

## EXECUTIVE SUMMARY

### 1. PREAMBLE

M/S Shakuntala Kasal is lessee and she is private individual. The concern is proposed to have mining activity of Manganese at Village Hatoda, Tehsil- Katangi, and District Balaghat in the state of Madhya Pradesh.

The project envisages forward mining activity for Manganese ore at mine area of 6.99 ha at Village Hatoda at district Balaghat, MP for the anticipated production of ore by 1000 tonnes per annum.

In order to assess the likely impacts on environment due to ongoing mining activity and to have a tool of environment management, M/s Shakuntala Kasal has submitted the Rapid Environment Impact Assessment study report for mining project.

### 2. LOCATION

The mining area is located in village Hatoda at district Balaghat, Madhya Pradesh located on Toposheet no. 55 0/14 (Scale 1:50,000) by the following coordinates:

Latitude            21°38'N  
Longitude          79°49'15" E

#### Details of Project Settings

S. No.	Particulars	Details
1	Latitude	21°38'N
2	Longitude	79°49'15" E
3	Height above mean sea level	100m average
4	Nearest City	Katangi about 21 km and major city is Waraseoni – 35 km in East direction
5	Nearest Railway Station	Tirodi BG - 25 Km Katangi (N.G.) – 21 km
6	Nearest Airport	Nagpur located at about 120 km from the mines by road.
7	Nearest Highway	Tumasar Balaghat State Highway at about 7 km

8	Nearest Village	Hathoda-0.5 km
9	Hills/Valley	No
10	Ecological Sensitive Zone	No national parks and sanctuary
11	Reserve Forest	Kapurwihiri RF – SW –2.5 km Mohgaonghat RF – ES- 1.75 km Garraghat RF – NW – 3.5 km
12	Historical Place	No
13	Nearest River/ Nalla	Bawanthari River – SW –7 km Biloni Nadi – WWS -8 km Katangi Nalla – N- 3.5
14	Annual Climatic Conditions	Max. Temperature – 47.5°C Min <sup>m</sup> Temperature – 9.0 °C Average Rainfall–1600 -1800 mm Max. RH (%) – 100% Min. RH (%) – 7%

### 3. TRANSPORT

The applied area is about 35 kms from Waraseoni in East direction and 60 kms from distt headquarter Balaghat via Waraseoni-Katangi. Katangi is the main township in Katangi Tehsil situated on Waraseoni Tirori State Highway. From Katangi, the applied area is 16 kms on Katangi – Tumsar PWD road and by taking a bifurcation from Garra Chowki to village Hathoda (5km). The nearest railway station is Katangi (N.G.) situated at a distance of about 21 kms from the applied area.

### 4. REASON FOR ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

The impact of mine on the environment depends to a large extent on its location with respect to Human settlements, meteorological conditions, ambient air quality, water bodies, agricultural and forest land etc.

Most of the adverse impacts of mines are amenable to technological control by providing necessary preventive and control measures and finally through effective environmental management of the operating mines. Keeping in view the likely impacts of mines on environment, this Rapid environment impact assessment report has been prepared for submission to State Pollution Control Board and Ministry for

Environment and Forests (MoEF) for clearance of the proposed additional mining area.

## **5. PROJECT DESCRIPTION**

### **5.1 Topography**

The area is a plain ground gently slopping towards south. The topography has been changed considerably due to old working pits and dumps, some of the old pits are water-logged. MRL of the area is 100. The area lies at the cross section of 21°38'N and 79°49'15"E and is covered under Toposheet no 55 O/14.

### **5.2 RESERVES**

The area is divided into two blocks: Block-I eastern portion of the lease area and Block - II is the western portion. They are separated from each other.

#### **Block 1**

The reserves of primary bedded deposit of Manganese ore will be estimated only after completion of proposed exploration by drilling.

#### **Block 2**

This area bears float deposit of Manganese ore. And the reserves are estimated on the basis of the old trial pits. The method adopted for estimation reserves are total volume of ore zone with a thickness 0.8m over 2.40ha of area is estimated. Recovery of Manganese Ore from the ore zone is considered to be 25%. Thus the volume of available ore in ore zone is worked out. The volume of available ore is multiplied by bulk density of Manganese ore (3T/cum) gives the tonnage of the reserves. The detail are as under:-

Total area of Block-II= 4.70ha

Float ore bearing area= 2.40ha

Manganese ore zone=0.8m

Average cross – sectional area X distance between two cross-section lines.

Total volume is a sum total of successive cross section.

Volume of ore zone=24000sqm \* 0.8=19200cum

Recovery of ore 25% out of manganese ore production from ore zone=  
19200cum \* 25%=4800cum

Total volume X Bulk Density

4800cum \* 3.0 T/cum = 14400T

Thus geological reserve is 14400T

Recovery of saleable ore at 85% of the geological reserve

14400T \*85%=12240 T

Thus total recoverable reserve is 12240 T

Summary of Reserves is as below

	<u>M. Tonnes</u>
Proved Category:	12240.00
	<hr/>
Total	12240.00

The average range of chemical composition of Manganese ore should be as under

46 % Mn and above	:	about 10%
40 to 45 % Mn	:	about 10%
27 to 39 % Mn	:	About 30%
24to 27 % Mn	:	about 10%
Mineralised rejects	:	about 10%

Since reserves of in Block-I are yet to be estimated on the basis of proposed drilling, no Mineable reserves are considered.

In Block – II reserves are estimated for float ore deposit and hence, Mineable reserves are worked out as under:

1. The Geological reserves in Proved Category (Float Ore deposit) : 14400 T
  2. Less ore blocked/trapped in 7.5 m zone on as mining limit zone : nil
  3. Graded ore recovery at 85 % of the above : 12240 T
  4. Sub Grade : NIL
  5. Balance is a mineralised reject i.e. 15% : 2160 T
- (Due to Gondite formation, Quartz, other gangue materials & fine of - 5mm size)

Therefore total Mineable Reserves: 12240.00 T

Rate of production @1000.00T

## 5.2 Anticipated Life of the Mine

Production of 2448 T of graded ore during first five years

Balance = 12240-2448=9792T

Balance 9792 T @ 1000 t per Years: in 9.79 years

Therefore life of the mine works out to 14.79 years say 15 years for Block-II.

The life of the mine is worked out on the basis of the production projected presently. This will change depending upon the market conditions as well as the increase in reserves after proposed exploration.

## 5.3 Mining Method

### (i) Already carried out in the area:-

Mn-ore deposit in village Hatoda is known since long and have mining history of more then 40 years. The lease area has numbers of old pit

abandoned pits for bedded ore deposit as well as float ore deposit worked by many parties.

At present, there are 6 old pits in the block-II, the old pit will be used as working pit and ore body in the form of Float deposit occurring in the area, can proof of existence of ore body in the area can be had amply, on study of these old trial pits.

Pit No.	Length in M	Width in M	Depth in M
1	12	8	3.8
2	15	6	2.9
3	14	6	3.6
4	13	7	3.5
5	16	8	2.9
6	15	6	2.95

However, there are a number of old excavations and pits which give clear evidence of presence of workable Float deposit of Manganese ore.

**(ii) Future Planning:-**

The further exploration and mining operation will go on simultaneously. In order to ascertain continuity and quality of Mn-ore available in the lease area, it is proposed to drill 6 bore holes (PBH-1 to PBH-6). 3 Bore holes will be drilled in Block I and 3 Bore holes will drilled in Block II. The proposed boreholes will be vertical due to low angle of dip of the ore body as observed in the working pit situated to north of the area. In this case there is every chance of getting intersections with the ore body with the ore body in Block-I & Block-II. In Block-II there are total six proposed trial pit (PTP-1 to PTP-6) and 2 trenches (PTR- which will be complete in first year). Boreholes are proposed for float ore deposit & trenches for primary

bedded deposit. This drilling operation will be completed during the first years of Mining Plan period.

After the proposed exploration, the reserves of manganese ore in the lease area will be reworked and assigned to proper classifications and will be incorporated in the subsequent Mining Scheme period.

Opencast manual method of mining will be adopted. Proposed to do mining activity is only a Float ore deposit area. The average thickness of soil over ore zone in the area is about 2m first bench will be in soil with about 2m height and second bench will be in ore zone with about 0.8m to 1.0m height. Width of bench in soil & ore zone will be about 5m. Enough care will be taken so that loose soil does not pollute excavation from ore zone.

The development and production will be done side by side simultaneously. The development and production has been proposed at one place for better supervision, control and conservation of mineral.

The mining machinery & equipment required for development consists of few tractors with pneumatic trailers, compressors, drill machines, water pump. (Three/Four numbers of tractor trolleys, one number of compressor & Two Jack hammers & two pumps). Sorting will be done manually.

#### **5.4 Proposed Rate of Production**

It will be about 1000 tonnes per year of saleable ore for full year after complete development of the mines.

#### **5.5 Loading**

Loading of ore will be done manually to the trolley/trucks and will be sending to the end users. The overburden will be removed and stacked in a place in the surface. Subsequently it will be manually loaded to the

tipper for onward dumping to the predetermined space in the lease boundary.

#### **5.6 Hauling/Transport**

The ore will be transported to the sorting yards by means of tubs on tracks.

#### **5.7 Mine Drainage**

The ground water table in the lease area varies from 98 m to 97mRL (2-3m bgl) during post monsoon and 92-90mRL (8-10m bgl) during pre monsoon and mining will be done upto 97m RL (3m bgl) hence it is expected that ground water seepage will be there when mining cross the ground water table. The accumulated water in the developed pit during the rainy season will be used for green belt development.

#### **5.8 Solid Waste Management**

Proposed mining is being carried out by open cast manual method using explosive in the mining lease area. The area proposed to be excavated in at the end of lease period is about 2.4Ha out of 4.70 for block-II. Presently the area covered by pits and queries is 0.0579 ha While, the Area covered by the top soil and waste dumps are nil. Considering the rate of production, it has been estimated that almost 208 cum of overburden will be generated average on monthly basis. The O.B. and mine waste will be use for backfilling simultaneous from 1<sup>st</sup> year. It is expected that at about 55000 cum of waste will be generated in the conceptual period. 9600cum top soil will be generated during first five year.

The reclamation of mined out is carried out in the following manner:

- Removal and storage of top soil separately for afforestation by manual.
- After leveling and compaction of backfilled material, the areas are covered with topsoil stacked soil separately in the earlier cycle of mining.
- The reclaimed area is intensely afforested.

- Manganese shall be mined out to its maximum depth and simultaneous backfilling shall be carried out immediately after extraction of Manganese.

Generation of waste during first five years is expected to be at the rate of about 12480cum of waste comprising rejections, overburden and top soil. Total quantity of waste will be removed from working areas to mine out areas for back filling purposes. While waste, which is generated in the mine after sorting of ore and hard overburden like Country rock will first be dumped in previously worked out areas and levelled by dozers. Topsoil will then be spread over the back filled areas.

The top soil is removed by excavator and transported by manual to the temporary dumping yard of soil in the near by proved non-mineralised area. The soil dumps are kept for not more then six months to preserve its fertility. After proper levelling to backfilled area by dozer the soil spared over the backfilled area for plantation purpose.

The year wise generation of OB and mine waste as given in following table:

Year	Top Soil, OB (cu m)	Development (Cum)	Waste rock (cu m)	Sub-grade mineral (tonnes)	Total waste in cum
1 <sup>st</sup> year	1600	640	480	Nil	2080
2 <sup>nd</sup>	1600	640	480	Nil	2080
3 <sup>rd</sup>	1600	640	480	Nil	2080
4 <sup>th</sup>	2400	960	720	Nil	3120
5 <sup>th</sup>	2400	960	720	Nil	3120
Total	9600	3840	2880	Nil	12480

- (1) Area to be covered by dumps - nil
- (2) Area to be reclaimed - 2.4ha
- (3) Area to be rehabilitated by way of afforestation- 0.3375 Ha

## 5.9 Resource Requirement

The present proposal is to carry out mining for Manganese at Village Hathoda, Tehsil Katangi, Dist Balaghat, (MP) for efficient operation of the Mines all necessary utilities will be made available, a brief description of the same is given below.

#### 5.9.1 Storage facility

It is proposed to provide adequate storage facilities for the excavated mineral, explosives and waste dumps, which is generated/used during mining process. Proposed excavated minerals and waste dumps will be kept in the existing mining lease area.

#### 5.9.2 Project Cost

Project	Estimated Cost in Lac of Rupees
Mining of Manganese ore	Rs. 8 Lac

#### 5.9.3 Electric System

The power requirement for the project has been met by M P State Electricity Board, which is available at village Hathoda.

#### 5.9.4 Water Supply

The total fresh water needs to be pumped is about 5 KL per day for consumption of domestic and mining purpose. This quantity of water will be taken from the ground water. The details of water balance of existing /proposed mining project are given below:

#### WATER BALANCE OF MINING PROJECT

Process		Total
<b>a) Mine Site</b>		
Dust suppression	3000 lit	3000 lit
Green Belt	1000 lit	1000 lit
<b>b) Domestic</b>		
Drinking & Washing	1000 lit	1000 lit
<b>Total (A + B)</b>	<b>5000 lit</b>	<b>5000 lit</b>
<b>Domestic</b>	<b>700lit</b>	<b>700lit</b>

waste water		
-------------	--	--

## 6. EXISTING ENVIRONMENT SCENARIO

### 6.1 Climate

The climatic condition of this area is semi arid. The maximum temperature goes upto 47.5°C during summer in the month of May and the minimum temperature goes down to 9.0°C during winter in the month of January. The average annual rainfall is observed to be 1600-1800 mm. The winds in the area are light to moderate during summer and winter. However, the speed of the wind increases during the end of the summer season and monsoon season.

The brief discussion over the meteorological condition of the area is as below:

- Temperature:** The winter season starts from December and continues till the end of February. January is the coolest month with the mean daily maximum temperature at 29°C and the mean daily minimum temperature at 10°C. Both the night and day temperatures increase rapidly during the onset of the pre-monsoon season from March to May. During pre-monsoon season, the mean maximum temperature (May) was observed to be 47.5°C with the mean minimum temperature (March) at 20°C. The mean maximum temperature in the monsoon season (Sep.) observed to be 37°C whereas the mean minimum temperature was observed to be 19°C. By the end of September with the onset of post-monsoon, the day temperatures decrease slightly, with the mean maximum temperature at 34°C and the mean minimum temperature at 17.3°C.
- Relative Humidity:** The air is generally humid in this region during the monsoon when the average relative humidity at 0830 hr. was observed to be with a maximum of 96% and a minimum of 65%. Similarly, at 1730 hr., the average value was observed to be with a maximum of 98% and a

minimum of 64%. Generally, the weather during Post monsoon seasons was observed to be with a maximum of 83% and a minimum of 48%.

- **Rainfall:** Monsoon in the area comes from south-westerly winds. The average annual rainfall based on the last 10-year IMD data, was observed to be 1600-1800 mm. The monsoon sets in the month of June and continues till mid observed in the evenings, with clear mornings. During the monsoon season, both in the mornings and evenings, the skies were found to be clouded.
- **Cloud:** 30 years average data reveal that maximum cloud cover was observed around 7.1 oktas in the month of July, August. Whereas cloud cover was observed around 2 (in oktas) in the month of November, December, January, February and March.

- **Wind Pattern**

Generally light to moderate winds prevails throughout the year. Winds were light and moderate particularly during the morning hours. While during the afternoon hours the winds were stronger. A review of the wind rose diagram shows that predominant winds are mostly from NE, NNE, SW, NW, NNW and SSW

## 6.2 AIR QUALITY

To establish the ambient air quality, sampling and testing were conducted. Air sampling stations were established at eight (8) locations around the proposed mining area to assess the background air pollution levels.

### COMPARISON OF AIR SAMPLING RESULTS WITH CPCB NORMS

	A1	A2	A3	A4	A5	A6	A7	A8	CPCB Norms	
									Indl. & Mixed used area	Residential & Rural Area
March-May 2008										
<b>SPM Concentration</b>										
Minimum	142	120	120	144	130	102	144	134	500	200
Maximum	198	190	188	196	195	190	196	250		

Average	177.2	160.6	162	176.3	169.2	161.4	175.5	192.9		
<b>RPM Concentration</b>										
Minimum	54	50	38	54	48	54	52	42	150	100
Maximum	98	104	86	94	94	88	90	130		
Average	74.4	73	68.3	76.7	68.7	69.3	72.3	92.8		
<b>SO2 Concentration</b>										
Minimum	11.1	10.9	8.6	9.6	8.6	9.1	10.8	9.9	120	80
Maximum	15.5	15.6	13.9	17.9	14.4	13.8	16.9	17.8		
Average	12.97	12.2	10.8	14.8	12.07	11.2	13.09	13.3		
<b>NOX Concentration</b>										
Minimum	13.8	12.8	12.6	15.2	12.9	12.9	13.0	13.2	120	80
Maximum	18.5	16.8	17.3	19.8	18.2	17.3	18.8	19.2		
Average	15.15	16.8	15.07	17.74	15.5	14.7	15.82	16.06		

### 6.3 NOISE LEVEL

Ambient noise levels were measured at different locations (same as ambient air monitoring locations for two days on hourly basis) to establish present scenario which shall be described as follows.

- All the values are well within the norms prescribed by CPCB for industrial and commercial area.
- Main source of noise are traffic movements.

### 6.4 WATER QUALITY

#### Surface Water

The Surface water bodies in the study area mainly located SW direction at about 7km Bawanthari River. The water from Bawanthari River is used for domestic as well as drinking purpose. The water from abandoned mine is a collection of run off water and used for domestic purpose. The data conform to the water quality standards for most of the parameters. The dissolved oxygen levels range between 4.7 to 6.2 mg/l, Total Hardness ranges from 240 to 268 mg/l; BOD levels are as low as 3.1 to 3.9 mg/l. The heavy metal content has been observed within the limit. The analysis of the sample indicates that the organic pollution of River is insignificant. The physico-chemical and biological analysis revealed that all the parameters are well within the prescribed limits of IS: 2296.

#### Ground Water

Water supply in the most of the villages depends on ground water resources. Well water is used for domestic as well as irrigation purposes. Ground Water quality analysis was carried out at 4 locations and the frequency of sampling was once /month/station. Ground water samples were examined for physico-chemical, heavy metals and bacteriological parameters in order to assess the effect of industrial and other activities on ground water. The samples were collected and analysed as per the procedures specified in “standard Methods for the examination of water & Wastewater” published by American Public Health association (APHA). pH in ground water sample was observed to be in the range 7.32 to 7.65 while conductivity was observed in the range of 1045-1246 umhos/cm. The value of alkalinity and hardness were observed in the range of 88 – 110mg/l and 208 to 240 mg/l respectively. Whereas heavy metal was found to be within the limit.

The physico-chemical and biological analysis revealed that all the parameters were well within the prescribed limits of IS: 10500.

## **6.5 SOIL QUALITY**

Five locations within 10 km radius of the project site were selected for soil sampling. At each location, soil samples were collected from three different depths viz. 30 cm, 60 cm and 90 cm below the surface and homogenized. The homogenized samples were analyzed for physical and chemical characteristics. For general characterisation of soil a few random samples from the study area to the depth of about 15 cm were collected. Soil samples so collected were brought to the laboratory for analysis. It has been observed that the texture of the soil was observed to be sandy and clay. The organic carbon was found to be in the range of 1.16% to 1.32% The nitrogen and phosphorus were observed to be in the ranges of 572 to 605Kg/ha and 24 to 28.65kg/ha respectively the pH range at the

soil vary in between 5.89 to 6.12. The soil has high percentage of iron, zinc and chloride.

## 6.6 FLORA AND FAUNA

The climate, rainfall and vegetation type contribute to decide the type of faunal community in the area. In the region the flat hilltops, varying degree of slopes and Rolling Meadows in the valley create diverse type of habitats and form ideal niches for varied forms of animals. There are more than 250 species of birds, 36 species of mammals and several reptiles, orthopods etc. occupying respective structure and function.

### LIST OF FLORA & FAUNA OF THE STUDY AREA

<b>NATURALLY OCCURRING SPECIES</b>	
Kohu ( <i>Terminalia arjuna</i> )	Karanji ( <i>Pongamia pinnata</i> )
Sisham ( <i>Dalbergia sissoo</i> )	Babul ( <i>Acacia arabica</i> )
Neem ( <i>Azadirachta indica</i> )	Kachnar ( <i>Bauhinia variegata</i> )
Akasneem ( <i>Millingtonia hertonsia</i> )	Bargad ( <i>Ficus bengalensis</i> )
Gular ( <i>Ficus glomerata</i> )	Jamun ( <i>Syzygium cumini</i> )
Aam ( <i>Mangifera indica</i> )	Palas ( <i>Butea monosperma</i> )
Mahua ( <i>Madhuca latifolia</i> )	Ber ( <i>Zizyphus mauritiana</i> )
Bel ( <i>Aegle marmelos</i> )	Saj ( <i>Terminalia tomentosa</i> )
Kanker ( <i>Flacorita indica</i> )	Tendu ( <i>Diospyros melanoxylon</i> )
	Reunjha ( <i>Acacia leucophloea</i> )
<b>CULTIVATED TREES GROWING IN THE VILLAGES</b>	
Bargad ( <i>Ficus bengalensis</i> )	Gular ( <i>Ficus glomerata</i> )
Pipal ( <i>Ficus religiosa</i> )	Imli ( <i>Tamarindus indica</i> )
Aam ( <i>Mangifera indica</i> )	Jamun ( <i>Syzygium cumini</i> )
Munga ( <i>Moringa olderfera</i> )	Ber ( <i>Zizyphus mauritiana</i> )
Bel ( <i>Aegle marmelos</i> )	Lasora ( <i>Cordia dichotoma</i> )
Neem ( <i>Azadirachta indica</i> )	Mahua ( <i>Madhuca latifolia</i> )
Sitaphal ( <i>Anona squamosa</i> )	

<b>LIST OF FAUNA OF THE STUDY AREA</b>	
Bengal Monkey ( <i>Macacus rhesus</i> )	Jungle cat ( <i>Felis chaus</i> )
Mongoose ( <i>Herpestes mingo</i> )	Sambhar ( <i>Canis unicolor</i> )
Kalmuha monkey ( <i>Semnaptheacus on lallccs</i> )	Common hawcuckoo ( <i>Cuculus micropterces</i> )
House sparrow ( <i>Passer domesticus</i> )	House crow ( <i>Corvus splendens</i> )
Common maina ( <i>Acrida tehra tristis</i> )	

## 6.7 LAND USE PATTERN

The study area covers about 5683 ha. For computation of the land use pattern in the study area based on the village-wise land-use data given in the census records, the geographical area of all settlements covered within the study area, though many villages in the peripheries of the circular study area are partially covered. Perfect delineation and quantification of land uses for the partially covered parts of villages of the study area is not possible, hence the entire village area is considered for the study, irrespective of its coverage within the village boundary.

The land use is classified into four types – viz. forests, area under cultivation, culturable waste and the area not available for cultivation. The land under cultivation is further sub-divided into two types viz. irrigated and un-irrigated.

### Land-use Pattern in the Study Area

<b>S. N.</b>	<b>Particulars</b>	<b>Study Area (ha)</b>	<b>Percentage Coverage</b>
1.	Forest Land	1556	18.53
2.	Land under Cultivation		
	a) Irrigated Land	1944	23.5
	b) Un irrigated Land	3604	40.57
3.	Culturable Waste Land	869	10.35
4.	Area not available for cultivation	620	7.38

	<b>Total Area</b>	<b>8395</b>	<b>100</b>
--	-------------------	-------------	------------

## 6.8 SOCIO-ECONOMIC CONDITIONS

The study area falls in Katangi Development Block of Balaghat district. The district is dominated by rural population (about 90% of the total population).

Scheduled cast account for about 12.53% of the total population. Scheduled tribes account for about 7.98% of the total population. Total work force of Katangi is reported to be about 49% of the total population. An examination of the occupational pattern reveals that about 46% of the total main workers are engaged in farming or in associated activities either as cultivators or as agricultural laborers. Thus, it can be inferred that a major portion of the population derives their livelihood from agricultural sector.

### ESTIMATED BASIC STATISTICS OF THE STUDY AREA

1. Households	5022
2. Population	23297
Male	11480
Female	11817
3. Schedule Tribe	1860
4. Schedule Cast	2921
5. Literacy Rate	64.2%
6. Occupational Pattern :	
(A) Main workers	49%
(% of total population )	
i) Cultivators (% of main worker)	46.66%
ii) Agricultural Labors (% of main worker)	38.35%
iii) Other Workers (% of main worker)	15.99%
(B) Marginal Workers	19.04%
(% of total population)	

### DIFFERENT AMENITIES IN KATANGI BLOCK

1.	Total No. of villages	21
----	-----------------------	----

2.	<u>EDUCATION</u> Primary Schools Middle Schools Higher Secondary Schools Sr Secondary School Degree College	25 7 3 3 0
3.	<u>HEALTH FACILITIES</u> Hospitals P.H.Cs & Adl. P.H.Cs	1 33
4.	<u>POLICE STATIONS</u>	2
5.	<u>POSTAL FACILITIES</u> Post Offices Telegraph Offices	35 0

## 7. **IMPACT ASSESSMENT**

Mining activities is bound to have an adverse impact on existent environment. An understanding of the nature and extent of various impacts is essential in devising the methods and advance planning to mitigate the impacts and ultimately restore the land to useful conditions.

## 8. **IMPACT EVALUATION**

An attempt has been made to evaluate the impact of project in terms of both quality and quantity by using modified matrix method for crucial environmental parameters. The environmental impact evaluation of possible effects as a result of proposed mining area is primarily based on study of objectives, process, surrounding environment etc. The aspects such as water, air, land and related issues have been assessed on the basis of mining operations for similar activity. The environmental impacts identify the possible relationship of proposed mining operations with respect to environmental parameters. Their relationship can be beneficial or adverse and can be further classified as short term, long term, reversible, irreversible, local or regional. The evaluation of the impact of proposed activity are presented in Table below

Parameters	Weight PIU	Baseline EIU (a)	Without EMP EIU (b)	With EMP EIU (c)	Change EIU (c-b)	Change EIU (c-a)
Biological Environment	300	205	184	202	18	-3
Environmental Pollution	450	344	315	345	30	1
Aesthetic	100	77	64	75	11	-2
Human Interest	150	119	111	129	18	10
<b>Grand Total</b>	<b>1000</b>	<b>745</b>	<b>674</b>	<b>751</b>	<b>77</b>	<b>+6</b>

## 9. ENVIRONMENT MANAGEMENT PLAN

### 9.1 Reclamation of Land

It was proposed to commence simultaneous backfilling and subsequently reclamation work from first year of plan period. Mineable area will be backfilled after mining the total depth of mineralization. Systematic reclamation and afforestation of mined out areas will be carried out in blocks-II so as to cover the entire worked out area before expiry of mining lease. Since further exploration is proposed to completely delineate ore bearing areas within the leasehold, complete reclamation programme cannot be given at this juncture but waste will be spread in worked out areas to the maximum extent possible. As depth of working will be maximum up to 3.0m, areas that will be reclaimed by backfilling of waste will be 0 to 1m below original ground level. Reclaimed areas will be subsequently afforested in phases.

Proposed mining is being carried out by open cast manual method in the mining lease area. Lease area divided in two block I & II. It is a proposed mine and production is concentrated in eastern block (Block-II) of the mining lease area. The area proposed to be excavated in at the end of lease period is about 2.40 Ha. Presently the area covered by pits and queries is 0.0579 ha. While, the Area covered by the top soil and waste dumps are about nil. Considering the rate of production, it has been estimated that

almost 208 cum of overburden will be generated average on monthly basis. The O.B. and mine waste will be use for backfilling simultaneous from 1<sup>st</sup> year. It is expected that at about 55000 cum of waste will be generated in the conceptual period. 9600cum top soil will be generated during first five year.

The reclamation of mined out is carried out in the following manner:

- Removal and storage of top soil separately for afforestation by manual.
- After leveling and compaction of backfilled material, the areas are covered with topsoil stacked soil separately in the earlier cycle of mining.
- The reclaimed area is intensely afforested.
- Manganese shall be mined out to its maximum depth and simultaneous backfilling shall be carried out immediately after extraction of Manganese.

Generation of waste during first five years is expected to be at the rate of about 12480cum of waste comprising rejections, overburden and top soil. Total quantity of waste will be removed from working areas to mine out areas for back filling purposes. While waste, which is generated in the mine after sorting of ore and hard overburden like Country rock will first be dumped in previously worked out areas and levelled by dozers. Topsoil will then be spread over the back filled areas.

The top soil is removed by excavator and transported by manual to the temporary dumping yard of soil in the near by proved non-mineralised area. The soil dumps are kept for not more then six months to preserve its fertility. After proper levelling to backfilled area by dozer the soil spared over the backfilled area for plantation purpose.

The year wise generation of OB and mine waste as given in following table:

Year	Top Soil, OB (cu m)	Development (Cum)	Waste rock (cu m)	Sub-grade mineral (tonnes)	Total waste in cum
1 <sup>st</sup> year	1600	640	480	Nil	2080
2 <sup>nd</sup>	1600	640	480	Nil	2080
3 <sup>rd</sup>	1600	640	480	Nil	2080
4 <sup>th</sup>	2400	960	720	Nil	3120
5 <sup>th</sup>	2400	960	720	Nil	3120
Total	9600	3840	2880	Nil	12480

Total area proposed to be mined out during the first five year is 0.6080ha and during the past mining 0.0579ha area has been excavated. However out of 4.70ha (Block-II), 2.40ha area will be excavating in lease period. Total area proposed for reclamation and rehabilitation is 2.4ha. Year wise reclamation plan is given below:

S. No.	Year	Reclamation (Ha)	Quantity in cum
1	1 <sup>st</sup>	0.08	2400
2	2 <sup>nd</sup>	0.08	2400
3	3 <sup>rd</sup>	0.08	2400
4	4 <sup>th</sup>	0.08	2400
5	5 <sup>th</sup>	0.08	2400
Total		0.4	12000

- (1) Area to be covered by dumps - nil
- (2) Area to be reclaimed - 2.4ha
- (3) Area to be rehabilitated by way of afforestation- 0.3375 Ha

## 9.2 Green Belt Development

The massive afforestation planned for the project shall generate a forest having greater tree density (about 25trees for first five year per 225m<sup>2</sup>). The proposed extensive will enhance the vegetation quality as well as aesthetic quality of the area. Thus there is no adverse impact is envisaged over biological environment due to ongoing mining activity.

Below is showing 5 yearly stage wise forest land development In order to show the backfilling rate and afforestation rate (on backfilled land) cumulative available broken land, back filled area generation and Overall, the project will have a very strong positive effect on flora.

S. No.	Year	Afforestation in Ha	Plantation in No.
1	1 <sup>st</sup>	0.0225	25
2	2 <sup>nd</sup>	0.0225	25
3	3 <sup>rd</sup>	0.0225	25
4	4 <sup>th</sup>	0.0225	25
5	5 <sup>th</sup>	0.0225	25
Total		0.1125	125

An average of 2000trees/ha will be planted as against barren land which is existed prior to mining operation with in mining leasehold area.

Post plantation cares that will be followed are:

- Fencing of plantation areas
- Using of Cow dung manure and fertilizer like urea and NPK for batter growth of the sapling
- Pesticides are regularly sprayed to protect the plants form different insects.
- Regular watering of the plants
- Local species are chosen which can grow easily on the available soil
- Regular watch and ward

### 9.3 Measures to Improve Socio-Economic Conditions

The impacts of the project would be felt in an integrated manner on the socio-economic environment in the study area. There is no village in core zone and further no displacement is required for the proposed project and

therefore impact will be positive side rather negative. The impacts on the different components viz employment, housing, educational, and medical and transport facilities, fuel availability, economics, status, health agriculture is not significant because size of project is very **small**. However, it would definitely increase the employment opportunity (primary as well as secondary) in the project area. Some of these impacts would be beneficial.

- i) The project will have a strong positive employment and income effect, both direct as well as indirect.
- ii) Migrant-Non migrant ratio shall shift towards migrant side. This will happen because of (i) better employment opportunities due to this project and (ii) relatively low agricultural yield through traditional agricultural practice with monocrops.
- iii) The project shall speed up the growing view on importance of education among people in study area.
- iv) The project is going to bring about changes in the pattern of demand from food to non-food items if sufficient income is generated.
- v) The project is not going to influence the existing traditional agricultural situation significantly. It may help to improve agricultural production by way of providing additional income to the farms from supplementary sources.

People perceive that the project will bring handful gains by way of creating significant job opportunities along with development of social infrastructure.

#### **9.4 Air Pollution Control Measures**

Following measures shall be taken to mitigate the effect of mining operation over ambient air environment:

1. Regular spraying of water by water sprinkling system over haulage roads.

2. To reduce dust generation during loading operation water shall be sprayed over the muck pile to the loaded;
3. To reduce dust generation during plying of dumpers on the haul road. Water sprinkling is done at frequent intervals. Water sprinklers shall be installed at the mine haulage road;
4. To reduce spread of dust, plantation along the mining lease boundary and plantation shall be also done along haul roads.
5. Periodic maintenance of haulage roads.
6. All over burden dumps shall be stabilized with legumes and grass to prevent the erosion of soil and arrest the dust emission during windy days.

In addition to the above following additional mitigation measures shall be adopted and it is expected to continue in future also:

1. Dust due to drilling shall be minimised by using wet drilling method like water injection system.
2. Dust mask shall be provided to all workers working in dusty atmosphere.
3. Tree Saplings shall be planted at the periphery of mining lease
4. Regular maintenance of vehicles and machinery's shall be carried out in order to control emissions;
5. A good house keeping and proper maintenance shall be practiced which will help in controlling pollution.

#### **9.5 Noise Pollution Control Measures**

The main sources of noise in mining activity are drilling, blasting, material handling machinery, loading equipment, etc. Following mitigation measures should be taken to control noise pollution:

1. Wherever the noise levels exceed 85 dBA, workers should be provided with earmuffs, ear plugs etc.
2. Hydraulic drills shall be used for drilling;
3. All moving parts of machine shall be properly lubricated;

4. Non-moving parts of machine shall be properly fastened;
5. Blasting shall be well designed and arranged in such a way that only one or two holes are blasted at a time with the use of short delay detonators in combination with sequential blasting machine;
6. No trunk like of detonating fuse shall be used on surface (Even if detonating fuse is used as trunk line with cord relays, then it shall be covered with clay properly);
7. No blasting shall be done when the sky is cloudy because cloud cover can cause reflection of pressure wave block to the ground at some distance from blast
8. Electric detonators shall be used instead of the detonating fuse as trunk line.
9. Blast shall be designed in such a way that fragmentation will be proper and over size boulder generation will be minimum. So secondary blasting is avoided;
10. Blasting shall be done between 12 noon to 4 pm when temperature inversions are not likely to be there and air density is less;
11. A barrier of overburden at mine boundaries shall be made and three rows of trees are proposed to be planted to reduce propagation of noise;
12. Secondary blasting is not required and hydraulic rock breaker is used.
13. Noise barriers, silencers and enclosures shall be incorporated for equipments, which emit high noise levels.
14. All the basic equipments and various machinery shall be kept well maintained.
15. Thick green belt around the mining pit and along the haulage roads.
16. As far as possible heavy and noisy workers shall be avoided during nighttime.
17. Unnecessary use of horns by the drivers of the vehicles shall be avoided.

#### **9.5 Water Pollution Control measures**

Following measures have been taken to avoid accumulation of water:

1. Pump having required capacity shall be installed to lift accumulated rain water from working pit.
2. There shall not be no over flow on wash off from dumps nor is there any beneficiation plant. Only rainwater is pumped out of the mine;
3. There is no toxic constituent in water and soil so water collected in sump is free from any toxic substances.
4. A silt-settling tank shall be constructed in northern barrier zone area to settle heavy particle before discharging water into drain.
5. Quality of water accumulated in the working pit may be checked during monsoon.
6. It shall be ensured that silt content in the mines discharged is minimum.
7. It shall be ensured that quality of drinking water for the worker is hygienic and good sanitation system is available.

#### **10.0 Conclusion**

The Manganese mining project of M/s Shakuntala Kasal, village – Hathoda, Tehsil Katangi, Balaghat District (MP) will be environmental compatible to the surrounding due to the high standards of pollution control measures to be adopted during the operation activity. Thus it can be safely stated that the mining activities will not have any adverse effect on the surroundings, if the proper environmental management plan is adopted.