

EXECUTIVE SUMMARY

1 INTRODUCTION

This is a proposed Manganese Mineral mine having a mining lease of 26.67 Ha. located in Khasra no. 251, 253, 254, 255, 259, 267, 268, 269, 271, 272 of Kawatha Village, Saoner Tehsil of Nagpur District, Maharashtra & is a Category 'A' project as per EIA Notification 2006. The lease area falls under Survey of India Topo-sheet no. 55K/15 and lies between Latitudes 21° 29' 57.810" N to 21° 29' 32.541" N & Longitudes 78° 53' 39.245" E to 78° 54' 5.703" E. This is a proposed project.

The mineable reserve under Proved category is calculated to be about 6400 tonnes and production of ROM will be @2732 TPA. The mined out area would be backfilled and plantation would be carried out on reclaimed area after winning all possible minerals. Life of mine will be 5 Years. During the period of mine plan further exploration is proposed in Mine lease area to enhance the Reserve quantity

1.1.1 Identification of Project

This is a newly proposed Mn mine. The project is located at Khasra No. 251, 253, 254, 255, 259, 267, 268, 269, 271, 272, Village: Kawatha, Tehsil: Saoner District: Nagpur, Maharashtra over an area of 26.67 Ha. It is proposed to produce 2732 TPA Manganese from the mine by manual opencast method of mining. The project is applied for Environmental clearance as per EIA notification dated 14th September 2006 and its amendments. Since the applied mine lease area is located at 0.5 km distance from Madhya Pradesh - Maharashtra Interstate Boundary, it falls under "Category A" based on the Schedule Clause no 1(a) of EIA notification 2006 and subsequent amendments.

1.1.2 Location of the Project

This is a new proposed Mn mine project. The project is located at Khasra No. 251, 253, 254, 255, 259, 267, 268, 269, 271, 272, Village: Kawatha, Tehsil: Saoner District: Nagpur, Maharashtra over an area of 26.67 Ha. It is proposed to produce 2732 TPA Manganese from the mine by manual opencast method of mining.

The lease area falls under Survey of India Toposheet no. 55K/15 and lies between Latitudes 21° 29' 57.810" N to 21° 29' 32.541" N & Longitudes 78° 53' 39.245" E to 78° 54' 5.703" E.

TABLE 1: SALIENT FEATURES OF THE PROJECT SITE

Sl.	Particulars	Details
1.	Project Location	Khasra No. : 251, 253, 254, 255, 259, 267, 268, 269, 271, 272. Village - Kawatha Tehsil – Saoner District - Nagpur, Maharashtra
2.	Latitude/Longitude	Latitudes 21° 29' 57.810" N to 21° 29' 32.541" N & Longitudes 78° 53' 39.245" E to 78° 54' 5.703" E.
3.	Location covered in Toposheet No	55 K/15
4.	Climatic Conditions	IMD data, Nagpur <ul style="list-style-type: none">Avg. Ambient air temp 8° C to 46° CAvg. Annual rainfall 1000 mm
5.	Site elevation above Mean Sea Level	Highest Elevation: 390 m MSL Lowest elevation: 342 m MSL
6.	Land use at the proposed project site	Pvt. Land
7.	Site topography	Undulating with slight slope towards South & Southeast. Old

Sl.	Particulars	Details
		mine pit exists within lease area.
8.	Nearest roadway	NH-26B / SH 19 ~3.65 km, W
9.	Nearest Railway Station	Kelod ~ 4.2 Km, SW
10.	Nearest Railway line	Railway Line connecting - North Eastern Railway Nagpur-Chhindwara extension.
11.	Nearest Air Port	Nagpur ~65 km, SW
12.	Nearest village/major town	Village : Kawatha ~ 2.5 km, South Town: Saoner town~ 11.9 km, South
13.	Hills/valleys	Hillocks in North and west side within 10 Km radius of mine lease area.
14.	Ecologically sensitive zone	None within 10km radius area
15.	Nearest Reserved/Protected forests	Khapa Padri RF - 0.5 km NNW Sita Gondi RF-7.43 Km – ENE Sapghota RF- 6.24km- NE Khapa Padri RF-0.5 km-E
16.	Historical/tourist places	None within 5 km radius of mine lease area
17.	Nearest Industries	Dolomite mines & other industries in 10 km area.
18.	Nearest water bodies	Khekara Nala waterbody ~ 6.54 km, NE Kanhani River ~ 2.66 km, NE
19.	Seismic zone	The area is not known for natural hazards. Seismically, this area is categorized under Zone-II as per IS-1893 (Part-1)-2002. Hence, seismically the site is a stable zone.

1.2 PROJECT DESCRIPTION

1.2.1 Method of Mining

It is proposed to carry out opencast manual mining method for this plan period i.e. five years. The operations like drilling of shot hole, sorting of rock and breaking boulders at the site will be done manually.

This is a new area for grant of mining lease and though the area had been prospected by trial pits, trenches and drilling but detailed prospecting operations are required for assessment of reserves and future planning. It is to drill 7 bore holes at 100 m x 100 m grid to a depth of 30 meters during the period of mine plan for further proving of Mn ore to have clear subsurface geology of deposit/ore body which is inclined. The sequence of unit operations in open cast manual mining consists of removal of soil and waste material i.e. overburden and dumping at suitable site, fragmentation of mineral from in-situ formation, excavation, sizing and sorting, loading and hauling and some other miscellaneous work. All these operations will be carried out by manual means. The bench height will be restricted to the statutory 1.5 m x 1.5 m as per the DGMS norms.

Drilling and blasting will be conducted in the mine for extracting Manganese Ore. The blasting will be carried out by using proper explosives. Controlled and occasional blasting will be carried out and will be procured/purchase from approved explosives vendor.

1.2.2 Anticipated life of the mine

The mineable reserve under proved category is calculated to be about 6400 tonnes and production of ROM will be @2732 TPA. Life of the mine is estimated as 4.92 i.e. ~5years.

1.2.3 Conceptual Mine Plan

Mining will be carried out by blasting followed by Jack Hammer Drill and manual loading, excavation and removal of stone in conjunction with deep whole drilling and blasting. In this connection guidelines issued by Director of Mine's Safety by various circular will be adopted. While preparing a conceptual mining plan for the Manganese Lease, the following points and precepts have been kept in view:

- The lease is under renewal for duration of 50 years by the state govt.
- The total ML area is 26.67 Ha and at the end of plan period of first five years total 25.3995 Ha. Area will be unbroken.
- 7.5 safety barriers will be maintained.
- The dumps will be suitably stabilized by means of proper terracing in the retreating fashion and after attaining the proposed height, plantation would be carried out. Plantation in safety zone and outside the lease under CSR activity and haul road dressing. The voids so left will be filled with rain water and treated as water reservoir.

TABLE 2
SALIENT FEATURES OF THE MINE

S. No.	Particulars	Details
1.	Method of mining	Manual Open Cast Mining
2.	Area	26.67 ha
3.	Proved Reserve	4864 Tonnes
4.	Life of the Mine	~5 years
5.	Stripping Ratio	1:6
6.	Bench Height and Width	Ht. 1.5 m and Width 1.5 m
8.	Maximum Depth of Mining	4 mbgl
9.	Minable Reserve	6400 Tonnes
10.	Available Reserve For Mining	6400 Tonnes
11.	Topsoil thickness	0.5m
12.	Ultimate Pit Slope angle	45 ⁰
13.	Elevation Range	Highest elevation:390 m MSL Lowest elevation: 342 m MSL
14.	Water requirement	15 KLD
15.	Source of Water	Nearby Water Supplier
16.	Water table	Depth of water level during Summer (pre-monsoon)Season :4-5 mtsbgl Depth of water level during the Post Monsoon Season : 2- 3 mtsbgl
17.	Commencement of Mining	After the grant of EC
18.	Manganese (T) Waste Rock/ Reject (T) Top Soil (T)	6,400 Tonnes 12965.4 Tonnes 2035.2 Tonnes
19.	Number of working days	250
20.	Number of shifts per day	1

1.2.4 Waste Generation & Disposal

Waste generation in ML area will be mainly in the form of top soil and Waste rock (Rejects). The proposed manganese mine is having on an average 3M OB and will be removed while reclamation. A

total of 6,074 cum. of soil and waste material (Soil: 1272 m³ and Waste: 4802 m³) will be generated during the plan period. Most of the production will be sold and hence there will not be any generation of un-sealable ore.

The mineral waste will be dumped on one side of the area earmarked for ore stacking yard in the non- mineralized area. The waste will be loaded in to tippers by labors and same will be dumped at designated dumping place, the dumps height will be maximum 6 meter, after dumping and stabilization plantation will be done on inactive site of dump. The soil will be temporarily stacked within the mine lease area and will be used for spreading on the safety barrier for plantation

1.2.5 Water Requirement & Source

Total water requirement for the project will be 15 KLD, which will be met from nearby water supplier. Water for drinking purposes will be supplied from nearby water supplier.

1.2.6 Manpower Requirement

Total manpower requirement for the project will be 20-30 persons.

1.2.7 Site Infrastructure

The available infrastructure is in the form of mines office, rest shelter, Transformer and machinery. The haul road, the road from mining to connecting NH will be developed. The first aid center, water drinking point etc. will be developed outside mine lease area.

1.3 EXISTING ENVIRONMENTAL SCENARIO

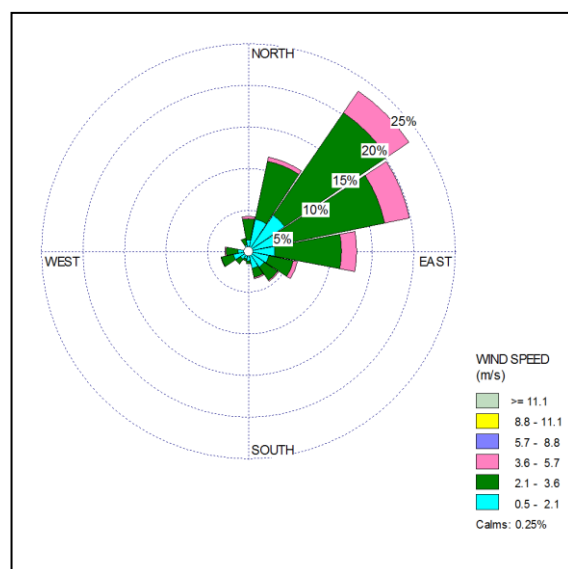
1.3.1 Baseline Environmental Studies

An environmental baseline monitoring was carried out as a part of EIA studies for proposed manganese mine during **Post monsoon season (October-December 2017)**.

1.3.2 Meteorology & Ambient Air Quality

Summary of Meteorological data generated at site (October-December 2017)

Temperature (°C)	16°C to 34°C
Relative Humidity (%)	18% to 94%
Wind Direction	NE (23%)
Calm wind %	0.25%



Ambient Air Quality Status

The ambient air quality monitoring with respect to parameters of significance was carried out during **post monsoon** season. The major sources of air pollution in the region are Industrial operations, domestic activities, traffic density and rural conditions. The prime objective was to assess the existing air quality of the area. The locations were identified keeping in view predominant wind directions prevailing during study period, sensitive receptors and human settlements. The levels of PM₁₀, PM_{2.5}, Sulphur Dioxide (SO₂), Oxides of Nitrogen (NO_x), Carbon monoxide (CO), Volatile Organic Compound (VOC), were monitored for establishing the baseline status. The minimum and maximum values of monitoring results are summarized in Table 3.

TABLE 3
SUMMARY OF AMBIENT AIR QUALITY MONITORING RESULTS

Sr. No.	Location		PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	Ozone	NH ₃
			µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	µg/m ³	µg/m ³
1.	Dudhala Khurd	Min	41.3	13.2	5.5	8.1	0.105	5.6	6.1
		Max	54.6	18.5	9.1	11.8	0.120	8.4	9.8
2.	Malegaon	Min	54.7	16.8	6.2	8.2	0.120	5.8	6.2
		Max	64.8	21.8	10.9	11.9	0.142	8.7	9.9
3.	Kelod	Min	53.2	17.1	6.3	10.1	0.135	6.4	6.4
		Max	69.1	23.9	11.9	15.6	0.154	9.6	9.8
4.	Birgaon	Min	68.1	23.6	9.0	11.7	0.221	6.2	6.5
		Max	78.4	28.8	12.7	18.6	0.247	13.3	12.9
5.	Kawatha	Min	65.3	20.1	10.3	14.3	0.212	8.1	8.1
		Max	84.6	27.8	13.8	19.8	0.231	11.4	11.3
6.	Saonga	Min	70.0	23.2	11.6	23.2	0.268	10.2	9.2
		Max	78.6	30.1	15.7	29.7	0.319	14.3	15.4
7.	Satnu	Min	71.2	26.1	10.5	26.2	0.265	10.1	10.1
		Max	84.3	33.4	17.4	34.3	0.329	16.8	15.6
8.	Kharduka	Min	45.3	15.1	6.3	8.2	0.152	5.2	5.1
		Max	64.3	22.8	11.6	11.7	0.165	7.8	7.4
CPCB Standards			100 (24hr)	60 (24hr)	80 (24hr)	80 (24hr)	2 (8hr)	100 (8hr)	400 (24hr)

From the above results, it is observed that the ambient air quality with respect to PM₁₀, PM_{2.5}, SO₂, and NO_x at all the monitoring locations was within the permissible limits specified by CPCB.

As project site comes under remote and undulated area, just representative sampling was carried at day time (8 hours) by DG set as power source.

1.3.3 Ambient Noise Levels

Ambient noise level monitoring was carried out at the 8 monitoring locations, those were selected for ambient air quality monitoring. The monitoring results are summarized in **Table 4**.

TABLE 1.4:
SUMMARY OF AMBIENT NOISE LEVEL MONITORING RESULTS

Sr. No.	Monitoring Locations	Category of Area/Zone	Equivalent Noise Level	
			Leq _{Day}	Leq _{Night}
1.	Dudhala Khurd	Residential	45.3	35.6
2.	Malegaon	Residential	52.1	42.1
3.	Kelod	Commercial	63.5	51.3
4.	Birgaon	Residential	53.2	41.6

Sr. No.	Monitoring Locations	Category of Area/Zone	Equivalent Noise Level	
5.	Kawatha	Silence	48.2	37.5
6.	Saonga	Commercial	61.8	50.2
7.	Satnui	Residential	54.2	41.5
8.	Kharduka	Residential	51.3	40.6
CPCB Standards dB(A)				
1.	Residential Area		55.0	45.0
2.	Commercial Area		65.0	55.0
3.	Industrial Area		75.0	70.0
4.	Silence Zone		50.0	40.0

The overall ambient noise quality with respect to various zones was found to be within prescribed limits by CPCB.

1.3.4 Surface and Ground Water Resources & Quality

Site Specific Geology

Considering the mine lease area and adjacent area, Quartz mica schist, Manganiferous quartzite & Dolomite rock Formations can be easily encountered. In the mine lease area there is occurrence of manganiferous quartzite boulders as float ore.

Site Specific Hydrogeology

Site area comprises of mainly two aquifer units which are Alluvium & Archaean rock Formations viz. Quartz mica schist, Manganiferous quartzite, pink gneisses & Dolomite. The study area which comes in Sausar Tehsil of Chindwara District showed fall in water level as compared to the study area which comes in Saoner Tehsil of Nagpur District due to large-scale withdrawal of ground water for irrigation purpose. Depth to water level in pre & post monsoon ranges in study area in Saoner tehsil are 2-4mbgl & 4-5 mbgl respectively. Whereas, in study area falling in Sausar tehsil of Chindwara District depth to water level in pre & post monsoon are 4-8 mbgl & 5-10 mbgl respectively.

Water Quality

The existing status of groundwater and surface water quality was assessed by identifying 8 ground water (Bore wells/dug wells) samples in different villages and 2 surface water samples.

The pH limit fixed for drinking water samples as per IS: 10500 is 6.5 to 8.5 beyond this range the water will affect the mucus membrane and or water supply system. During the study period, the pH was varying for ground waters from 7.72-8.26 and in surface water the pH was varying between 8.09-8.48. The pH values for all the samples collected in the study area during study period were found to be within the limits.

The desirable limit for total dissolved solids as per IS: 10500 is 500 mg/l whereas the permissible limits in absence of alternate source is 2000 mg/l, beyond this palatability decreases and may cause gastro intestinal irritation. In ground water samples collected from the study area, the total dissolved solids are varying from 318-1236 mg/l. The TDS of maximum samples were above the desirable limit but within the permissible limit of 2000 mg/l. In surface waters the total dissolved solids were in the range of 298-635 mg/l which were within the desirable limit.

The desirable limit for chloride is 250 mg/l as per IS: 10500 whereas the permissible limit of the same is 1000 mg/l beyond this limit taste, corrosion and palatability are affected. The Chloride levels in the ground water samples collected in the study area were ranging from 29.35-269.07 mg/l. All are within

the desirable limits. In surface waters the chlorides were in the range of 9.78-24.46 mg/l, which are within the desirable limits.

The desirable limit as per IS10500 for hardness is 300 mg/l whereas the permissible limit for the same is 600 mg/l beyond this limit encrustation in water supply structure and adverse effects on domestic use will be observed. In the ground water samples collected from the study area, the hardness is varying from 211.89-882.0 mg/l. In surface waters the hardness is varying between 166.54-430.50 mg/l.

Fluoride is the other important parameter, which has the desirable limit of 1 mg/l and permissible limit of 1.5 mg/l. However the optimum content of fluoride in the drinking water is 0.6 to 1.5 mg/l. If the fluoride content is less than 0.6 mg/l it causes dental carries, above 1.5 mg/l it causes staining of tooth enamel, higher concentration in range of 3 - 10 mg/l causes fluorosis. In the ground water samples of study area the fluoride value were in the range of 0.21-2.27 mg/l. where as in the surface waters the fluoride was in range of 0.22-0.32 mg/l.

Dissolved oxygen (DO) refers to the amount of oxygen (O₂) dissolved in water. Because in surface water fish and other aquatic organisms cannot survive without oxygen, DO is one of the most important water quality parameters. In surface water the reported value of range of 6.4-6.5 mg/l. Phosphorus (as PO₄) is an important nutrient for plants and algae. Because phosphorus is in short supply in most fresh waters, even a modest increase in phosphorus can cause excessive growth of plants and algae that deplete dissolved oxygen (DO) as they decompose. The range of Phosphorus (as PO₄) was found to be below detectable limit or absent.

Bacteriologically, all surface water samples were contaminated and proper treatment such as chlorination or disinfection treatment is needed before use for alternate source of drinking purpose, and also ground water samples were bacteriologically contaminated. Present of Sodium into ground water is mainly influenced by Sodium Chloride or table salt.

1.3.5 Land use Land Cover classification

The land-use & land cover map of the 10 km radial study area from the periphery of project site has been prepared using Resource SAT-2, sensor- LISS-3 having 23.5 m spatial resolution and date of pass 29 May 2015 satellite image with reference to Google Earth data and the IRS-P5- Cartosat-I data having 2.5 m spatial resolution and date of pass April 2016. In order to strengthen the baseline information on existing land use pattern, the following data covering approx. 21°24'11.66" to 21°35'11.05" N latitude and 78°54'00.79" to 78°54'15.72" E longitude and elevation ranging between 344-364 meter in an around mining lease area and for whole 10 km study area is about 235-403 m.

The Land Cover classes and their coverage are summarized in **Table 5**.

TABLE 5
LU/LC CLASSES AND THEIR COVERAGE WITHIN 10 KM RADIUS

Sr. No.	LU/LC Class	Area (Sq.Km ²)	Percentage (%)
1	Built up Land Rural/Urban)		
	Settlement	2.41	0.77
	Industry/other industries	1.3	0.41
	Road Infrastructure	0.97	0.31
	Railway Line/Railway Siding	0.54	0.17
2	Agriculture Land		
	Cropland	230.15	73.30

Sr. No.	LU/LC Class	Area (Sq.Km ²)	Percentage (%)
	Barren Land	0.74	0.24
3	Water bodies		
	River/Nala/Stream	6.29	2.00
	Pond/Tank	1.22	0.39
4	Scrub/Waste Land		
	Land with scrub/Open Scrub	17.21	5.48
5	Dense Forest		
	Open Mixed Jungle/PF/RF	52.04	16.57
6	Mining/Stone Quarry	1.13	0.36
	Total	314	100

1.3.6 Soil Quality

For studying soil profile of the region, sampling locations were selected to assess the existing soil conditions in and around the proposed project site representing various land use conditions. The physical, chemical properties and heavy metals concentrations were determined. The samples were collected by ramming a core-cutter into the soil up to a depth of 15-20 cm. Total 8 samples within the study area were collected and analyzed.

Regular cultivation practices increase the bulk density of soils thus inducing compaction. This results in reduction in water percolation rate and penetration of roots through soils. The soils with low bulk density have favorable physical conditions whereas those with high bulk density exhibit poor physical conditions for agriculture crops. The bulk density of the soil in the study area ranged between 1.41-1.61 g/cc which indicates favorable physical condition for plant growth. The water holding capacity is between 18.45-34.06 %. Infiltration rate, in the soil is in the range of 15.99-26.62 mm/hr. The important soluble cations in the soil are calcium and magnesium whose concentration levels ranged from 209.52-486.44 mg/Kg and 75.12-153.05 mg/Kg respectively. Chloride is in the range of 186.39-829.71 mg/Kg. Organic matter and nitrogen were found in the range of 0.34-2.17 % and 125.17-161.12 kg/ha.

1.3.7 Biological Environment

Flora and Fauna are important features of natural environment. They are organized into communities with mutual dependencies among their members and show various responses and sensitivities to outside influences. Therefore, nature of development and baseline characteristics of flora and fauna around the site of proposed activities is required to be assessed. Hence, the present study is conducted to generate the baseline pertaining to biological environment and assessment of the impact due to proposed Manganese Project on biotic environment.

Rare and Endangered Flora in the Study Area

The IUCN Red List is the world's most comprehensive inventory of the global conservation status of plant and animal species. It uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies. These criteria are relevant to all species and all regions of the world. With its strong scientific base, the IUCN Red List is recognized as the most authoritative guide to the status of biological diversity. Among the enumerated flora in the study area, none of them were assigned any threat category, by RED data book of Indian Plants. (Nayar and Sastry, 1990) and Red list of threatened Vascular plants (IUCN, 2010; BSI, 2003)

Endemic Plants of the Study Area

De Candolle (1855) first used the concept of “Endemic”, which is defined as an area of a taxonomic unit, especially species which has a restricted distribution or habitat, isolated from its surrounding region through geographical, ecological or temporal barriers. Among recorded plant species none were assigned the status of endemic plant of this region.

Aquatic Plant Diversity: Kanhan River is passing through the study area. The study area is also having few fresh water ponds. The water bodies observed in low lying areas exist with patches of marshy depressions and swamps as well as perennial water bodies of varying shape, size and depth.

The aquatic plant species belongs to diverse habits and have distinctive characteristics provides perching grounds for various birds. Total 10 aquatic species have been identified and they can be described into following broad Categories.

- Free floating hydrophytes: *Eichhornia crassipes*, *Lemna minor*.
- Suspended submersed hydrophytes: *Ceratophyllum demersum*, *Utricularia sp.*
- Anchored submerged hydrophytes: *Hydrilla verticillata* & *Potamogeton crispus*.
- Anchored hydrophytes with floating shoots: *Ludwigia aquarium* and *Ipomea aquatica*.
- Emergent amphibious hydrophytes: *Sagittaria latifolia*.
- Rooted hydrophytes with floating leaves: *Nilumbo nucifera*

Fauna in the study area

The 10 km radius study area is home to several species of Mammals, Reptiles, Aves and other lower invertebrates. As earlier described, the study area has about 16.57% of forest in the study area; the top carnivore not observed in the study area either direct or indirect evidences but its existence in the buffer area were taken in consideration as Sitagondi Reserve forest is a part of study area. During the site survey, indirect evidences in the form of pellets of Bluebull, Cheetal, Barking Deer, Chinkara, Hanuman langur were observed in reserve forest of the study area. Among the reported species no Schedule I species were observed in Core Area.

Birds can be observed throughout the study area but mostly located near forest area and water bodies. Reptiles and amphibians are also observed in the study area. Fresh water fish are found in the river (Kanhan River), ponds and streams.

1.3.8 Socio-economic Environment

Information on socio-demographic status and the trends of the communities in the 10 km radius, was collected through primary social survey and secondary data from census 2011 & village directory 2001. Summary of the socio-economic status of the study area is given in **Table 6**.

TABLE 6:

SUMMARY OF SOCIO-ECONOMIC ENVIRONMENT OF VILLAGES WITHIN 10 KM RADIUS AREA

No. of villages	30
Total households	7034
Total population	29968
Male Population	15326
Female population	14642
SC Population	5381
ST Population	2935
Total literates	21926
Total workers	15859

Total main workers	13544
Total marginal workers	2315
Total non-workers	14109

TABLE 7:

DETAILS REGARDING EDUCATION FACILITIES WITHIN 10 KM RADIUS STUDY AREA

Gov Pre Primary School	Gov. Primary school	Private primary school	Gov. Middle School	Private Middle School	Gov. Secondary School	Gov. Senior Secondary School	Private Senior Secondary School	Gov. Arts, Science Degree College	Pvt. Arts, Sci.& Comm. College
28	27	28	09	03	05	01	0	0	0

Source: District census handbook 2011, District Nagpur and Chhindwada State Madhya Pradesh & Maharashtra

1.4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

1.4.1 Impact on Topography, Drainage & Landuse

There is no forest land involved in the mine lease area. The existing topography of the mine lease area will be altered due to the proposed mining operations. However, there will not be any changes in the topography of the area located outside the mine lease area as all the mining activities will be conducted within mine lease area only.

There is no perennial surface water stream or nallah or any kind of water bodies are in existence except small seasonal gully developed due to rain water within mine lease area which will be unaffected or unaltered by proposed manual mining activity.

The mining operations will alter most of the mine lease area into mine pits, surface dumps and other infrastructure facilities. However, since there is no forest or built-up land in the mine lease area, no significant impact will be observed on the land use pattern of the mine lease area. There will not be any changes in the land use pattern outside the mine lease area.

1.4.2 Ambient Air Quality

Impacts on Air Quality

To assess the impact of the Kawatha Manganese Mine operations from the, air quality modeling was carried out for the mining operations and the mineral transportation activities. The modeling was carried out using MoEF/CPCB approved ISCST3 model.

The cumulative concentration levels (Ambient + predicted incremental rise) reveals that the concentration level for ROM particulate matter occurring in the WSW and SW directions with a concentration levels (cumulative) of 88.2 $\mu\text{g}/\text{m}^3$ (overall activity), 84.74 $\mu\text{g}/\text{m}^3$ (blasting) and for OB particulate matter occurring in the WSW and SW directions with a concentration levels (cumulative) of 88.8 $\mu\text{g}/\text{m}^3$ (overall activity), 84.85 g/m^3 (blasting), which is found to be below the ambient air quality standards. Hence it is inferred that considering cumulative concentration levels, the pollution load exerted due to mining activity will be insignificant.

Air Pollution Control Measures

- No blasting under unfavorable wind and atmospheric conditions.
- Drilling machines will be equipped with wet drilling arrangements or dust collector.

- Water sprinkling on haul roads at regular intervals.
- Regular maintenance of haul road.
- Water sprinkling during loading operations to control dust emissions.
- Regular maintenance of vehicles and machinery.
- Provision of Dust masks to workmen.
- Plantation of thick green belt around lease boundary, road sides and dumps.
- Covered transport of manganese ore to end user.
- Good housekeeping would be practiced to control air pollution.

1.4.3 Ambient Noise Levels & Ground vibrations

For predicting the impacts on ambient noise levels, 'DHWANI' Noise model, developed by NEERI was used. From the modeling results, it was observed the maximum predicted noise level within the mine boundary (0.3 km radius) is 47.6-57.1 dB (A). Noise level at a distance of 0.5 km radius of the mine is predicted to be less than 45 dB (A) which is well within the standards. The nearest human settlement (Dudhala Khurd) is 1.4 km away from project site and resultant noise level at this village is 45.6 dB(A) and 38.0 dB(A) at day night respectively. Another nearest human settlement (Kawtha) is 2.2 km away from project site and resultant noise level at this village is 48.3 dB(A) and 38.3 dB(A) at day night respectively. Thus, no significant impact will take place on the ambient noise levels due to the proposed Kawatha Manganese Mine operations.

Ground vibrations

The ground vibrations and peak particle velocity due to the blasting is calculated using the empirical equation as per guidelines of Director General of Mines Safety (DGMS), Dhanbad. It is calculated that there is no significant impact on surrounding villages due to blasting and thereby ground vibration.

Proposed Noise Control Measures

- Drilling will be carried out with sharp drill bits which help in reducing noise.
- Controlled blasting with proper spacing, burden, and optimum charge/delay will be maintained.
- Proper maintenance, of machines at regular intervals will be done to reduce generation of noise.
- Proper designing by providing inbuilt mechanism like silencers, mufflers and enclosures for noise generating parts and shock absorbing pads at the foundation.
- Green Belt/Plantation will be developed around the mining activity area and along haul roads.
- Ear muffs/ear plugs will be provided to persons working at high noise generating area
- Periodical monitoring of noise will be done.

Measures to Control Ground Vibration & Fly Rocks

- Proper blast design will be made to control ground vibration and fly rocks.
- Adequate safe distance from blasting will be maintained.
- Charge per delay will be minimized and more number of delays will be used per blasts;
- During blasting, other activities in the immediate vicinity will be temporarily stopped;
- Drilling parameters will be properly designed to give proper blast.

- Muffle blasting using wire mesh and sand bags will be conducted at mine working near ML boundary towards habitation.
- Blasting will be carried out only to loosen the strata, thereby reducing the quantity of explosives.

1.4.4 Water Resources & Quality

Impact on Water Resources & Quality

As the ultimate depth of mining is 4m from the surface, the groundwater table level will not be intersected & hence there will not be any quantitative or qualitative effect on the groundwater in the study area due to proposed mining activity. Due to undulating topography and location of mine lease area close to the Kanhan River, which continuously recharges the ground water table in the area, there will not be any significant impact on the ground water table of the area. Hence, no impact is envisaged on the surface water resources due to mining in the proposed Kawatha Manganese Ore Mine.

Proposed Water Conservation & Water Pollution Control Measures

The garland drains will be constructed around the mine pits, surface dumps and along the mine lease boundary will be connected to a series of settling tanks. This will facilitate proper settling of the sediments / silt carried with the storm water run-off before discharging / supplying the water to the farmers.

Check dams and gully plugs will be constructed at strategic locations along the hill slope to arrest silt wash-off during rainy season.

1.4.5 Solid Waste Generation & Management

Waste generation in ML area will be mainly in the form of top soil and Waste rock (Rejects). The proposed manganese mine is having on an average 3M OB and will be removed while reclamation. A total of 6,074 cum. of soil and waste material (Soil: 1272 m³ and Waste: 4802 m³) will be generated during the plan period. The dumps will be suitably stabilized by means of proper terracing in the retreating fashion and after attaining the proposed height, plantation would be carried out. The angle of repose of these dumps will not be more than 45°. Garland drain and retaining wall will be constructed during the plan period. Slope stability investigations would be carried out in the conceptual period to avoid land slide and develop the mine accordingly so that there will not be any accidental hazard. Most of the production will be sold and hence there will not be any generation of un-sealable ore.

1.4.6 Biological Environment

There is no Forest land, National Park, Wildlife Sanctuary and Biosphere Reserve within 10 km radius of the project site. No rare, endemic & endangered species are reported in the buffer zone. Dust deposition on leaf lamina will takes place on nearby local plant species along the transport road which may results in decline the rate of photosynthesis and retards the plant growth.

Proposed Biological Environment Conservation Measures

- Dust issues are mainly raised in the area due to unpaved road, cumulative fugitive dust emissions by various mining activities. To mitigate the impact regular water sprinkling will be carried out within the mine lease area as well as approach road.
- Stabilization of soil/waste dumps by grass cover shall be done.
- Fencing around the mine lease area to restrict the entry of stray animals
- Thick Green belt will be developed around mine lease area and along transport road.

- Periodic maintenance of mineral transport road
- Regular sprinkling of water through mobile tanker on mineral transport road up to railway siding.
- Covered Transport
- Monitoring of dust fall at agriculture land located nearby the mining area.

1.4.7 Socio-economic Environment

- There is no habitation or private land within mine lease area. There is no rehabilitation and resettlement involved in the project.
- This is a small manual opencast manganese mine. Around 20-30 persons will be employed in the mine. Mostly local persons will be employed in the mine.
- The mine management will take efforts as a part of CSR for improvement in civic amenities like sanitation, drinking water facilities, transport road, etc in the nearby villages.

1.5 ENVIRONMENTAL MONITORING PROGRAM

An Environmental Management Cell (EMC) will be established in the mine under the control of Mines Manager. The EMC will be headed by an Environmental scientist having adequate qualification and experience in the field of environmental management. Environmental monitoring of Ambient Air Quality, Water table depth, Water quality, Ambient Noise Levels, Soil Quality, etc. will be carried out through MOEF accredited agencies regularly and reports will be submitted to MPCB/MoEF.

1.6 RISK ASSESSMENT & DISASTER MANAGEMENT PLAN

The assessment of risk in the proposed manganese mine project has been estimated for Slope failure, Handling of explosives, Fly-rocks during blasting, Movement of Trucks/Tippers Inundation due to surface water, Dust hazards, Hazards associated with use of electricity/ Diesel Generator Sets and flooding of lower benches and corresponding mitigation measures are suggested in the Draft EIA/EMP report.

A detailed Disaster Management Plan for facing disasters due to natural effects and human reasons is prepared and incorporated in the draft EIA/EMP report for ensuring safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities. For effective implementation of Disaster Management Plan, it will be widely circulated and personnel training through rehearsals. Site facilities, procedures, Duties and responsibilities, Communications, etc is considered in detail in the Disaster Management Plan.

1.7 PROJECT BENEFITS

The proposed mining project at Kawatha village would generate additional employment opportunities which would finally result in improvement in the quality of life of people of the nearby villages. In line with this CSR policy, project proponent will carry community welfare activities in the following areas:

- Community development
- Education
- Health & medical care
- Drainage and sanitation
- Roads

A budget of Rs. 1.30 Lakh per annum as recurring expenses has been proposed for implementation of Socio-economic welfare activities in the nearby villages.

1.8 ENVIRONMENTAL MANAGEMENT PLAN

An Environmental Management Plan comprise of following set of mitigation, management, monitoring and institutional measures to be taken during implementation and operation of the project, to eliminate adverse environmental impacts or reduce them to acceptable levels.

- Overall conservation of environment.
- Minimization of natural resources and water.
- Safety, welfare and good health of the work force and populace.
- Ensure effective operation of all control measures.
- Vigilance against probable disasters and accidents.
- Monitoring of cumulative and longtime impacts.
- Ensure effective operation of all control measures.
- Control of waste generation and pollution.

Judicious use of the environmental management plan addresses the components of environment, which are likely to be affected by the different operations in the project. A budget of Rs. 13.0 Lakh as capital cost and Rs. 9.00 Lakh as recurring expenses has been allocated for implementation of the Environmental Management Plan.

1.9 CONCLUSION

The proposed Kawatha Manganese Mine (Lease area: 26.67 Ha) project of Smt. Rachana A Belorkar, will be beneficial for the development of the nearby villages. Some environmental aspects like dust emission, noise, siltation due to surface run-off, etc. will have to be controlled within the permissible norms to avoid impacts on the surrounding environment. Necessary pollution control equipment like water sprinkling, plantation, personal protective equipments, etc., will form regular practice in the project. Additional pollution control measures and environmental conservation measures will be adopted to control/minimize impacts on the environment and socio-economic environment of the area. Measures like development of thick green belt and plantation within mine lease area and along transport road, adoption of rainwater harvesting in the mine and in nearby villages, etc. will be implemented. The CSR measures proposed to be adopted by the mine management will improve the social, economic status of the nearby villages.

The overall impacts of the proposed Kawatha Manganese Mine will be positive and will result in overall socio-economic growth of nearby villages.