

## **EXECUTIVE SUMMARY**

**OF**

### **DRAFT ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL MANAGEMENT PLAN (EIA&EMP)**

**PROJECT: REDI IRON ORE MINE**

Location: Redi Village, (including Sakhalbhat, Mhartale and Bambadojiwadi), Taluka Vengurla, District Sindhudurg, State Maharashtra

**Mining Lease Area: 27.452 Ha. (27.0374 Ha as per the DGPS Survey)**

**PROJECT PROPONENT**

**M/s. MINERALS & METALS**

Mumbai, Maharashtra

**July , 2021**

**EIA Consultant**

**M/s Mineral Engineering Services**

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## **1.0 Introduction**

M/s Minerals & Metals is a partnership firm having its registered office at 34, Ashutosh, Nepeansea Road, Mumbai, Maharashtra – 400036, Phone Number: (office) 022 22025893, **email :- [mineralsandmetals21@gmail.com](mailto:mineralsandmetals21@gmail.com)**. The Lessee, 'M/s Minerals and Metals', was granted Mining Lease 'Redi Iron Ore Mine', over an extent of 27.452 Ha., (27.0374Ha as per DGPS Survey), located at Redi Village (including Sakhalbhat, Mhartale and Bambadojiwadi), Taluka Vengurla, District Sindhudurg, State Maharashtra and the said Mining Lease is now valid up to 20/08/2029.

## **2.0 Project Description**

The Lessee, 'M/s Minerals and Metals', was granted Mining Lease 'Redi Iron Ore Mine', with an area of 27.452 Ha., located at Redi Village (including Sakhalbhat, Mhartale and Bambadojiwadi) Taluka Vengurla, District Sindhudurg, State Maharashtra. Mining lease area falls in Topo sheet no 48 E /10 of Survey of India. The Mine is well connected by Vengurla-Shiroda-Aronda road and Sawantwadi Road Railway station is at a distance of about 20 Kms. Dabolim is the nearest airport located at a distance of about 70Km from the area. Nearest port is Redi Port located at a distance of 1.03 to 4.0 Kms by road.

The Mining Lease is having non-contiguous blocks namely Block 1, Block 1A, Block 2 and Block 3. Block 1 and Block 1A are falling under CRZ and the other two blocks (Block 2 & Block 3) fall outside the CRZ, accordingly, the planning of Mining and allied activities is done. The Lessee will work in Block 2 and Block 3 falling outside the CRZ. The Lessee has appointed Institute of Remote Sensing, Anna University for the preparation of local level CRZ map by superimposing on approved CZMP as per CRZ Notification 2011. The IRS Team has conducted the physical survey and issued us the authenticated CRZ map of 1:4000 scale, 7 Km radius CRZ map of 1:25000 scale, approved CZMP of the study area and satellite imagery of the study area.

## **2.1 Mining Methodology**

The proposed rate of production will be maintained at 0.2 Million tonnes per annum with overall overburden ratio of 1 : 2.06. Mining operations will be by way of mechanized opencast method complying with all the statutory conditions, Ripper dozer will be used for ripping of hard material , Hydraulic excavators and wheel loaders will be used for loading, dumpers / tipper trucks for hauling and dozers will be used levelling. The Run of Mine (ROM) Iron Ore will be subjected to dry crushing and screening. Finished product

(Lumps & Fines) or ROM will be sold to the domestic buyers for further export or domestic consumption. The ore transportation by the buyer will be done by 10 Tonnes tippeers

**Table No. 1**  
**Production and Development Plan**

Year	ROM (in Lakh Tonnes)	Waste/Overburden (in Lakh Tonnes)	Top Soil Generation (in Lakh Tonnes)	Total Excavation (in Lakh Tonnes)	Ore to Overburden stripping Ratio
During the Present Approved Mine Plan Period					
2021 – 22	1.0	0.95	0.010	1.96	0.96
2022 – 23	1.0	1.65	0.012	2.662	1.66
2023 – 24	2.0	0.25	0.003	2.253	0.13
During the next Plan period					
2024-25 to - 2029-30 (up to 20.08.2029)	12.0	30.0	0.025	42.025	2.50
Total	16.0	32.85	0.05	48.9	2.06

### **3.0 Description of the Environment**

The 'Redi Iron Ore Mine' is the core zone for the present EIA study. The area encompassing 10 km radius from the boundary of the core zone has been defined as the buffer zone. The core zone and the buffer zone together constitute the study area. The Baseline Environmental data with respect to Air, Water, Noise and Soil Quality in the study area for the present EIA study is considered for the Winter Season 2020-21. The other studies with respect to biodiversity, hydrogeology, socio-economic is been conducted during the same period. Sampling and analysis has been carried out by M/s. Mineral Engineering Services, Ballari, Laboratory recognized by MoEF&CC.

### **3.1 Physiography**

The Block 1 and Block 1A of the Mining Lease are near to Redi Port. Block 2 is central part and Block 3 is the eastern most of the Mining Lease. The western and eastern part of the

Mining Lease is relatively flat while the central part is along the slope of the plateau. The highest contour is 24m and the lowest is 8m above MSL.

### **3.2 Drainage**

There are no perennial sources of water within the mining lease area. However, rain water during monsoon season, drains towards sea on the west and southwest and through agricultural fields towards north to Shiroda creek which drains into the sea. HTL (High Tide Line) of Shiroda creek is beyond 500m from the lease boundary. Tiracol creek is located towards SE at a distance of 2.5 Km from ML area. HTL of Arabian Sea coast is about 0.5 km from the ML boundary. The ground water table in the area is around 5 m above MSL.

### **3.3 Ambient Air Quality**

For Ambient air quality 8 stations have been fixed covering 7 villages and 1 core zone covering all the directions, the frequency of monitoring is 2 days/ week for 3 months and the parameters covered were as per CPCB guidelines.

The statistical analysis of Ambient Air Quality is as follows, the maximum values of SO<sub>2</sub>, NO<sub>2</sub>, PM<sub>10</sub> & PM<sub>2.5</sub> in the core zone are observed to be 14, 19, 72 & 36 µg/m<sup>3</sup>. All the parameters including CO, Pb, O<sub>3</sub>, NH<sub>3</sub>, BaP, As, Ni and Benzene as per NAAQ are monitored and monitoring results compared to AAQM are observed to be well within the limits.

### **3.4 Noise Levels**

For noise quality 8 stations including one station in core zone and 7 in buffer zone villages were monitored and Leq during day & night are observed. The Leq value during day in the core zone is observed as 53.7 dB(A) and in night 42.9 dB(A) and monitoring results when compared to Noise Quality Standards are well within limits. The Leq values in buffer zone during day and night were found to be ranging from 49.0 dBA to 52.5 dBA and 39.7 dBA to 43.7 dBA respectively. Monitoring results when compared to Noise Quality Standards are well within limits.

### **3.5 Water quality**

Water Quality Monitoring was done by grab sampling once in a season for 3 surface Water and 8 Ground Water samples. IS: 3025, APHA 21st Edition, & IS:1622 standards

are used for analysis. Thus, the analysis results are compared to IS standards IS:2296 & IS:10500:2012 and the results are within the permissible limits as per the standards.

### **3.6 Soil Quality**

Soil samples at 6 different locations, one from the ML area and 6 from nearby villages are collected and analysed, during the study period for Textural & Physical Parameters and the Nutrients. These soil quality monitoring stations represents the orchard and agricultural land use. They are all observed to be within normal soil quality fit for cultivation.

### **3.7 Land Environment**

The existing major land use of study area covering 10 km radius are 53.2% of water bodies including the creeks, 0.18% reserve forests, land acquired by forest 0.09%, 16.25% of cultivated land, Salt pans of 0.14%, 23.40% of orchard land, 1.23% of mining area and 5.50% of Settlement area. Mining in the adjacent area is being done since early sixties. The proposed Mine workings will be undertaken in Block 3 and Block 2 only. The existing land use pattern of the Mining Lease and at the end of the Plan period is as given in Table No. 1. The total area under the Mining and allied activities, at the end of mining plan period will be only 2.2923 Ha. out of total 27.0374Ha lease area.

**Table No.2  
Present Land Use and Land Use at the end of the Plan period**

Sr. No.	Land Use Category	Present land use as on date (area in Ha)	Land use at the End of Plan Period As on 31-03-2024 (area in Ha)
1	Area under Mining (Open Pit Area)	Nil	1.8444
2	Storage for Top soil	Nil	0.0543
3	Waste dump site	Nil	0.3936
	<b>Sub-Total (1 to 3)</b>	<b>Nil</b>	<b>2.2923</b>
4	Un utilized area	27.0374	24.7451
	<b>Total</b>	<b>27.0374</b>	<b>27.0374</b>

After mining, broken up land will be backfilled and will be progressively planted and rehabilitated with local species like Cashew, mango, Jamun, Cocum, Terminalia etc. All the efforts will be taken for maximum survival and growth of the plants. The detail land use at Conceptual Stage is as given below:-

**Table No.3**  
**Land use at Conceptual Stage**

Sr. No	Particulars	Area (in Ha)
1	Pit Area	
	i) Converted as reservoir	0.1778
	ii) Backfilled and Afforested	7.6669
2	Waste Dumps & Protective measures	1.7287
	<b>Sub Total(1 to 2)</b>	<b>9.5734</b>
3	Balance un-utilized area	17.4640
	<b>TOTAL</b>	<b>27.0374</b>

### **3.8 Biological Environment**

The entire ML area is non-forest private land. The reserve forest of Sawantwadi forest division is at a distance of 8.52Km towards NE of the ML area. Besides this, the small portion of land is acquired by the Forest Department. There are no endangered or endemic species of flora or fauna in the forest area.

As the peculiar characteristics of the Konkan are the Lateritic plateaus which cover the largest surface of the study area. These plateaus are highly characterized by seasonality, appearing totally barren during dry season while full of life during wet season. Lack or scarcity of woody species make rocky plateaus appear barren or "waste lands" for eight month long dry season covering winter and summer. The plants include ephemerals, which complete their life cycle as fast as within four favourable months or geophytes, which survive dry period through their underground parts such as bulbs and rhizomes. Many of these species show certain adaptive strategies like carnivory, desiccation tolerance, succulence (high water content) etc activities back to life, especially invertebrates and small vertebrates, such as insects, amphibians and reptiles, etc.

The Mining Lease is also remarkably covered with such lateritic plateau covered with seasonal growth of grass and flowering species. In the plain areas and on the outskirts of settlements, a few large trees including Banyan, Peepal, Mango etc. are growing.

In the buffer zone, plantation comprise of Cashew, Mango, Casurina, Acacia, Nilgiri, Tamarind, Bamboo, Jamul. The dominant species in the reserved forest were *Anacardium*

*occidentale* (Cahsew), *Cassirina equisitifoilia* (Casurina), and *Acacia auriculiformis* (Acacia) etc. which have been promoted significantly on both private lands and degraded forestlands, followed by mango and coconut orchards, which have been significantly promoted by farmers on agricultural bunds and house backyards. There are no endangered or endemic species of flora or fauna in the forest area. The most common species sighted by us and local communities are Indian hare, Rats, Wild boar.

### **3.9 Hydrology**

The Dharwarian meta-sediments and intrusions are devoid of primary porosity and Permeability. The major aquifer formations are Granitic Gneisses and Granites, which are jointed, locally sheared and weathered, that facilitates movement and storage of water. The secondary porosity and permeability thus developed gives rise to moderately yielding aquifers.

Granulite is dense and compact and hence not suitable for storage or transmission of ground water. The unconfined aquifer is developed down to depth of 15- 20 metres below ground level (mbgl) and the yield of the wells tapping such aquifer varies from 2 to 3 m<sup>3</sup>/day. The hydrological study has been conducted. As per the study, there is no impact of mining activities on the surrounding ground water regime.

### **3.10 Socio-economic environment**

The buffer zone comprises of 29 villages and one town located in Vengulara Taluka, Sindhudurg district of Maharashtra, with a total population of around 29341 as per census of 2011. The sex ratio is 969 females per 1000 males according to 2011 census and 1018 females per 1000 males according to survey 2021. Out of the total population, 39% is working population, out of which 75% are male workers and 25% are female workers. Out of total working population, 68% are main workers, out of which 16% are cultivators, 13.5% agriculture workers, 3.2% are in house-hold industries and 65.5% are in other industries. The literacy rates are high. It is observed that 85 per cent of all households do not have land for cultivation. Usually, villagers grow coconuts, cashew or mango in the small piece of land. In the absence of intensive agriculture, mining and tourism are the only source for employment. There exists few human settlements within the core zone. However, the proposed mining is planned leaving 45m distance away from these houses as per the DGMS approvals.

The infrastructure and amenities available in the study area denotes the economic well-being of the region. It is observed that good infrastructure facilities are available in the

project study area, which consists of education, health care, drinking water facilities, communications, transportation, etc. Due to the proposed mining activity, no significant adverse changes are visualized in the traditional way of life of the people residing in the villages in the buffer zone. Further people residing in the nearby villages will be benefited by the direct and indirect employment opportunities created by the mining activities. The communication, health and education facilities will improve and thus the mining activity will be beneficial and will have a positive impact in the region.

#### **4.0 Anticipated environmental impacts and mitigation measures**

The 'Redi Iron Ore Mine' is yet to start mining and shall operate taking all precautionary measures to reduce the impact of mining operations on Air, Water, Noise and Soil and ensuring all control measures to comply with the prescribed standards.

#### **4.1 Air Environment**

Following measures will be undertaken to control the Air pollution/dust generation during the mining activities:-

- ❖ Due to high inherent moisture of the ore as well as waste, generation of dust while loading will be minimal. Speed limit of transport vehicles will be enforced.
- ❖ Transportation trucks will be loaded to the prescribed capacity and covered with tarpaulin.
- ❖ Unpaved roads will be regularly sprinkled with water for which two water tankers each of 8000 litres capacity shall be provided.
- ❖ Nevis Dust Suppression system with a fine mist spray will be used for dust suppression along the road as well as stacks.
- ❖ Wherever possible the dump slopes will be covered with laterite boulders, which prevent generation of dust. Inactive portions of critical dump slopes will be covered with geotextiles followed by plantation.
- ❖ Plantation done on the slope of waste dump itself act as a wind breaker.
- ❖ Latest machinery having air conditioned cabin will be used for loading and dozing operations.
- ❖ Proper maintenance of transport machinery with regular PUC will be done.
- ❖ Providing enclosure and proper exhaust chimney height to DG set.
- ❖ General aspects of air quality management will be included in induction training to be provided to all employees



#### **4.2 Water Environment**

There are no surface water bodies within the lease area. The wastes or the ore do not contain any leachable toxic elements or heavy metals. Thus, no leachate water is generated either from the waste dump or from the pit workings. No surface water is drawn for any of the mining purposes. The major runoff from ML area is collected through drain and diverted to working pit which acts as ground water recharge. Part of the surface runoffs are allowed to pass through the series of settling ponds and filter beds wherein water is treated with lime and flocculants. The depth to groundwater level around the present mine lease area is 5.5 m bgl in post-monsoon and 7.85m bgl during Pre-monsoon season. Ground water discharge along with rain accumulated pit water from the mine pit is 770m<sup>3</sup>/day. As per the hydrogeological studies, there shall be no adverse impact on surface and ground water due to the proposed Mining. The rain accumulated pit water will be used to supply to the villagers for agriculture purpose.

#### **4.3 Noise Environment**

Maximum noise is produced from operation of earth moving machineries & movement of dumpers. No drilling and blasting operations are involved. The green belt shall be provided surrounding ML to attenuate noise pollution. Regular maintenance of mining equipment, machinery & all vehicles as per the manufactures recommendations to minimize the Noise generation shall be followed. Following management measures will be adopted to control noise levels:

1. Provision of acoustic cabins for operators deployed on HEMM
2. Selection of new low-noise equipment from the manufactures failing which use of additional retrofits if available.
3. Plantation acts as an acoustic barrier

#### **4.4 Land Environment**

At conceptual stage, 7.6669 ha will be backfilled and reclaimed by planting fruit bearing trees like Cashew, Jack fruit etc. which will be beneficial to the society and also for immigration of avifauna. The 0.1778 Ha of the area will remain open pit and will be reclaimed by forming a water reservoir (hydro reclamation) at the conceptual stage. This water reservoir will serve in augmenting the ground water condition of the region and also the pit discharge water will be supplied to local villagers for agricultural purpose.

In addition to this, green belt (7.5 m Safety barrier) will be developed over 0.55 Ha by planting fruit & flower bearing shrub & tree species for immigration of avifauna.

#### **4.5 Biological Environment**

The entire ML area is non-forest private land. The reserve forest of Sawantwadi forest division, which is fairly mixed jungle is at 8.52Km towards NE of the ML area. The small patch of land is acquired by forest department which is located at a distance of around 1.7Km from the proposed working Block of the Mining Lease. There are no endangered or endemic species of flora or fauna in the forest area. A full-fledged biodiversity assessment study has been taken up by the proponent. Based on the findings, the wildlife conservation plan with financial outlay of Rs.5 lakhs per annum has been prepared in consultation with the local forest department and biodiversity expert.

#### **4.6 Socio economic environment**

This mine shall provide employment for about 360 people by both direct employment and indirect employment, in contractual works & transport. The mining activities help in sustainable development of this area including further development of physical & social infrastructural facilities.

Also by this mining activity, the State and Central Government get the revenue in terms of taxes, DMF, NMET and Royalty to the tune of Rs. 8.5 Crores/annum with the proposed iron ore production. The project proponent shall assess the health conditions of the workers as per the DGMS guidelines. The efforts will be taken to maintain the Air, Noise, Water and Soil quality well within the limits.

#### **5.0 Additional Studies**

In additional studies, Risk Analysis followed by Disaster Management Plan, which will help in identifying the possible risks and to promote preparedness to counter any mishap. Risk analysis and disaster management plan have been prepared and incorporated in EIA Report.

#### **6.0 Project benefits and costs evaluation**

The opening of the Mine in the area will contribute towards the upliftment of the socioeconomics of the area. The mine shall provide employment to 360 people, in direct and indirect way. About 60 families in direct way and 300 families will benefit indirect way with this project. The Lessee will contribute by helping to improve water supply for

irrigation, sanitation, health and education in the nearby villages. Promotion of cultural and religious activities and training of village, repairs of transport roads also shall be taken up.

This project helps in contributing to the State Govt. by way of Royalty and taxes etc. and Central Govt, with income tax and export duty. The payment in the form of DMF, Royalty, and National Mineral Iron Ore Fund (around Rs. 8.5 Cr per annum) will contribute to the State and Nation. DMF is meant to be used for people and the area affected due to mining in the region and National Mineral Iron ore fund which is meant to support exploration of Minerals in the country.

We propose to use funds upto Rs. 40.0 Lakhs per annum towards the CSR activities focusing towards mainly the water supply for irrigation, education, Health and sanitation, programs under skill development, women empowerment, rain water harvesting and Help centers for e services etc.

## **7.0 Environmental Management Plan**

Identification of all potential environmental impacts of a project is an essential step of Environmental impact Assessment. These are critically examined and major impacts are further studied. In case of mining projects, change in topography and land use, air pollution, water pollution, waste management, biodiversity and socio-infrastructure issues are significant. The Mine will be operated taking all precautionary measures to reduce the impact of mining operations on Air, Water, Noise and Soil and ensuring all control measures to comply with the prescribed standards. The impact of change of land use will be positive only, as portion of abandoned pit is partly backfilled and afforested and balance portion is left as water reservoir beneficial to local villagers. Development of green belt at the feasible places along the boundary of ML area will ensure a better environment.

### **Corporate Environmental Responsibility (CER)**

For Corporate Environmental Responsibility, the Lessee has allocated a sum of Rs. 35 lakhs/ annum as detailed below.

**Table.No.4**  
**Annual Budget for Corporate Environmental Responsibility**

<b>Sl. No</b>	<b>Particulars</b>	<b>Expenditure (Rs. in Lakhs)</b>
1	Environmental Monitoring	12.0
2	Afforestation and Stabilization of Overburden Dump	2.0
3	Environmental Protective measures to Air Pollution, control soil erosion and control of water pollution and implementation and improvised technology	7.0
4	Measures towards the water conservation, rainwater harvesting etc.	1.0
5	Environmental Cell	4.0
6	Statutory Costs	2.0
7	Implementation of Wildlife Management Plan	5.0
8	Awareness and Training	2.0
	<b>Total</b>	<b>35.0</b>

**Corporate Social Responsibility (CSR)**

Annual budget to be provided for socio-economic development of the area shall be Rs. 40.0Lakhs per annum.

**Table No.5**  
**Annual Budget for Corporate Social Responsibility**

<b>Sl. No</b>	<b>Particulars</b>	<b>Expenditure (Rs. In Lakhs)</b>
1	Water Supply for Irrigation and support for agriculture	6.4
2	Health and Medical	5.0
3	Assistance to Village and School Sanitisation and ODF facility	6.0
4	Education	10.0
5	Skill Development programs	2.0
6	Women Empowerment	2.0
7	Rain water harvesting structure/infrastructure	5.0
8	Help Centre for e services	3.6
	<b>TOTAL</b>	<b>40.0</b>

**8.0 Environmental monitoring program**

Environmental monitoring is required to know the Quality of Ambient Air, Water and Noise Levels during the operation phase of the proposed project and take required corrective measures, in case of any non-compliance with the norms stipulated by regulatory authorities. The methodologies adopted for environmental monitoring will be in accordance with the CPCB/SPCB/MoEF and Indian Bureau of Mines requirement.

Environmental Monitoring is being done as per the CPCB guidelines for Ambient Air Quality Monitoring, Water Quality Monitoring, Noise level and Soil quality monitoring.

The Comprehensive monitoring program has been planned to evaluate the effectiveness of various / specific aspects of technological / mitigation measures. Monitoring shall be conducted by the environmental management cell by engaging a lab recognized by MoEF&CC.

**Table No. 6**

Proposed Environmental Monitoring schedule at 'Redi Iron Ore Mine'

S.No.	Particulars	Frequency of Monitoring	Sampling	Parameters Required to be Monitored
<b>Air Quality</b>				
1	Ambient Air quality in and around the Mine and fugitive dust emissions	Twice a week, all the seasons of the year	24 hours continuously	Particulate Matter PM10 & PM2.5, Sulphur-dioxide (SO2), Nitrogen Dioxide, Lead, Ammonia, Benzene, Nickel, Arsenic, Benzo-alco-pyrene, CO and Ozone
<b>Water Quality</b>				
2	Water Quality around the Mine(Surface & Ground Water)	Once in a Month	Grab Sampling	IS 2296 and as per IS: 10500
<b>Noise Level Monitoring</b>				

S.No.	Particulars	Frequency of Monitoring	Sampling	Parameters Required to be Monitored
3	Ambient Noise levels & work place Noise monitoring	Once in a Quarter	Continuously 24hours with 1hour interval	Noise Level
<b>Soil Quality</b>				
4	Soil Quality around the Mine	Once in a year	Grab Sampling	IS: 2720

### **9.0 Disclosure of Consultants engaged**

The EIA/EMP report for the proposed Iron Ore production with respect to 'Redi Iron Ore Mine' has been prepared by 'Mineral Engineering Services', based in Ballari, Karnataka, accredited by QCI/NABET for preparing EIA/EMP in the sectors, including "Mining of Minerals including Opencast/Underground Mining" vide their certificate no. NABET/EIA/1922/RA/0158.

### **10.0 Conclusion**

The proposed project is production of 0.2 Million tonnes per annum with overall overburden ratio of 1 : 2.06. There shall be no adverse impact on environmental status of the area with the proposed mining activity. The Lessee has planned the effective Environmental Management Plan in line with mining operations and is sufficient to take care of environmental impacts. Out of the total 27.0374Ha lease area, the mining and allied activities will cover only 9.5734 Ha area. At the conceptual stage, out of this 9.5734Ha area, 7.6669ha area will be backfilled and afforested, 0.1778Ha area will be left as water reservoir useful for villagers for irrigation purpose and 1.7287Ha area will be covered under stabilized waste dump and environmental protective measures. Although it is a miniscule operation, the proposed mining industry will improve the economic status of the people in and around the lease area, with the increased direct and indirect employment opportunities and the CSR benefits provided. Iron ore reserves of this area form mineral wealth, as, the iron ore is raw material for the manufacture of steel. Since, the iron ore reserves of this area are economically viable, their proper utilization will improve the economic status of the people and the Country. Apart from Cess, DMF, NMET and Royalty, Govt. taxes, DMF, NMET and Royalty (to the tune of Rs. 8.5 Crores/annum) with the proposed iron ore production will be getting many indirect taxes like Road tax, Sales tax and valuable foreign exchange from the export of Iron ore. The above shows that the proposed mining activity of production of 0.20 MTPA (i.e. 2.0Lakh Tonnes per annum) of iron ore for this mine is remunerative after meeting direct

mining costs, environmental costs, cost on health & safety, socio economics, compensation for land, capital and & R&D costs and beneficial in terms of socio economics of the area and national mineral conservation.