO 1658000 E 671600 TO 672000
5	Sillukolla (SK)	N 1657960 TO 1658854 E 670000 TO 670400
6	Kanigemaradakolla-E(KMK-E)	N 1658332 TO 1658556 E 668800 TO 669092
7	Kanigemaradakolla-(KMK)	N 1658291 TO 1658569 E 668857 TO 669128
8	Neerkolla(NK)	N 1658690 TO 1659000 E 667016 TO 667378
9	Kappataswamy (KPTS)	1.N 1658844 TO 1659133 E 665694 TO 666200 2.N 1658600 TO 1658869 E 666400 TO 667020

Table No. 103

BHQ Stacking Locations

Pit No	Name of the pit	BHQ Stacking Locations
1	Kammathuru-A(KTIO-A) Kammathtu-B(KTIO-B)	N 1658440 TO 1658885 E 677248 TO 677553
2	Kanavihalli(KVHIO)	N 1661046 TO 1661165 E 664926 TO 665080
3	Ramanayakana Pit (RNP	N 1662627 TO 1662800 E 664044 TO 664247

Requirement of Machinery:

In view of saleable ore production of 3.85MTPA of Iron ore and 2.54LTPA of Manganese ore,the following list of machineries are projected.

Table No. 104

Sl.No	Type of Machines	Proposed Numbers	Capacity
1	Excavators	60	0.9 to 1.6 M^3
2	Haulage trucks of 16 tons capacity	377	16 to 25 tons
3	Wagon Drills	32	115 mm
4	Compressors	12	10 to 14 M^3
5	Jack hammer Drill	18	
6	Wheel Loaders	54	1.6 to 3.6 M^3
7	Mobile Screen & Crushing plant	10	150 to 450 TPH
8	Crusher for crushing over size Iron Ore	06	100 to 350 TPH
9	JCB	17	0.4 to 0.7 M^3
10	Rock breaker	06	25 to 50 Tons/Hr.
11	Water Tanker	44	5 KL to 12 KL

12	X-Centric Ripper	01	40 to 60 Tons / Hr.
13	Downhill Conveyor System	01	300 TPH
14	Ore Beneficiation Plant(Wet)	01	300TPH & 100TPH
15	Explosive Magazine	04	
15	Explosives Vans	06	4 Ton
16	HSD TANKERS	06	12 to 20 KL
17	Bus	06	
18	Utility vehicles	06	
19	Jeeps	15	

Justification in respect of excavators, trucks and drills: Excavators used presently are with the bucket capacity ranging from 0.9-1.6 m^3. For different capacity excavators different handling per hour varies, namely for 0.9 m^3 bucket capacity 70 m^3 per hour handling is considered and for 1.6 m^3 bucket capacity 140 m^3 handling is taken. Thus the total number of excavators proposed is 60 in no, to handle 6051270 m^3 of material. For transportation of waste to the designated dump yard and ROM to the stack yard 16 and 25 tonne capacity trucks / dumpers are proposed. The distances from the mine pits to the dumps and stack yards vary from 1.5 km to 5 kms. Thus the handling of the material ranges from 1 trip to 3 trips per hour. Therefore total no of trucks / dumpers proposed are 377 no's for the proposed handling of 6051270 m^3 quantity. For the purpose of blasting each hole is drilled for 8.75 m depth which includes sub drilling also for the benches of 7.5 m height, thus for handling 6051270 m^3 material 691574 m of drilling is required. To achieve this 12 wagon drill with performance of 30 m per hour drill machines are proposed for 250 days with 8 hours working in each day.

Excavators are used for development, ore production, feeding of Ore to Crushing & Screening plants & loading of ore onto trucks for dispatch. Higher capacity excavators are to be deployed in Mine & lower capacity excavators for feeding the processing plant. Dumpers are deployed for conveying the material from the mine to the dump or Stock yard. Wheel loaders are used for general work and for removing ore from the mobile crushing & screening plants & terracing of dumps. Ore loading for dispatch is also done as & when required, JCB are deployed near weigh bridges either to add or remove excess quantities of ore from the trucks near weigh bridges.

New pits in virgin areas are planned for which the requirement of Explosives & its storage will be planned appropriately. Drills are deployed in hard strata for drilling holes which in turn are charged & blasted for loosening the same. Screening & Crushing plant both Stationary & mobile will be used for sizing & screening the ore. Iron ore is sized and screened using mobile plants till a semi-permanent plant is erected. Once the semi-permanent plant comes up some of the mobile units will be de-commissioned. Ore beneficiation plants are proposed to be set up for annual production of 3.85 Million tons of Iron ore and 1.6 lakh tons of Manganese ore for upgrading the low grade ores.

Downhill Conveyor system is planned for conveying part of the Iron Ore from the Kammathuru Iron Ore Pit. i.e., from bottom of the pit at western end to PMBR

(BMM) Railway siding. This will meet the requirement of fine ore transportation which constitutes 80 to 85 % of the production from this pit. The planned capacity is 300 TPH. This will be supported by matching arrangements for feeding in the mining area & for movement of ore away at the head end near the siding.

f) Conceptual Mine Planning:

The exploration by drilling has been carried out covering almost entire lease area. Recently, additional exploration has been carried out by drilling 129 holes mainly in Iron ore bearing areas and Hematatic Silicious Iron ore also estimated separately by analyzing Silica percentage. All this has resulted in addition of Iron ore reserves. Accordingly, Iron Ore reserves are re-estimated by using all the exploration data and exposures in the existing pits. Thus the revised Manganese and Iron ore reserves and resources are as below.

Table No. 105

Manganese Ore and Iron Ore Reserves & Resources

Manganese Ore in Million tons		**Iron Ore** in Million tons	
Reserves	Resources	Reserves	Resources
13.354	0.415	101.92	12.94

Lease area consists of Manganese Ore as well as Iron Ore. Presently, there are only two pits/areas which are exclusively for Iron Ore, where as there are more than 28 pits/locations of Manganese predominant areas where low grade Iron Ore is associated with Manganese ore and this low grade Iron Ore excavation is incidental during the development for Manganese Ore. The Ultimate Pit Limits are designed separately for Manganese predominant areas including low grade Iron Ore and separately for exclusive Iron Ore pits, up to the bottom most depth of ore body intersection. Ore to waste ratios are estimated using Datamine software. The mineable reserves of manganese ore are 13.354 million tonnes and estimated waste generation will be about 260.98 million tonnes (130.39million m^3). And the mineable reserves of Iron ore are 101.92 million tonnes and estimated waste generation will be about 81.00 million tonnes (40.50 million m^3). Conceptually, the detail exploration by Core drilling, RC and DTH drilling has been carried out covering almost entire lease area.

Planning for production of 0.254 million tonnes of manganese ore per year and 3.85 Million tonnes of Iron Ore along with waste dump planning is already discussed in above paragraphs for the years 2018-19 to 2022-23 (Plan period). There is sufficient area available to accommodate the waste to be generated during the plan period.

The conceptual production of Manganese & Iron ore along with waste handling for the remaining reserves up to the end of mining lease period i.e up to 31-12-2033 at 5 yearly periods is given in the table below.

The quantity of overburden/ waste material and Mineral Reject to be mined and disposed during this plan period is given below.

Table No. 108

Quantities of overburden, Waste and Mineral Reject

Year	Waste (Cum)		Mineral Reject(Cum)		
	B.H.Q.	Shale, Clay, Phyllite and Igneous intrusion	Manganese Ore	Hematatic Silicious Iron Ore	Top soil
2018-19	176580	2192160	128120	166730	76250
2019-20	83870	2628340	128120	228230	57100
2020-21	143000	2996560	128120	237620	72600
2021-22	110490	4602630	128120	294460	65550
2022-23	270630	5099220	128120	210150	62250
Total	**784570**	**17518910**	**640600**	**1137190**	**332750**

The locations of disposal of Waste and stacking of Mineral reject are discussed in para 2(e) and 4(b).

The grades of hematitic silicious ore is ranging from 35-45 % Fe and silica is ranging from 15 to 40. Whereas in case of BHQ grade range is from below 35% Fe and silica is above 20%, these are stacked separately.

b) The proposed dumping ground within the lease area be proved for presence or absence of mineral and be outside the UPL unless simultaneous backfilling is proposed or purely temporary dumping for a short period is proposed in mineralized area with technical constraints & justification.

The proposed dumping grounds are proved for the barrenness and are located outside the UPL.

Simultaneous backfilling:

The simultaneous back filling locations mentioned below will be proved for barrenness before taking for back filling by drilling few holes. For each of the locations, necessary approvals will be obtained before starting the back filling.

1. **KTIO-A:** In the western end of the pit bottom Iron ore is expected to be exhausted by the end of year 2018-19. At the pit bottom BHQ formations are intersected in the bore hole, hence this part of the pit is proposed for stacking of incidental excavation of BHQ during development/mining of Iron Ore for the period 2018-19 and will continue progressively.
2. **SK**: Central part of the pit there is a meager quantity of ore which is planned for production during the year 2018-19, on exhausting ore there, back filling is proposed from 2019-20 and is presented in **Plate No. MP - 19d to g.**
3. **KMK-E:** Ore zone has been encountered as per the bore hole drilled at the bottom most portion of the pit. To extract the entire ore, ore to waste ratio goes beyond 1:200, and the operation becomes un-economical, therefore exploratory mining was proposed in this area for the year 2017-18 to extract the feasible ore with safety. After removal of this ore back

filling is proposed in this area from 2018-19 onwards and is presented in **Plate No. MP- 21c to g.**

4. **Chance:** Pit bottom out side UPL which is proved barren is proposed for back filling. Bottom most level of the pit is proposed for exploratory mining, if the quality is found poor, then entire pit bottom is proposed for progressive back filling, since ore to waste ratio is too high and is not economical to mine the ore from pit bottom and is presented in **Plate No. MP -23c**
5. **NK:** Pit bottom out side UPL which is proved barren is proposed for back filling and is presented in **Plate No. MP -24c to g.**

Purely temporary dumping for short period:

In view of poor market condition and fall in manganese ore prize, in some of the manganese pits temporary dumping for short period is proposed to reduce the cost of production. Waste transportation is one of the major costs in Manganese ore production as ore to waste ratio is higher. The pits proposed for temporary dumping are YRD, CBG & KMK and is presented in **Plate Nos. MP-11c to g,, 17c to g, & 22c to g.**

Backfilling in worked out pit:

In approved location:

1. **JLK:** Back filling will continue in the already approved area by dumping waste from JLK/KTIO and if need be there from YRD pit also.
2. **Konadahejje pit** located near KVHIO mine is proved for its barrenness by drilling holes and is proposed for back filling with waste generated from KVHIO & S.Bencha pit. This can accommodate 529266 Cu. m. of waste in an area of 3.3 Ha.

KTIO-A, SK, KMK-E & Chance pit as mentioned above.

c) Attach a note indicating the manner of disposal of waste, configuration and sequence of year wise buildup of dumps along with the proposals for protective measures.

Step wise dumping method will be followed in a retreating way, starting from the bottom most level. The height of each step will be limiting to maximum 20 meters and the width at 10 meters. The dumps are so designed that the overall angle is less than the natural angle of repose and the gradient on the top of the dump is so maintained that it forms a gentle gradient of 1 in 200 & this slope will be away from the dump edge. Surface drains will be connected to the natural drainage for the water to flow to the silt settling pond. Toe walls will be constructed to arrest silt going outside the dumping area. Appropriate drainages will be created so that over flow will be directed to Silt Settling Ponds with successive boulder check dams to arrest the flow & silt, Rain water harvesting pits are constructed at certain distances, so that clean water is stored & excess water flows the downstream. Once

6.0 PROCESSING OF ROM AND MINERAL REJECT:

a) If processing / beneficiation of the ROM or Mineral Reject is planned to be conducted, briefly describe nature of processing / beneficiation. This may indicate size and grade of feed material and concentrate (finished marketable product), recovery etc.

Mineral Beneficiation of low grade Manganese Ore, analyzing from 25 to 35% Mn is being proposed in a small scale of 100 Tons/hour capacity.

Manganese Ore beneficiation Test:

The Beneficiation Test on Manganese ore was carried out in a Laboratory scale by Tenova- Delkor Technik India Pvt Limited Bangalore. Lab is located at Pinnya Industrial estate. initially on size range -40+20mm,-20+12mm,-12+5mm,-5+3mm. Subsequently test was carried-out on ROM also. Based on these tests and experiments a flow sheet has been prepared for construction of beneficiation plant.

The flow sheet is prepared for Mn ore with feed capacity of 100 TPH. While mining for Mn ore, there is incidental production of low grade Iron orc which can also be beneficiated in the same plant with minor alteration in the flow sheet. Mineral Beneficiation of low grade Manganese Ore, analyzing from 25 to 35% Mn is being proposed in a small scale of 100 Tons/hour capacity. The process involves crushing, scrubbing, wet screening and jigging.

Crushing: ROM is fed to bunker, and to vibrating Grizzly of size 40mm. +40 mm oversize material from grizzly fed to crusher to make uniform size of below 40mm. All below 40mm product from crusher and grizzly underflow fed to scrubber.

Scrubbing: -40 mm is thoroughly washed in the scrubber and passes to triple deck screen.

Wet screening: Scrubbed ore is fed to wet triple deck screen. The products sizes will be, -40+20mm, -20+12mm, -12+3mm and fines -3mm.

Jigging: The coarser size particles are exclusively treated in jig. Here particles will get separated according to their Specific gravity. Jigging products are of four types, i.e. concentrate, middling, tailing and hutch. Hutch consisting of fine size of below 1 mm will go to Thickener and remaining coarse products will be collected under the belt.

Cyclone classifier: -3mm particles from wet screen go to spiral classifier. -3 mm +0.1 mm particles from classifier will be collected as concentrate. -0.1mm will be fed to Hydro cyclone. Classifier concentrate and Hydro cyclone under flow will be fed to Dewatering Classifier(DWC). DWC product collected as concentrate.

Thickener: DWC under flow water & cyclone over flow water fed to thickener. Thickener under flow in the form of slurry collected as tailing

containing 50% solids and will be fed to filter press to recover water. 75% of water is recovered from thickener overflow and Filter press. Final Tailing contains about 10-12% moisture which will be in the form of cake.

Iron Ore Beneficiation:

Based on these tests carried out earlier, a flow sheet has been prepared for construction of two beneficiation plants with feed capacity of each 300TPH.

The flow sheet is prepared for Iron Ore with feed capacity of 300TPH. The low grade Iron ore of quality ranging from 51-52% Fe, can be beneficiated by crushing, scrubbing, wet screening, Hydro cycloning and Magnetic Separation.

Crushing: ROM is fed to bunker, and to vibrating Grizzly of size 40mm. +40 mm oversize material from grizzly fed to primary Jaw crusher and followed by cone crusher to make below 20mm sponge iron size. Below 20mm material fed to the wet single deck screen to separate -20+5mm and -5mm sizes. to make uniform size. All below 40mm product from grizzly underflow fed to Wet Drum Scrubber.

Scrubbing: -40 mm is thoroughly washed in the scrubber and passes to Double Deck Screen.

Wet screening: Scrubbed ore is fed to wet Double Deck Screen. The products sizes will be, -40+10mm, and fines -10mm and the product will be stacking separately.

Screw Classifier: -10mm and -5mm particles from wet screen will go to Screw Classifier. -10 mm +100# particles from classifier will be collected as concentrate. -100# will fed to Primary Hydro cyclone (15") and Primary Hydro Cyclone overflow to Secondary Hydro Cyclone (5"). Both cyclones under flow material pass through the WHIMS (Wet High Intensity Magnetic Separator). The Mag concentrate is fed to Dewatering screen (DWS). DWS product collected as concentrate.

Thickener: DWS under flow water, Non Mag from Magnetic Separator & secondary cyclone over flow water fed to thickener. Thickener under flow in the form of slurry collected as tailing containing 50% solids and will be fed to filter press to recover water. 75% of water is recovered from thickener overflow and Filter press. Final Tailing contains about 10-12% moisture which will be in the form of cake.

c) Explain the disposal method for tailings or reject from the processing plant.

Tailings will be in the form of cake with moisture content of about 10-12%. Such tailings will be stack separately adjacent to the plant or will be stored in the worked out part of the pit and will be sold directly depending on the demand or can be used for making bricks or rejects will be undertaken by Hydro-metallurgical methods to recover the balance material.

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.

As the proposed wet beneficiation to process the low-grade Iron Ore is only about 300 tons/hour, the quantity of tailing to be generated will be about 50-60 tons/hour with less than 35%Fe and in case of Manganese Ore it will be about 12 to 18 tons per hour with about 17% Mn & 30% Fe. These tailings will be in the form of cake with moisture content of about 10-12%, hence it will become dry immediately. Such tailings are proposed to stack separately adjacent to the plant or will be stored in the worked out part of the pit and will be sold directly depending on the demand or can be used for making bricks or rejects will be undertaken by Hydro-metallurgical methods(Leaching) to recover the balance material.

All precautions & protective measures implemented & there is no toxic effect of tailing.

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

No chemicals will be used at beneficiation, processing plant except the use of flocculent for faster settling of fine particle at thickener at the rate about 300 to 400 grams per ton of incoming material to thickener.

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

Not applicable.

g) Indicate quantity (cum per day) of water required for mining and processing and sources of supply of water, disposal of water and extent of recycling. Water balance chart may be given.

Water required for Mining:

Table No. 110

Details of water requirement

Sr.No	Purpose	Quantity required Cum/day
1	Dust Suppression	745
2	Greenbelt	
3	Workshop	
4	Crusher-Iron ore	
5	Domestic (Mines)	480
6	Beneficiation plant	3000

Apart from the above, recycled water from Sewage treatment plant, Rain Water Harvesting Pits and Roof Top Rain water Harvesting is being used for dust suppression and watering the plants.

Water required for beneficiation:

The proposed thickener will supply nearly 75% of the water required for the plant by recirculation of water from the thickener, therefore makeup water requirement will be minimum, i.e. 25 %. As per the calculation, it is estimated that to start with the plant about 10400 Cubic meter of water is required for 600 Tons/hour capacity of Iron Ore plant and 100TPH of Manganese Ore, further the requirement of makeup water is only about 3000 Cubic meter per day. The source of water is bore wells. There is no disposal of waste water.

7.0 OTHER:

Describe briefly the following:

a) Site services:

i) Transportation facility provided for mine staff & workers.

ii) Fully furnished mine office for office staff and for maintenance of records.

i) Electricity and water supply for drinking & domestic use.

ii) First Aid and medical facility.

iii) Canteen,

iv) Crech,

v) Training Center,

vi) Hospital/dispensary

vii) Accommodation & House Rent Allowance.

b) Employment potential :

Highly Skilled-	074	Members
Skilled:	609	Members
Semi-Skilled:	695	Members
Un-Skilled:	223	Members

8.0 PROGRESSIVE MINE CLOSURE PLAN UNDER RULE 23 of MCDR' 2017:

The Progressive Mine Closure Plan is prepared as per Rule 23 of MCDR 2017.

8.1 ENVIRONMENTAL BASE LINE INFORMATION

The baseline environmental qualities of various environmental components like air, noise, water, land, flora and fauna and socio-economic form an important and integral part of any environmental study. The baseline data forms the basis for predicting/assessing the environmental impacts of the proposed project. The baseline environmental quality is assessed through field surveys within the impact zone as well as secondary data for various components of the environment, viz. air, noise, water and land and socio-economic.

In the present case it is an already existing operating mine, environmental monitoring and all the required statutory requirements have been implemented. Hence, the latest data collected in these regard are considered as baseline data. The latest environmental monitoring report enclosed as **Annexure 13.**

Table No. 111
EXISISTING LAND USE PATTERN

Sl No	Land use	Area in Ha
1	Pit	434.33
2	Waste dump	377.02
3	Mineral Storage (Subgrade/Saleable)	101.23
4	Roads	29.16
5	Infrastructure (including Camp, magazine, work shop, processing plant, shelters, offices Engineering structures etc.)	47.62
6	Safety Zone	54.67
7	Biodiversity area	2.50
8	Area reserved for future mining operation including pits, dumps, ore stacking, processing plant, plantation etc.	813.57
Total		**1860.10**

a. Water Regime

The average annual rainfall in the region is for the past 4 years is about 731 mm. The baseline water quality status in the region is established by analyzing surface water and ground water. Water requirement at site would be met through ground water supply.

Surface water regime: There are no surface water sources or reservoir with in Mining area. The source of water is the rain water gushes out as spring during monsoon. There are 3 such springs in Deogiri mine group (Durgammana kola, Jaldikolla & Katashingakolla) and 2 springs in Ramgad mine group, which provide water for drinking and domestic use for the colony.

reclamation and rehabilitation of the area. Top soil will be collected regularly when top benches are moved, wherever it is available during the plan period.

8.3.3 TAILINGS DAM MANAGEMENT

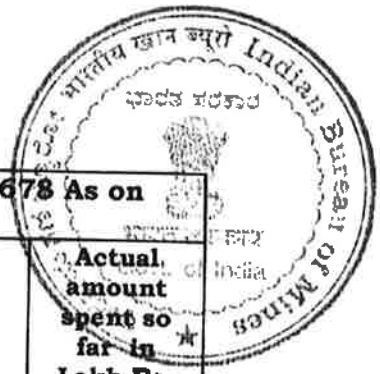
As the proposed wet beneficiation to process the low-grade Iron Ore is only about 300 tons/hour, the quantity of tailing to be generated will be about 50-60 tons/hour with less than 35%Fe and in case of Manganese Ore it will be about 12 to 18 tons per hour with about 17% Mn & 30% Fe. These tailings will be in the form of cake with moisture content of about 10-12%, hence it will become dry immediately. Such tailings are proposed to stack separately adjacent to the plant or will be stored in the worked out part of the pit and will be sold directly depending on the demand or can be used for making bricks or rejects will be undertaken by Hydro-metallurgical methods(Leaching) to recover the balance material. All precautions & protective measures implemented & there is no toxic effect of tailing.

The Design practice emphasis on optimum Fe up gradation and high recovery of concentrates using the state of art technologies. Air - Pulsated jigs, spirals and slow speed classifiers, hydro cyclones, log washers, recuperates, floated density separators and wet high intensity magnetic separators and a wide range of process controls. This coupled with the computerized mine planning and blending through intermediate stockpiles, allows mining of low grade ores and yields iron ore lumps and fines and recoveries high. Iron Ore recovery using high gradient permanent magnetic separator is one of the major innovation now a days. It is a matrix type separator employing permanent ferrite ceramic type magnetic to generate high magnetic field gradients capable of separating magnetic / Paramagnetic material from non - magnetic. Ferrous Wheel Separator (FWS) is used for beneficiation of ultra-fine hematite.

8.3.4 ACID MINE DRAINAGE: Not applicable.

8.3.5 SURFACE SUBSIDENCE MITIGATION MEASURES THROUGH BACKFILLING OF MINE VOIDS OR BY ANY OTHER MEANS AND ITS MONITORING MECHANISM.

In this mining lease, mining is going on for more than 10 decades. The formation encountered during mining is semi soft to hard sedimentary formations. To avoid any surface subsidence the mitigation measures implemented are systematic and scientific way of configuration of mine benches and the waste dumps. Mine benches are formed in such a way that the width of the bench is always kept more than the height such that it will take care of any surface subsidence. Garland drains are constructed to avoid collection of water during monsoon on mine benches and on dumps also. While dumping the waste, retreating method of dumping from the lowest level is being implemented with maximum height of each step being 20 meters and width of the berm not less than 10 meters. The ultimate slope of the dump is maintained at around 28°. Dump slopes are stabilized by covering with geotextile mat and plantations. Systematic drainage is provided with proper toe wall at the dump bottom to avoid any chance of surface subsidence.



Implementation Status of R & R WORKS -ML NO 2678 As on 31.08.2018				
Sl. No	**Particular Item**	**Units**	**Work done**	**Actual amount spent so far in Lakh Rs.**
1	Toe wall cement Masonry	M^3	11469.00	370.72
2	Toe wall Dry	M^3	15782.00	204.52
3	Garland drain	M^3	14043.00	29.11
4	Geo textile cover on dumps	Ha	4205.00	792.58
5	Plantation on dumps	Ha	136.32	213.88
6	Retaining wall	M^3	5126.50	38.43
7	Silt settling tank 20 x 10 x 3 mtrs	No's	22.00	315.57
	Silt settling tank 30 x 15 x 3 mtrs	No's	28.00	
8	Loose boulder check dam	M^3	3895.00	36.15
9	Earthen check dam	M^3	16230.00	24.81
10	Stone masonry check dam	No's	26.00	120.38
11	Rain water harvesting pit	No's	43.00	160.98
12	Gully plug	M^3	1556.00	11.37
13	Mine drain\pit drain	M^3	5042.00	39.42
14	Avenue plantation	Ha	20.97	48.92
15	Green belt development in safety zone	Ha	53.81	35.40
16	Gap plantation	Ha		33.61
17	Installation of pipe line for drainage			213.79
18	Machinery hire for other works			309.12
				2998.76

Year wise Reclamation and Rehabilitation measures to be taken up during plan period are given below.

Table No. 118

Year-wise reclamation and rehabilitation measures to be taken up

Sl No	Particular	2018-19	2019-20	2020-21	2021-22	2022-23
1	Retaining Wall (m)	350	350	250	200	200
2	Garland drain(m)	240	210	20	40	40
3	Check dam(m)	20	0	0	0	0
4	No. of saplings to be planted	50000	50000	50000	50000	50000
	Rate of survival	65%	65%	65%	65%	65%
	Area(ha) for gap filling	20	20	20	20	20

For plantation purpose gap filling area is shown since area proposed in R& R plan is already covered.

8.6 FINANCIAL ASSURANCE

The area considered for financial assurance is given below for the lease:

Table No. 119

Details of Financial Assurance Area Calculation

Sl. No.	Head	Area put to use at Start of Plan (Ha)	Additional requirement during plan period (Ha)	Total (Ha)	Area Considered as re-claimed & rehabilitated fully (Ha)	Net area considered for calculation (Ha)
1	Area under Mining	434.33	62.00	496.33	Nil	496.33
2	Storage for Topsoil	Nil	1.00	1.00	Nil	1.00
3	Waste dump site	377.02	118.00	495.02	110.00	385.02
4	Mineral Storage	101.23	42.00	143.23	Nil	143.23
5	Infrastructure (Workshop, administrative buildings etc.)	22.10	2.00	24.10	Nil	24.10
6	Roads	29.16	6.00	35.16		35.16
7	Railways	Nil	Nil	Nil	Nil	Nil
8	Tailing pond	Nil	2.00	2.00	Nil	2.00
9	Effluent Treatment plant	Nil	Nil	Nil	Nil	Nil
10	Mineral Separation Plant	Nil	2.00	2.00		2.00
11	Township Area	25.52	Nil	25.52	Nil	25.52
12	Others (Virgin land including Safety Zone, Biodiversity & for future mining, dumping & other mining activities)	870.74	Nil	635.74	Nil	Nil
Grand Total		**1860.10**	**235.00**	**1860.10**	**110.00**	**1114.36**

Total area calculated for financial assurance for the period from 1st April 2018 to 31st March 2023 is 1114.36 Ha. Therefore, the Financial Assurance in the form of Bank Guarantee to be submitted is for Rs.33,43,08,000/-(Rs. Thirty Three Crore Fourty Three Lakh and Eight Thousand) calculated @ Rs.300000 per Hectare, as per the Rule 27(1) of Mineral Conservation and Development Rule 2017.

The Bank Guarantee which was submitted along with previously approved document dated 7th December 2017 is for an area of 1065.36 Ha with Bank Guarantee No.1541010000886l with amended date 28.03.2018 for an amount of Rs.31,96,08,000/-(Rs.Thirty One Crore Ninty Six Lakh and Eight Thousand) is valid till 31-03-2023. The copy of which is enclosed as **Annexure 14.**

Therefore, for the additional area of 49 ha requirement during this modification, an additional financial assurance in the form of bank guarantee is obtained with the Bank Guarantee bearing No.0002BGFD004919 dated 29 September 2018 for an amount of Rs.1,47,00,000/- (Rupees One Crore Forty Seven Lakh only), valid till 31 March 2023 enclosed as **Annexure-14(A)**.

Financial Area Assurance plan showing details of area is enclosed as **Plate No. SM16-Md1.**

This Mining Plan is approved subject to the conditions / stipulations indicated in the Mining Plan approval letter No. 279/281/91/BNG Date 05/10/2018

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

DUE TO FILE SIZE RESTRICTION, WE ARE UPLOADING ONLY FEW PAGES OF THE APPROVED MINING PLAN